ESM-TGH

11th Gen. Intel® Xeon®, Core® i7/i5/i3, Celeron® BGA Processor Type 6 COMe Basic Module

User's Manual

2nd Ed –05 December 2022

Part No. E2047290202R

FCC Statement

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

Copyright Notice

Trademark Acknowledgement

Brand and product names are trademarks or registered trademarks of their respective owners.

Disclaimer

Avalue Technology Inc. reserves the right to make changes, without notice, to any product, including circuits and/or software described or contained in this manual in order to improve design and/or performance. Avalue Technology assumes no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright, or masks work rights to these products, and makes no representations or warranties that

these products are free from patent, copyright, or mask work right infringement, unless otherwise specified. Applications that are described in this manual are for illustration purposes only. Avalue Technology Inc. makes no representation or warranty that such application will be suitable for the specified use without further testing or modification.

Life Support Policy

Avalue Technology's PRODUCTS ARE NOT FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE PRIOR WRITTEN APPROVAL OF Avalue Technology Inc.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into body, or (b) support or sustain life and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

A Message to the Customer

Avalue Customer Services

Each and every Avalue's product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Avalue device is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Avalue has come to be known.

Your satisfaction is our primary concern. Here is a guide to Avalue's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone. So please consult the user's manual first.

To receive the latest version of the user's manual; please visit our Web site at:
http://www.avalue.com.tw/

CONTENT

1. Getting Started

1.1 Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

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

- 1 x ESM-TGH COMe Module
- 1 x Desiccant (5g)
- 2 x Screw-Pan (D4.4) M2.5*4mm Ni
- 5 x Screw-Pan (ψ4.4)M2.5*14mm BK

If any of the above items is damaged or missing, contact your retailer.

1.3 Document Amendment History

Revision	Date	By	Comment
1st	October 2022	Avalue	Initial Release
2nd	December 2022	Avalue	Update System Specifications

1.4 Manual Objectives

This manual describes in details Avalue Technology ESM-TGH Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to set up ESM-TGH series or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the NVRAM that make booting impossible. If this should happen, clear the NVRAM settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors regarding this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.5 System Specifications

System	
CPU	On board 11th Gen Intel® Xeon®/Core®/Celeron® BGA 10nm Processor (TDP 45/35W)
BIOS	AMI uEFI BIOS, 256 Mbit SPI Flash ROM
System Chipset	Intel® RM590E/QM580E/HM570E Express Chipset
I/O Chip	EC (ITE IT5571)
System Memory	Up to 3x 260-pin DDR4-3200MHz SO-DIMM with up to 96 GByte with ECC (ECC is supported with specific SKU) Note1:(3rd socket on rear side by request)
Watchdog Timer	H/W Reset, 1sec. ~ 65535sec. and 1sec./step
H/W Status Monitor	Monitoring System Temperature, Voltage and FAN Status with Auto Throttling Control
TPM	TPM 2.0 (NuvoTon NPCT754AADYX SPI Interface E14S4075401H, wide temp version, Co-lay with Infineon SLB9670 solution)
iAMT	Support AMT (supported with specific SKU)
PCI Express	1 PEGx16 (Gen4, 16.0 GT/s) support dGFX and NVMe Storage 8 PCIex1 (Gen3, 8.0 GT/s)
UART	2 x UART(2-wire)
USB 2.0	8 x USB 2.0
USB 3.1	4 x USB3.2 Gen2x1 (10 Gbps)
SATA	4 x SATA3.0 (6.0Gb/s)
DIO	8bit GPIO(NCT5655Y)
LPC	1x LPC (via eSPI-to-LPC bridge)
I^2C Bus	1x I^2C
SMBus	1x SMBus
Display	
Graphic Chipset	Gen 12 Intel® UHD Graphics (Xe architecture)
Spec. & Resolution	HDMI 2.0b: 4096 x 2304 @ 60Hz DP 1.4: 4096x2304 @60Hz LVDS: 1920x1080 @60Hz, support Dual-channel 18/24-bit LVDS (via eDP-to-LVDS IC 7511B) VGA: 1920x1200 @60Hz (via DP to VGA IC Chrontel® 7517A) eDP 1.4b: 4096x2304@60Hz (Optional) →Per Intel design guide, need to add Redriver (Redriver in carrier board to fine tune the signal of DP1.4). *Only support 4Lanes 2560x1440 & 2Lanes 1920x1080

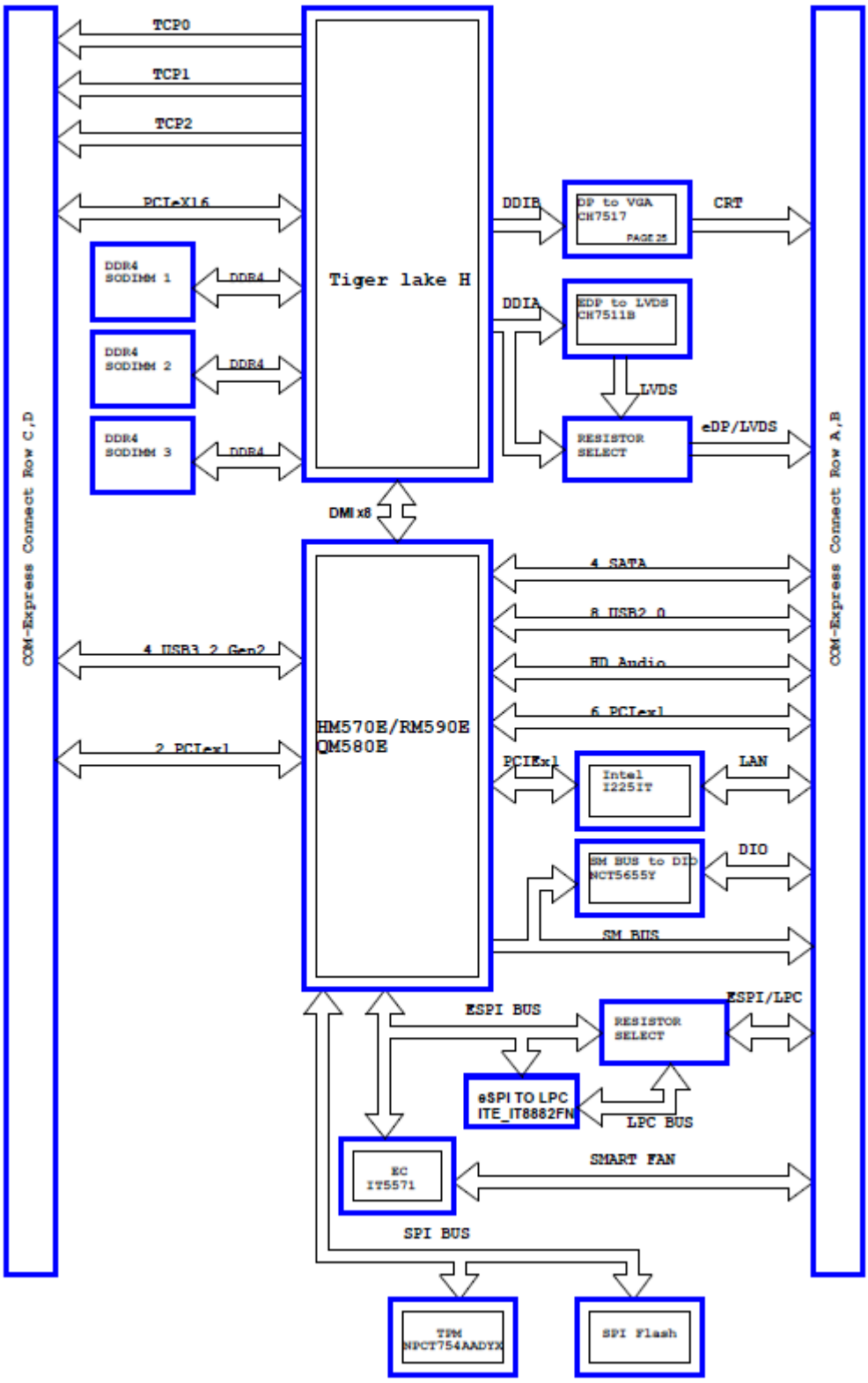
Multiple Display	Supporting 4 display up to 2K (3DDI+eDP)
Digital Display Interface (SOM)	HDMI/DP (default)
Audio	
Audio Codec	Intel® HD Audio integrated in SoC
Ethernet	
LAN Chipset	1 x 2.5 GbE Ethernet via Intel® i225LM/IT
LAN Spec.	10/100/1000/2500 Base-Tx GbE compatible
Mechanical & Environmental	
Power Requirement	+9~ +19V
ACPI	Single power ATX Support S0, S4, S5 ACPI 5.0a Compliant
Power Mode	AT/ATX
Operating Temp.	Operating Standard: 0 ~ 60 °C (32 ~ 140 °F) Operating Industrial (build option with selected SKUs): -40°C ~ 75°C (-40°F ~ 167°F)
Storage Temp.	-40°C ~ 85°C (-40°F ~ 185°F)
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Size (L x W) (Please consult product engineers for the production feasibility if the size is larger than 410x360mm or smaller than 80x70mm)	125*95 mm (3.74" x 4.92")
Weight	0.44lbs(0.2kg)
Vibration Test	Random Vibration Operation 1 Test PSD : 0.00454G²/Hz , 1.5 Grms 2 System condition : operation mode 3 Test frequency : 5~500 Hz 4 Test axis : X,Y and Z axis 5 Test time : 30 minutes per each axis 6 IEC60068-2-64 Test Fh 6 Storage : mSATA Random vibration test (Non-operation) 1 PSD: 0.01818G²/Hz, 3.0 Grms 2 Non-Operation mode 3 Test Frequency: 5-500Hz 4 Test Axis: X, Y and Z axis 5 30 min. per each axis 6 IEC 60068-2-64 Test:Fh Package Vibration Test:

	1 Test PSD: 0.026G²/Hz , 2.16 Grms 2 Test frequency: 5~500 Hz 3 Test axis : X,Y and Z axis 4 Test time : 30 minutes per each axis 5 IEC 60068-2-64 Test Fh
Shock Test	1 Wave from : Half Sine wave 2 Acceleration Rate : 10g 3 Duration Time : 11ms 4 No. of shock : Z axis 300 times 5 Test Axis : Z axis 6 operation mode 7 Reference IEC 60068-2-27 testing procedures Test Eb : Shock Test
Drop Test	Package drop test Reference ISTA 2A, Method : IEC-60068-2-32 Test: Ed Test Ea : Drop Test 1 Test phase : One corner, three edges, six faces 2 Test high : 96.5cm 3 Package weight : 5Kg 4 Test drawing
OS Information	Windows® 10, Linux (Kernel>5.8)

Note: Specifications are subject to change without notice.

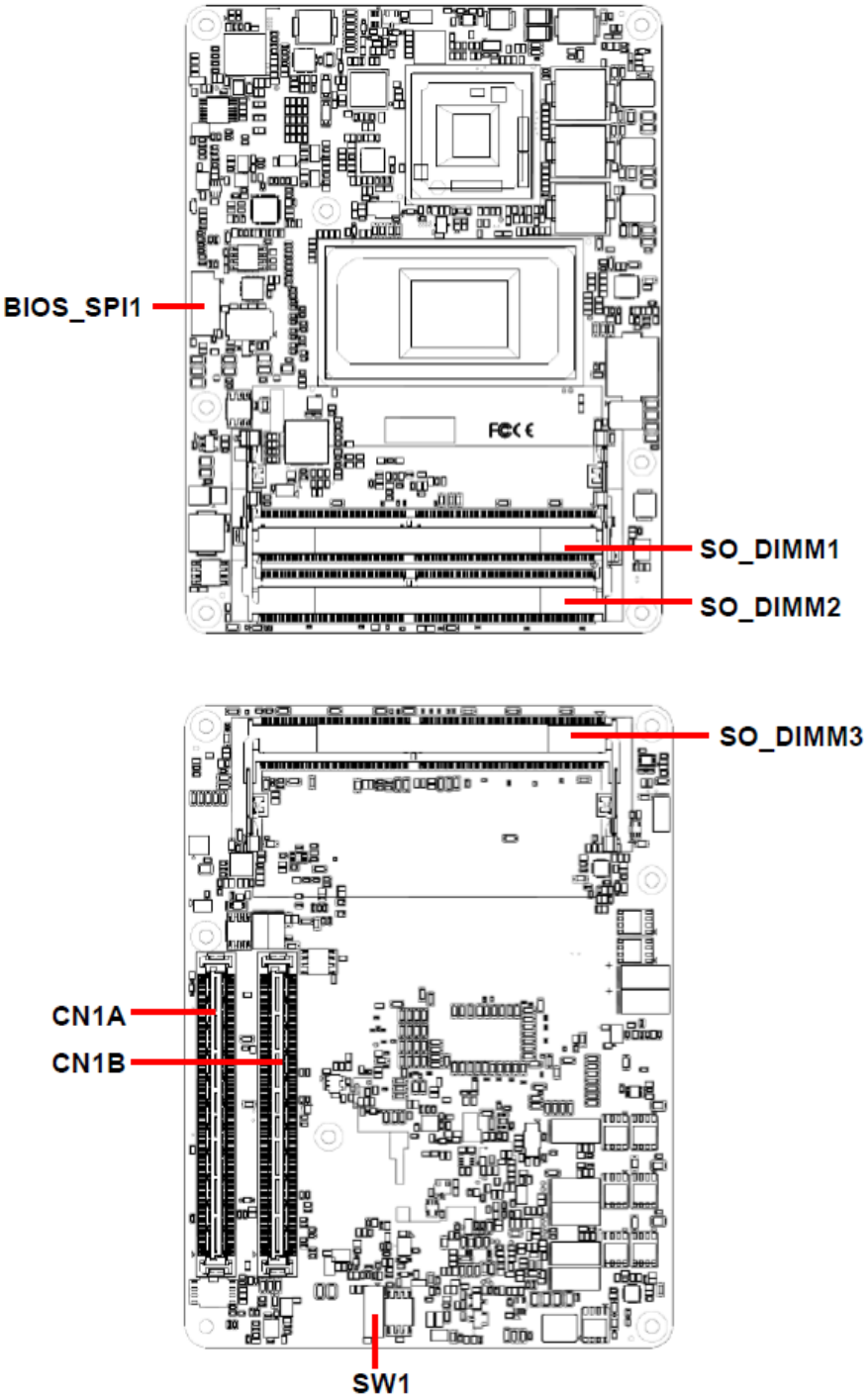
1.6 Architecture Overview—Block Diagram

The following block diagram shows the architecture and main components of ESM-TGH.



2. Hardware Configuration

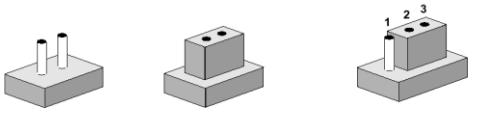
2.1 Product Overview



2.2 Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



Open Closed Closed 2-3

The jumper settings are schematically depicted in this manual as follows:

Open Closed Closed 2-3

A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

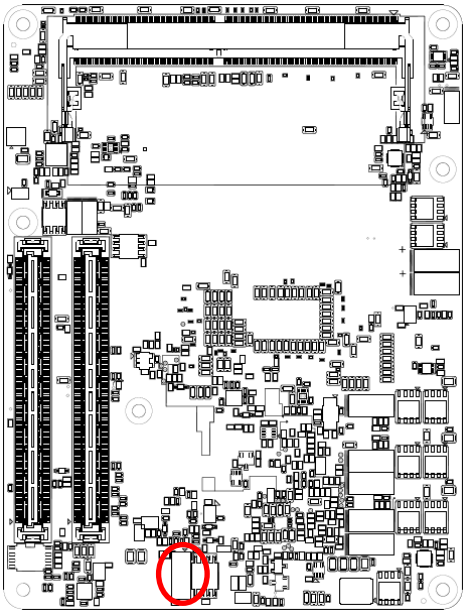
The following tables list the function of each of the board's jumpers and connectors.

Connectors

Label	Function	Note
BIOS_SPI1	(Reserved for BIOS programming)	
CN1A	COM Express connector 1	
CN1B	COM Express connector 2	
SODIMM1	260-pin DDR4 SDRAM DIMM socket	
SODIMM2	260-pin DDR4 SDRAM DIMM socket	
SODIMM3	260-pin DDR4 SDRAM DIMM socket	
SW1	AT/ATX mode selector	

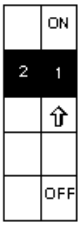
2.3 Setting Jumpers & Connectors

2.3.1 AT/ATX mode selector (SW1)

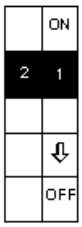


AT/ATX mode

AT mode*



ATX mode

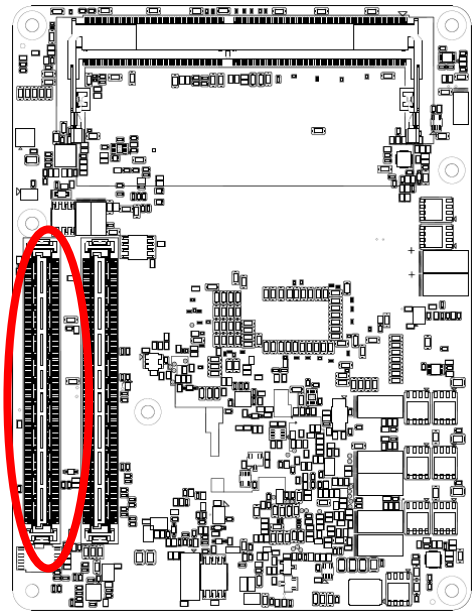


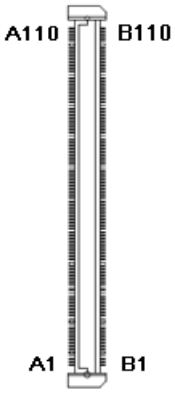
***Default**

2.3.1.1 Signal Description –AT/ATX mode selection

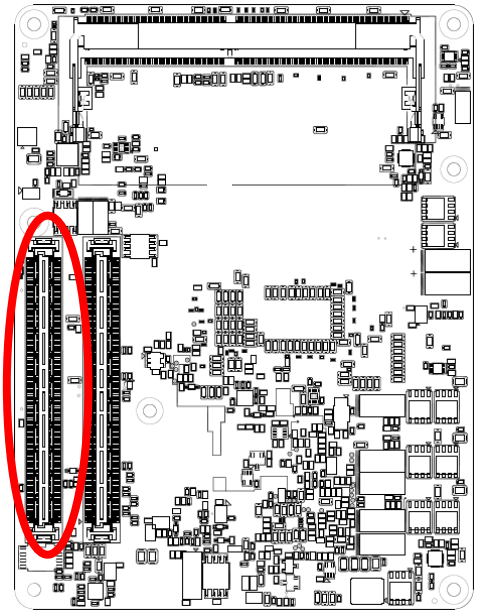
AT/ATX mode	Description
AT mode 	Auto-power on, no need to press Power button to enable power on/off
ATX mode 	Press the power button to enable power on/off

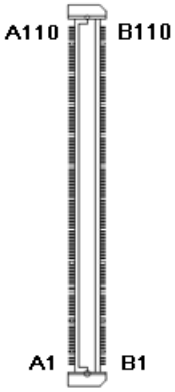
2.3.2 COM Express Connector 1 (CN1A)



