

CEM570

**Intel® Core™ Ultra Processors
Family (Meteor Lake U/H) COM
Express Type 6 Basic Module**

User's Manual



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 modules or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the module 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 modules and components.

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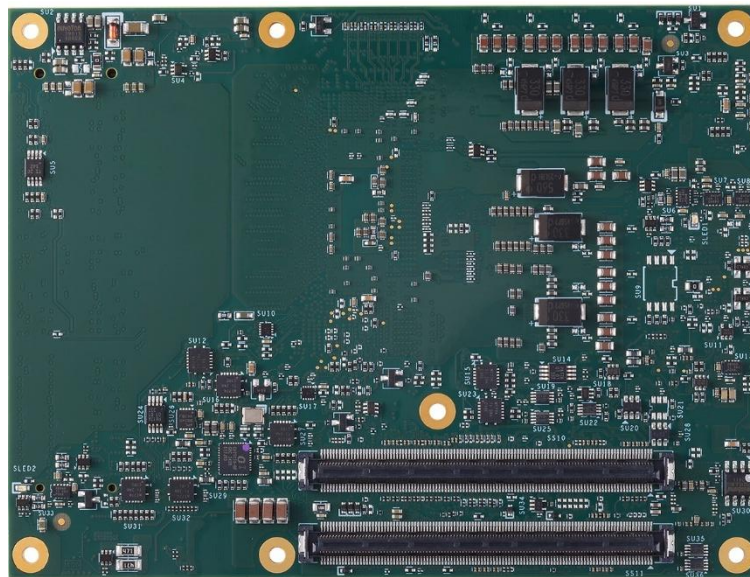
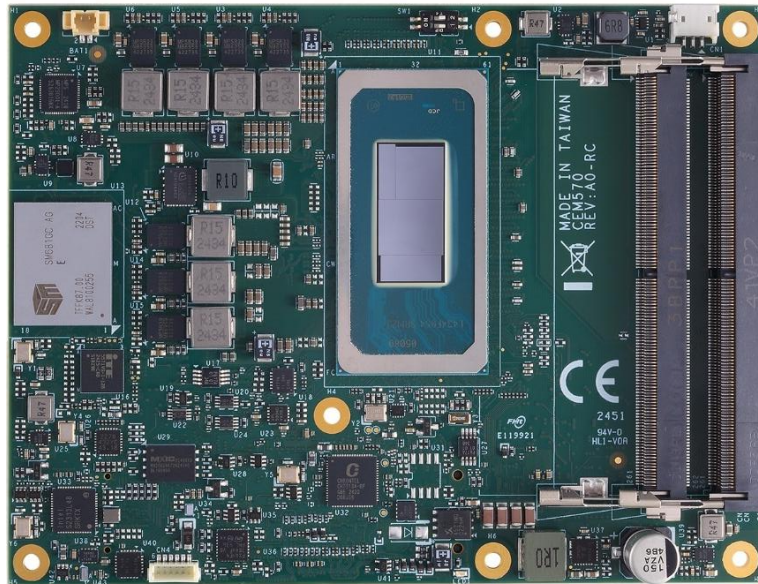
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Section 1

Introduction



The CEM570 is a new COM Express™ Type 6 Basic Module supporting Intel® Core Ultra Processors (Code Name: Meteor Lake-U/H) processor. It delivers outstanding system performance and support excellent multiple I/Os like LVDS, 2.5 Gigabit Ethernet, HD Audio interface, dual SATA 3.0, four USB 3.2 Gen2 and eight USB 2.0 ports. For extension purpose, it provides up to 20 lanes of PCI-Express by maximum Gen 4 throughput which could fulfill various applications with high computing requirement.

1.1 Features

- Intel® Core™ Ultra processors family (Meteor Lake U/H)
- Two 262-pin DDR5 5600MT/s up to 96GB
- Up to 20 PCIe lanes
- Two SATA 6Gb/s
- Up to 4 USB 3.2 Gen2 and 8 USB 2.0
- Supports up to 512GB NVMe storage
- Supports TPM 2.0

1.2 Specifications

- **CPU**
 - H Line:
 - Core Ultra 7 165H
 - Core Ultra 7 155H
 - Core Ultra 5 125H
 - U Line:
 - Core Ultra 7 155U
 - Core Ultra 5 125U
- **BIOS**
 - American Megatrends Inc. BIOS
 - UEFI only
- **System Memory**
 - Two 262-pin DDR5 5600 MT/s SO-DIMM sockets support maximum memory capacity up to 96GB.
- **Expansion Interface**
 - PEG:
 - H series: Support 20 lanes by default, compliant with PCIe Gen4 (16.0 GT/s) specifications, configurable to PEG x8, x4, x1
 - U series: Support 12 lanes by default; however, it has no PEG x8
 - HSIO PCIe, maximum up to 8x PCIe 4.0 x1 (by request)

Config.	CPU SKU	PEG			PCIe		
Default	H	1(x8) [0:7]	1 (x4) [8:11]	1 x NVME	5 (x1) or 3 (x1) +1 (x4) : 2 (x1) COMe 2x1,1x2 [2:3] 3 (x1) COMe3x1,1x1+1x2 [5:7] 1 (x4) COMe 1x4(only 1 x4) [0:3]	2 x SATA	1 x GbE
Optional			2 (x4) [8:11] [12:15]	N/A	4 (x1) COMe 4x1,2x2,1x4 [0:3] 3 (x1) COMe 3x1,1x1+1x2 [5:7]	N/A	1 x GbE
					4 (x1) COMe 4x1,2x2,1x4 [0:3] 4 (x1) COMe 4x1,2x2,1x4 [4:7]	N/A	N/A

Config.	CPU SKU	PEG			PCIe		
Default	U	N/A	1 (x4) [0:3]	1 x NVME	5 (x1) or 3 (x1) +1 (x4) : 2 (x1) COMe 2x1,1x2 [2:3] 3 (x1) COMe3x1,1x1+1x2 [5:7] 1 (x4) COMe 1x4(only 1 x4) [0:3]	2 x SATA	1 x GbE
Optional		N/A	2 (x4) [0:3] [12:15]	N/A	4 (x1) COMe 4x1,2x2,1x4 [0:3] 3 (x1) COMe 3x1,1x1+1x2 [5:7]	N/A	1 x GbE
					4 (x1) COMe 4x1,2x2,1x4 [0:3] 4 (x1) COMe 4x1,2x2,1x4 [4:7]	N/A	N/A

USB Interface

- Four USB ports comply with USB 3.2 Gen2
- Eight USB ports comply with USB 2.0

- **SATA Interface**

- Dual SATA 6Gb/s ports supported through COM Express™ connector

- **TPM**

- Trusted Platform Module compatible with TPM2.0 Main and PC Client specification based on Intel LPC Bus Interface

- **Graphics & Display**

- Intel® Arc™ Graphics (Xe LPG)
- Quad simultaneous independent displays are supported:
 - One LVDS; 18/24-bit single/dual channel (optional eDP 1.4b HBR3: 5120x3200 @60Hz)
 - Three DDIs with configurable HDMI 2.1 (4096x2304 @60Hz) and DisplayPort 2.1 HBR3 (4096x2304 @60Hz)
 - One VGA (1920x1200 @60 Hz)

- **Ethernet**

- One 2500/1000/100/10 Base-T provided by Intel® I226 supports Wake-on-LAN, PXE Boot ROM

- **Audio**

- Intel® High Definition Audio interface

- **Operating Temperature**

- Standard: 0°C to +60°C (+32°F to +140°F) with a system thermal solution
- Extended range available upon request: -40°C to +85°C (-40°F to +185°F) with a system thermal solution

- **Power Input**

- Vin: 8 to 20V
- VSB: 4.75 to 5.25V
- RTC battery: 2.0 to 3.3V with support for AT and ATX modes

- **Power Management**
 - ACPI (Advanced Configuration and Power Interface)
- **Form Factor**
 - Compact module 95mm x 95mm

1.3 Utilities Supported

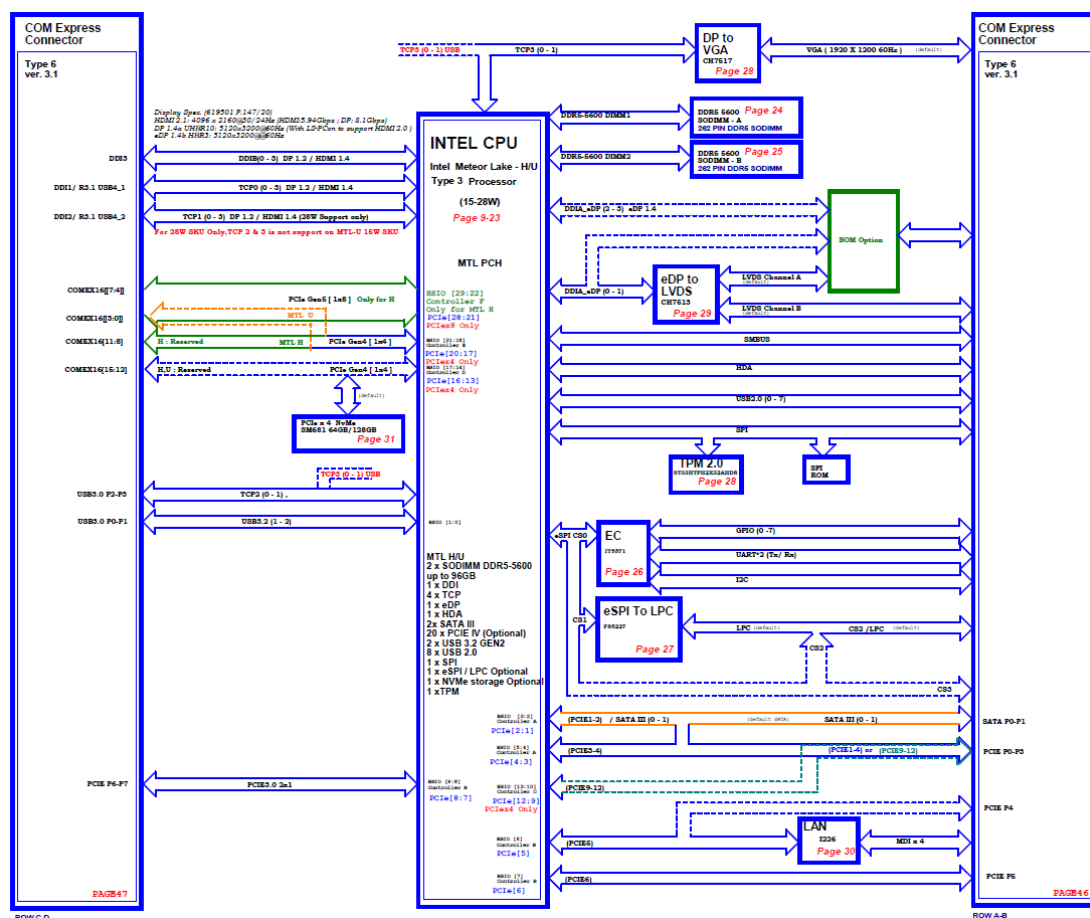
- Chipset Driver
- Graphics Driver
- Management Engine Firmware
- Intel Network Connection
- Intel Rapid Storage Technology
- NPU Driver



Note

All specifications and images are subject to change without notice.

1.4 Block Diagram

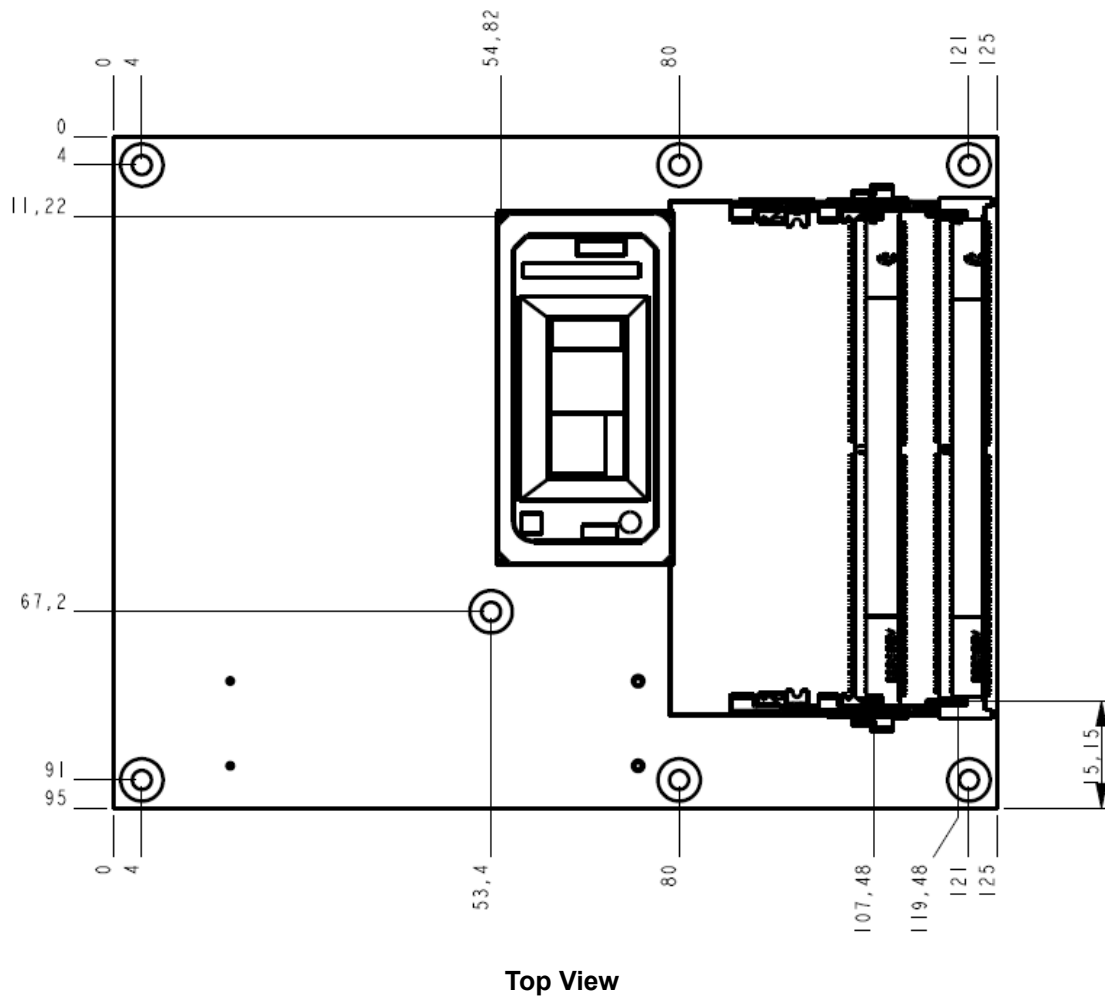


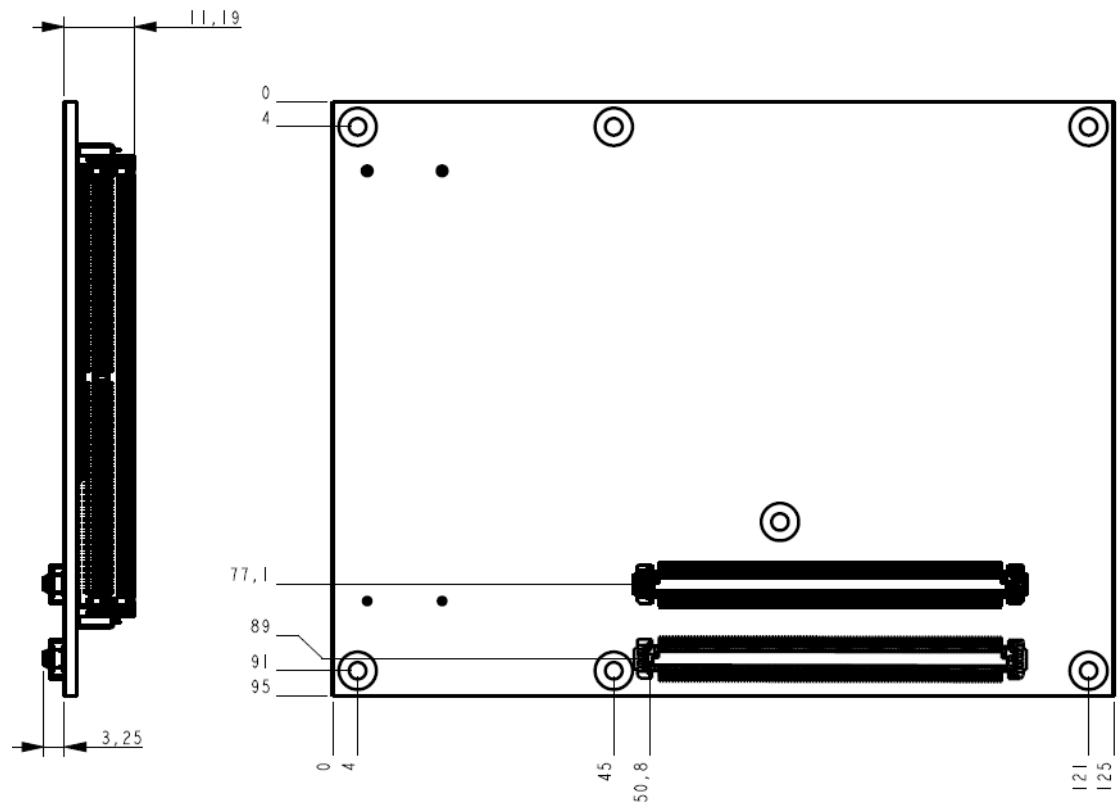
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Section 2

Module and Pin Assignments

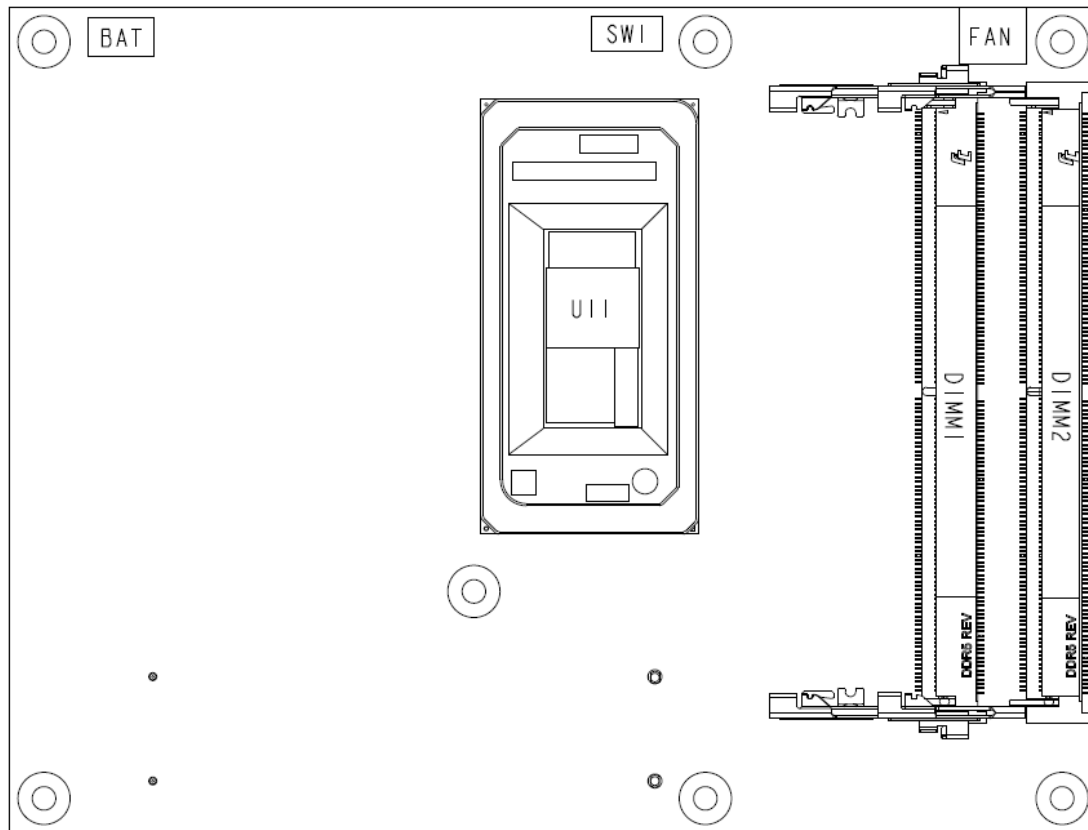
2.1 Module Dimensions and Fixing Holes



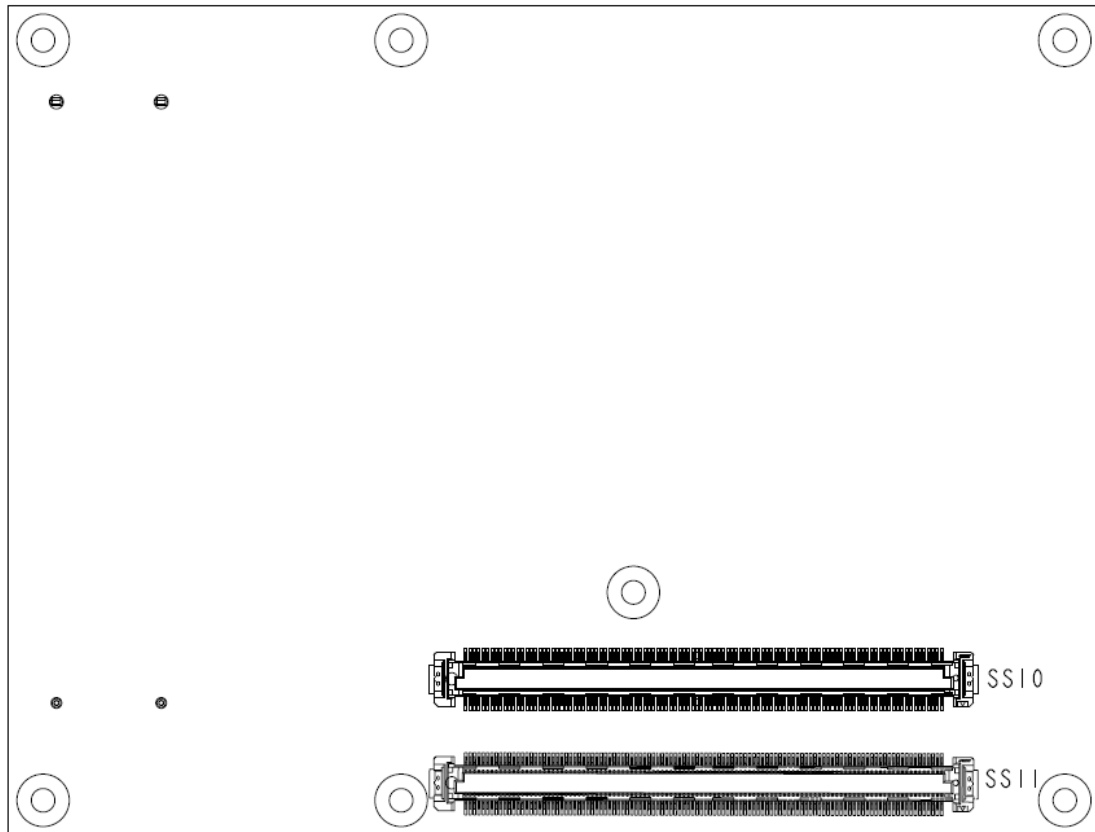


Bottom View

2.2 Module Layout



Top View

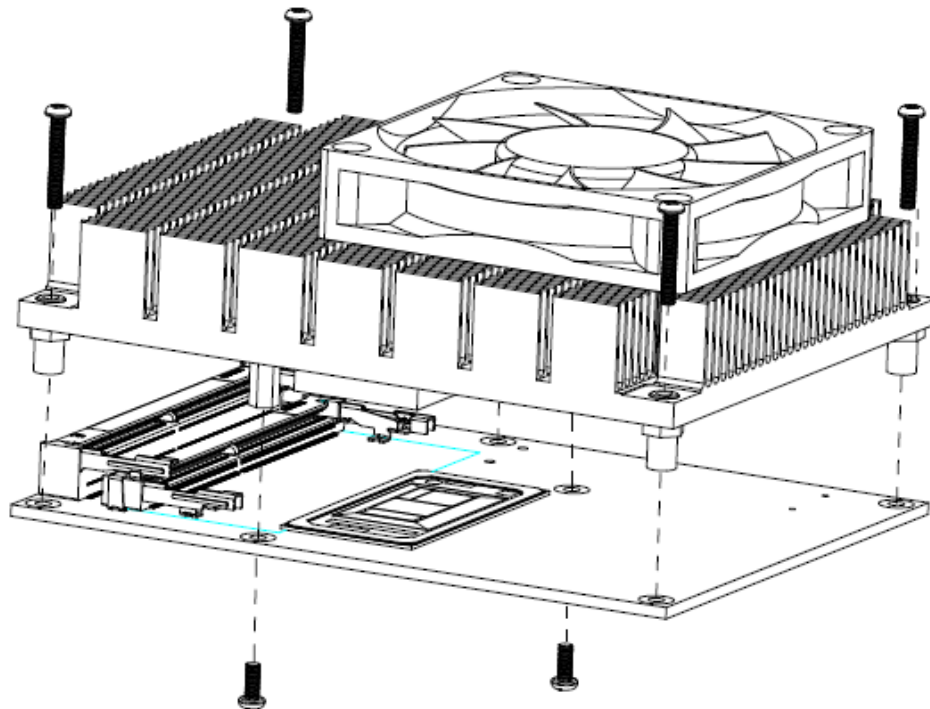


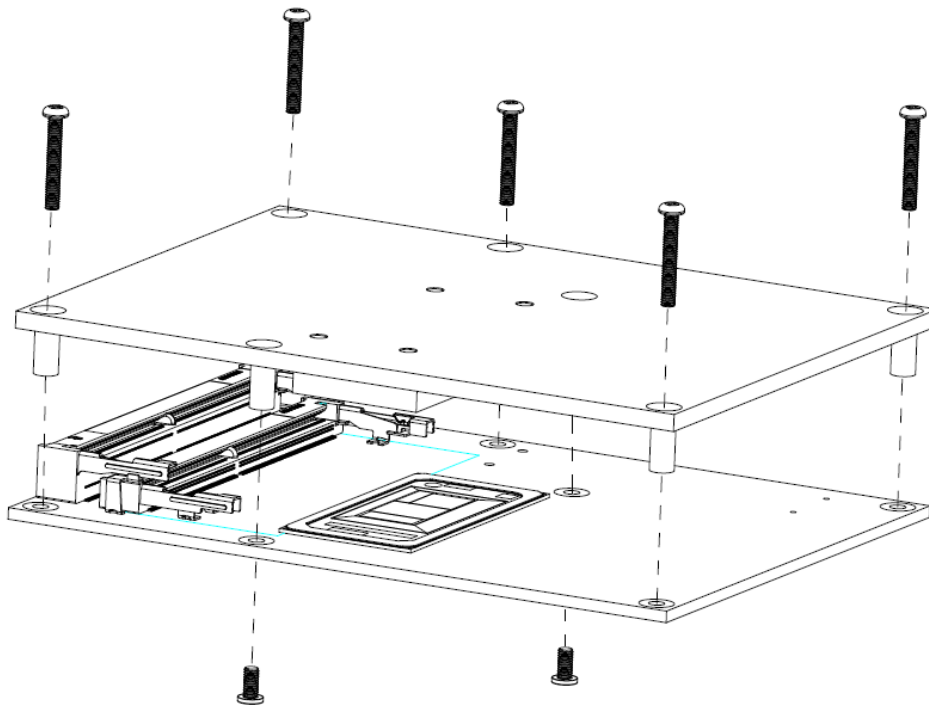
Bottom View

2.3 Installing Thermal Solution

For thermal dissipation, a thermal solution enables the CEM570's components to dissipate heat efficiently. All heat generating components are thermally conducted to the heatsink in order to avoid hot spots. Below images illustrate how to install the thermal solution.

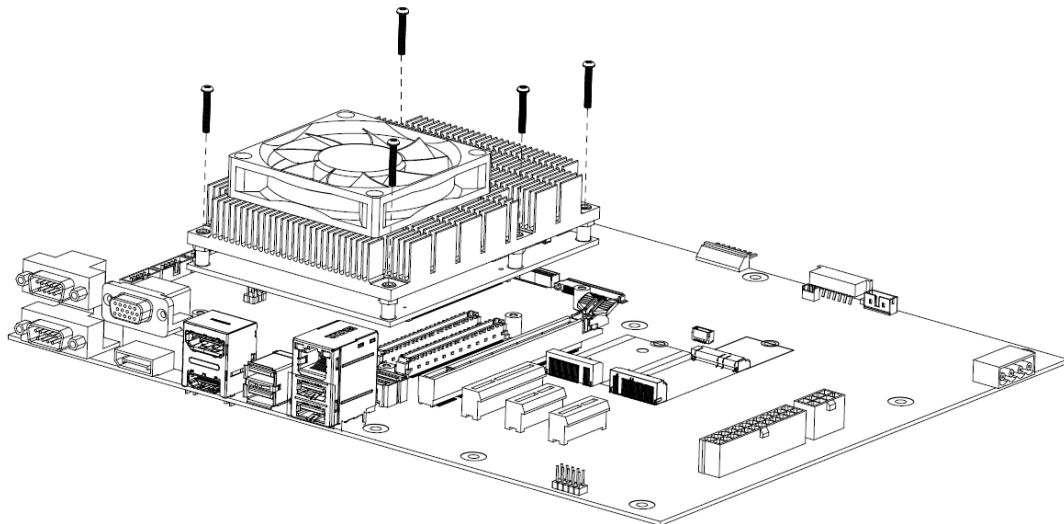
1. There is a protective plastic covering on the thermal pads. This must be removed before the heatsink can be mounted.
2. Each heatsink is designed for a specific CEM module. The thermal pads on the heatsink are designed to make contact with the necessary components on the CEM module. When mounting the heatsink you must make sure that the thermal pads on the heatsink make complete contact (no space between thermal pad and component) with the corresponding components on the CEM module. This is especially critical for CEM modules that have higher CPU speeds (for example 1.0GHz or more) to ensure that the heatsink acts as a proper thermal interface for cooling solutions.
3. This CPU module has six assembly holes for installing heatsink plate. Use the six screws to secure the heatsink plate to the CEM570. Be careful not to over-tighten the screws.