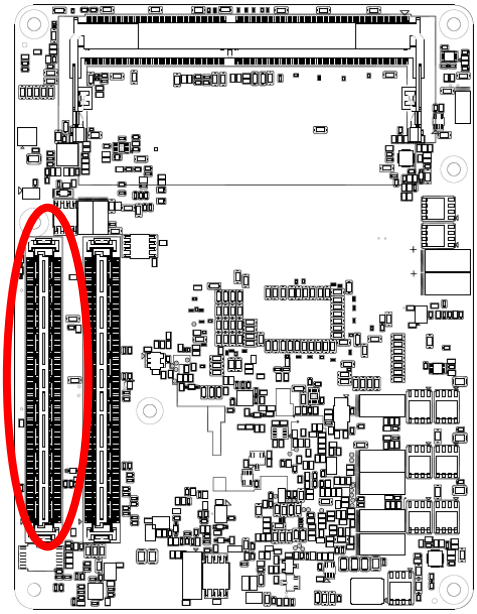


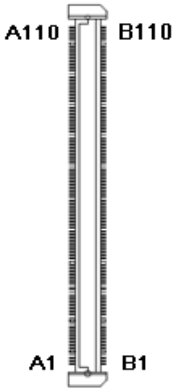
Signal	PIN	PIN	Signal
GND	A110	B110	GND
VCC	A109	B109	VCC
VCC	A108	B108	VCC
VCC	A107	B107	VCC
VCC	A106	B106	VCC
VCC	A105	B105	VCC
VCC	A104	B104	VCC
LID#	A103	B103	SLEEP#
SER1_RX	A102	B102	FAN_TACHIN
SER1_TX	A101	B101	FAN_PWMOUT
GND	A100	B100	GND
SER0_RX	A99	B99	NC
SER0_TX	A98	B98	NC
TYPE10#	A97	B97	NC
TPM_PP	A96	B96	VGA_I2C_DAT
NC	A95	B95	VGA_I2C_CK
NC	A94	B94	VGA_VSYNC
GPO0	A93	B93	VGA_HSYNC
NC	A92	B92	VGA_BLU
+3.3V_SPI	A91	B91	VGA_GRN
GND	A90	B90	GND
PCIE_CLK_REF-	A89	B89	VGA_RED
PCIE_CLK_REF+	A88	B88	NC
CB_EDP_HDP	A87	B87	+ATX5VSB
NC	A86	B86	+ATX5VSB
GPI3	A85	B85	+ATX5VSB
LVDS_I2C_DAT/EDP_AUX-	A84	B84	+ATX5VSB
LVDS_I2C_CK/EDP_AUX+	A83	B83	LVDS_BKLT_CTRL/ EDP_BKLT_CTRL
LVDS_A_CK-/EDP_TX3-	A82	B82	LVDS_B_CK-
LVDS_A_CK+/EDP_TX3+	A81	B81	LVDS_B_CK+



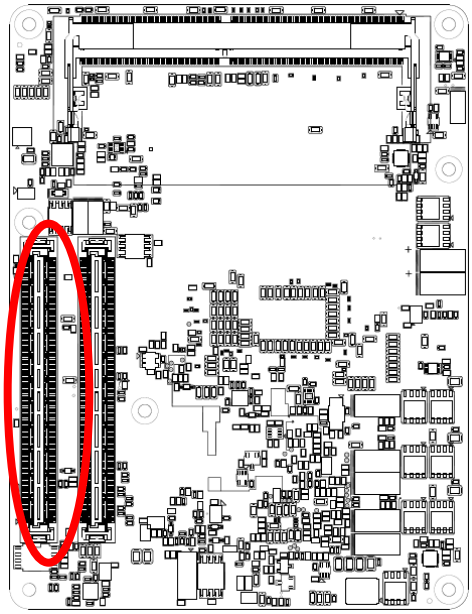


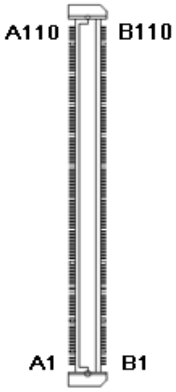
Signal	PIN	PIN	Signal
GND	A80	B80	GND
LVDS_A3-	A79	B79	LVDS_BKLT_EN/ EDP_BKLT_EN
LVDS_A3+	A78	B78	LVDS_B3-
LVDS_VDD_EN/EDP_VDD_EN	A77	B77	LVDS_B3+
LVDS_A2-/EDP_TX0-	A76	B76	LVDS_B2-
LVDS_A2+/EDP_TX0+	A75	B75	LVDS_B2+
LVDS_A1-/EDP_TX1-	A74	B74	LVDS_B1-
LVDS_A1+/EDP_TX1+	A73	B73	LVDS_B1+
LVDS_A0-/EDP_TX2-	A72	B72	LVDS_B0-
LVDS_A0+/EDP_TX2+	A71	B71	LVDS_B0+
GND	A70	B70	GND
PCIE_TX0-	A69	B69	PCIE_RX0-
PCIE_TX0+	A68	B68	PCIE_RX0+
GPI2	A67	B67	WAKE1#
GND	A66	B66	WAKE0#
PCIE_TX1-	A65	B65	PCIE_RX1-
PCIE_TX1+	A64	B64	PCIE_RX1+
GPI1	A63	B63	GPO3
PCIE_TX2-	A62	B62	PCIE_RX2-
PCIE_TX2+	A61	B61	PCIE_RX2+
GND	A60	B60	GND
PCIE_TX3-	A59	B59	PCIE_RX3-
PCIE_TX3+	A58	B58	PCIE_RX3+
GND	A57	B57	GPO2
PCIE_TX4-	A56	B56	PCIE_RX4-
PCIE_TX4+	A55	B55	PCIE_RX4+
GPI0	A54	B54	GPO1
PCIE_TX5-	A53	B53	PCIE_RX5-
PCIE_TX5+	A52	B52	PCIE_RX5+
GND	A51	B51	GND





Signal	PIN	PIN	Signal
LPC_SERIRQ/ ESPI_CS1#	A50	B50	CB_RESET#
GBE0_SDP	A49	B49	SYS_RESET#
RSVD1	A48	B48	USB0_HOST_PRSNT
+3.3V_RTC	A47	B47	NC
USB0+	A46	B46	USB1+
USB0-	A45	B45	USB1-
USB_2_3_OC#	A44	B44	USB_0_1_OC#
USB2+	A43	B43	USB3+
USB2-	A42	B42	USB3-
GND	A41	B41	GND
USB4+	A40	B40	USB5+
USB4-	A39	B39	USB5-
USB_6_7_OC#	A38	B38	USB_4_5_OC#
USB6+	A37	B37	USB7+
USB6-	A36	B36	USB7-
THRMTRIP#	A35	B35	THRM#
NC	A34	B34	I2C_DATA
HDA_SDOUT	A33	B33	I2C_CLK
HDA_BITCLK	A32	B32	SPKR
GND	A31	B31	GND
HDA_RST#	A30	B30	HDA_SDIN0
HDA_SYNC	A29	B29	HDA_SDIN1
(S)ATA_ACT#	A28	B28	NC
BATLOW#	A27	B27	WDT
SATA2_RX-	A26	B26	SATA3_RX-
SATA2_RX+	A25	B25	SATA3_RX+
SUS_S5#	A24	B24	PWR_OK
SATA2_TX-	A23	B23	SATA3_TX-
SATA2_TX+	A22	B22	SATA3_TX+
GND	A21	B21	GND





Signal	PIN	PIN	Signal
SATA0_RX-	A20	B20	SATA1_RX-
SATA0_RX+	A19	B19	SATA1_RX+
SUS_S4#	A18	B18	ESPI_RST#
SATA0_TX-	A17	B17	SATA1_TX-
SATA0_TX+	A16	B16	SATA1_TX+
SUS_S3#	A15	B15	SMB_ALERT#
GBE0_CTREF	A14	B14	SMB_SDA_S5
GBE0_MDI0+	A13	B13	SMB_SCL_S5
GBE0_MDI0-	A12	B12	PWRBTN#
GND	A11	B11	GND
GBE0_MDI1+	A10	B10	LPC_CLK/ ESPI_CK
GBE0_MDI1-	A9	B9	LPC_DRQ1#/ ESPI_ALERT1#
GBE0_LINK#	A8	B8	LPC_DRQ0#/ ESPI_ALERT0#
GBE0_MDI2+	A7	B7	LPC_AD3/ ESPI_IO_3
GBE0_MDI2-	A6	B6	LPC_AD2/ ESPI_IO_2
GBE0_LINK2500#	A5	B5	LPC_AD1/ ESPI_IO_1
GBE0_LINK1000#	A4	B4	LPC_AD0/ ESPI_IO_0
GBE0_MDI3+	A3	B3	LPC_FRAME#/ ESPI_CS0#
GBE0_MDI3-	A2	B2	GBE0_ACT#
GND	A1	B1	GND

2.3.2.1 Signal Description – COM Express Connector 1 (CN1A)

2.3.2.1.1 Audio Signals

Signal	Signal Description
HDA_SYNC	HD Audio Sync
HDA_RST#	HD Audio Reset

2.3.2.1.2 Gigabit Ethernet Signals

<table>
<tr><th>Signal</th><th>Signal Description</th></tr>
<tr><td>GBE0_MD[0:3] +/-</td><td>Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0,1,2,3. The MDI can operate in 2500, 1000, 100 and 10 Mbit / sec modes. Some pairs are unused in some modes, per the following:
<table>
<tr><th></th><th>2500B-T/1000B-T</th><th>100B-T</th><th>10B-T</th></tr>
<tr><td>MDI[0]+/-</td><td>B1_DA+/</td><td>TX+/-</td><td>TX+/-</td></tr>
<tr><td>MDI[1]+/</td><td>B1_DB+/</td><td>RX+/-</td><td>RX+/-</td></tr>
<tr><td>MDI[2]+/</td><td>B1_DC+/</td><td>X</td><td>X</td></tr>
<tr><td>MDI[3]+/</td><td>B1_DD+/</td><td>X</td><td>X</td></tr>
</table>
</td></tr>
<tr><td>GBE0_ACT#</td><td>Gigabit Ethernet Controller 0 activity indicator, active low.</td></tr>
<tr><td>GBE0_LINK#</td><td>Gigabit Ethernet Controller 0 link indicator, active low.</td></tr>
<tr><td>GBE0_LINK100_1000#</td><td>Gigabit Ethernet Controller 100 1000 Mbit / sec link indicator, active low.</td></tr>
<tr><td>GBE0_LINK2500#</td><td>Gigabit Ethernet Controller 2500 Mbit / sec link indicator, active low.</td></tr>
</table>

2.3.2.1.3 PCI Express Signals

Signal	Signal Description
PCIE_TX[0:5] +/-	PCI Express Differential Transmit Pair 0-5
PCIE_RX[0:5] +/-	PCI Express Differential Receive Pair 0-5

2.3.2.1.4 Flat Panel LVDS Signals

Signal	Signal Description
LVDS_BKLT_CTRL	Controls panel digital power.
LVDS_I2C_CK	I2C clock output for LVDS display use.
LVDS_I2C_DAT	I2C data line for LVDS display use.
LVDS_VDD_EN	LVDS panel power enables.

2.3.2.1.5 LPC/eSPI Signals

Signal	Signal Description
LPC_FRAME#/ ESPI_CS0#	LPC frame indicates the start of an LPC cycle
	ESPI Mode: eSPI Master Chip Select Outputs Driving Chip Select0#. A low selects a particular eSPI slave for the transaction. Each of the eSPI slaves is connected to a dedicated Chip Selectn# pin
LPC_AD[0:3]/ ESPI_IO_[0:3]	LPC multiplexed address, command and data bus
	ESPI Mode: eSPI Master Data Input / Outputs These are bi-directional input/output pins used to transfer data between master and slaves. Multiplexed with LPC_AD[0:3]
LPC_CLK/ ESPI_CK	LPC clock output - 33MHz nominal
	ESPI Mode: eSPI Master Clock Output This pin provides the reference timing for all the serial input and output operations
LPC_SERIRQ/ ESPI_CS1#	LPC serial interrupt
	ESPI Mode: eSPI Master Chip Select Outputs Driving Chip Select# A low selects a particular eSPI slave for the transaction. Each of the eSPI slaves is connected to a dedicated Chip Selectn# pin
LPC_DRQ0#/ ESPI_ALERT0#	LPC serial DMA request.
	ESPI Mode: eSPI pins used by eSPI slave to request service from the eSPI master.
LPC_DRQ1#/ ESPI_ALERT1#	LPC serial DMA request.
	ESPI Mode: eSPI pins used by eSPI slave to request service from the eSPI master.

2.3.2.1.6 GPIO Signals

Signal	Signal Description
GPI[0:3]	General purpose input pins.
GPO[0:3]	General purpose output pins.

2.3.2.1.7 Power & System Management Signals

Signal	Signal Description
SUS_S3#	Indicates system is in Suspend to RAM state. Active low output.
BATLOW#	Indicates that external battery is low
PWRBTN#	Power button to bring system out of S5 (soft off), active on rising edge.
SMB_SCL_S5	System Management Bus bidirectional clock line.
SMB_SDA_S5	System Management Bus bidirectional data line.
SMB_ALERT#	System Management Bus Alert - input can be used to generate an SMI# (System Management Interrupt) or to wake the system.

ESPI_RST#	ESPI Mode: eSPI Reset Reset the eSPI interface for both master and slaves. eSPI Reset# is typically driven from eSPI master to eSPI slaves
PWR_OK	Power OK from main power supply
SYS_RESET#	Reset button input. Active low input.
WAKE0#	PCI Express wake up signal.
WAKE1#	General purpose wake up signal.

2.3.2.1.8 SATA Signals

Signal	Signal Description
SATA[0:3]_TX +/-	Serial ATA Channel 0-3 transmit differential pair.
SATA[0:3]_RX +/-	Serial ATA Channel 0-3 receive differential pair.
ATA_ACT#	ATA (parallel and serial) activity indicator, active low.

2.3.2.1.9 USB Signals

Signal	Signal Description
USB[0:7] +/-	USB differential pairs, channels 0 through 7
USB_0_1_OC#	USB over-current sense, USB channels 0 and 1
USB_2_3_OC#	USB over-current sense, USB channels 2 and 3
USB_4_5_OC#	USB over-current sense, USB channels 4 and 5
USB_6_7_OC#	USB over-current sense, USB channels 6 and 7

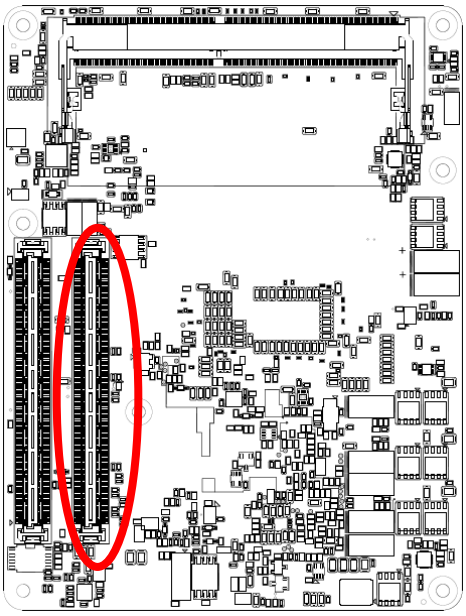
2.3.2.1.10 I2C Signals

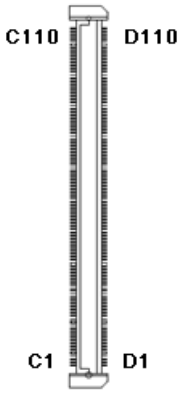
Signal	Signal Description
I2C_CLK	General purpose I2C port clock output.
I2C_DATA	General purpose I2C port data I/O line.

2.3.2.1.11 USB3.0 Signals

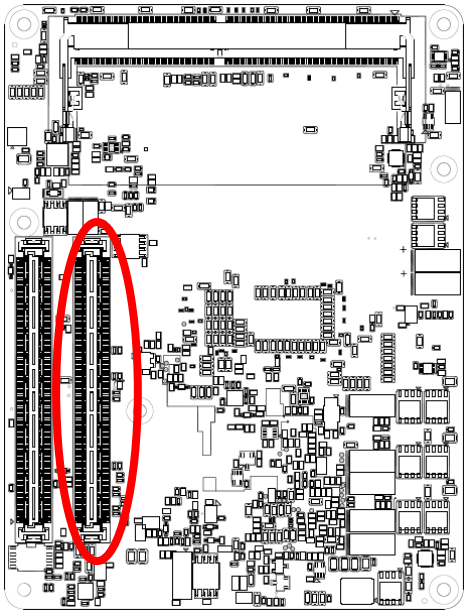
Signal	Signal Description
USB_SSTX[0:1]+ USB_SSTX[0:1]-	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSRX[0:1]+ USB_SSRX[0:1]-	Additional receive signal differential pairs for the SuperSpeed USB data path.

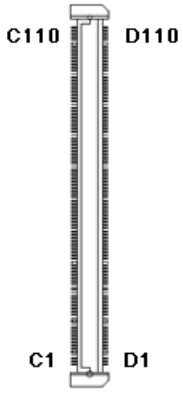
2.3.3 COM Express Connector 2 (CN1B)



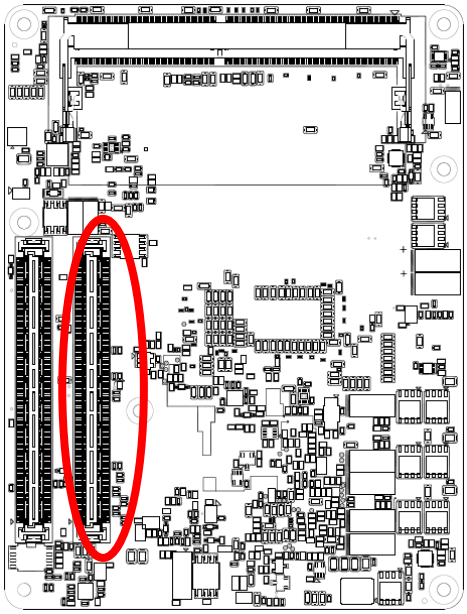


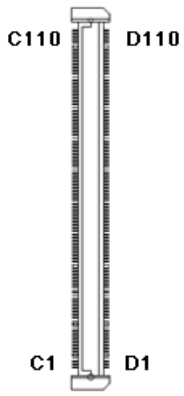
Signal	PIN	PIN	Signal
GND	C110	D110	GND
VCC	C109	D109	VCC
VCC	C108	D108	VCC
VCC	C107	D107	VCC
VCC	C106	D106	VCC
VCC	C105	D105	VCC
VCC	C104	D104	VCC
GND	C103	D103	GND
PEG_RX15-	C102	D102	PEG_TX15-
PEG_RX15+	C101	D101	PEG_TX15+
GND	C100	D100	GND
PEG_RX14-	C99	D99	PEG_TX14-
PEG_RX14+	C98	D98	PEG_TX14+
NC	C97	D97	NC
GND	C96	D96	GND
PEG_RX13-	C95	D95	PEG_TX13-
PEG_RX13+	C94	D94	PEG_TX13+
GND	C93	D93	GND
PEG_RX12-	C92	D92	PEG_TX12-
PEG_RX12+	C91	D91	PEG_TX12+
GND	C90	D90	GND
PEG_RX11-	C89	D89	PEG_TX11-
PEG_RX11+	C88	D88	PEG_TX11+
GND	C87	D87	GND
PEG_RX10-	C86	D86	PEG_TX10-
PEG_RX10+	C85	D85	PEG_TX10+
GND	C84	D84	GND
NC	C83	D83	NC
PEG_RX9-	C82	D82	PEG_TX9-
PEG_RX9+	C81	D81	PEG_TX9+