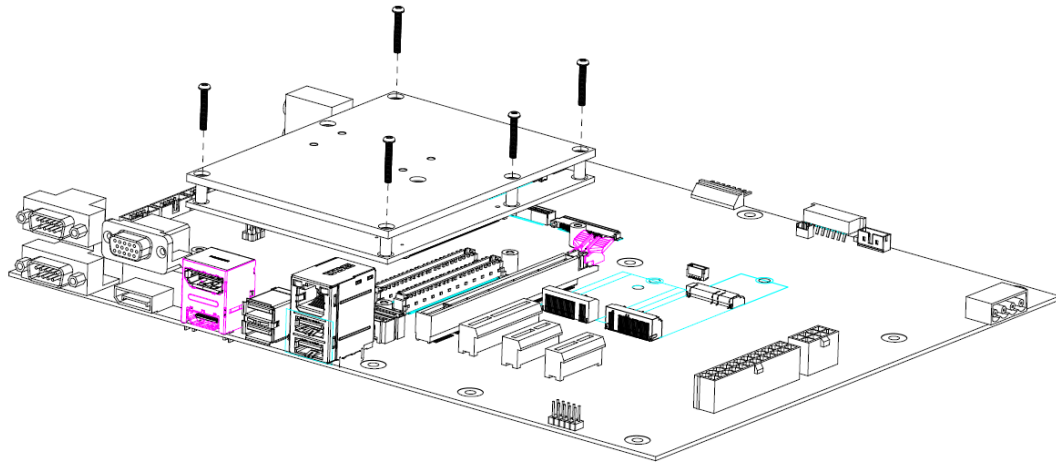




Note

When installing CEM570 on CEB94011, please add stand-off and secure with nut. Then, use the screws to secure the heatsink plate to the CEM570.





2.4 Switch Settings

Before applying power to the CEM570, please make sure onboard switches are in factory default positions.



Note

Once the default switch setting needs to be changed, please do it under power-off condition.

Switch	Description	Setting
SW1	Auto Power On Default: Disable	SW1-1 OFF
	Restore BIOS Optimal Defaults Default: Normal Operation	SW1-2 OFF

2.4.1 Auto Power On and Restore BIOS Optimal Defaults (SW1)

If dip1 of SW1 (SW1-1) is set to ON position, the system will be automatically power on without pressing soft power button. If this switch is set to OFF position, it is necessary to manually press soft power button to power on the system.

The dip2 of SW1 (SW1-2) is for restoring BIOS default status. Flip SW1-2 to ON position for a few seconds then flip it back to OFF position. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Disable auto power on (Default)	SW1-1 OFF
Enable auto power on	SW1-1 ON
Normal operation (Default)	SW1-2 OFF
Restore BIOS optimal defaults	SW1-2 ON



2.5 Connector

Signals go to the 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 which shows connectors on the hardware.

Connector	Description
FAN	Fan Connector
BAT	CMOS Battery Connector
SS10	COM Express™ Connector
SS11	COM Express™ Connector
DIMM1	Channel 0 DDR5 SO-DIMM Socket
DIMM2	Channel 1 DDR5 SO-DIMM Socket



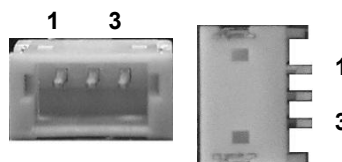
Note

- For single memory channel configuration, install memory module in channel 0 (DIMM1) DDR5 SO-DIMM socket.
- For dual memory channel configuration, install memory modules of the same size, chip width, density and rank in both channel 0 (DIMM1) and channel 1 (DIMM2) DDR5 SO-DIMM sockets.

2.5.1 Fan Connector (FAN)

The FAN is a 3-pin (pitch=1.5mm) connector, compliant with JST S3B-ZR-SM4A-TF, for fan interface.

Pin	Signal
1	GND
2	+12V level
3	Fan speed feedback



2.5.2 CMOS Battery Connector (BAT)

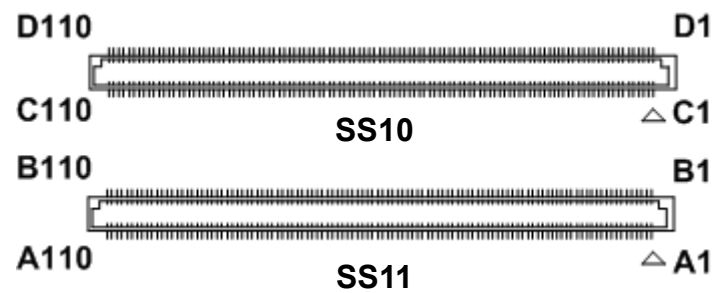
The BAT is a 2-pin (pitch=1.25mm) connector which is compliant with Molex 0532610271.

Pin	Signal
1	+3V level
2	GND



2.5.3 COM Express™ Connector (SS10 and SS11)

The following table shows pin assignments of the 220-pin COM Express™ connectors.



Bottom View

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND (FIXED)	B1	GND (FIXED)	C1	GND (FIXED)	D1	GND (FIXED)
A2	LAN1_MDI3-	B2	LAN1_LED_ACT_N	C2	GND	D2	GND
A3	LAN1_MDI3+	B3	LPC_FRAME_N	C3	USB3_RX0_N	D3	USB3_TX0_N
A4	LAN1_LED_2500_N	B4	LPC_AD0	C4	USB3_RX0_P	D4	USB3_TX0_P
A5	LAN1_LED_1000_N	B5	LPC_AD1	C5	GND	D5	GND
A6	LAN1_MDI2-	B6	LPC_AD2	C6	USB3_RX1_N	D6	USB3_TX1_N
A7	LAN1_MDI2+	B7	LPC_AD3	C7	USB3_RX1_P	D7	USB3_TX1_P
A8	LAN1_LINK_LED_N	B8	N.C./ ESPI_ALERT2(RSVD)	C8	GND	D8	GND
A9	LAN1_MDI1-	B9	N.C./ ESPI_ALERT3(RSVD)	C9	USB3_RX2_N	D9	USB3_TX2_N
A10	LAN1_MDI1+	B10	L_CLK_33M_COM	C10	USB3_RX2_P	D10	USB3_TX2_P
A11	GND (FIXED)	B11	GND (FIXED)	C11	GND (FIXED)	D11	GND (FIXED)
A12	LAN1_MDI0-	B12	PWRBTN_N_CB	C12	N.C./ USB3_RX3_N(option)	D12	N.C./ USB3_TX3_N (option)
A13	LAN1_MDI0+	B13	COM_SMB_CLK	C13	N.C./ USB3_RX3_P(option)	D13	N.C./ USB3_TX3_P (option)
A14	GBE0_CTREF	B14	COM_SMB_DAT	C14	GND	D14	GND
A15	SLP_S3_N_B	B15	SMBALERT_N	C15	N.C.	D15	DDIC_CTRLCLK_AUXP
A16	SATA0_TXP	B16	SATA1_TXP	C16	N.C.	D16	DDIC_CTRLDATA_AUXN
A17	SATA0_TXN	B17	SATA1_TXN	C17	N.C.	D17	N.C./ USB_PD_ALERT#(RSVD)
A18	SLP_S4_N_B	B18	SUS_STAT_N_R	C18	N.C./ GND(option)	D18	N.C./ PMCALERT# (RSVD)
A19	SATA0_RXP	B19	SATA1_RXP	C19	PCIE_RX_DP6	D19	PCIE_TX_DP6
A20	SATA0_RXN	B20	SATA1_RXN	C20	PCIE_RX_DN6	D20	PCIE_TX_DN6
A21	GND (FIXED)	B21	GND (FIXED)	C21	GND (FIXED)	D21	GND (FIXED)
A22	N.C.	B22	N.C.	C22	PCIE_RX_DP7	D22	PCIE_TX_DP7
A23	N.C.	B23	N.C.	C23	PCIE_RX_DN7	D23	PCIE_TX_DN7
A24	SLP_S5_N	B24	PWR_OK_CB	C24	DDPC_HPD	D24	N.C./ GND(option)
A25	N.C.	B25	N.C.	C25	N.C./ SML0_CLK (RSVD)	D25	N.C./ GND(option)
A26	N.C.	B26	N.C.	C26	N.C./ SML0_DATA(RSVD)	D26	DDI1_DP_TX0_DP
A27	PM_BATLOW_N	B27	WDT_RESET_N	C27	N.C./ SML1_CLK (RSVD)	D27	DDI1_DP_TX0_DN
A28	SATA_LED_N	B28	N.C./ SNDW0_CLK(RSVD)	C28	N.C./ SML1_DATA (RSVD)	D28	N.C.
A29	HDA_SYNC	B29	HDA_SDI1 / SNDW0_DAT(RSVD)	C29	N.C./ I2C3_SCL(RSVD)	D29	DDI1_DP_TX1_DP
A30	HDA_RST#	B30	HDA_SDI0	C30	N.C./ I2C3_SDA(RSVD)	D30	DDI1_DP_TX1_DN
A31	GND (FIXED)	B31	GND (FIXED)	C31	GND (FIXED)	D31	GND (FIXED)
A32	HDA_CLK	B32	EC_SPKR	C32	DDI2_CTRLCLK_AUXP	D32	DDI1_DP_TX2_DP
A33	HDA_SDO	B33	EC_I2C_CLK	C33	DDI2_CTRLDATA_AUXN	D33	DDI1_DP_TX2_DN
A34	BIOS_DISABLE0_N	B34	EC_I2C_DAT	C34	DDI2_SEL	D34	DDI1_SEL
A35	THERMTRIP_N_3P3	B35	COM_THRM_N	C35	N.C.	D35	N.C./ USB42LSR (RSVD)
A36	USBP_6N	B36	USBP_7N	C36	DDI3_CTRLCLK_AUXP	D36	DDI1_DP_TX3_DP
A37	USBP_6P	B37	USBP_7P	C37	DDI3_CTRLDATA_AUXN	D37	DDI1_DP_TX3_DN
A38	USB_67_OC_N	B38	USB_45_OC_N	C38	DDI3_SEL	D38	N.C./ GND(option)
A39	USBP_4N	B39	USBP_5N	C39	DDI3_TX0_DP	D39	DDI2_DP_TX0_DP
A40	USBP_4P	B40	USBP_5P	C40	DDI3_TX0_DN	D40	DDI2_DP_TX0_DN
A41	GND (FIXED)	B41	GND (FIXED)	C41	GND (FIXED)	D41	GND (FIXED)
A42	USBP_2N	B42	USBP_3N	C42	DDI3_TX1_DP	D42	DDI2_DP_TX1_DP
A43	USBP_2P	B43	USBP_3P	C43	DDI3_TX1_DN	D43	DDI2_DP_TX1_DN
A44	USB_23_OC_N	B44	USB_01_OC_N	C44	DDP3_HPD	D44	DDI2_HPD
A45	USBP_0N	B45	USBP_1N	C45	N.C./ GP_SPI_CS#(RSVD)	D45	N.C./ GND(option)
A46	USBP_0P	B46	USBP_1P	C46	DDI3_TX2_DP	D46	DDI2_DP_TX2_DP
A47	VCC_RTC_CB	B47	N.C.	C47	DDI3_TX2_DN	D47	DDI2_DP_TX2_DN

CEM570 COM Express™ Type 6 Module

A48	N.C./ RSMRST(RSVD)	B48	N.C.	C48	N.C.	D48	N.C./ GND(option)
A49	N.C./ COM_GBE0_SPD (RSVD)	B49	RST_BTN_N	C49	DDI3_TX3_DP	D49	DDI2_DP_TX3_DP
A50	INT_SERIRQ	B50	PLTRST_CB_N	C50	DDI3_TX3_DN	D50	DDI2_DP_TX3_DN
A51	GND (FIXED)	B51	GND (FIXED)	C51	GND (FIXED)	D51	GND (FIXED)
A52	PCIE_TX_DP5	B52	PCIE_RX_DP5	C52	PEG_RX0+	D52	PEG_TX0+
A53	PCIE_TX_DN5	B53	PCIE_RX_DN5	C53	PEG_RX0-	D53	PEG_TX0-
A54	COM_GPI0	B54	COM_GPO1	C54	N.C.	D54	PEG_LAN_RV#
A55	N.C./ PCIE_TX_DP4(option)	B55	N.C./ PCIE_RX_DP4(option)	C55	PEG_RX1+	D55	PEG_TX1+

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A56	N.C./ PCIE_TX_DN4(option)	B56	N.C./ PCIE_RX_DN4(option)	C56	PEG_RX1-	D56	PEG_TX1-
A57	GND	B57	COM_GPO2	C57	N.C.	D57	TYPE2_N
A58	PCIE_TX_DP3	B58	PCIE_RX_DP3	C58	PEG_RX2+	D58	PEG_TX2+
A59	PCIE_TX_DN3	B59	PCIE_RX_DN3	C59	PEG_RX2-	D59	PEG_TX2-
A60	GND (FIXED)	B60	GND (FIXED)	C60	GND (FIXED)	D60	GND (FIXED)
A61	PCIE_TX_DP2	B61	PCIE_RX_DP2	C61	PEG_RX3+	D61	PEG_TX3+
A62	PCIE_TX_DN2	B62	PCIE_RX_DN2	C62	PEG_RX3-	D62	PEG_TX3-
A63	COM_GPI1	B63	COM_GPO3	C63	N.C./ GND(option)	D63	N.C./ GND(option)
A64	PCIE_TX_DP1	B64	PCIE_RX_DP1	C64	N.C./ GND(option)	D64	N.C./ GND(option)
A65	PCIE_TX_DN1	B65	PCIE_RX_DN1	C65	PEG_RX4+	D65	PEG_TX4+
A66	GND	B66	COM_WAKE0	C66	PEG_RX4-	D66	PEG_TX4-
A67	COM_GPI2	B67	COM_WAKE01	C67	RAPID_SHUTDOWN	D67	GND
A68	PCIE_TX_DP0	B68	PCIE_RX_DP0	C68	PEG_RX5+	D68	PEG_TX5+
A69	PCIE_TX_DN0	B69	PCIE_RX_DN0	C69	PEG_RX5-	D69	PEG_TX5-
A70	GND(FIXED)	B70	GND(FIXED)	C70	GND(FIXED)	D70	GND(FIXED)
A71	LVDS_A0+_R	B71	LVDS_B0+	C71	PEG_RX6+	D71	PEG_TX6+
A72	LVDS_A0-_R	B72	LVDS_B0-	C72	PEG_RX6-	D72	PEG_TX6-
A73	LVDS_A1+_R	B73	LVDS_B1+	C73	GND	D73	GND
A74	LVDS_A1-_R	B74	LVDS_B1-	C74	PEG_RX7+	D74	PEG_TX7+
A75	LVDS_A2+_R	B75	LVDS_B2+	C75	PEG_RX7-	D75	PEG_TX7-
A76	LVDS_A2-_R	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	N.C./ GND(option)	D77	N.C./ GND(option)
A78	LVDS_A3+_R	B78	LVDS_B3-	C78	PEG_RX8+ (H Type) / N.C.	D78	PEG_TX8+ (H Type) / N.C.
A79	LVDS_A3-_R	B79	LVDS_BKLT_EN_N	C79	PEG_RX8+ (H Type) / N.C.	D79	PEG_TX8+ (H Type) / N.C.
A80	GND(FIXED)	B80	GND(FIXED)	C80	GND(FIXED)	D80	GND(FIXED)
A81	LVDS_CK_A+_R	B81	LVDS_CK_B+	C81	PEG_RX9+ (H Type) / N.C.	D81	PEG_TX9+ (H Type) / N.C.
A82	LVDS_CK_A-_R	B82	LVDS_CK_B-	C82	PEG_RX9+ (H Type) / N.C.	D82	PEG_TX9+ (H Type) / N.C.
A83	LVDS_I2C_CK_R	B83	LVDS_BKLT_CTRL	C83	N.C./ GND(option)	D83	N.C./ GND(option)
A84	LVDS_I2C_DAT_R	B84	5V_SBY_CB	C84	GND	D84	GND
A85	COM_GPI3	B85	5V_SBY_CB	C85	PEG_RX10+ (H Type) / N.C.	D85	PEG_TX10+ (H Type) / N.C.
A86	N.C./ GP_SPI_MOSI (RSVD)	B86	5V_SBY_CB	C86	PEG_RX10+ (H Type) / N.C.	D86	PEG_TX10+ (H Type) / N.C.
A87	EDP_HPDP	B87	5V_SBY_CB	C87	GND	D87	GND
A88	CK_100M_COM_DP1	B88	BIOS_DISABLE1_N	C88	PEG_RX11+ (H Type) / N.C.	D88	PEG_TX11+ (H Type) / N.C.
A89	CK_100M_COM_DN1	B89	VGA_RED	C89	PEG_RX11+ (H Type) / N.C.	D89	PEG_TX11+ (H Type) / N.C.
A90	GND (FIXED)	B90	GND (FIXED)	C90	GND (FIXED)	D90	GND (FIXED)

CEM570 COM Express™ Type 6 Module

A91	+3.3VA	B91	VGA_GREEN	C91	N.C./ PEG_RX12+ (option)	D91	N.C./ PEG_TX12+ (option)
A92	SPI_MISO	B92	VGA_BLUE	C92	N.C./ PEG_RX12- (option)	D92	N.C./ PEG_TX12- (option)
A93	COM_GPO0	B93	VGA_HSYNC	C93	GND	D93	GND
A94	SPI_CLK	B94	VGA_VSYNC	C94	N.C./ PEG_RX13+ (option)	D94	N.C./ PEG_TX13+ (option)
A95	SPI_MOSI	B95	VGA_CH7517_DDCSCL	C95	N.C./ PEG_RX13- (option)	D95	N.C./ PEG_TX13- (option)
A96	N.C./ TPM_PP(RSVD)	B96	VGA_CH7517_DDCSDA	C96	GND	D96	GND
A97	N.C.	B97	SPI_CS_C	C97	N.C./ GND(option)	D97	N.C./ GND(option)
A98	EC_UART1_TX	B98	N.C./ GP_SPI_MISO (RSVD)	C98	N.C./ PEG_RX14+ (option)	D98	N.C./ PEG_TX14+ (option)
A99	EC_UART1_RX	B99	N.C./ GP_SPI_CK (RSVD)	C99	N.C./ PEG_RX14- (option)	D99	N.C./ PEG_TX14- (option)
A100	GND (FIXED)	B100	GND (FIXED)	C100	GND (FIXED)	D100	GND (FIXED)
A101	EC_UART2_TX	B101	FAN_PWMOUT	C101	N.C./ PEG_RX15+ (option)	D101	N.C./ PEG_TX15+ (option)
A102	EC_UART2_RX	B102	FAN_TACHIN	C102	N.C./ PEG_RX15- (option)	D102	N.C./ PEG_TX15- (option)
A103	C_LID_N	B103	C_SLEEP_N	C103	GND	D103	GND
A104	+VIN(12V)	B104	+VIN(12V)	C104	+VIN(12V)	D104	+VIN(12V)
A105	+VIN(12V)	B105	+VIN(12V)	C105	+VIN(12V)	D105	+VIN(12V)
A106	+VIN(12V)	B106	+VIN(12V)	C106	+VIN(12V)	D106	+VIN(12V)
A107	+VIN(12V)	B107	+VIN(12V)	C107	+VIN(12V)	D107	+VIN(12V)
A108	+VIN(12V)	B108	+VIN(12V)	C108	+VIN(12V)	D108	+VIN(12V)
A109	+VIN(12V)	B109	+VIN(12V)	C109	+VIN(12V)	D109	+VIN(12V)
A110	GND (FIXED)	B110	GND (FIXED)	C110	GND (FIXED)	D110	GND (FIXED)

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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 section 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 the key immediately.
2. After you press the key, 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 SW1-2 (see section 2.4.1).

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.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
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.
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.

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.

Aptio Setup - AMI		
Main	Advanced	Chipset
Security	Boot	Save & Exit
Professional	MEBx	
BIOS Information Build Date and Time 03/11/2026 09:20:42 Project Version CEM570 X005 CRB Firmware Information Firmware Version CEM570 X04 ME Firmware Version 18.0.5.2107 ME Firmware Mode Normal Mode ME Firmware SKU Corporate SKU Board Information Processor Name MeteorLake ULT Type Intel(R) Core(TM) Ultra Stepping 5 125H C0 PCH Name MTL SOC M SKU P Premium Stepping C0 Memory Size 8192 MB Frequency 4800 MHz System Date [Tue 03/03/2026] System Time [05:51:12] Access Level Administrator		Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998-9999 Months: 1-12 Days: Dependent on month Range of Years may vary. →+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.22.1293 Copyright (C) 2026 AMI		

BIOS/Firmware/Board Information

Display the BIOS/Firmware/Board 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

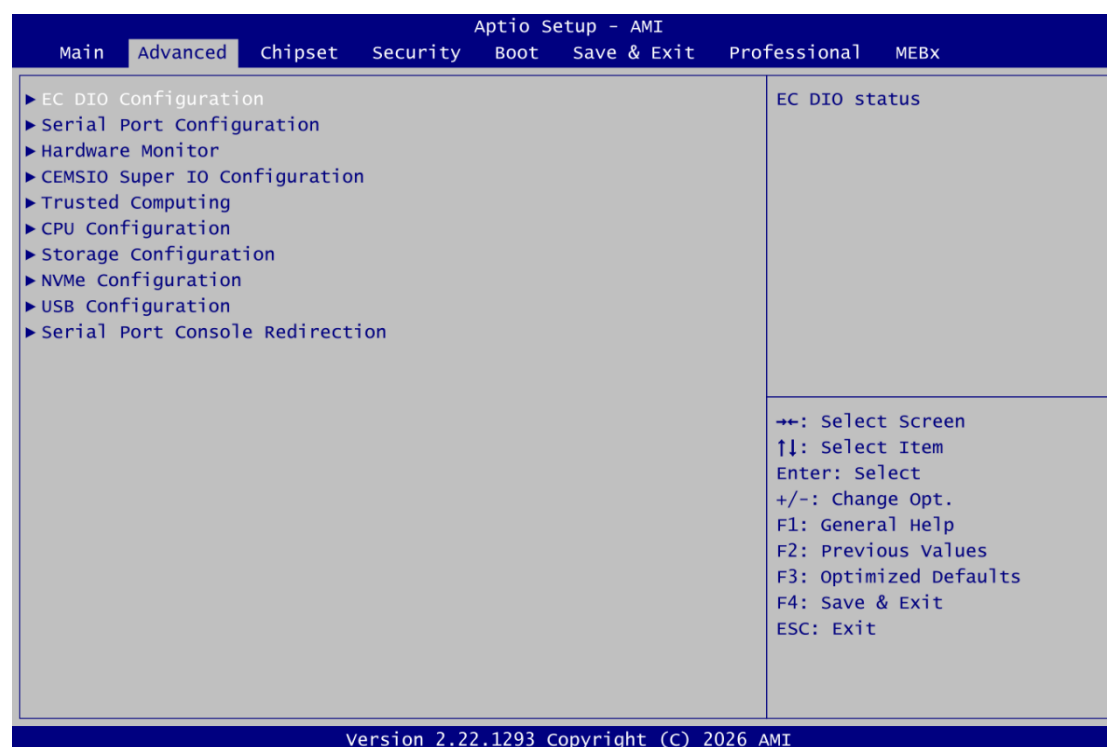
Display the access level of current user.

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:

- ▶ EC DIO Configuration
- ▶ Serial Port Configuration
- ▶ Hardware Monitor
- ▶ CEMSIO Super IO Configuration
- ▶ Trusted Computing
- ▶ CPU Configuration
- ▶ Storage Configuration
- ▶ NVMe Configuration
- ▶ USB Configuration
- ▶ Serial Port Console Redirection

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



- **EC DIO Configuration**

You can use this screen to select options for DIO configuration. A description of selected item appears on the right side of the screen. For more details, see Appendix A.



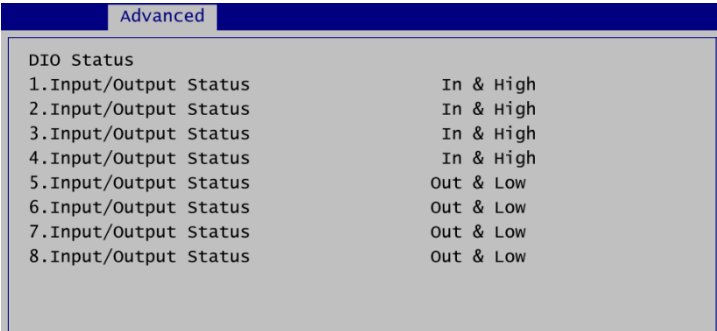
DIO Modification

Enable or disable digital I/O modification. The default is Disabled.

DIO port 1-8

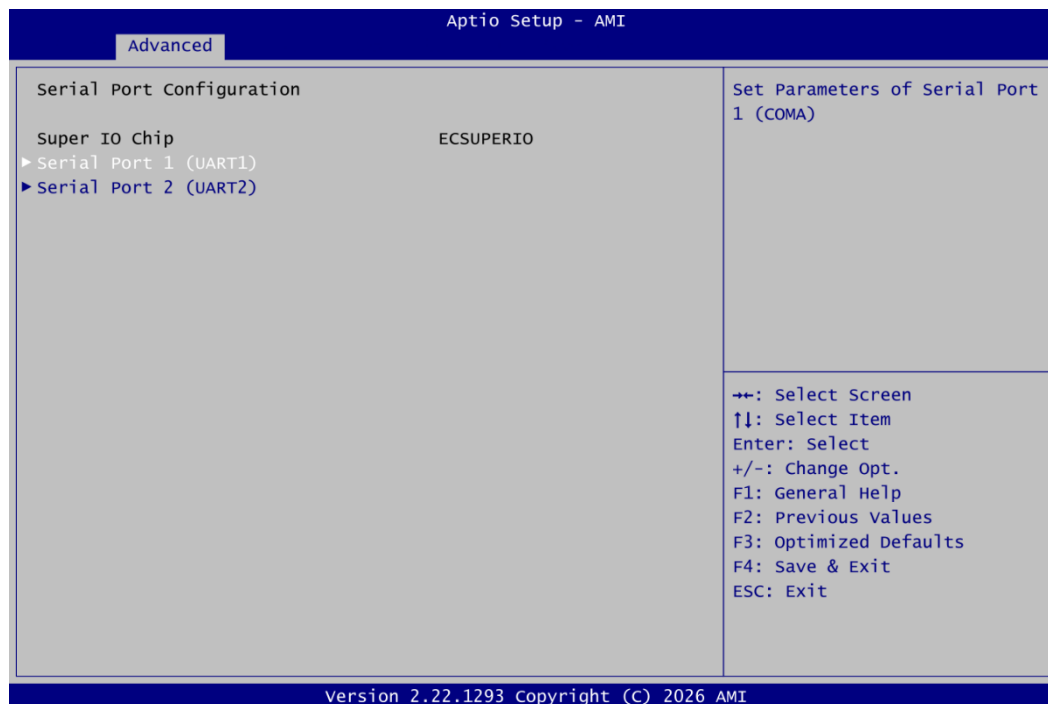
Click on this option to open DIO status sub-screen.

If DIO Modification is disabled, you are not allowed to change inputs/outputs setting. The DIO status sub screen is as follows:



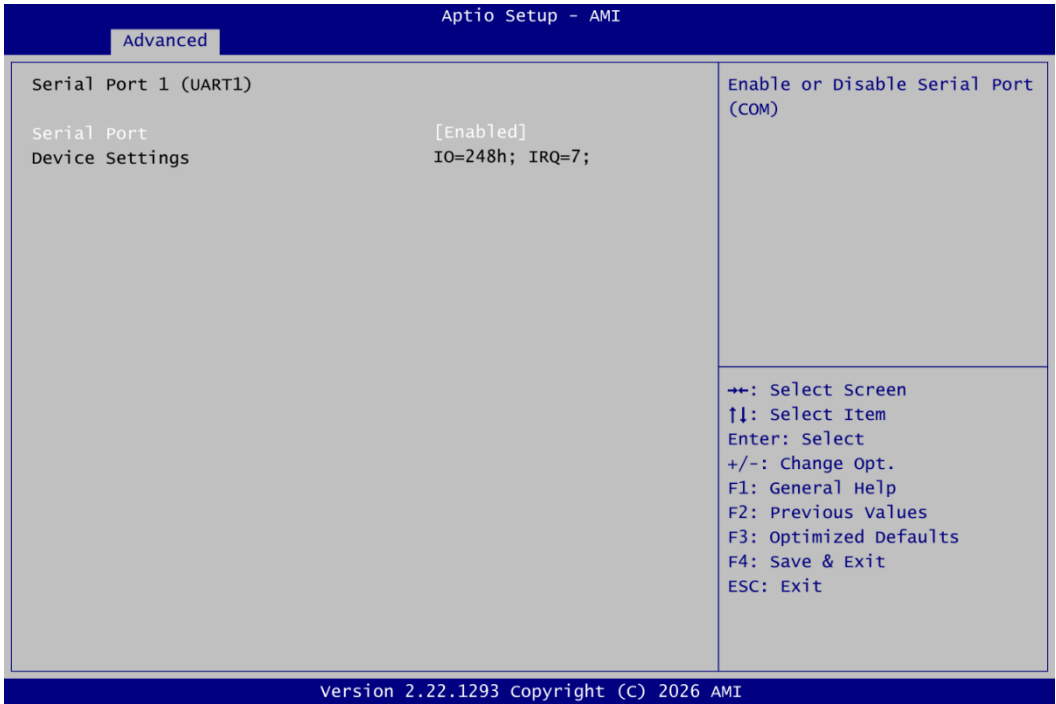
- **Serial Port Configuration**

You can use this screen to select options for Serial Port 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 1~2 (UART1~2)**

Set parameters related to serial port 1~2.