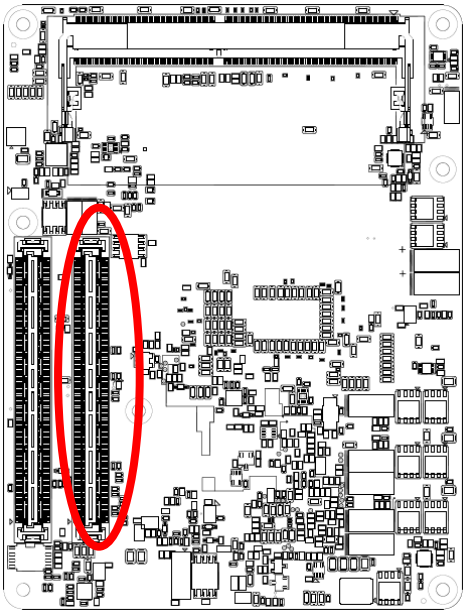


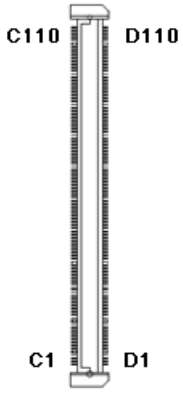
Signal	PIN	PIN	Signal
GND	C80	D80	GND
PEG_RX8-	C79	D79	PEG_TX8-
PEG_RX8+	C78	D78	PEG_TX8+
NC	C77	D77	NC
GND	C76	D76	GND
PEG_RX7-	C75	D75	PEG_TX7-
PEG_RX7+	C74	D74	PEG_TX7+
GND	C73	D73	GND
PEG_RX6-	C72	D72	PEG_TX6-
PEG_RX6+	C71	D71	PEG_TX6+
GND	C70	D70	GND
PEG_RX5-	C69	D69	PEG_TX5-
PEG_RX5+	C68	D68	PEG_TX5+
RAPID_SHUTDOWN	C67	D67	GND
PEG_RX4-	C66	D66	PEG_TX4-
PEG_RX4+	C65	D65	PEG_TX4+
NC	C64	D64	NC
NC	C63	D63	NC
PEG_RX3-	C62	D62	PEG_TX3-
PEG_RX3+	C61	D61	PEG_TX3+
GND	C60	D60	GND
PEG_RX2-	C59	D59	PEG_TX2-
PEG_RX2+	C58	D58	PEG_TX2+
TYPE1#	C57	D57	TYPE2#
PEG_RX1-	C56	D56	PEG_TX1-
PEG_RX1+	C55	D55	PEG_TX1+
TYPE0#	C54	D54	PEG_LAN_RV#
PEG_RX0-	C53	D53	PEG_TX0-
PEG_RX0+	C52	D52	PEG_TX0+
GND	C51	D51	GND





Signal	PIN	PIN	Signal
DDI3_PAIR3-	C50	D50	DDI2_PAIR3-
DDI3_PAIR3+	C49	D49	DDI2_PAIR3+
NC	C48	D48	NC
DDI3_PAIR2-	C47	D47	DDI2_PAIR2-
DDI3_PAIR2+	C46	D46	DDI2_PAIR2+
NC	C45	D45	NC
DDI3_HPD	C44	D44	DDI2_HPD
DDI3_PAIR1-	C43	D43	DDI2_PAIR1-
DDI3_PAIR1+	C42	D42	DDI2_PAIR1+
GND	C41	D41	GND
DDI3_PAIR0-	C40	D40	DDI2_PAIR0-
DDI3_PAIR0+	C39	D39	DDI2_PAIR0+
DDI3_DDC_AUX_SEL	C38	D38	NC
DDI3_CTRLDATA_AUX-	C37	D37	DDI1_PAIR3-
DDI3_CTRLCLK_AUX+	C36	D36	DDI1_PAIR3+
NC	C35	D35	NC
DDI2_DDC_AUX_SEL	C34	D34	DDI1_DDC_AUX_SEL
DDI2_CTRLDATA_AUX-	C33	D33	DDI1_PAIR2-
DDI2_CTRLCLK_AUX+	C32	D32	DDI1_PAIR2+
GND	C31	D31	GND
NC	C30	D30	DDI1_PAIR1-
NC	C29	D29	DDI1_PAIR1+
NC	C28	D28	NC
RSVD7	C27	D27	DDI1_PAIR0-
NC	C26	D26	DDI1_PAIR0+
NC	C25	D25	NC
DDI1_HPD	C24	D24	NC
PCIE_RX7-	C23	D23	PCIE_TX7-
PCIE_RX7+	C22	D22	PCIE_TX7+
GND	C21	D21	GND





Signal	PIN	PIN	Signal
PCIE_RX6-	C20	D20	PCIE_TX6-
PCIE_RX6+	C19	D19	PCIE_TX6+
LVDS_BLDN	C18	D18	NC
LVDS_BLUP	C17	D17	NC
NC	C16	D16	DDI1_CTRLDATA_AUX-
NC	C15	D15	DDI1_CTRLCLK_AUX+
GND	C14	D14	GND
USB_SSRX3+	C13	D13	USB_SSTX3+
USB_SSRX3-	C12	D12	USB_SSTX3-
GND	C11	D11	GND
USB_SSRX2+	C10	D10	USB_SSTX2+
USB_SSRX2-	C9	D9	USB_SSTX2-
GND	C8	D8	GND
USB_SSRX1+	C7	D7	USB_SSTX1+
USB_SSRX1-	C6	D6	USB_SSTX1-
GND	C5	D5	GND
USB_SSRX0+	C4	D4	USB_SSTX0+
USB_SSRX0-	C3	D3	USB_SSTX0-
GND	C2	D2	GND
GND	C1	D1	GND

2.3.3.1 Signal Description – COM Express Connector 2 (CN1B)

2.3.3.1.1 USB3.0 Signals

Signal	Signal Description
USB_SSTX[0:3]+ USB_SSTX[0:3]-	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSRX[0:3]+ USB_SSRX[0:3]-	Additional receive signal differential pairs for the SuperSpeed USB data path.

2.3.3.1.2 DDI Signals

Signal	Signal Description
DDI[1:3]_PAIR[0:3]+ DDI[1:3]_PAIR[0:3]-	Digital Display Interface 1 to 3Pair[0:3] differential pairs
DDI[1:3]_DDC_AUX_SEL	Selects the function of DDI[1:3]_CTRLCLK_AUX+ and DDI[1:3]_CTRLDATA_AUX-. If this input is floating the AUX pair is used for the DP AUX+/- signals. If pulled-high the AUX pair contains the CRTLCLK and CTRLDATA signals.
DDI[1:3]_CTRLCLK_AUX+	DP AUX+function if DDI[1:3]_DDC_AUX_SEL is no connect HDMI/DVI 12C CTRLCLK if DDI[1:3]_DDC_AUX_SEL is pulled high
DDI[1:3]_CTRLDATA_AUX-	DP AUX-function if DDI[1:3]_DDC_AUX_SEL is no connect HDMI/DVI 12C CTRLDATA if DDI[1:3]_DDC_AUX_SEL is pulled high
DDI[1:3]_HPD	Digital Display Interface Hot-Plug Detect

2.3.3.1.3 PCI Express Signals

Signal	Signal Description
PCIE_TX6 +/-	PCI Express Differential Transmit Pair 6
PCIE_RX6 +/-	PCI Express Differential Receive Pair 6

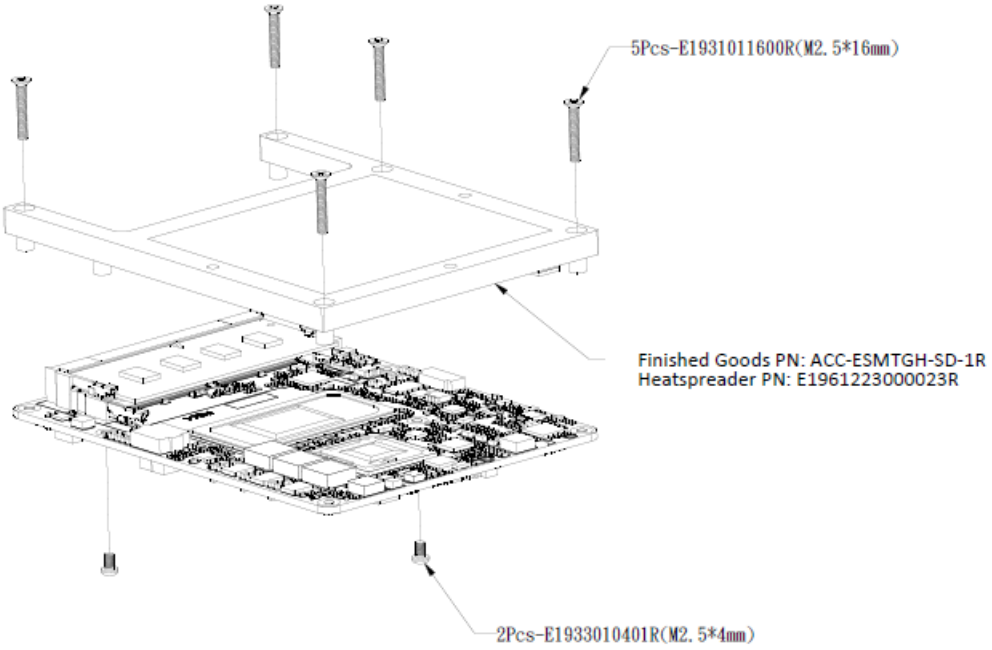
2.3.3.1.4 PEG PCI Express Lanes Signals

Signal	Signal Description
PEG_TX[0:15]+ PEG_TX[0:15]-	PCI Express Graphics transmit differential paris.
PEG_RX[0:15]+ PEG_RX[0:15]-	PCI Express Graphics recevie differential paris.

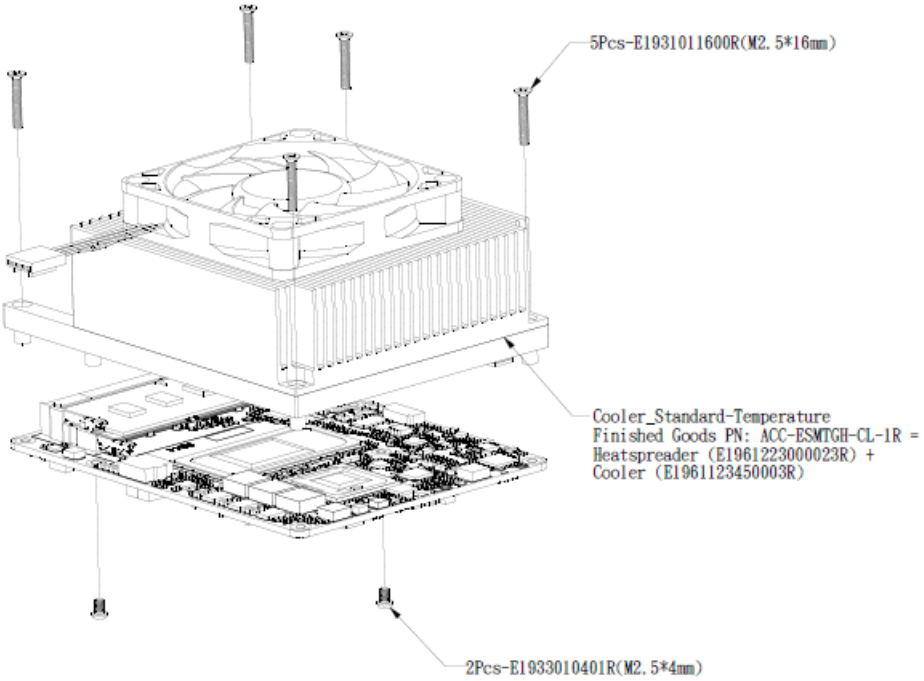
2.4 Installing Heatsink / Cooler

Standard Temperature

Heat spreader



Cooler



Step1. Using 5 screws (M2.5-16L) to lock the heat spreader and Cooler through PCB screw holes from top to bottom.

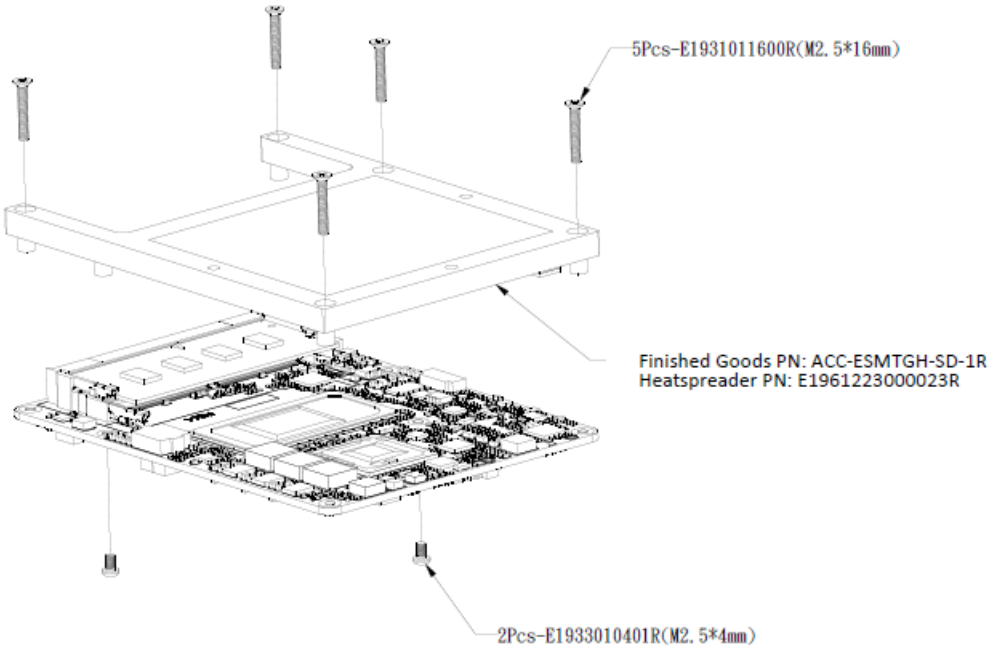
Note:

Screw Size/Q'TY

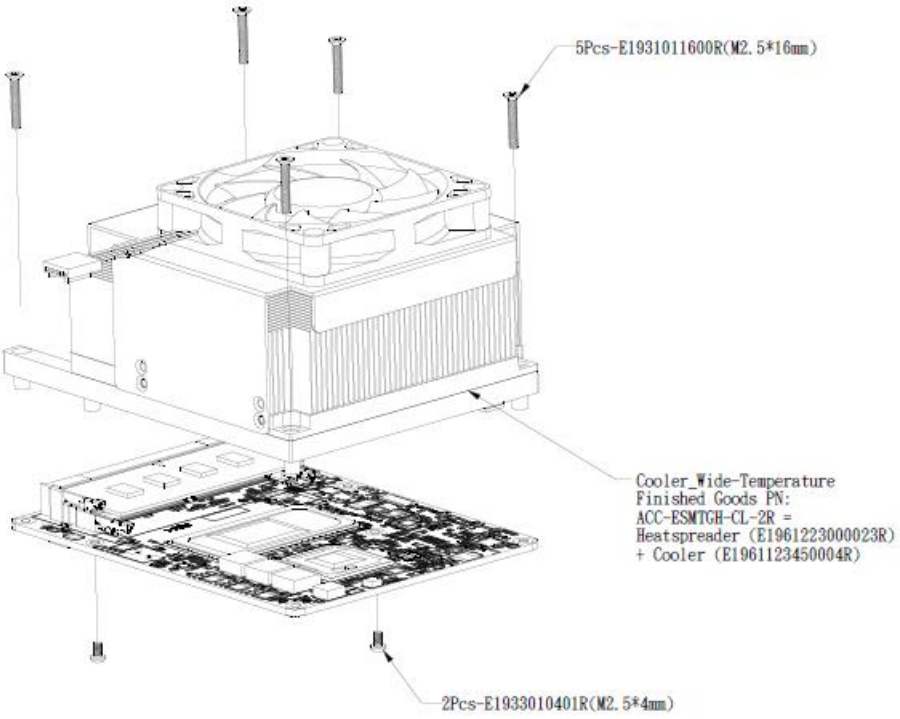
- M2.5-16L Ni*5pcs

Wide Temperature

Heat spreader



Cooler



Step1. Using 5 screws (M2.5-16L) to lock the heat spreader and Cooler through PCB screw holes from top to bottom.

Note:

Screw Size/Q'TY

- M2.5-16L Ni*5pcs

3. BIOS Setup

3.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. In this following chapter will describe how to access the BIOS setup program and the configuration options that may be changed.

3.2 Starting Setup

AMI BIOS™ is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:
By pressing <F2> or <Del> immediately after switching the system on, or
By pressing the <F2> or <Del> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <F2> or <Del> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

3.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Button	Description
↑	Move to previous item
↓	Move to next item
←	Move to the item in the left hand
→	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into NVRAM Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Previous Values
F3 key	Optimized defaults
F4 key	Save & Exit Setup

- **Navigating Through The Menu Bar**

  Use the left and right arrow keys to choose the menu you want to be in.

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

- **To Display a Sub Menu**

  Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>. A "➢" pointer marks all sub menus.

3.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

3.5 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the BIOS supports an override to the NVRAM settings which resets your system to its defaults.

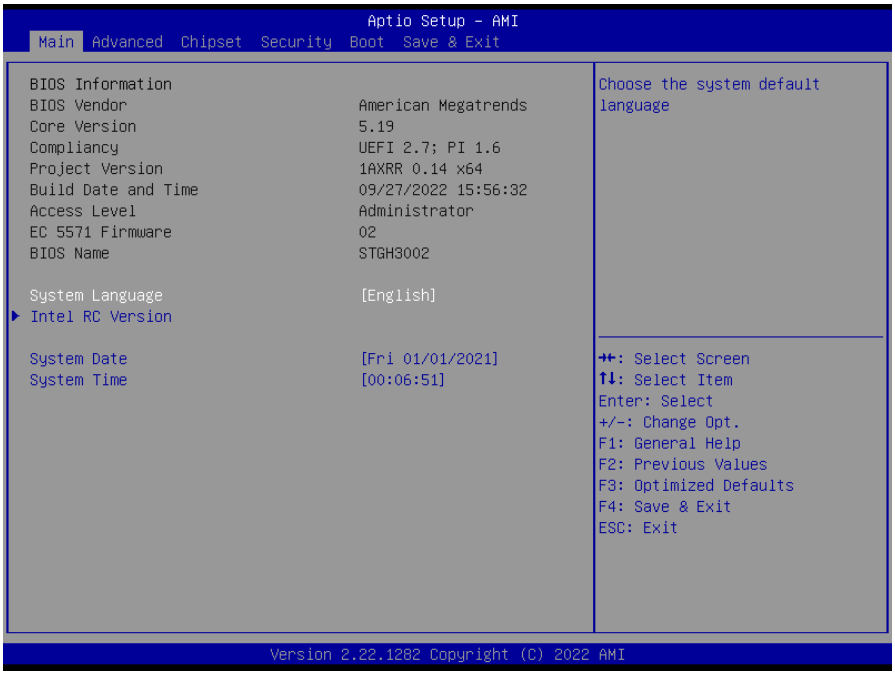
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

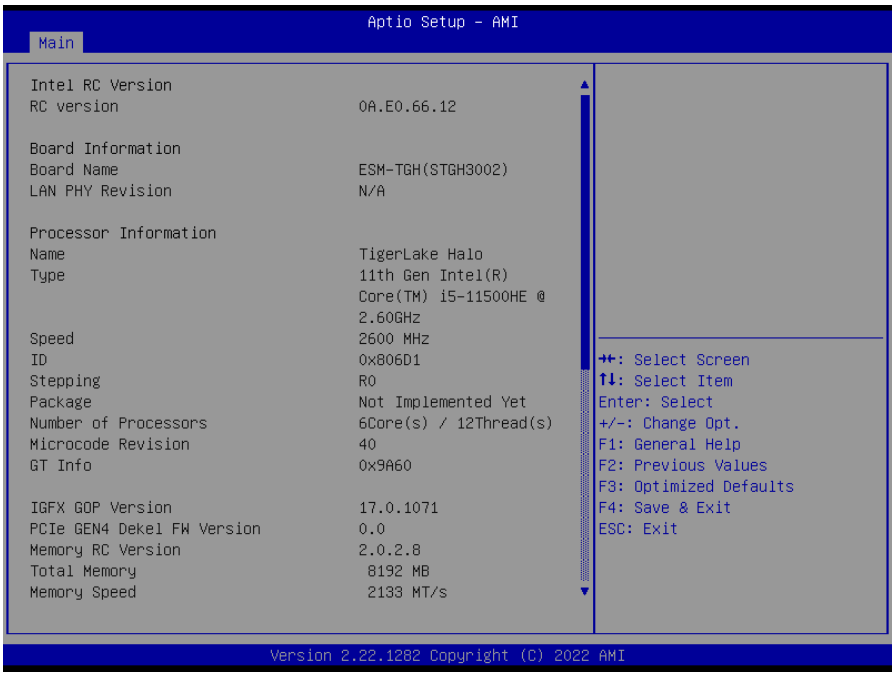
3.6 BIOS setup

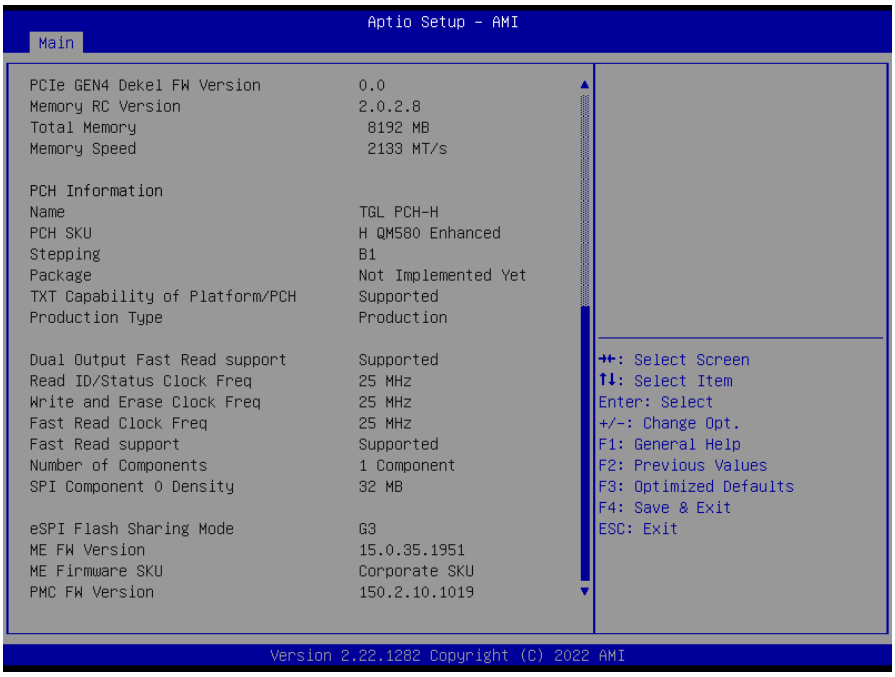
Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

3.6.1 Main Menu

This section allows you to record some basic hardware configurations in your computer and set the system clock.