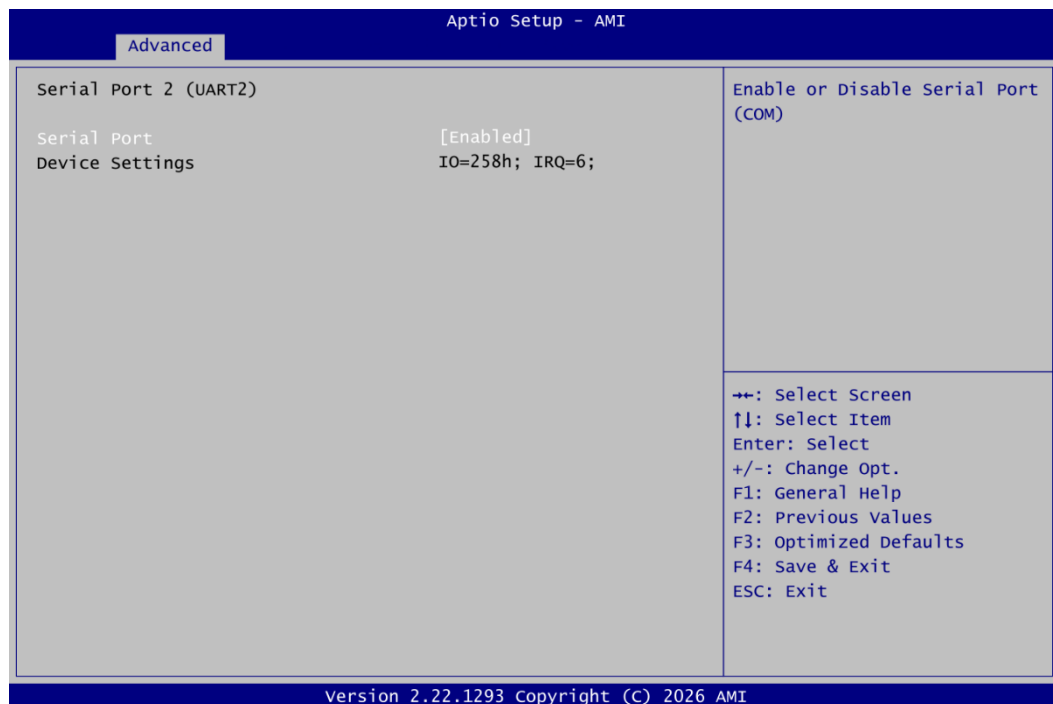
- Serial Port 1 (UART1)



Serial Port

Enable or disable serial port 1. The optimal setting for base I/O address is 248h and for interrupt request address is IRQ7.

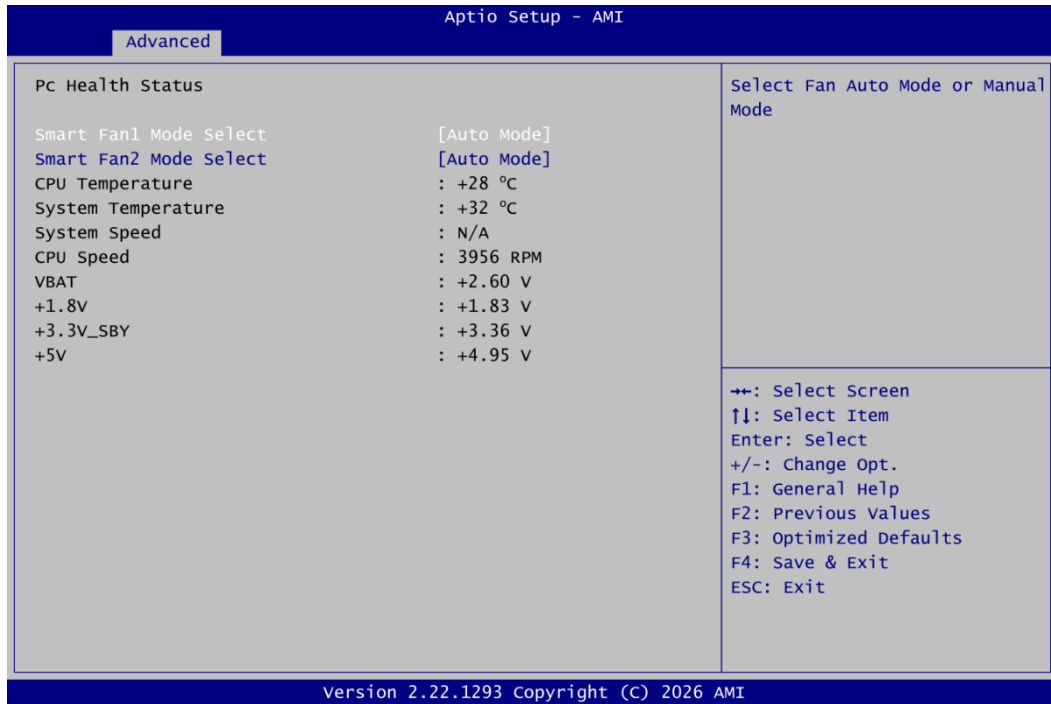
- Serial Port 2 (UART2)

**Serial Port**

Enable or disable serial port 2. The optimal setting for base I/O address is 258h and for interrupt request address is IRQ6.

- **Hardware Monitor**

This screen is for fan speed control and hardware health status monitoring.



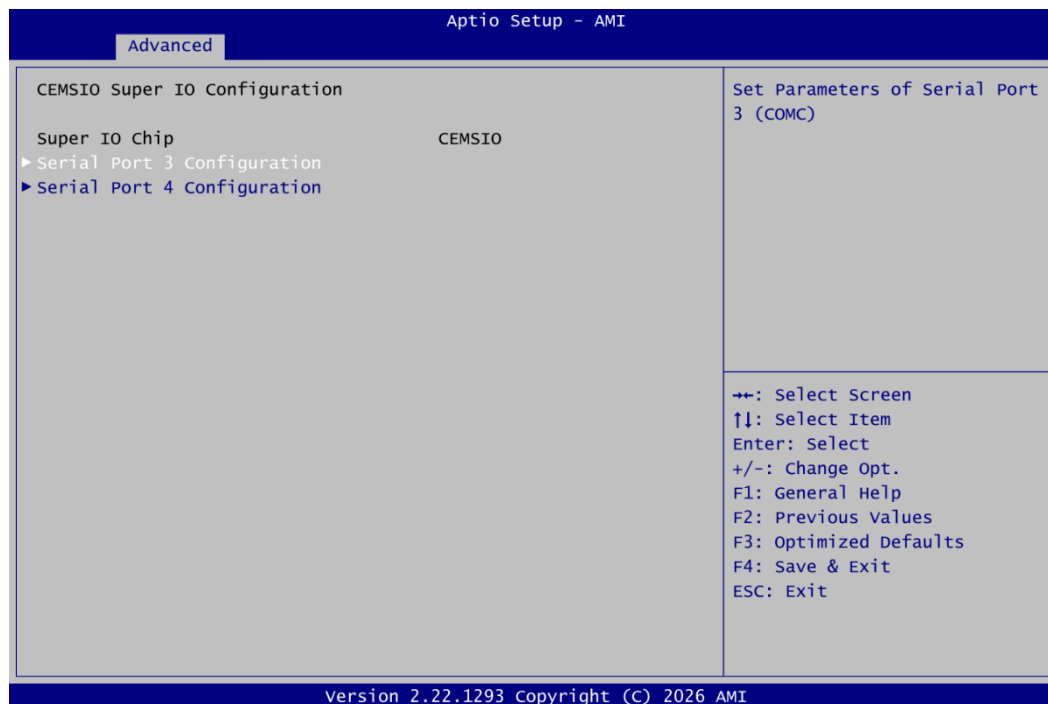
This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VBAT, +1.8V, +3.3V_SBY and +5V).

Smart Fan1\Smart Fan2 Mode Select

Set Smart Fan mode. The default is Auto Mode. If Smart Fan is in Auto Mode, the system fan spins at different speed depending on system temperature; the higher the temperature, the faster the system fan spins. If Smart Fan is in Manual Mode, user can manually change system fan speed to 100%, 75%, 50%, 25% or 0%.

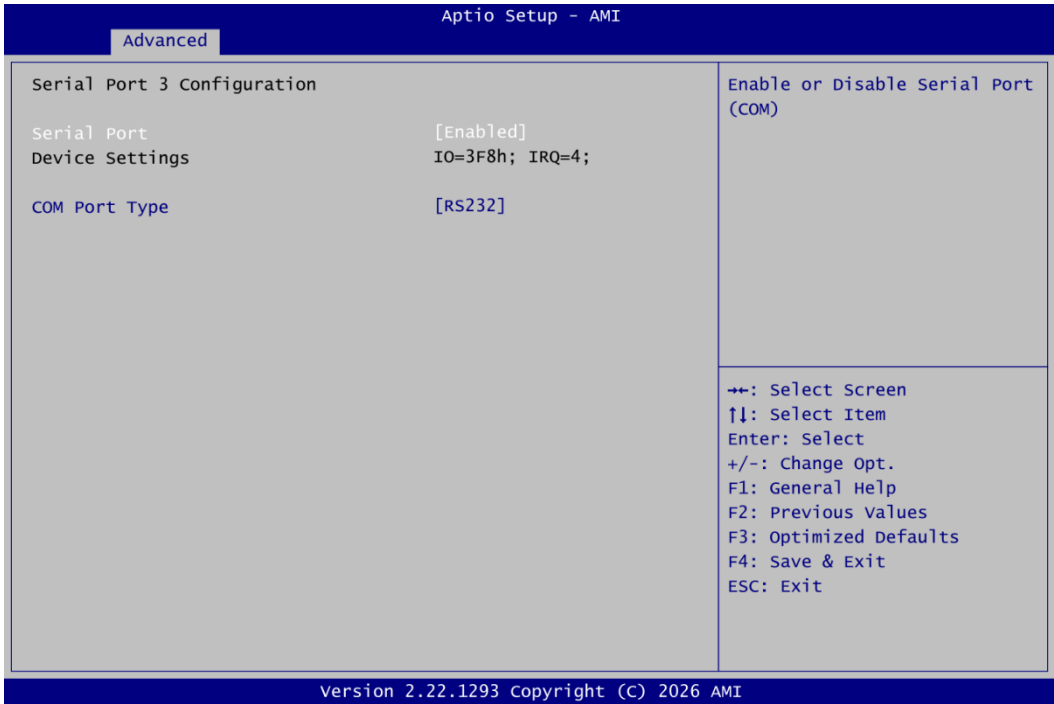
- **CEMSIO Super IO Configuration**

You can use this screen to select options for the CEMSIO 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 3~4 Configuration**

Set parameters related to serial port 3~4.

- Serial Port 3 Configuration



Serial Port

Enable or disable serial port 3. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

COM Port Type

Use this item to set for RS-232/422/485 communication mode.

- Serial Port 4 Configuration

Aptio Setup - AMI	
Advanced	
Serial Port 4 Configuration	
Serial Port	[Enabled]
Device Settings	IO=2F8h; IRQ=3;
COM Port Type	[RS232]
Enable or Disable Serial Port (COM)	
→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.22.1293 Copyright (C) 2026 AMI	

Serial Port

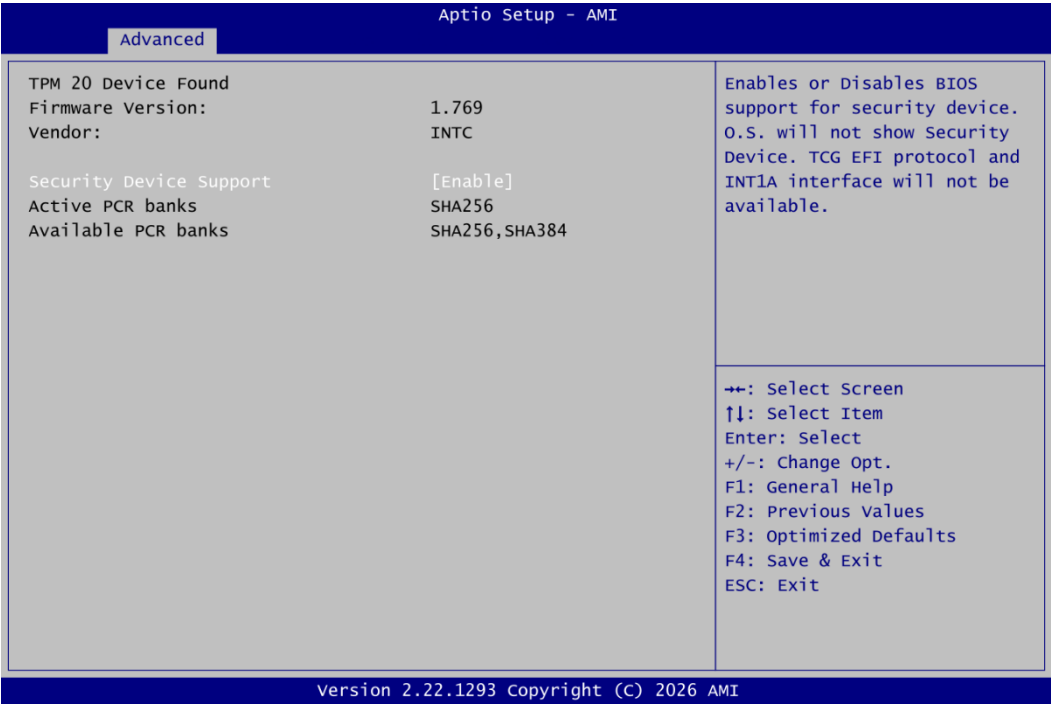
Enable or disable serial port 4. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

COM Port Type

Use this item to set for RS-232/422/485 communication mode.

- **Trusted Computing**

You can use this screen for TPM (Trusted Platform Module) configuration. It also shows current TPM status information.

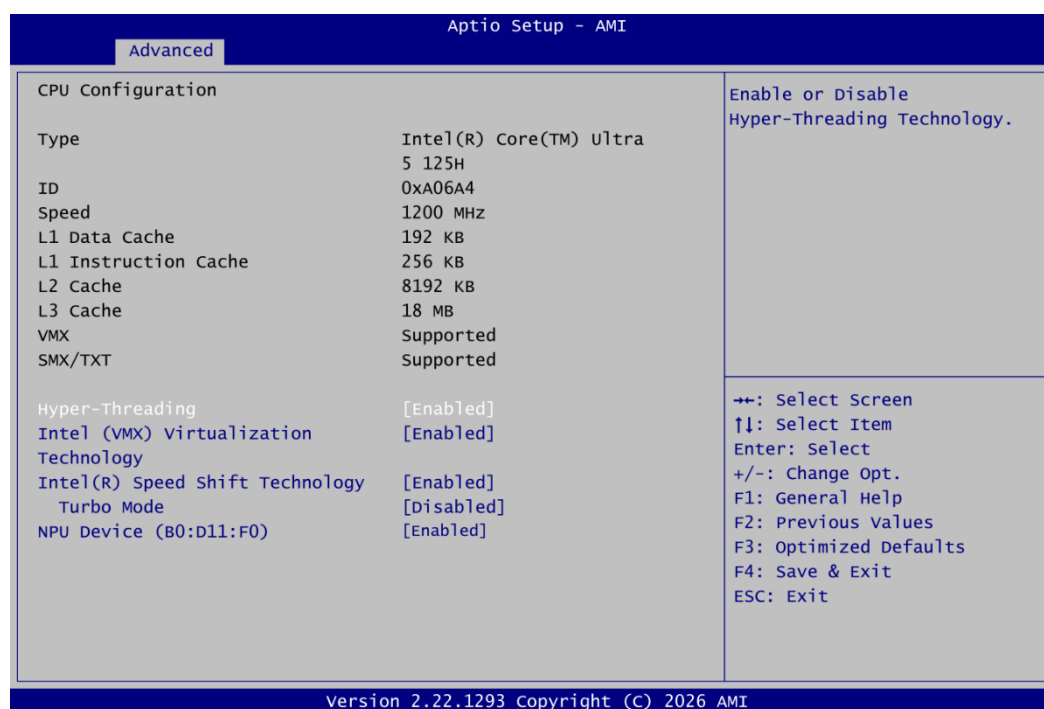


Security Device Support

Enable or disable BIOS support for security device, typically a TPM. When enabled (default setting), the BIOS initializes and makes the TPM available for use by the operating system and other system components. When disabled, the TPM is effectively hidden from the OS, and critical security functions, such as secure boot and disk encryption, may not function. Additionally, TCG EFI protocols and the INT1A interface, which are used for secure boot and other trusted computing tasks, will not be available.

- **CPU Configuration**

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



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 computer system to work as several virtual systems.

Intel(R) Speed Shift Technology

Enable or disable Intel(R) Speed Shift Technology support. Enabling will trigger the CPPC v2 (Collaborative Processor Performance Control version 2) interface to optimize CPU performance and power management. CPPC works by dynamically adjusting the processor's frequency and voltage in collaboration with the operating system. This helps achieve a balance between performance and energy efficiency.

Turbo Mode

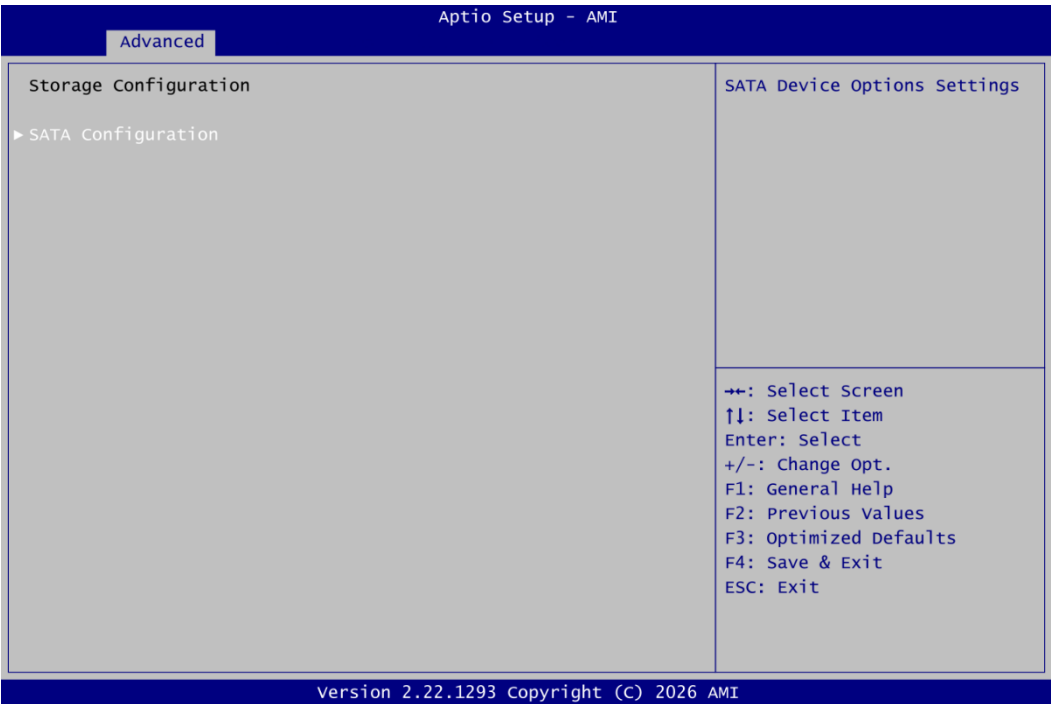
Enable or disable processor Turbo Mode. When enabled, the processor can be up to maximum turbo frequency when the system loading becomes higher.

NPU Device

Enable or disable the NPU (Neural Processing Unit) device.

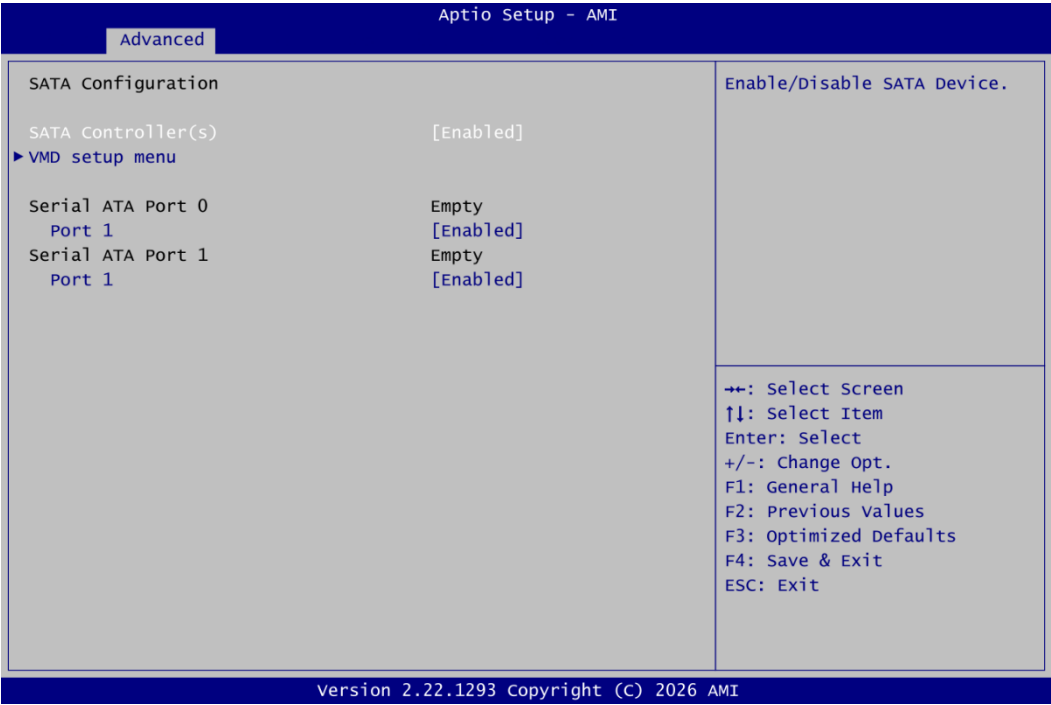
- **Storage Configuration**

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



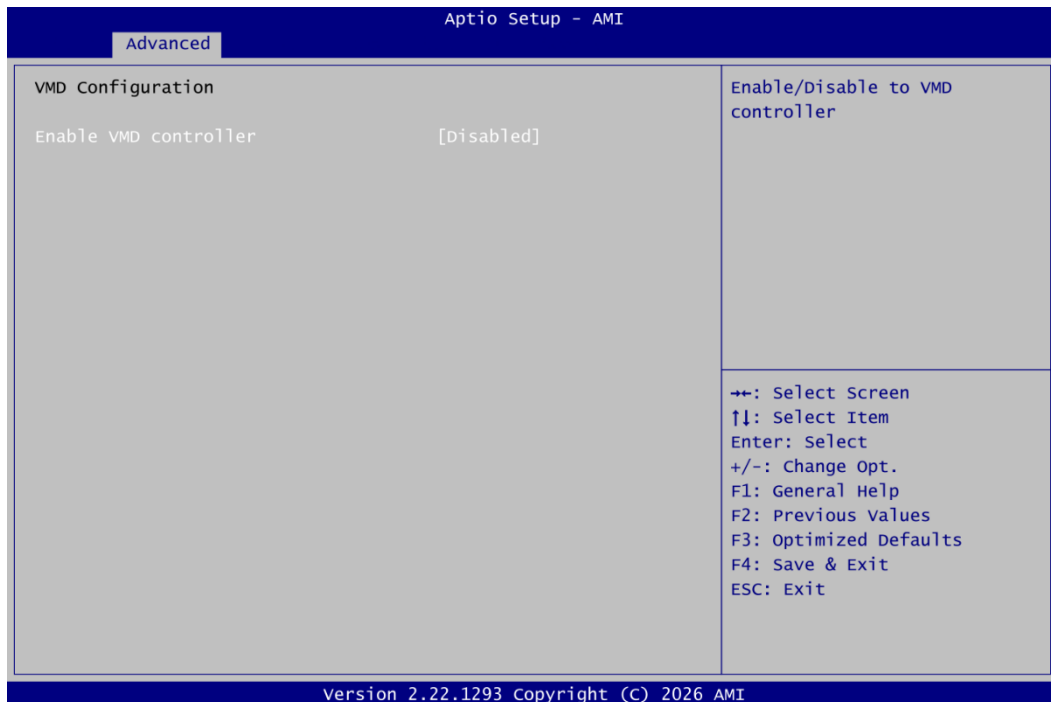
SATA Configuration

Click to open SATA device setting sub-screen.



SATA Controller(s)

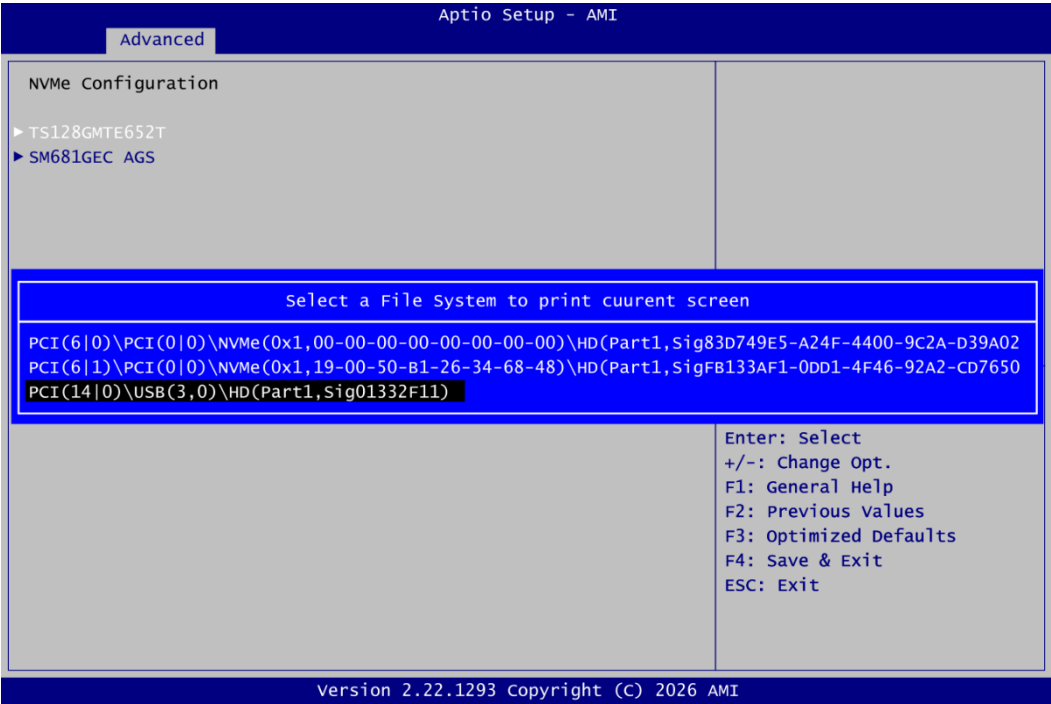
Enable or disable the SATA Controller feature.

VMD setup menu**Enable VMD controller**

Enable or disable VMD (Volume Management Device) controller. Also, need to enable VMD Global Mapping.

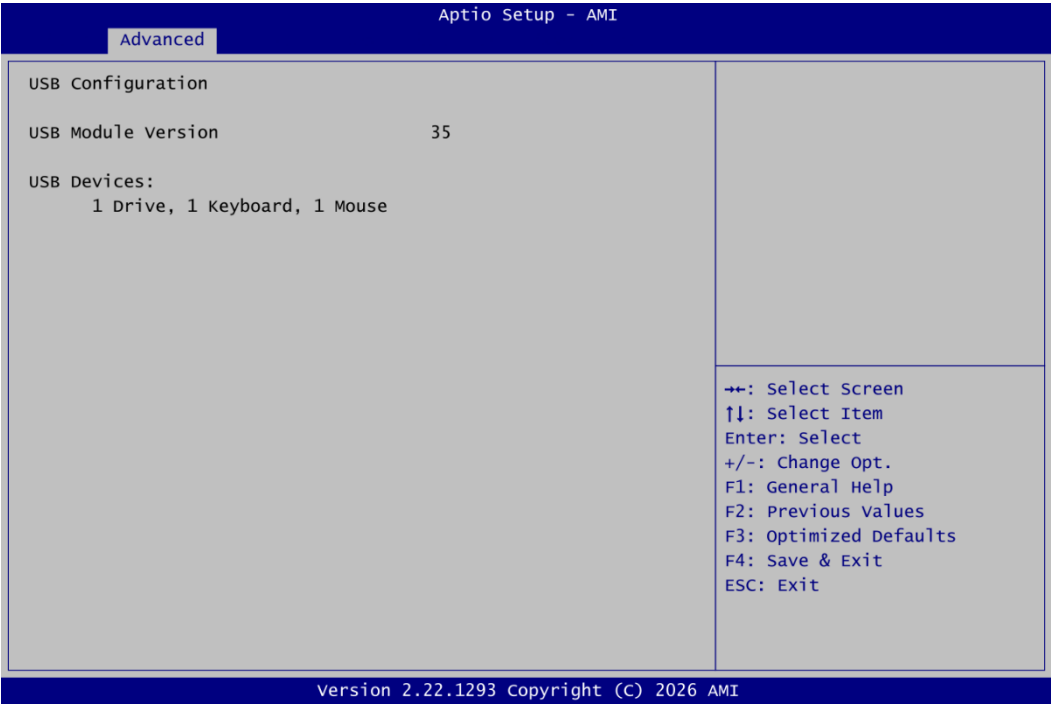
● **NVMe Configuration**

This screen shows related information and settings for NVMe (Non-Volatile Memory Express) storage device.



● **USB Configuration**

This screen specifies USB settings.