3.6.1.1 System Language

This option allows choosing the system default language.

3.6.1.2 System Date

Use the system date option to set the system date. Manually enter the day, month and year.

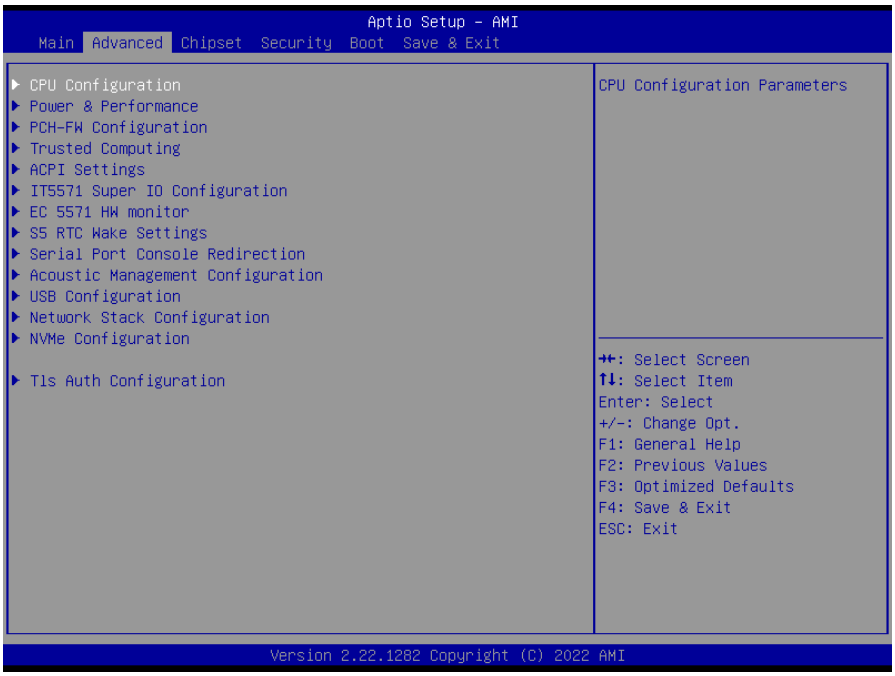
3.6.1.3 System Time

Use the system time option to set the system time. Manually enter the hours, minutes and seconds.

Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com.tw) to download the latest product and BIOS information.

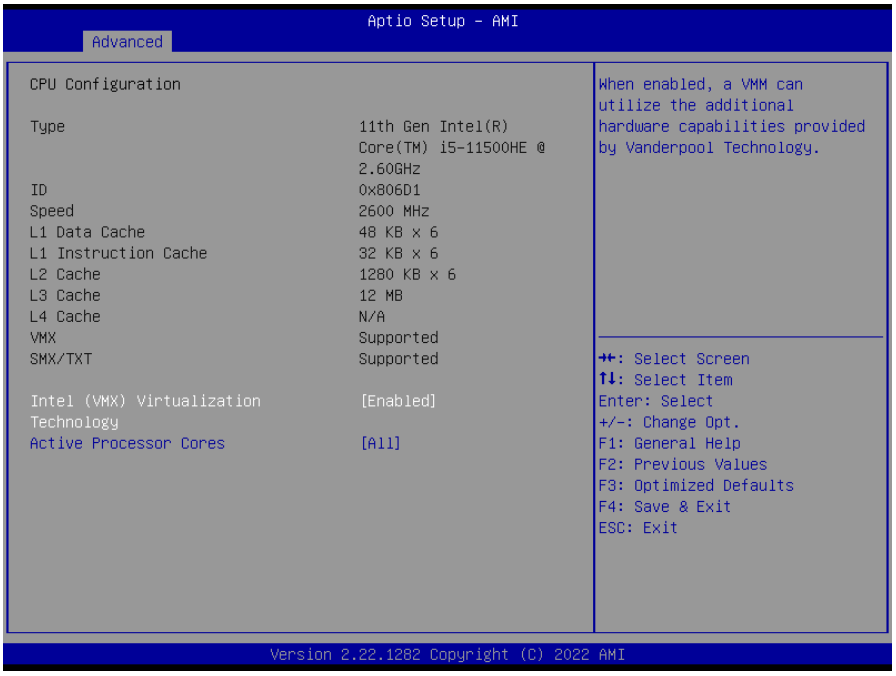
3.6.2 Advanced Menu

This section allows you to configure your CPU and other system devices for basic operation through the following sub-menus.



3.6.2.1 CPU Configuration

Use the CPU configuration menu to view detailed CPU specification and configure the CPU.

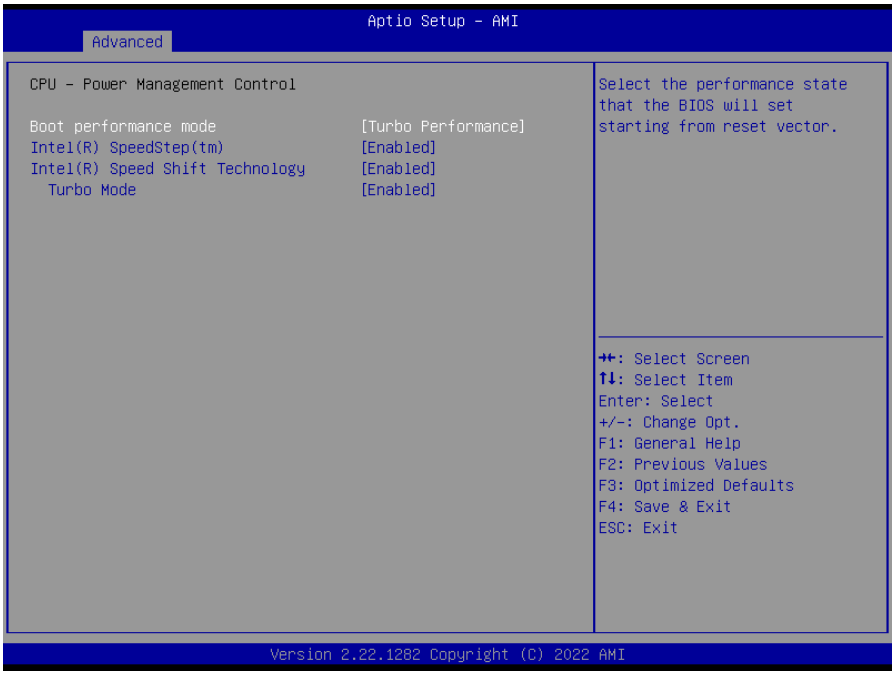


Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool

		Technology.
Active Processor Cores	All**[Default]** 1 2 3 4 5 6 7 8	Number of cores to enable in each processor package.

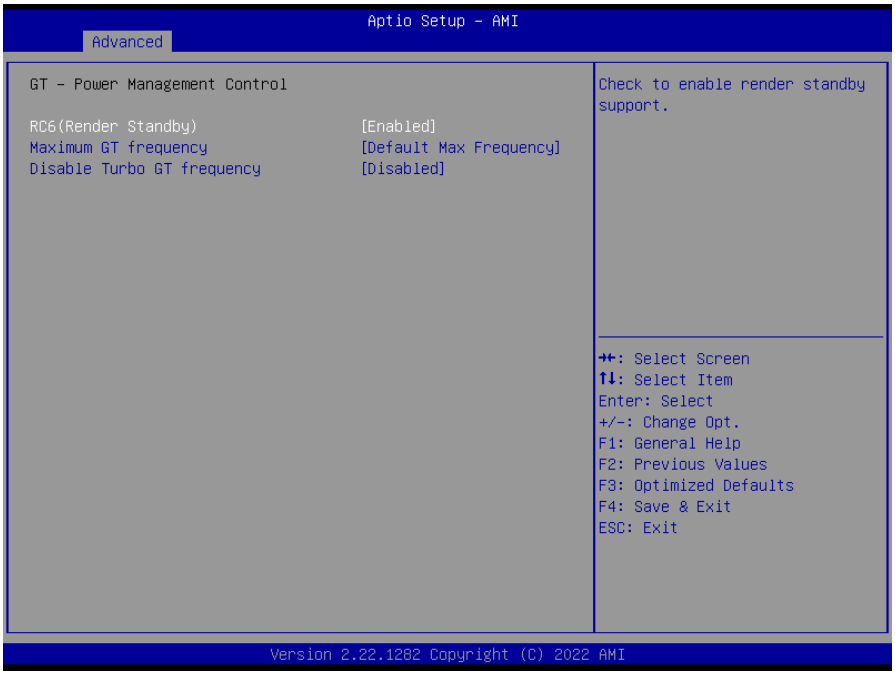
3.6.2.2 Power & Performance

3.6.2.2.1 CPU – Power Management Control



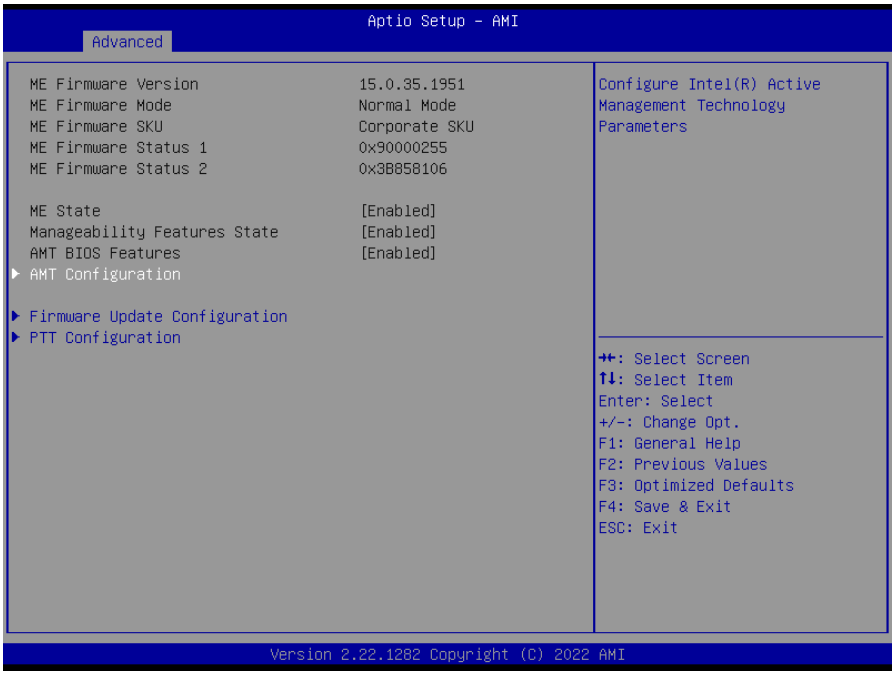
Item	Option	Description
Boot performance mode	Max Battery Max Non-Turbo Performance Turbo Performance**[Default]**	Select the performance state that the BIOS will set starting from reset vector.
Intel(R) SpeedStep(tm)	Disabled Enabled**[Default]**	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Disabled Enabled**[Default]**	Eanble/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Disabled Enabled**[Default]**	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.

3.6.2.2.2 GT – Power Management Control

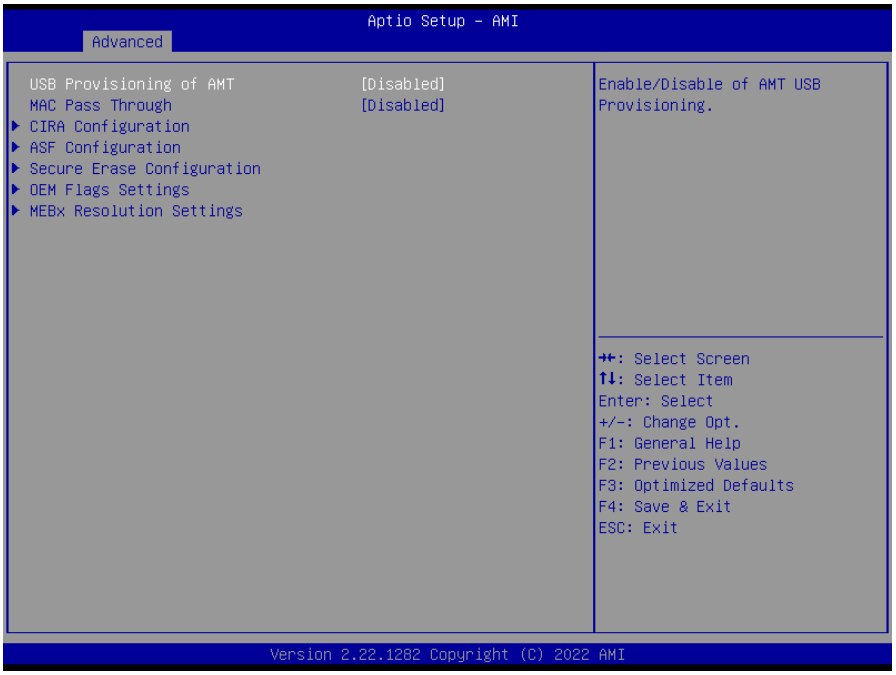


Item	Option	Description
RC6(Render Standby)	Enabled**[Default]**, Disabled	Check to enable render standby support.
Maximum GT frequency	Default Max Frequency**[Default]**,/ 100Mhz/150Mhz/200Mhz/250Mhz/ 300Mhz/350Mhz/400Mhz/450Mhz/ 500Mhz/550Mhz/600Mhz/650Mhz/ 700Mhz/750Mhz/800Mhz/850Mhz/ 900Mhz/950Mhz/1000Mhz/1050Mhz/ 1100Mhz/1150Mhz/1200Mhz	Auto Updated.
Disable Turbo GT frequency	Enabled Disabled**[Default]**	Enable: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

3.6.2.3 PCH-FW Configuration

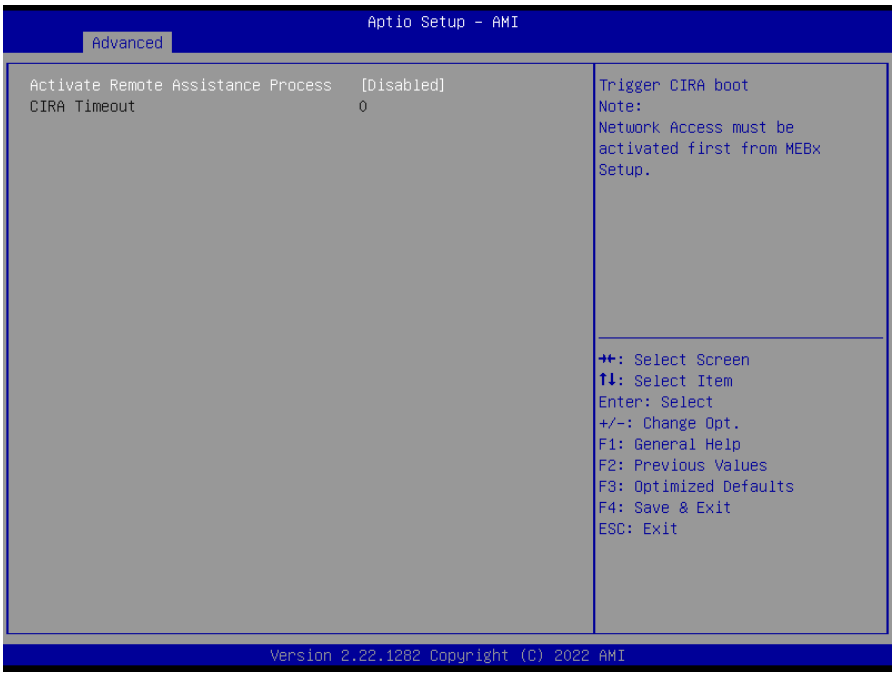


3.6.2.3.1 AMT Configuration



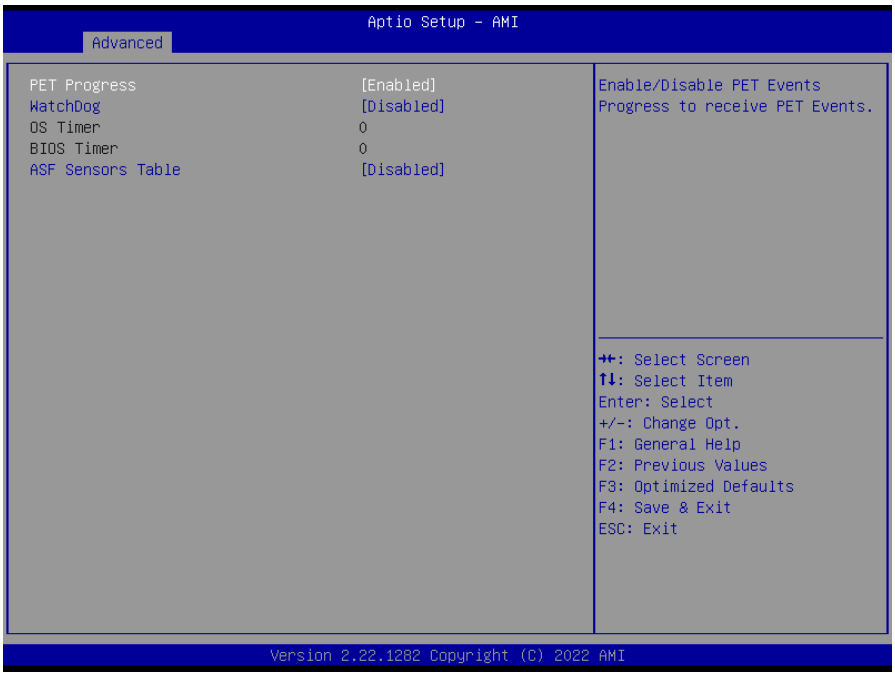
Item	Option	Description
USB Provisioning of AMT	Disabled**[Default]**, Enabled	Enable/Disable of AMT USB Provisioning.
MAC Pass Through	Disabled**[Default]**, Enabled	Enable/Disable MAC Pass Through function.

3.6.2.3.1.1 CIRA Configuration



Item	Option	Description
Activate Remote Assistance Process	Disabled**[Default]**, Enabled	Trigger CIRA boot Note: Network Access must be activated first from MEBx Setup.

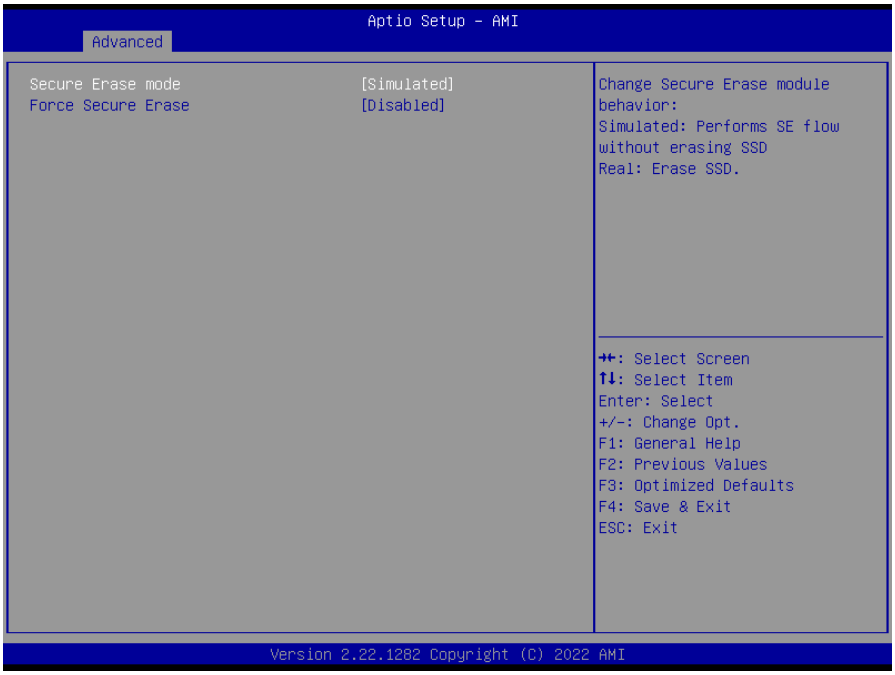
3.6.2.3.1.2 ASF Configuration



Item	Option	Description
PET Progress	Disabled Enabled**[Default]**,	Enable/Disable PET Events Progress to receive PET Events.
WatchDog	Disabled**[Default]**, Enabled	Enable/Disable WatchDog Timer.

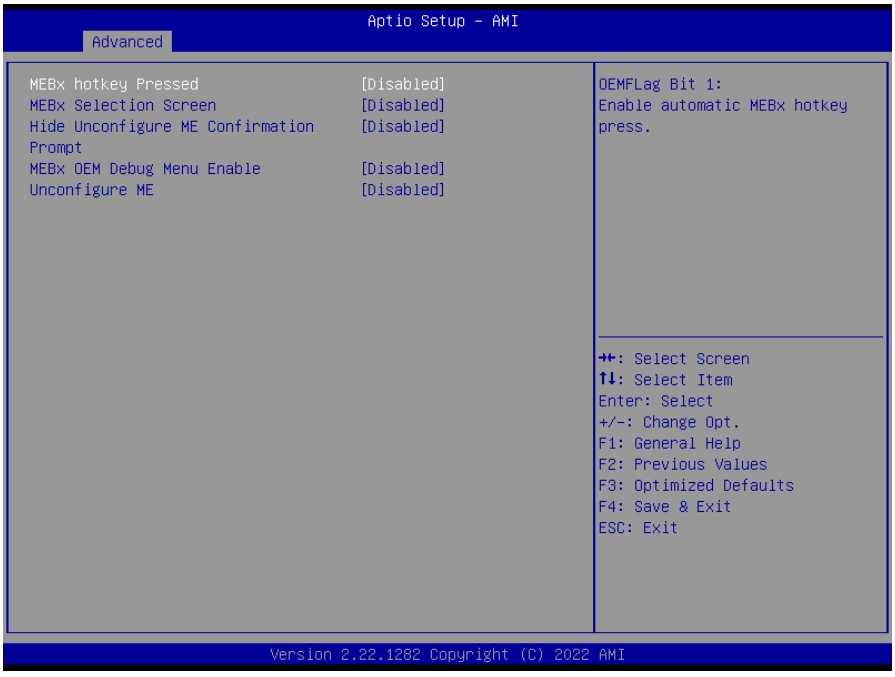
ASF Sensors Table	Disabled**[Default]**, Enabled	Adds ASF Sensors Table into ASF! ACPI Table

3.6.2.3.1.3 Secure Erase Configuration



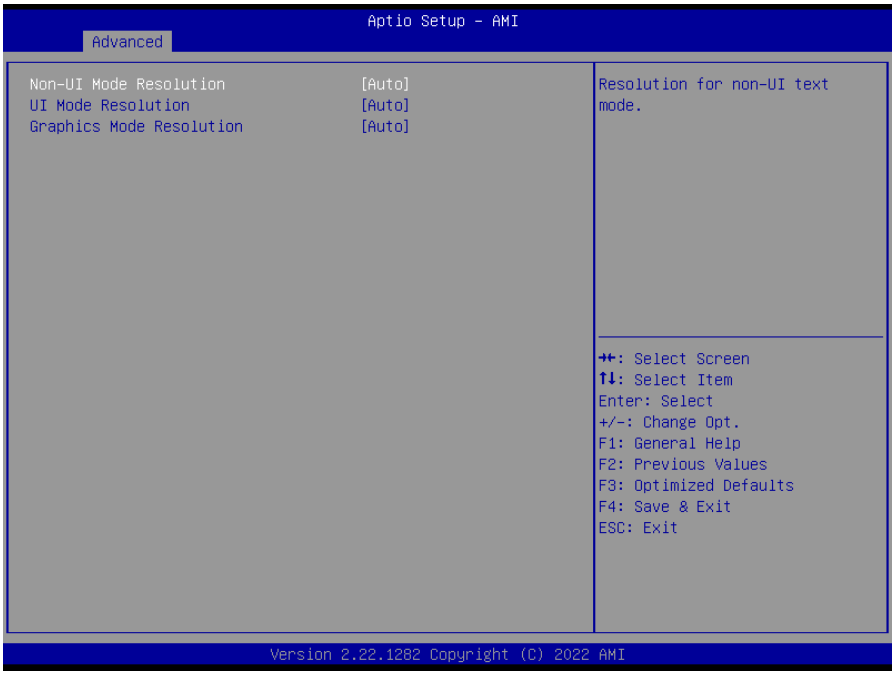
Item	Option	Description
Secure Erase mode	Simulated**[Default]**, Real	Change Secure Erase module behaviour: Simulated: Performs SE flow without erasing SSD Real: Erase SSD.
Force Secure Erase	Disabled**[Default]**, Enabled	Force Secure Erase on next boot

3.6.2.3.1.4 OEM Flags Settings



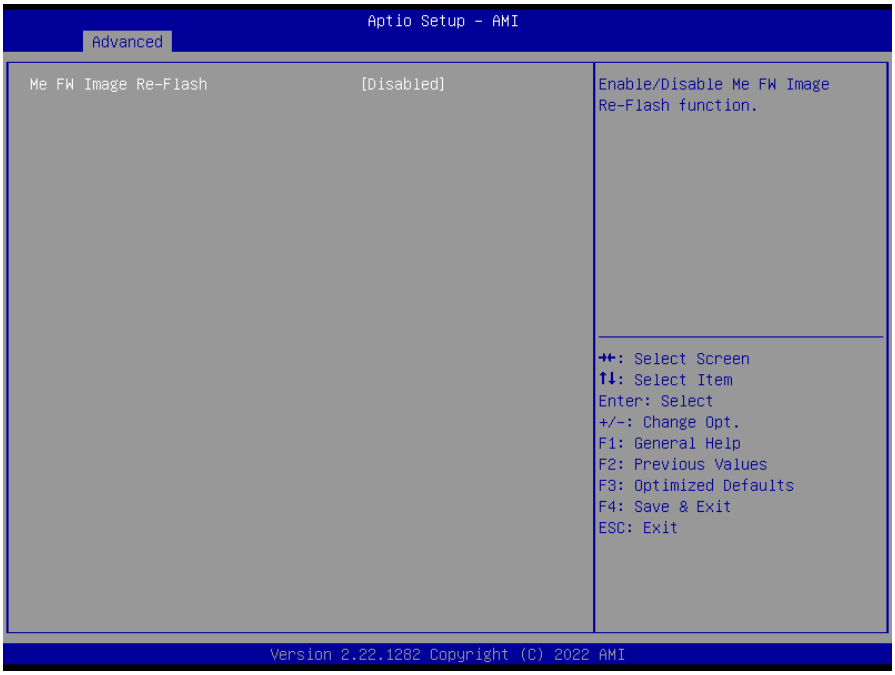
Item	Option	Description
MEBx hotkey Pressed	Disabled**[Default]**, Enabled	OEMFLag Bit 1: Enable automatic MEBx hotkey Pressed
MEBx Selection Screen	Disabled**[Default]**, Enabled	OEMFLag Bit 2: Enable MEBx selection screen with 2 options: Press 1 to enter ME Configuration Screens Press 2 to initiate a remote connection Note: Network Access must be activated from MEBx Setup for this screen to be displayed.
Hide Unconfigure ME Confirmation Prompt	Disabled**[Default]**, Enabled	OEMFlag Bit 6: Hide Unconfigure ME confirmation prompt when attempting ME unconfiguration.
MEBx OEM Debug Menu Enable	Disabled**[Default]**, Enabled	OEMFlag Bit 14: Enable OEM debug menu in MEBx.
Unconfigure ME	Disabled**[Default]**, Enabled	OEMFlag Bit 14: Unconfigure ME with resetting MEBx password to default.

3.6.2.3.1.5 MEBx Resolution Settings



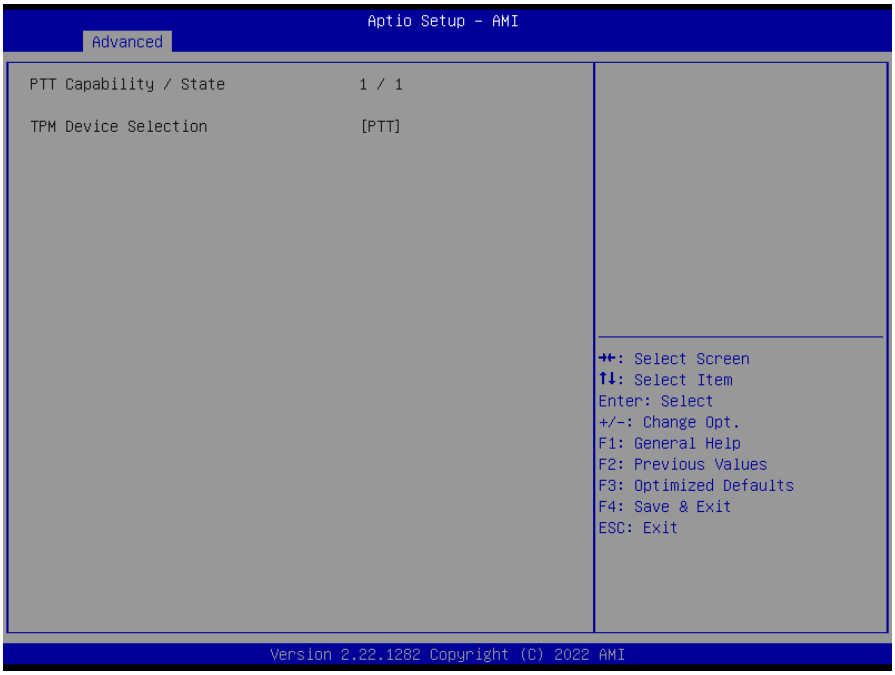
Item	Option	Description
Non-UI Mode Resolution	Auto**[Default]**, 80x25 100x31	Resolution for non-UI text mode.
UI Mode Resolution	Auto**[Default]**, 80x25 100x31	Resolution for UI text mode.
Graphics Mode Resolution	Auto**[Default]**, 640x480 800x600 1024x768	Resolution for graphics mode.

3.6.2.3.2 Firmware Update Configuration



Item	Option	Description
ME FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.

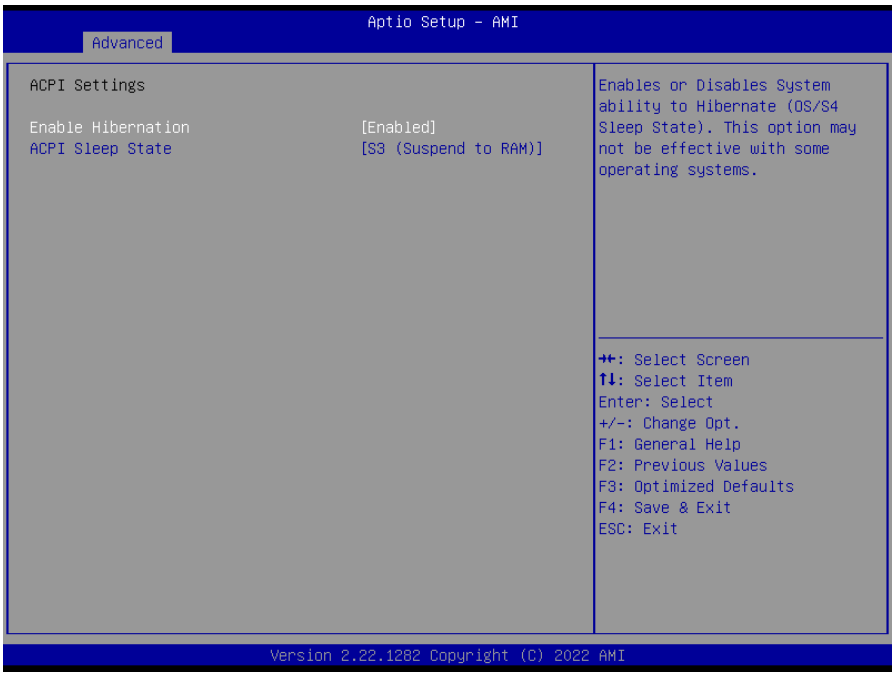
3.6.2.3.3 PTT Configuration



3.6.2.4 Trusted Computing

Item	Options	Description
Security Device Support	Disable, Enable**[Default]**	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.6.2.5 ACPI Settings

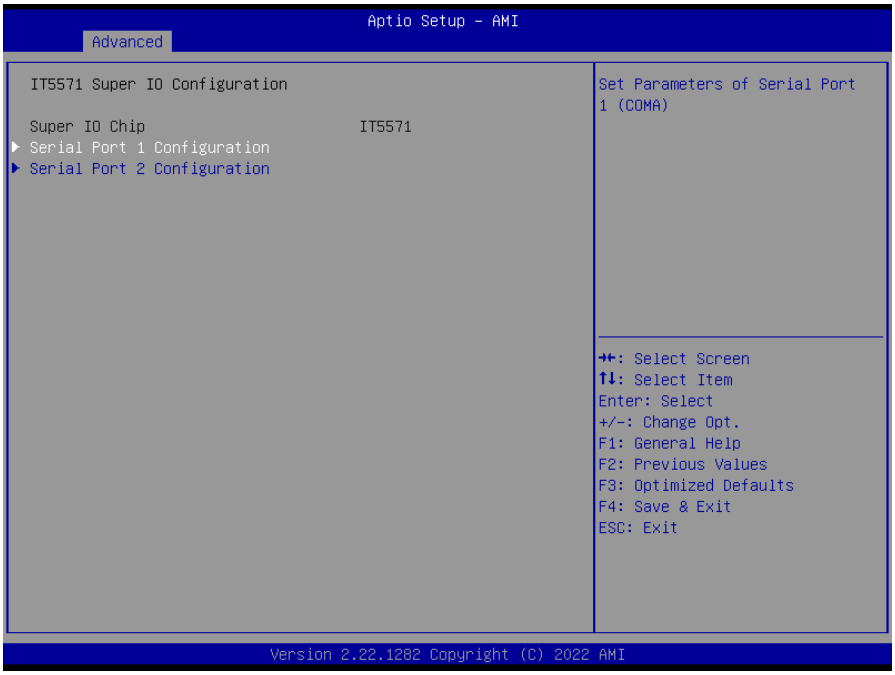


Item	Options	Description
Enable Hibernation	Disabled Enabled**[Default]**,	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This

		option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

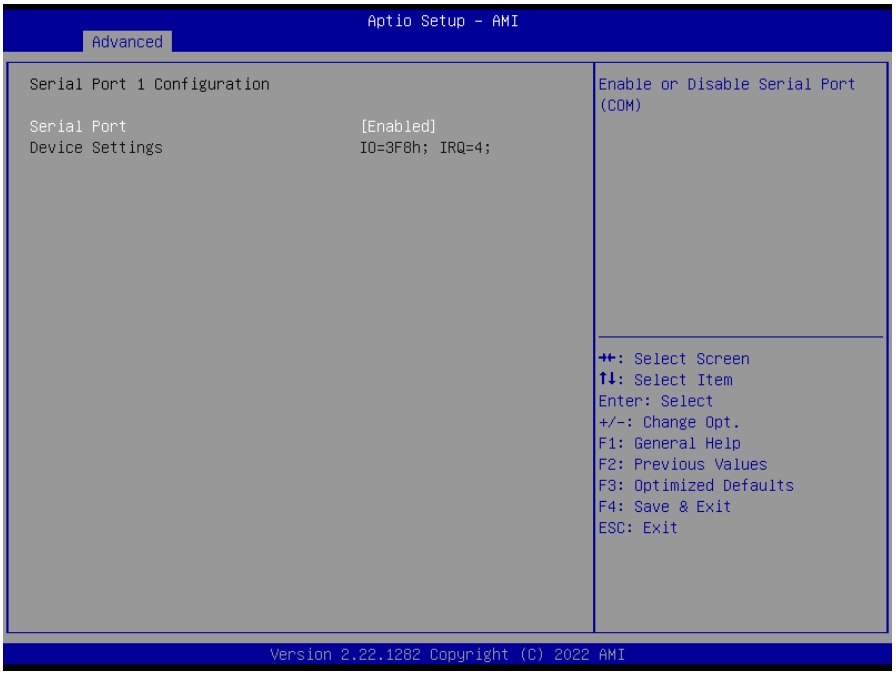
3.6.2.6 IT5571 Super IO Configuration

You can use this item to set up or change the IT5571 Super IO configuration for serial ports. Please refer to 3.6.2.6.1 ~ 3.6.2.6.2 for more information.



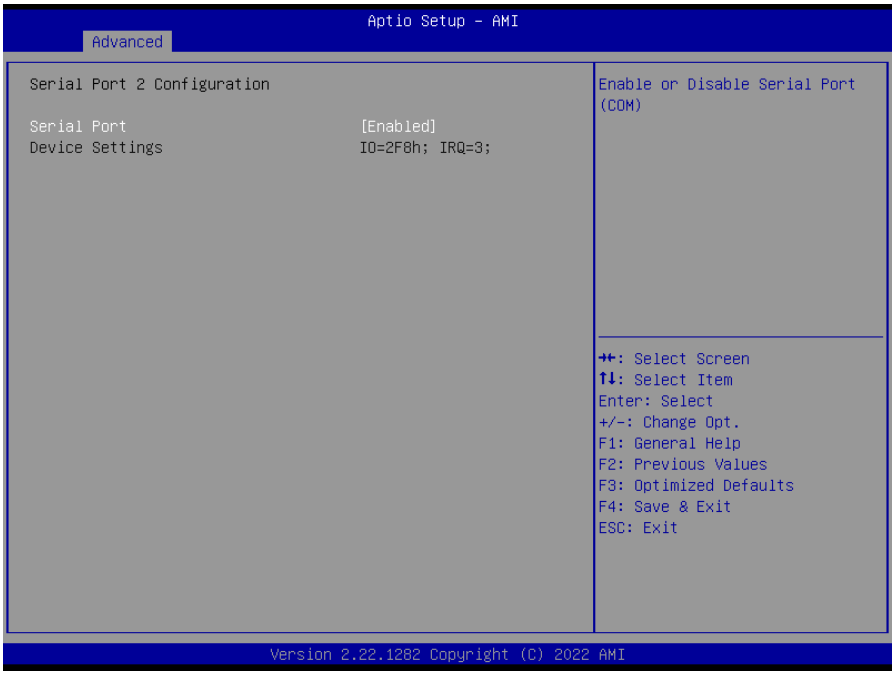
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).