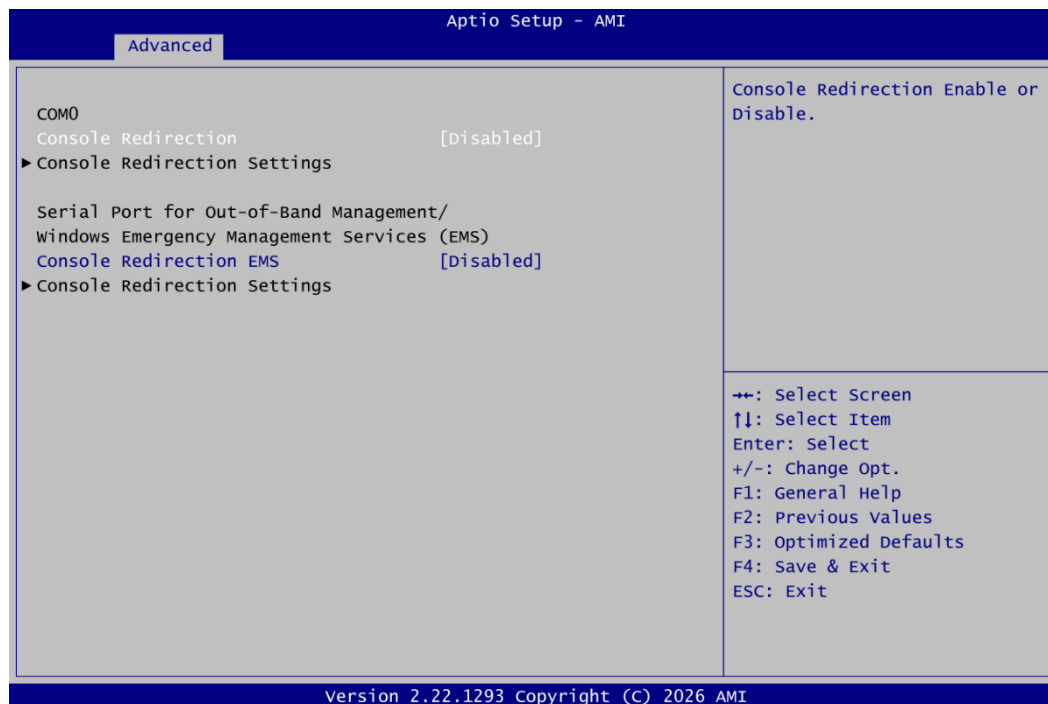


USB Devices

Display all detected USB devices.

- **Serial Port Console Redirection**

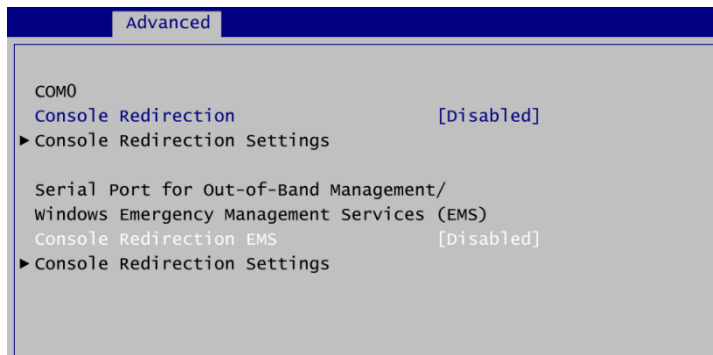
You can use this screen to select options for Serial Port Console Redirection, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.

**COM0 Console Redirection**

Enable or disable COM0 console redirection.

Console Redirection Settings

When enabled, the settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

**Console Redirection EMS**

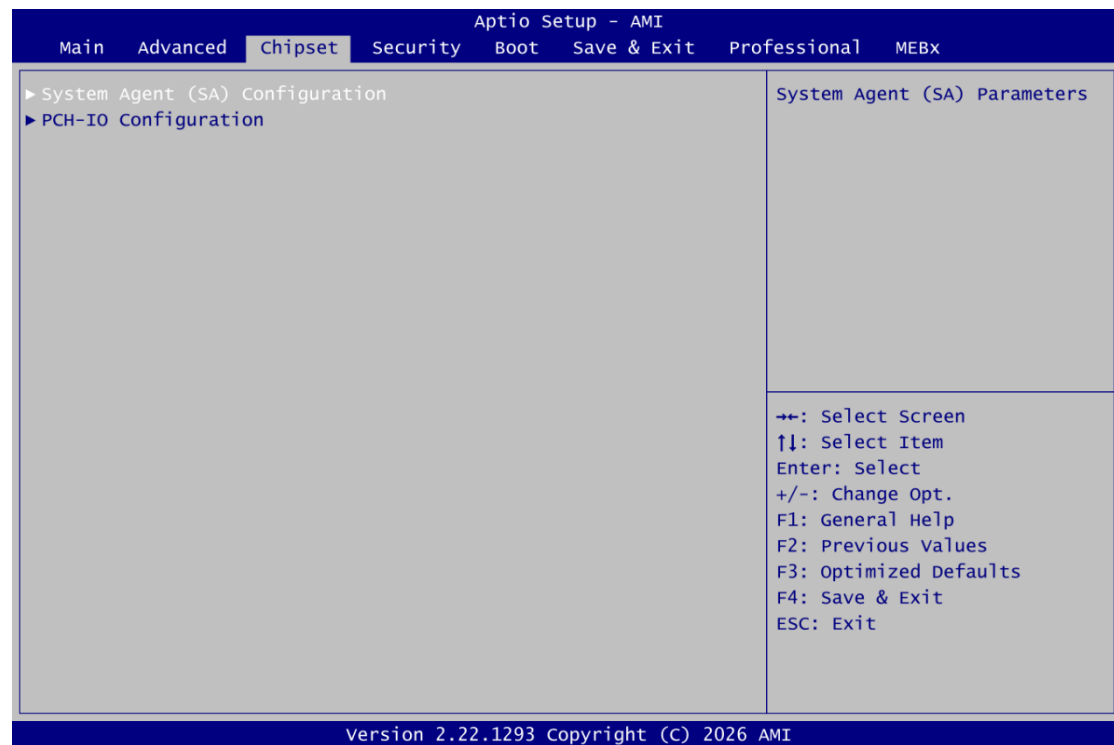
Enable or disable redirection of system console output to a serial port for remote management and troubleshooting, especially when the operating system supports Emergency Management Services (EMS).

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:

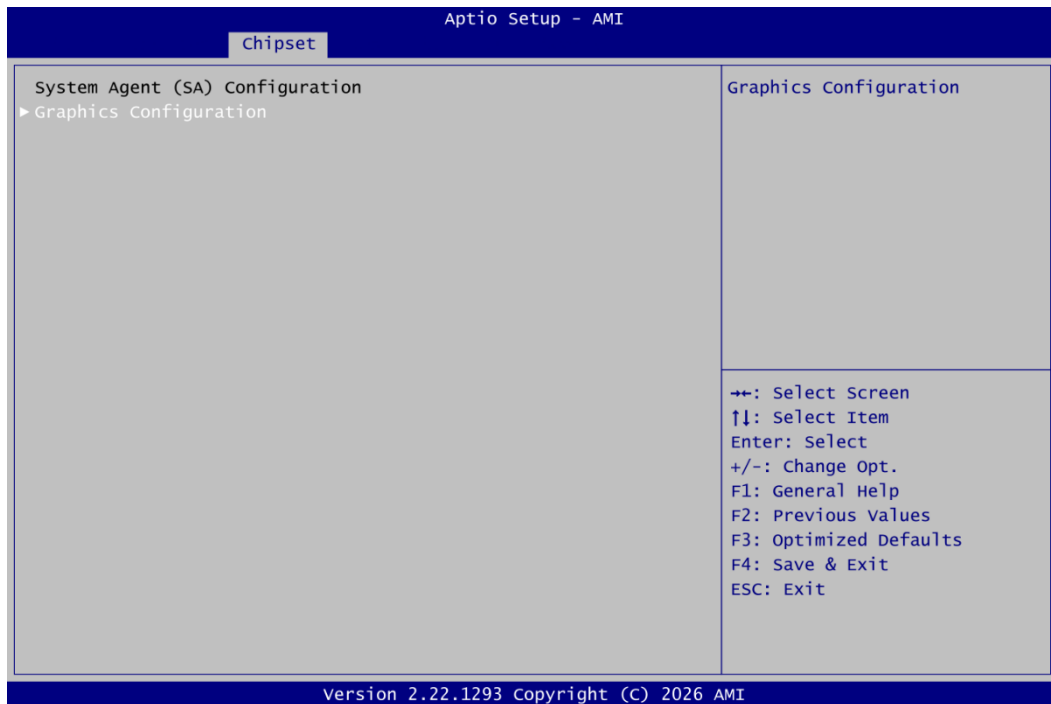
- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration

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.

Graphics Configuration

Aptio Setup - AMI		
Chipset		
Internal Graphics	[Auto]	Keep IGFX enabled based on the setup options.
DDI3 Signal Select	[DisplayPort]	
DDI1 Signal Select	[HDMI/DVI]	
DDI2 Signal Select	[DisplayPort]	
LVDS Panel Device	[Enabled]	
LVDS Panel Type	[1024x768 24bit]	
		→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.22.1293 Copyright (C) 2026 AMI		

Internal Graphics

Keep IGFX enabled based on the setup options.

DDI3 Signal Select

Select the DDI3 signal output to DisplayPort or HDMI/DVI.

DDI1 Signal Select

Select the DDI1 signal output to DisplayPort or HDMI/DVI.

DDI2 Signal Select

Select the DDI2 signal output to DisplayPort or HDMI/DVI.

LVDS Panel Device

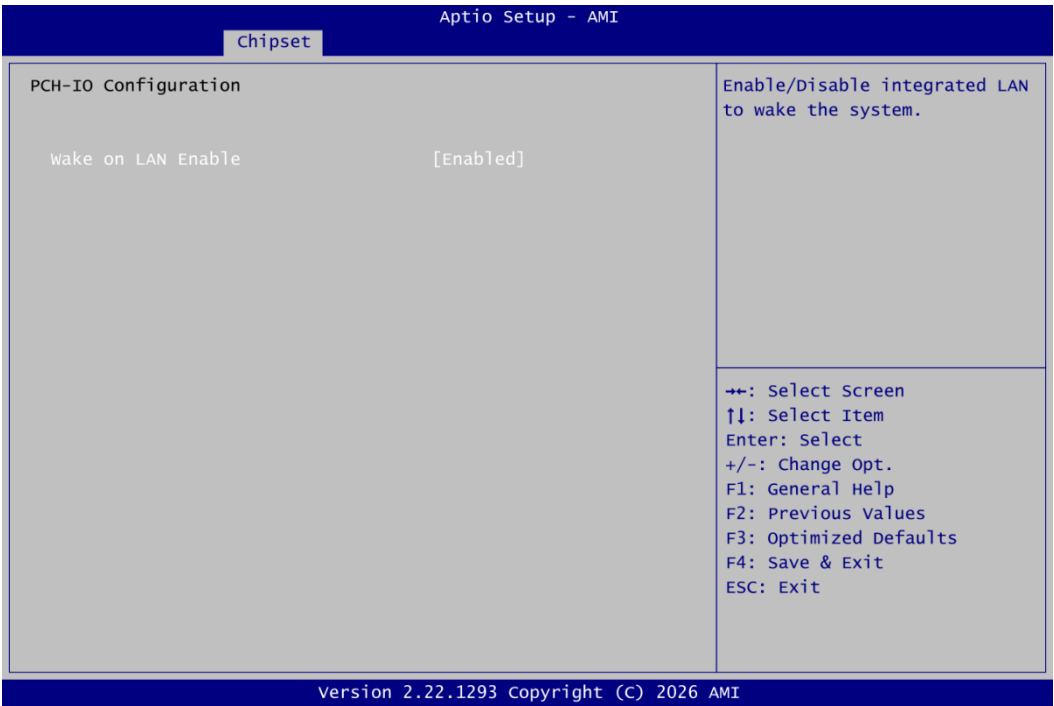
Enable or disable LVDS panel support.

LVDS Panel Type

Select the appropriate LVDS panel resolution.

PCH-IO Configuration

This screen allows user to set PCH parameters.



Wake on LAN Enable

Enable or disable integrated LAN to wake the system.

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 user password.
- **Secure Boot**
Use this item to set parameters related to Secure Boot.

- **Secure Boot**

The Secure Boot feature is designed to ensure and protect the system from unauthorized access and malwares during boot-up.



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

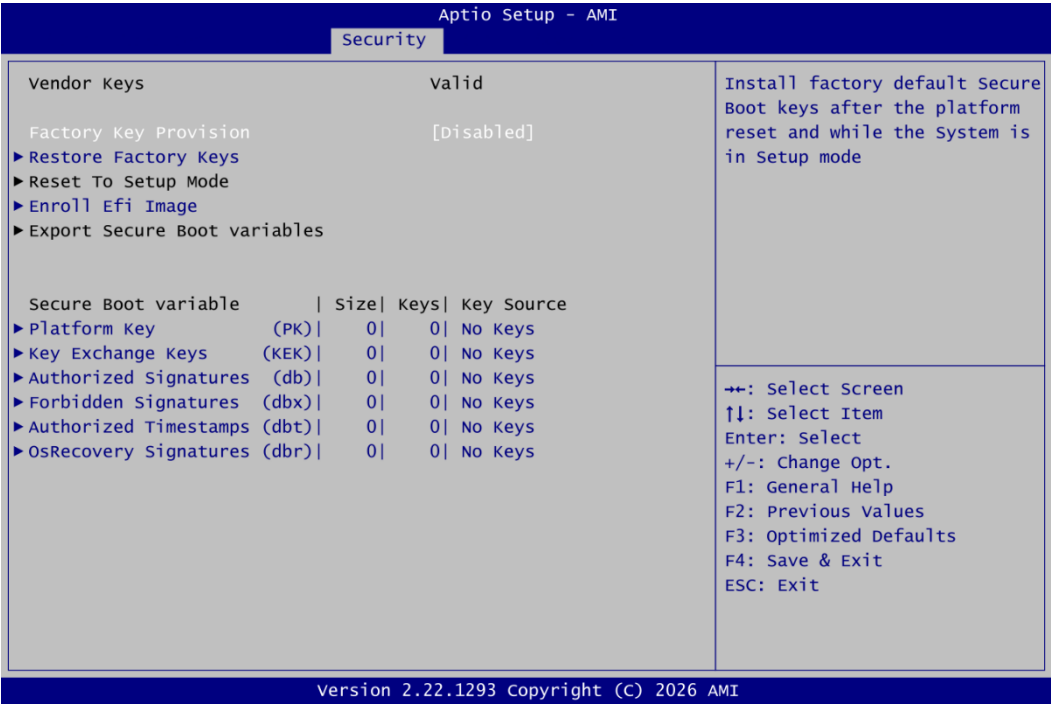
Force System to User mode. Install factory default Secure Boot key databases.

Reset To Setup Mode

Delete all Secure Boot key databases from NVRAM.