3.6.2.6.1 Serial Port 1 Configuration



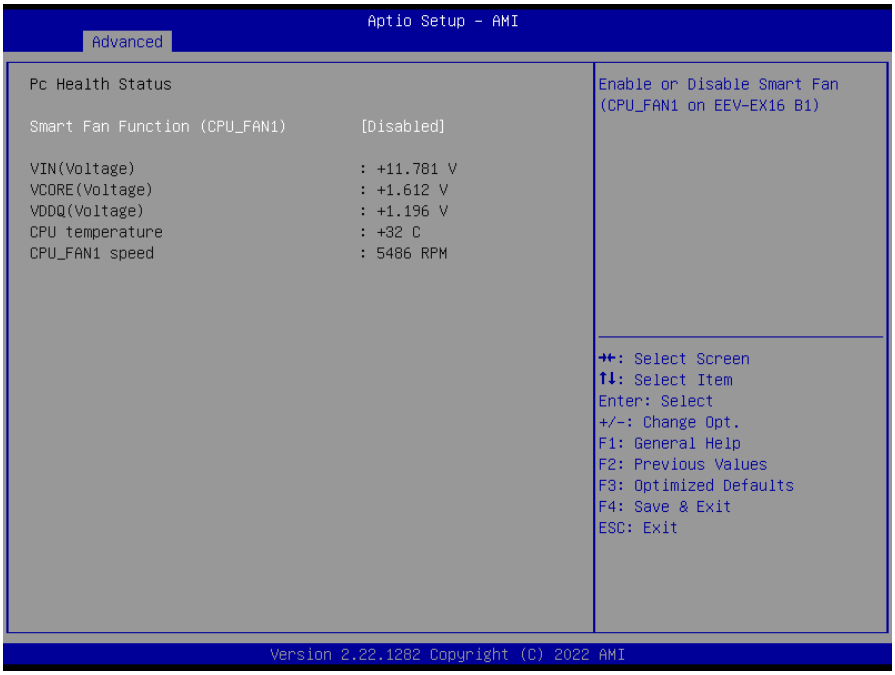
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.6.2 Serial Port 2 Configuration

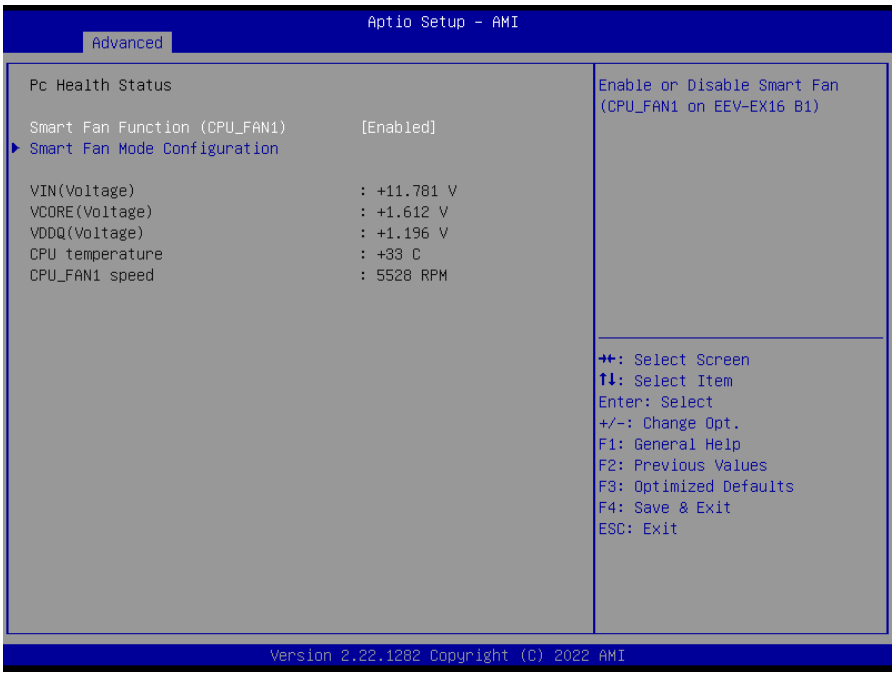


Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.7 HW Monitor

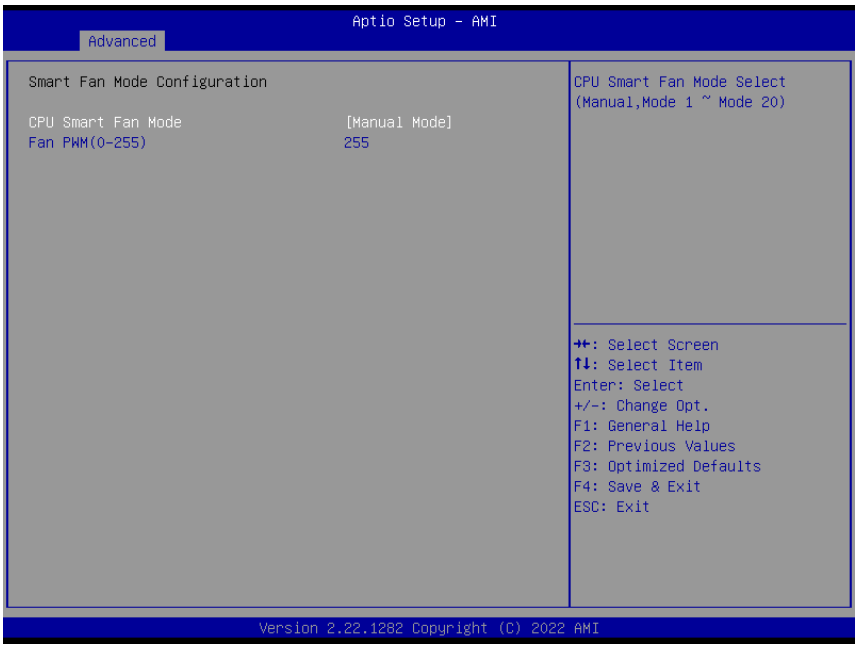


Item	Options	Description
Smart Fan Function (CPU_FAN1)	Disabled**[Default]** Enabled,	Enables or Disables Smart Fan (CPU_FAN1 on EEV-EX16B1).



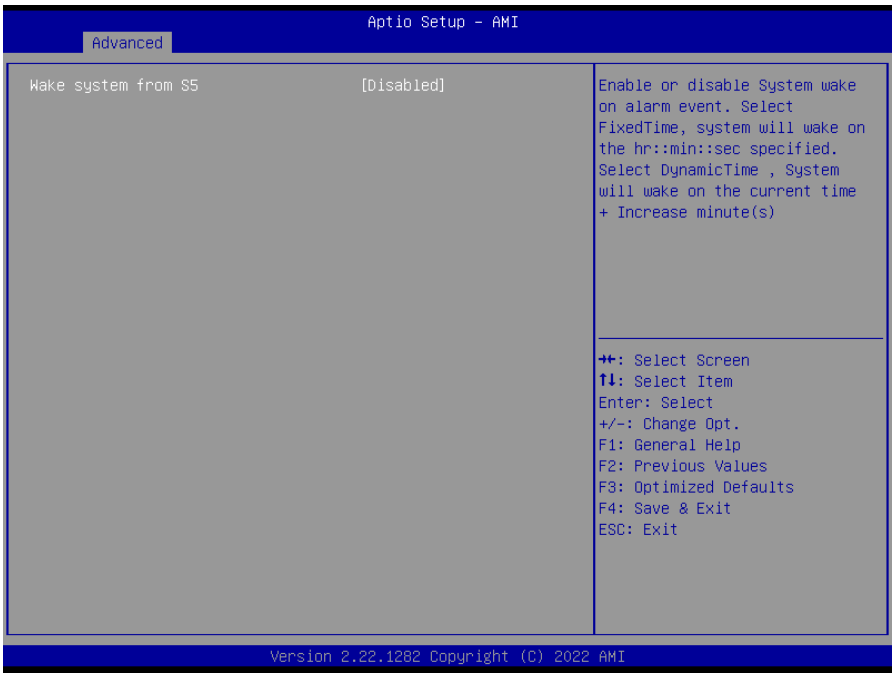
Item	Options	Description
Smart Fan Function (CPU_FAN1)	Disabled Enabled**[Default]**,	Enables or Disables Smart Fan (CPU_FAN1 on EEV-EX16B1).

3.6.2.7.1 Smart Fan Mode Configuration

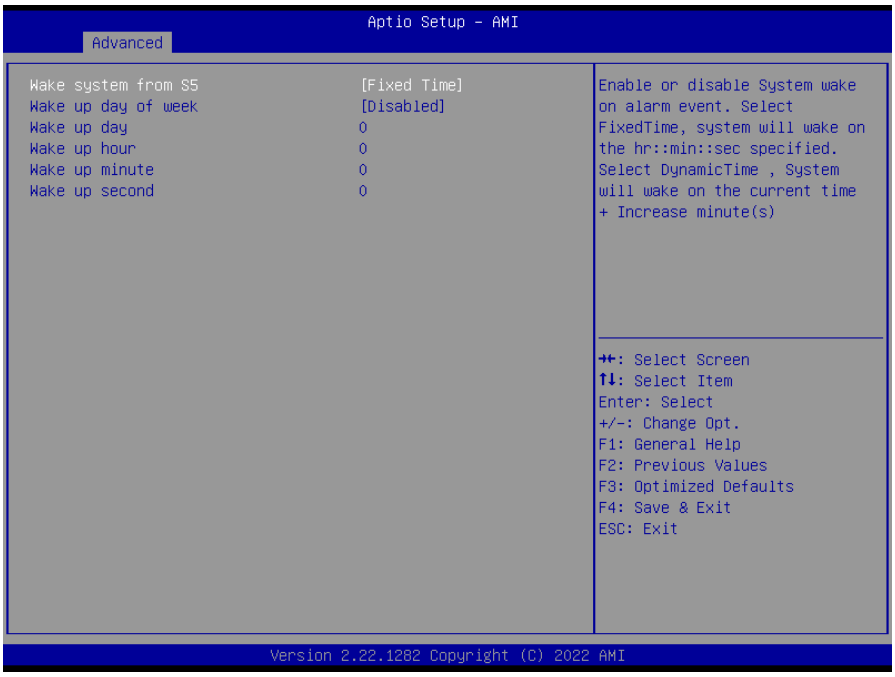


Item	Option	Description
CPU Smart Fan Mode	Manual Mode**[Default]**,/ Mode 01/Mode 02/ Mode 03/ Mode 04/ Mode 05/Mode 06/ Mode 07/ Mode 08/ Mode 09/Mode 10/ Mode 11/ Mode 12/ Mode 13/Mode 14/ Mode 15/ Mode 16/ Mode 17/Mode 18/ Mode 19/ Mode 20	CPU Smart Fan Mode Select (Manual,Mode 1 ~ Mode 20)
Fan PWM(0-255)	255	Fan PWM duty (0-255)

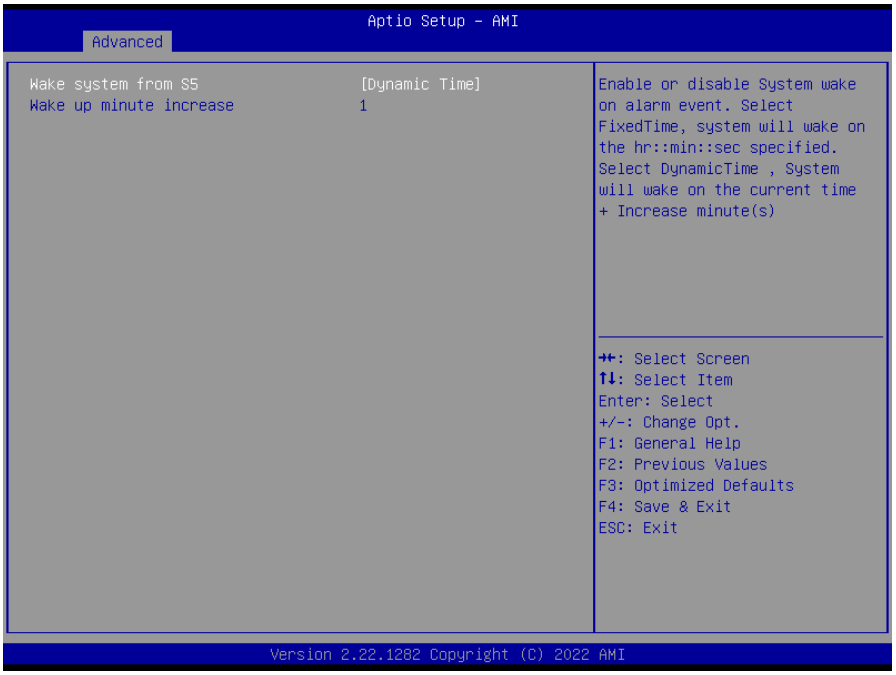
3.6.2.8 S5 RTC Wake Settings



Item	Options	Description
Wake system from S5	Disabled**[Default]**, Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on the current time + Increase minute(s)

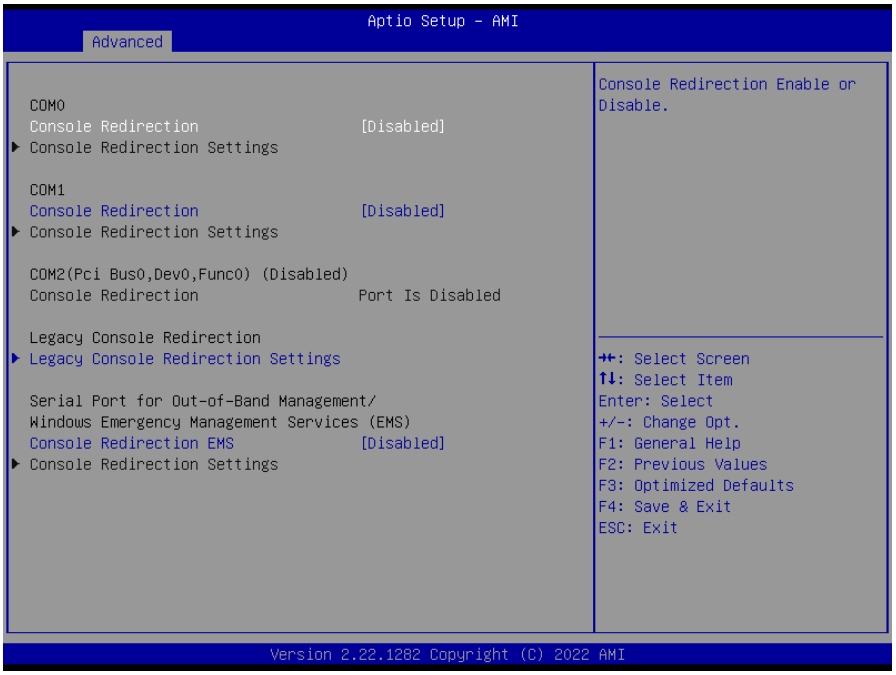


Item	Options	Description
Wake system from S5	Disabled, Fixed Time**[Default]** Dynamic Time	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on the current time + Increase minute(s)
Wake up day of week	Disabled**[Default]** Monday-Friday Monday-Saturday	wake up day of week. (Monday-Friday) or (Monday-Saturday)
Wake up day	0	Select 0 for daily system wake up 1-31 for which day of the month that you would like the system to wake up
Wake up hour	0	Select 0-23 For example enter 3 for 3am and 15 for 3pm
Wake up minute	0	Select 0-59 For Minute
Wake up second	0	Select 0-59 For Second



Item	Options	Description
Wake system from S5	Disabled, Fixed Time Dynamic Time**[Default]**	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on the current time + Increase minute(s)
Wake up minute increase	1	1 - 5

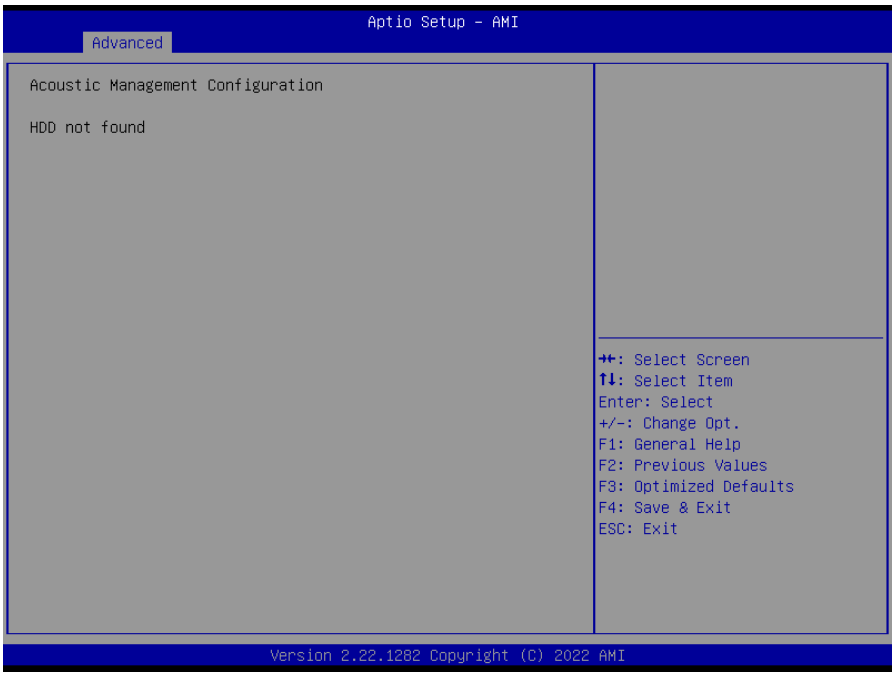
3.6.2.9 Serial Port Console Redirection



Item	Options	Description
Console Redirection	Disabled**[Default]**,	Console Redirection Enable or Disable.

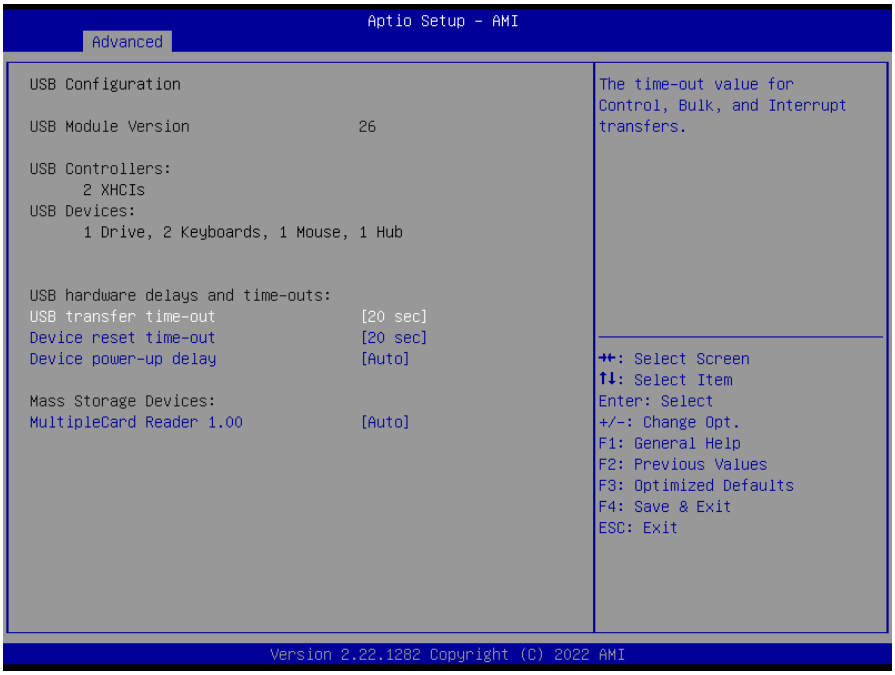
	Enabled	
Console Redirection EMS	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.

3.6.2.10 Acoustic Management Configuration



3.6.2.11 USB Configuration

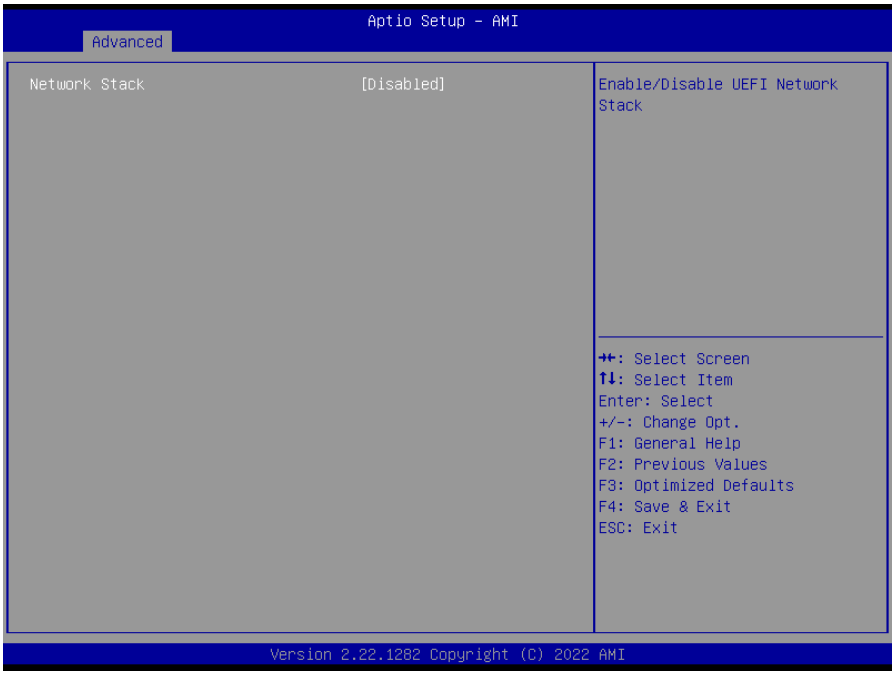
The USB Configuration menu helps read USB information and configures USB settings.



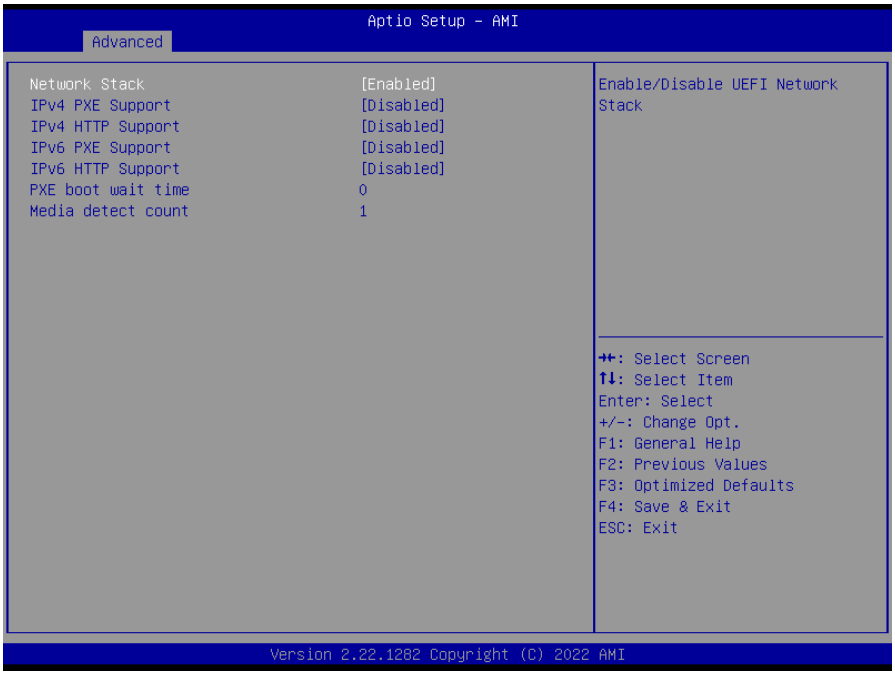
Item	Options	Description
USB transfer time-out	1 sec 5 sec 10 sec 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out	10 sec 20 sec**[Default]** 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken form Hub descriptor.
MultipleCard Reader 1.00	Auto**[Default]** Floppy Forced FDD Hard Disk CD-ROM	Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

3.6.2.12 Network Stack Configuration

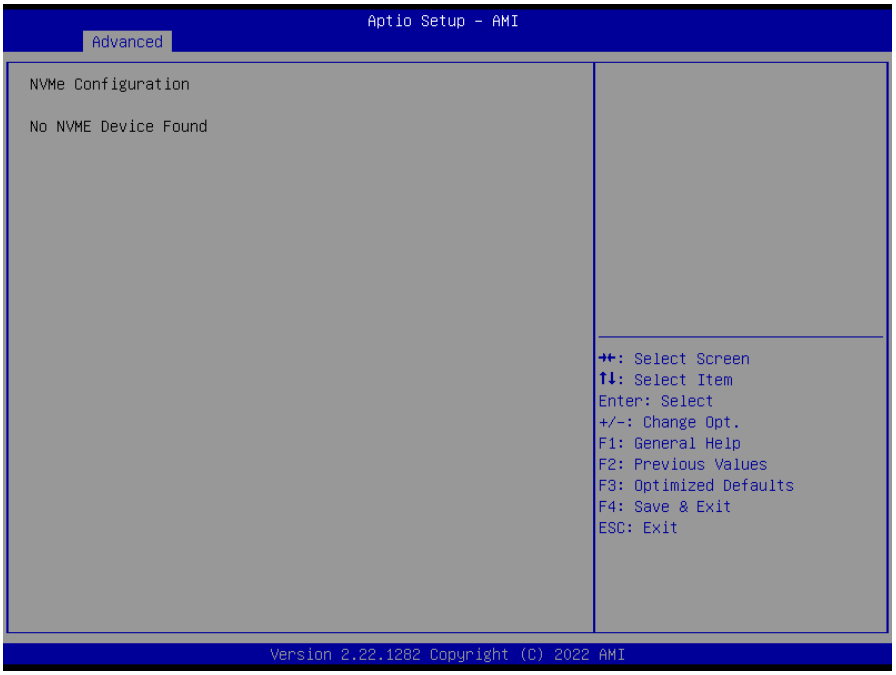


Item	Options	Description
Network Stack	Disabled**[Default]**, Enabled	Enable/Disable UEFI Network Stack

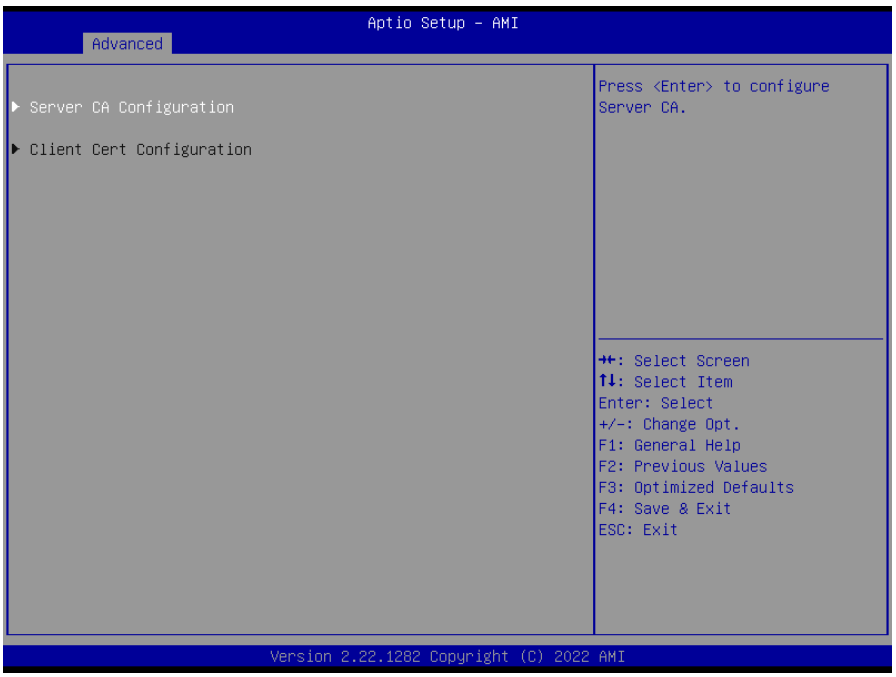


Item	Options	Description
Network Stack	Disabled Enabled**[Default]**,	Enable/Disable UEFI Network Stack
Ipv4 PXE Support	Disabled**[Default]**, Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
Ipv4 HTTP Support	Disabled**[Default]**, Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
Ipv6 PXE Support	Disabled**[Default]**, Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
Ipv6 HTTP Support	Disabled**[Default]**, Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	0	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	1	Number of times presence of media will be checked. Use either +/- or numeric keys to set the value.

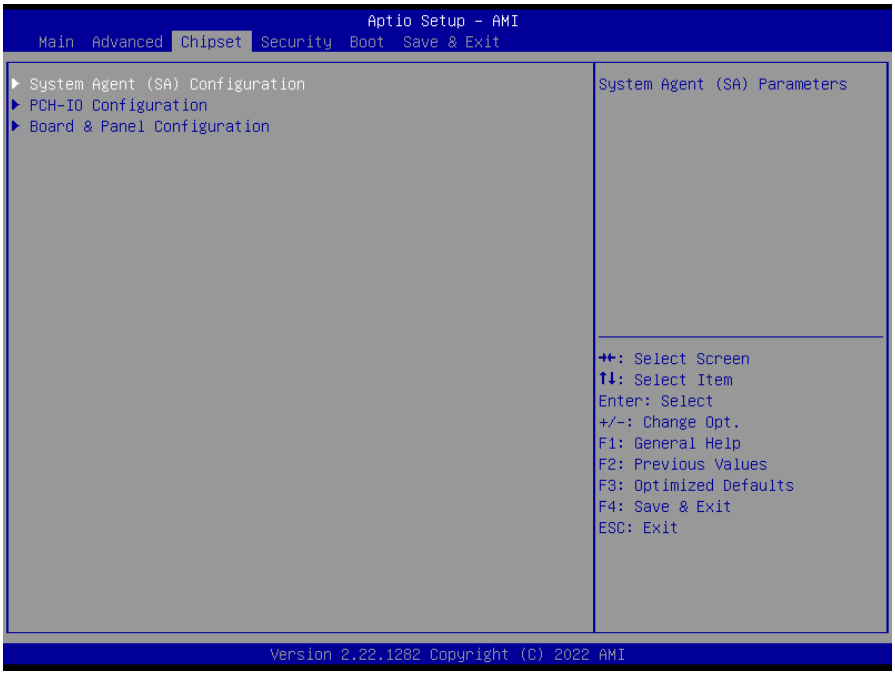
3.6.2.13 NVMe Configuration



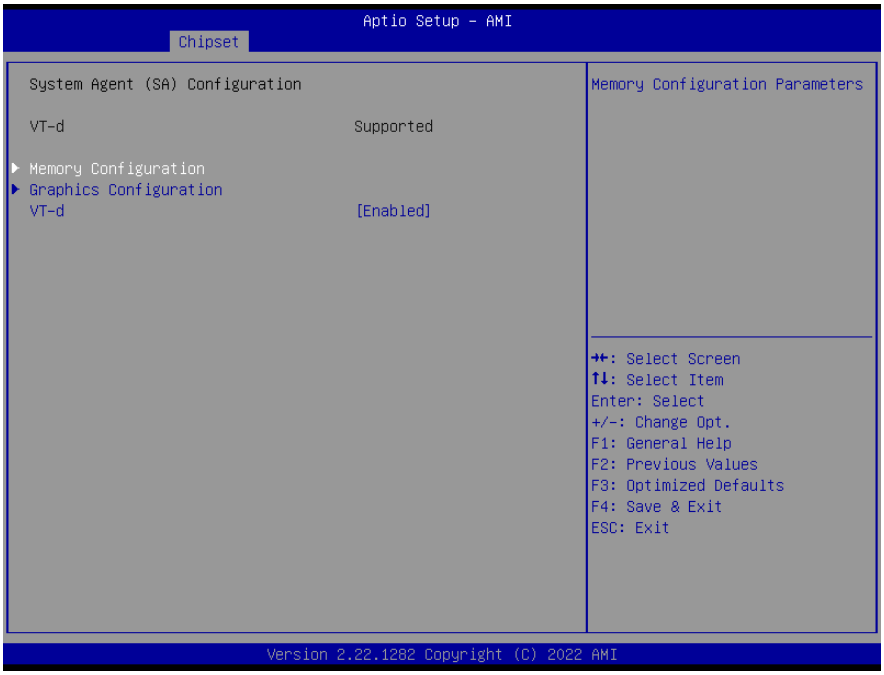
3.6.2.14 Tls Auth Configuration



3.6.3 Chipset

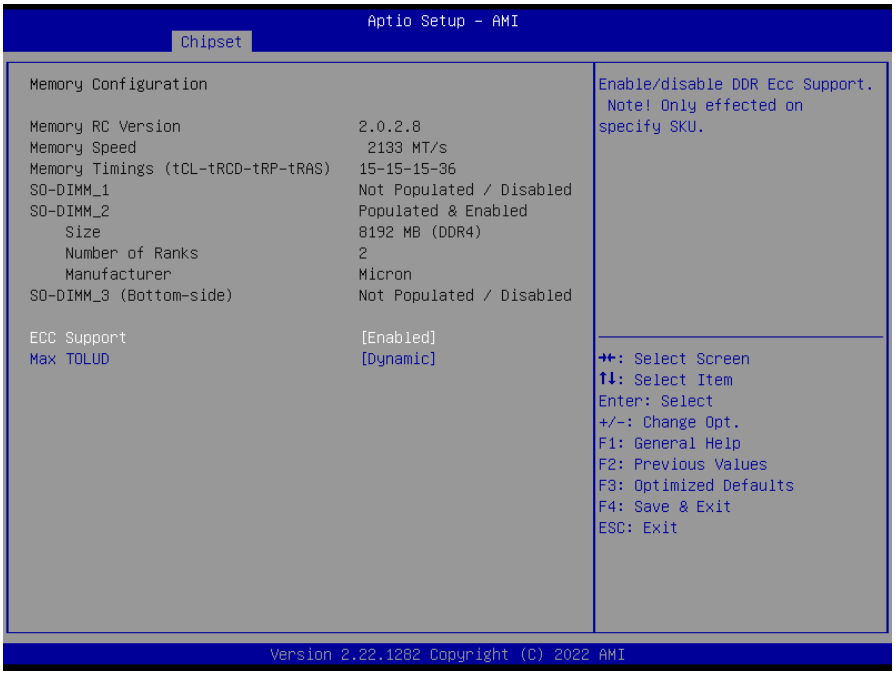


3.6.3.1 System Agent (SA) Configuration



Item	Option	Description
VT-d	Disabled Enabled**[Default]**	VT-d capability

3.6.3.1.1 Memory Configuration

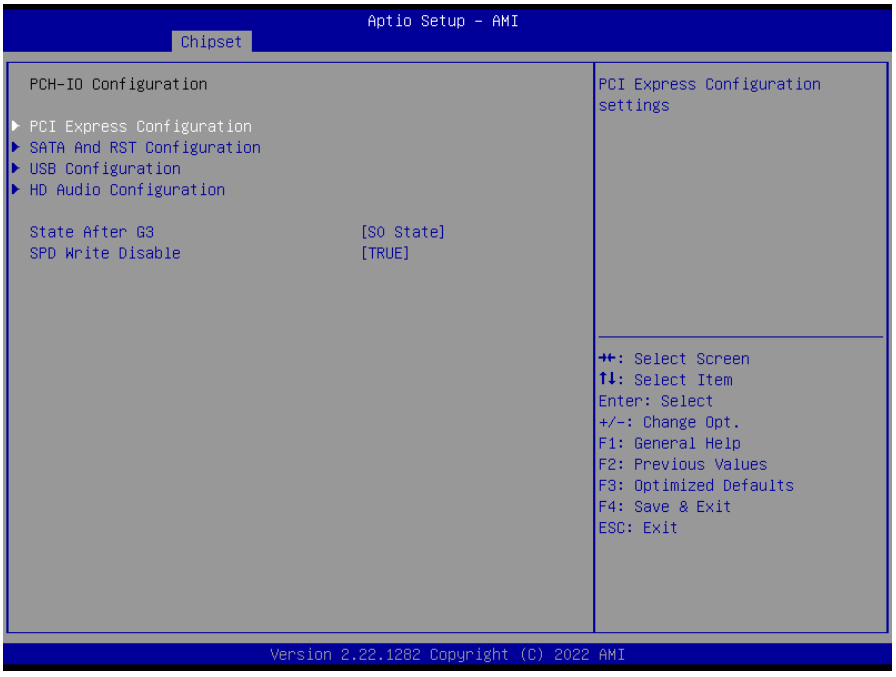


Item	Option	Description
ECC Support	Enabled**[Default]** Disabled	Enable/Disable DDR Ecc Support. Note! Only effected on specify SKU.
Max TOLUD	Dynamic**[Default]** /1 GB/1.25 GB/1.5 GB/1.75 GB/2 GB/2.25 GB/2.5 GB/2.75 GB/3 GB/3.25 GB/3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller

3.6.3.1.2 Graphics Configuration

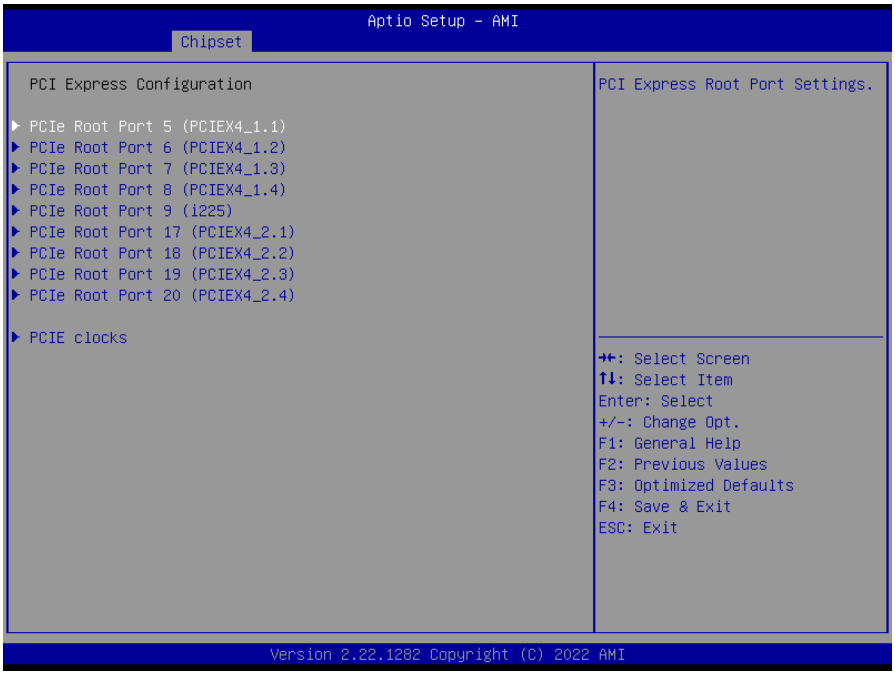
Item	Option	Description
Primary Display	Auto**[Default]** IGFX PEG Slot PCH PCI HG	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.
Internal Graphics	Auto**[Default]** Disabled Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2MB 4MB 8MB**[Default]**	Select the GTT Size
Aperture Size	128MB 256MB**[Default]** 215MB 1024MB	Select the Aperture Size Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.
VBT Select	eDP MIPI 3-HDMI & VGA 3-DP++ & VGA**[Default]**	Select VBT for GOP Driver. 3-HDMI VGA:Port D/E/F are HDMI only. 3-DP++_VGA: Port D/E/F are DP++.