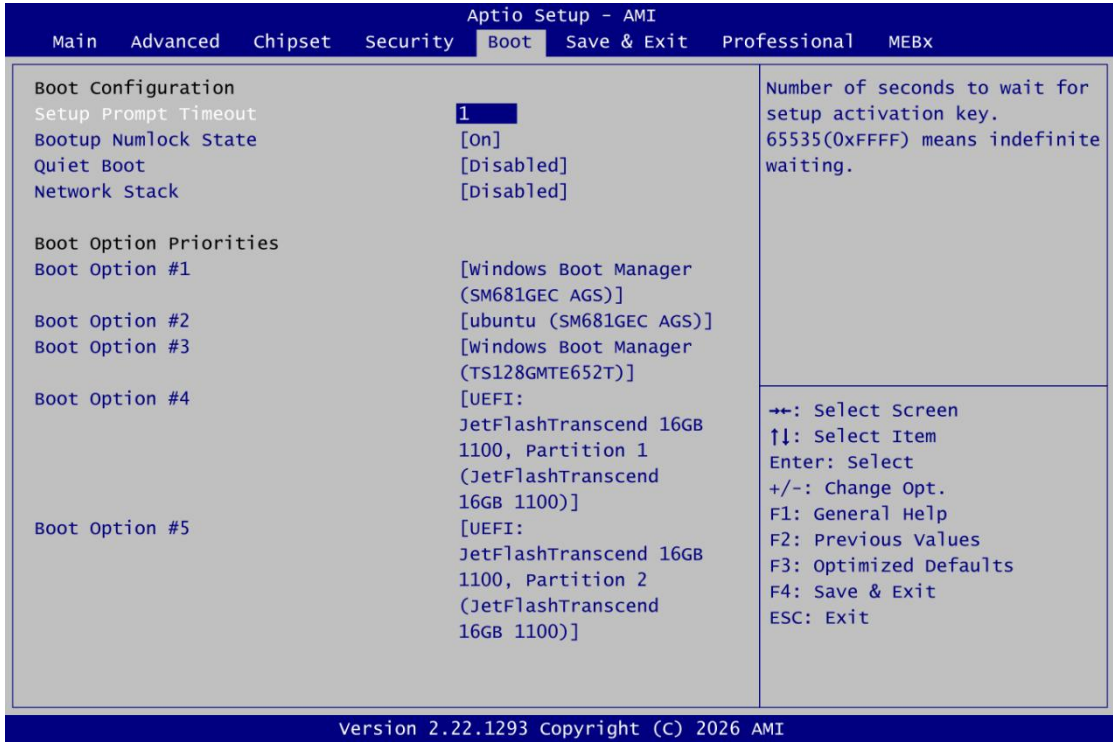
Expert Key Management

Enables expert users to modify Secure Boot Policy variables without full authentication, which includes the following items:



4.7 Boot Menu

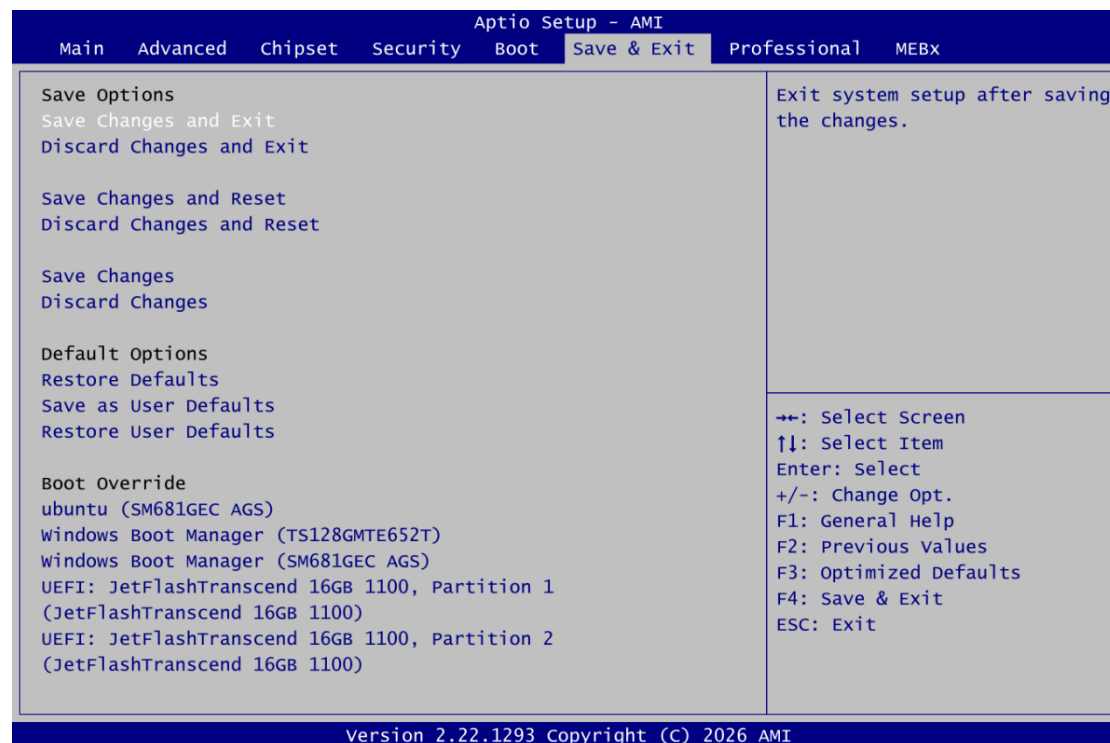
The Boot menu allows users to change boot options of the system.



- Setup Prompt Timeout**
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- Bootup Numlock State**
Use this item to select the power-on state for the keyboard NumLock.
- Quiet Boot**
Select to display either POST output messages or a splash screen during boot-up.
- Network Stack**
Enable or disable UEFI Network stack.
- Boot Option Priorities [Boot Option #1, ...]**
These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.8 Save & Exit Menu

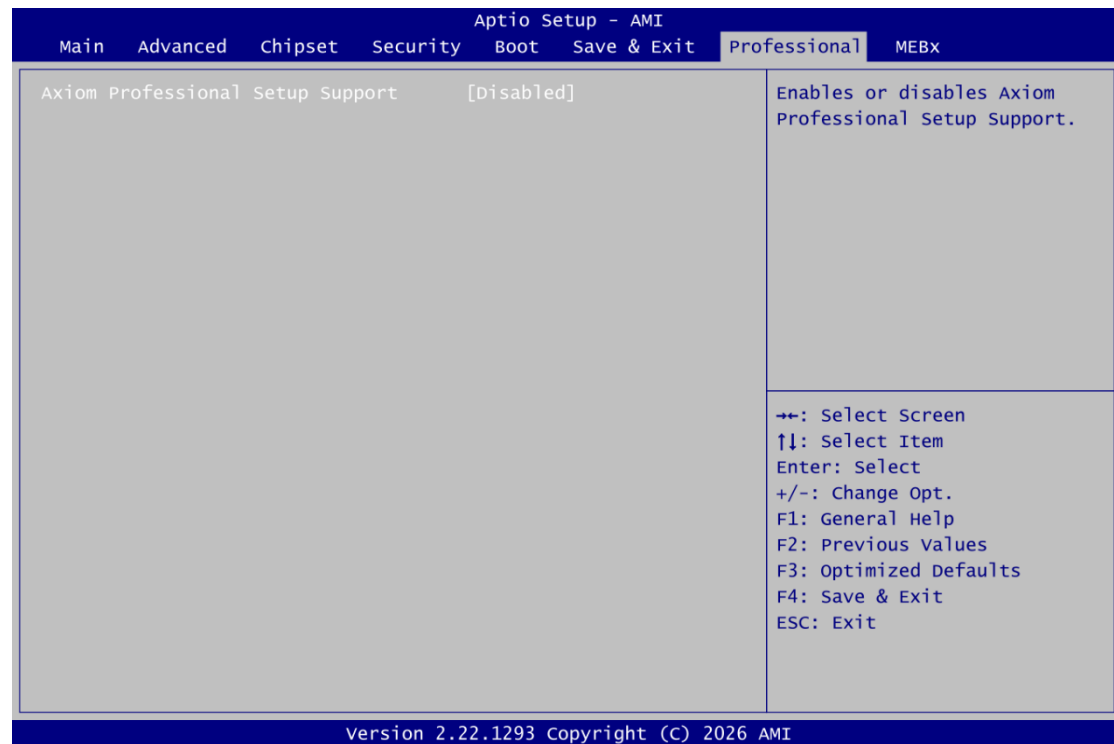
The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- 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.

4.9 Professional

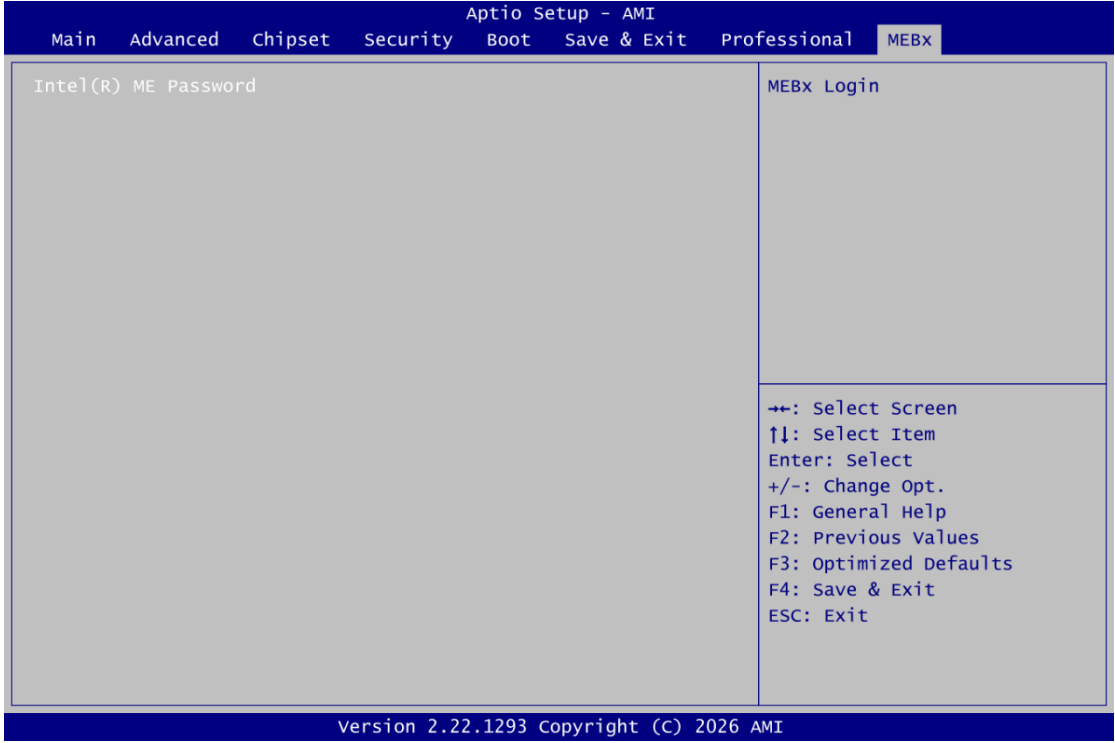


Axiom Professional Setup Support

Enable or disable Axiom Professional Setup Support.

4.10 MEBx

The MEBx menu allows users to configure Intel® Management Engine settings such as AMT configuration, network setup and ME password.



Intel (R) ME Password

Specifies the password used to access the MEBx menu.

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Appendix A

Watchdog Timer

B.1 About Watchdog Timer

After the system stops working for a while, it can be auto-reset by the watchdog timer. The integrated watchdog timer can be set up in the system reset mode by program.

B.2 How to Use Watchdog Timer (C programming language)

```

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

#define AXIOM_WDT_TIMER      0xFA10
#define AXIOM_WDT_TRIGGER   0xFA12

void main()
{
    unsigned long int    DefaultTimer = 0xFFFF; // 65535 Seconds
    unsigned long int    CurrentWdtTimer = 0;

    clrscr();
    // Set WDT Timer, maximum is 65535 seconds
    outportw(AXIOM_WDT_TIMER, DefaultTimer);
    printf("Set WDT Timer to: %ld Seconds\n", DefaultTimer);

    // 0x01: Enabled WDT, 0x00: Disabled WDT
    outportb(AXIOM_WDT_TRIGGER, 0x01);
    printf("Enabled WDT Timer\n");

    while(1)
    {
        clrscr();
        // Get current WDT Timer
        CurrentWdtTimer = inportw(AXIOM_WDT_TIMER);
        printf("Set WDT Timer to: %ld Seconds\n", DefaultTimer);
        printf("Current WDT Timer: %ld Seconds\n", CurrentWdtTimer);
        delay(1000);
    }
}
/////////////////////////////////////////////////////////////////

```

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Appendix B

Digital I/O

A.1 About Digital I/O

The onboard GPIO or digital I/O has 8 bits (DIO0~7). Each bit can be set to function as input or output by software programming. In default, all pins are pulled high with +3.3V level (according to main power). The BIOS default settings are 4 inputs and 4 outputs where all of these pins are set to 1.

A.2 How to Use Digital I/O (C programming language)

```

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

#define AXIOM_DIO_IN_OUT_ADDR      0xFA31
#define AXIOM_DIO_HIGH_LOW_ADDR   0xFA32

#define DIO_PIN1 BIT0    //correspondence to HW pin is GPIO
#define DIO_PIN2 BIT1    //correspondence to HW pin is GPI1
#define DIO_PIN3 BIT2    //correspondence to HW pin is GPI2
#define DIO_PIN4 BIT3    //correspondence to HW pin is GPI3
#define DIO_PIN5 BIT4    //correspondence to HW pin is GPO0
#define DIO_PIN6 BIT5    //correspondence to HW pin is GPO1
#define DIO_PIN7 BIT6    //correspondence to HW pin is GPO2
#define DIO_PIN8 BIT7    //correspondence to HW pin is GPO3

void main()
{
    // BIT0-BIT3 is input,BIT4-BIT7 is output
    unsigned char DIO_DefaultInOutSetting = 0x0F;
    // BIT0-BIT3 is input so do not care,BIT4-BIT7 is High
    unsigned char DIO_DefaultHighLowSetting = 0xF0;

    clrscr();
    // Set DIO input/output,1:input,0:output,BIT0-BIT3 is input,BIT4-BIT7 is output
    outportb(AXIOM_DIO_IN_OUT_ADDR, DIO_DefaultInOutSetting);
    printf("DIO input/output set to 0x%X \n", DIO_DefaultInOutSetting);
    printf("BIT0-BIT3 is setting to input,BIT4-BIT7 is setting to output\n");
}

```

```
// Set DIO High/Low,1:High,0:Low,now is set to BIT0-BIT3 is Low,BIT4-BIT7 is
// High
outportb(AXIOM_DIO_HIGH_LOW_ADDR, DIO_DefaultHighLowSetting);
printf("DIO High/Low set to 0x%X \n", DIO_DefaultHighLowSetting);
printf("BIT0-BIT3 is set to input so do not care,BIT4-BIT7 is setting to High");

while(1);
}
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
```