3.6.3.2 PCH-IO Configuration

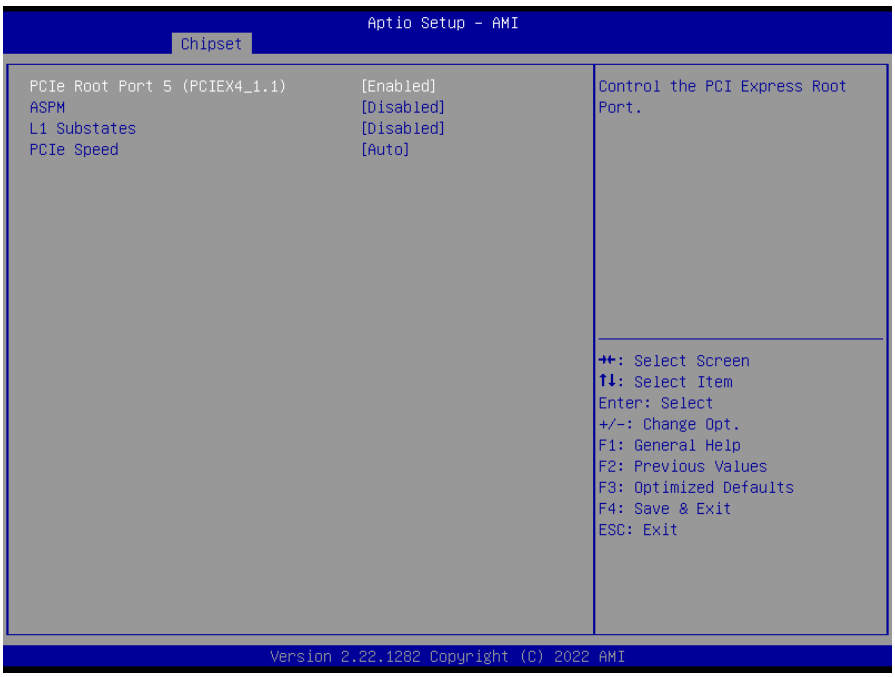


Item	Option	Description
State After G3	S0 State**[Default]** S5 State	Specify what state to go to when power is re-applied after a power failure (G3 state).
SPD Write Disable	TRUE**[Default]** FALSE	Enable/Disable setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.

3.6.3.2.1 PCI Express Configuration



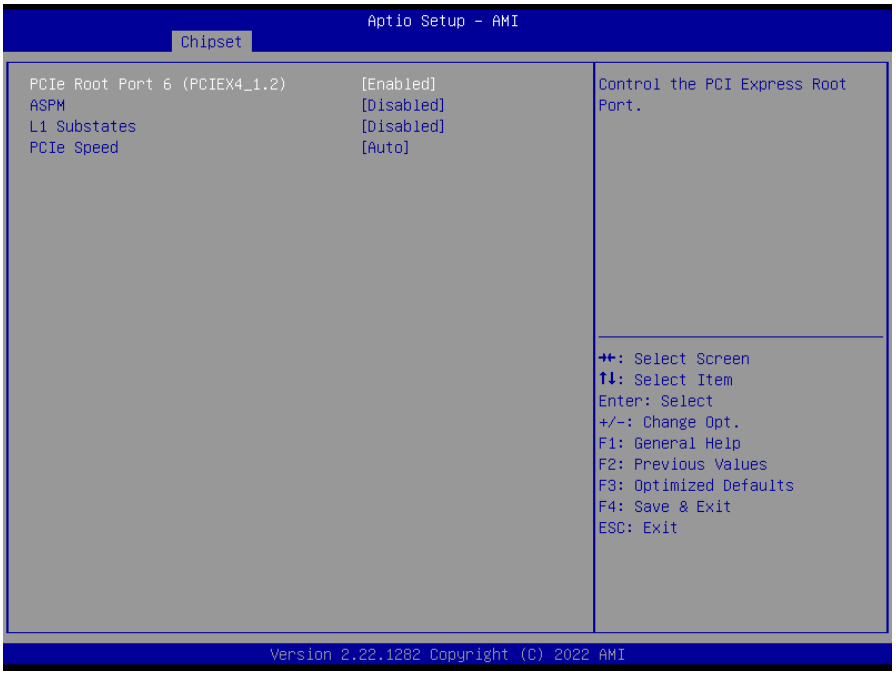
3.6.3.2.1.1 PCIe Root Port 5 (PCIEX4_1.1)



Item	Option	Description
PCIe Root Port 5 (PCIEX4_1.1)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM

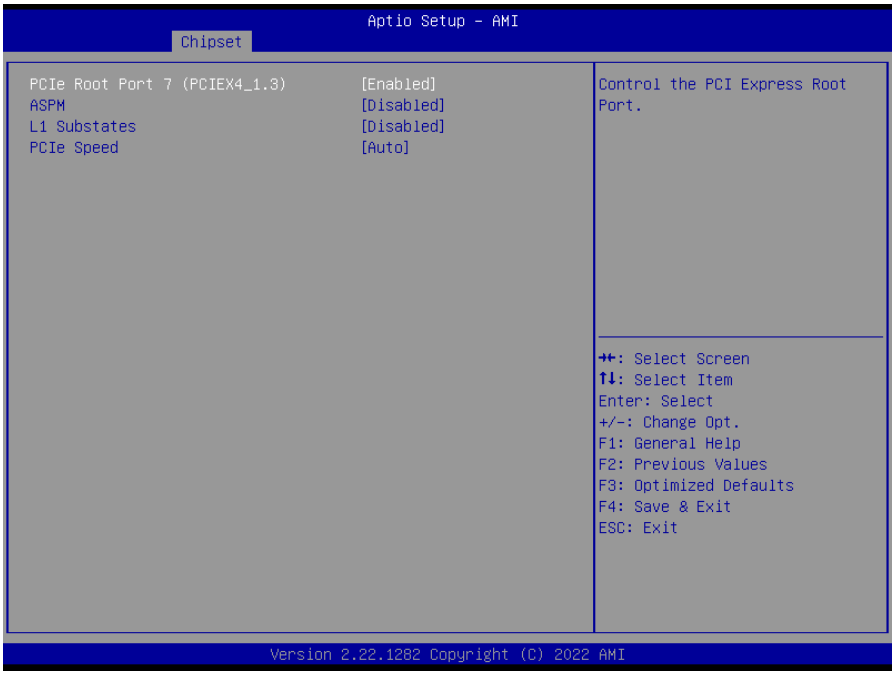
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.2 PCIe Root Port 6 (PCIEX4_1.2)



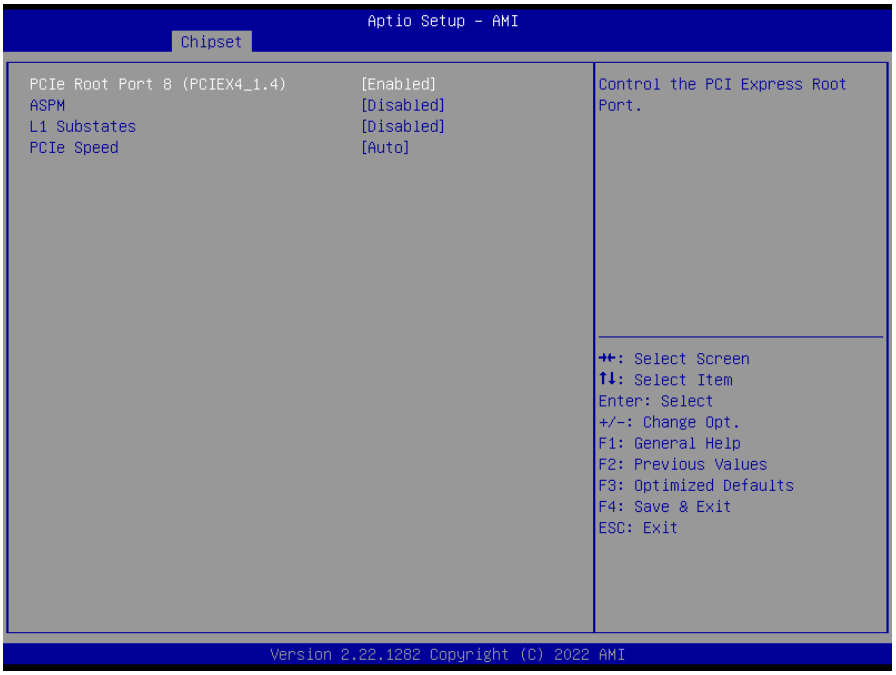
Item	Option	Description
PCIe Root Port 6 (PCIEX4_1.2)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.3 PCIe Root Port 7 (PCIEX4_1.3)



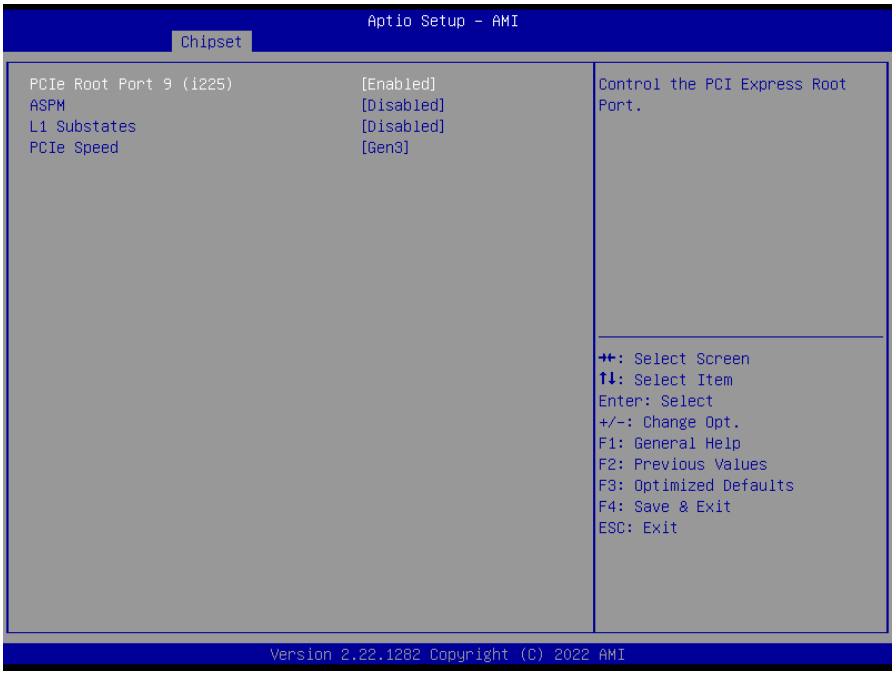
Item	Option	Description
PCIe Root Port 7 (PCIEX4_1.3)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.4 PCIe Root Port 8 (PCIEX4_1.4)



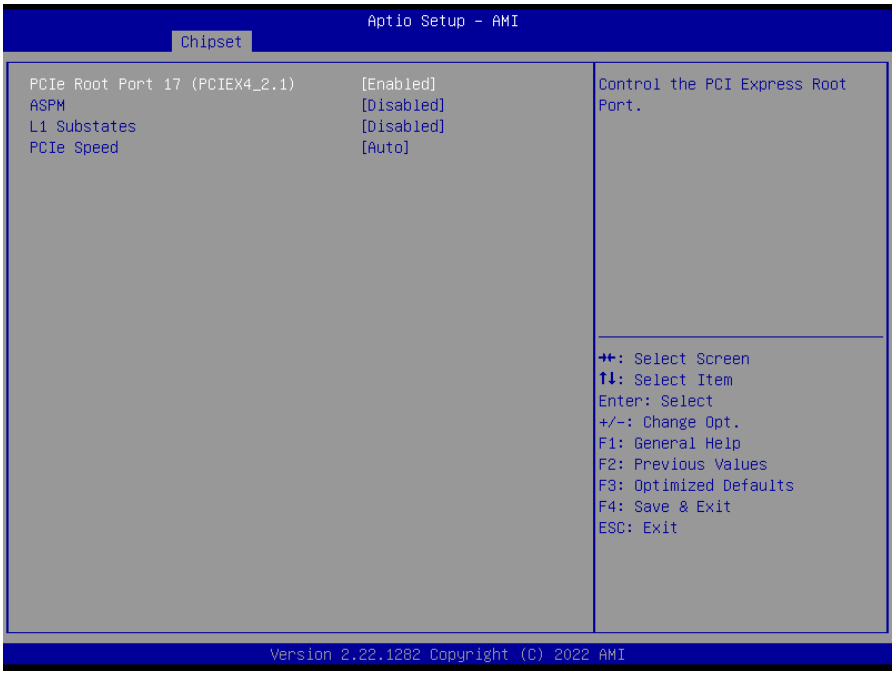
Item	Option	Description
PCIe Root Port 8 (PCIEX4_1.4)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.5 PCIe Root Port 9 (i225)



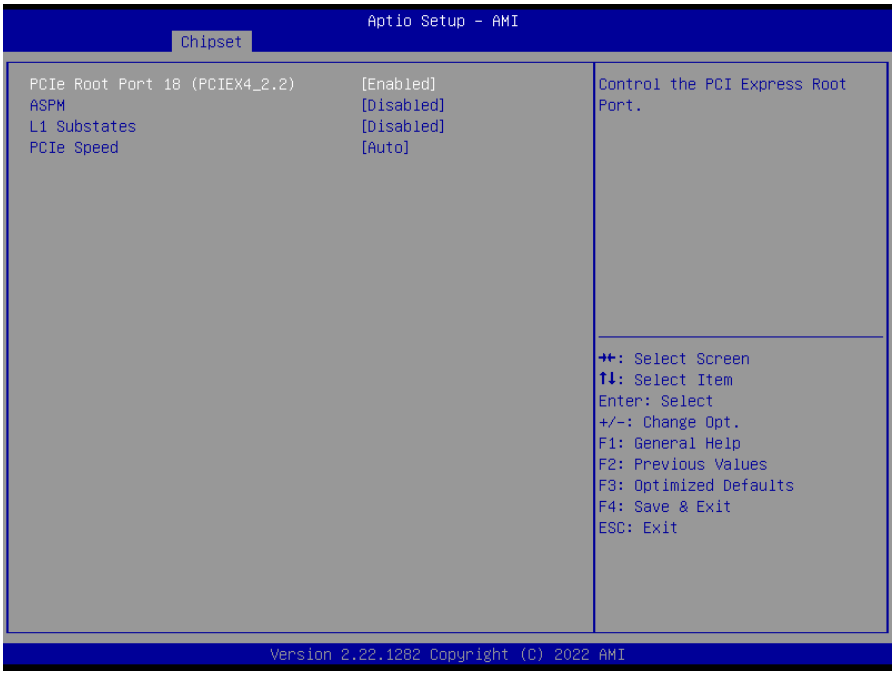
Item	Option	Description
PCIe Root Port 9 (i225)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto Gen1 Gen2 Gen3**[Default]**	Configure PCIe Speed

3.6.3.2.1.6 PCIe Root Port 17 (PCIEX4_2.1)



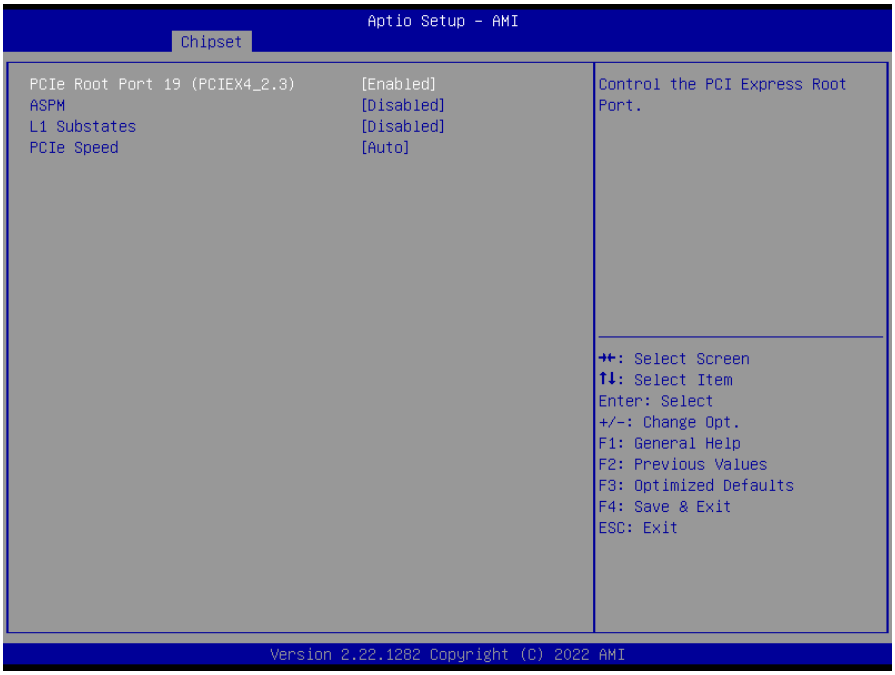
Item	Option	Description
PCIe Root Port 17 (PCIEX4_2.1)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.7 PCIe Root Port 18 (PCIEX4_2.2)



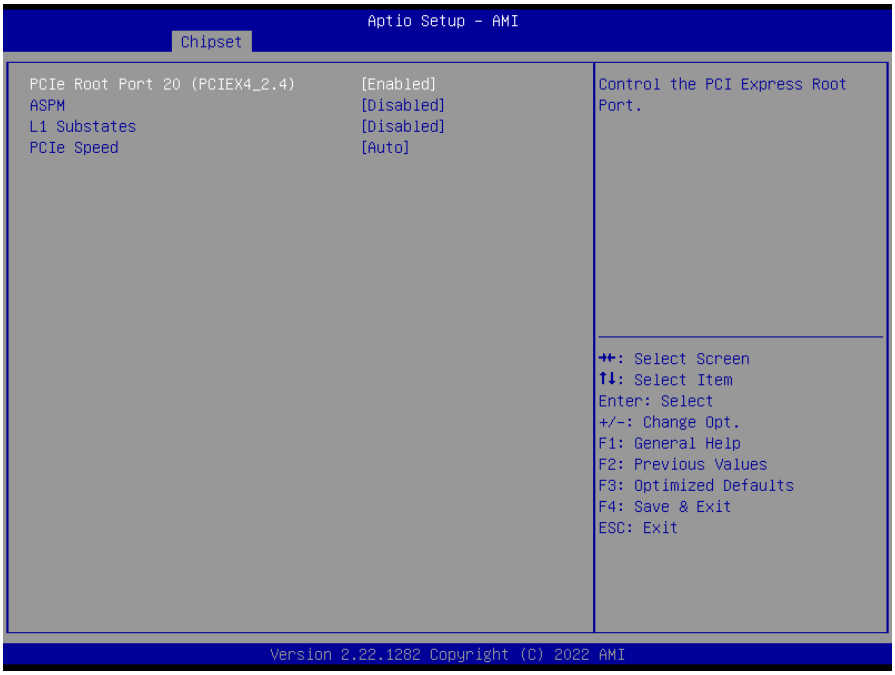
Item	Option	Description
PCIe Root Port 18 (PCIEX4_2.2)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.8 PCIe Root Port 19 (PCIEX4_2.3)



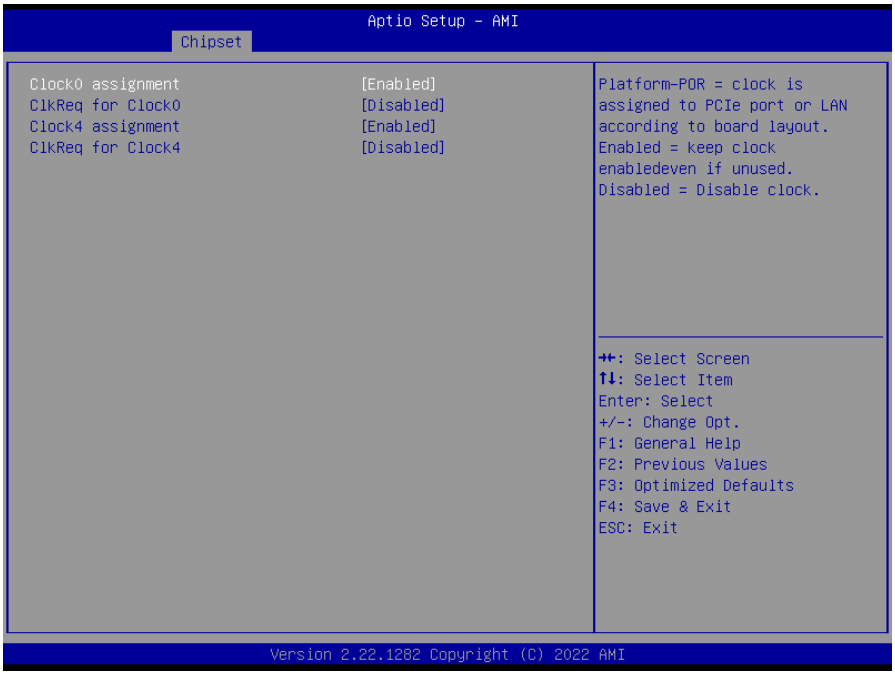
Item	Option	Description
PCIe Root Port 19 (PCIEX4_2.3)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.9 PCIe Root Port 20 (PCIEX4_2.4)



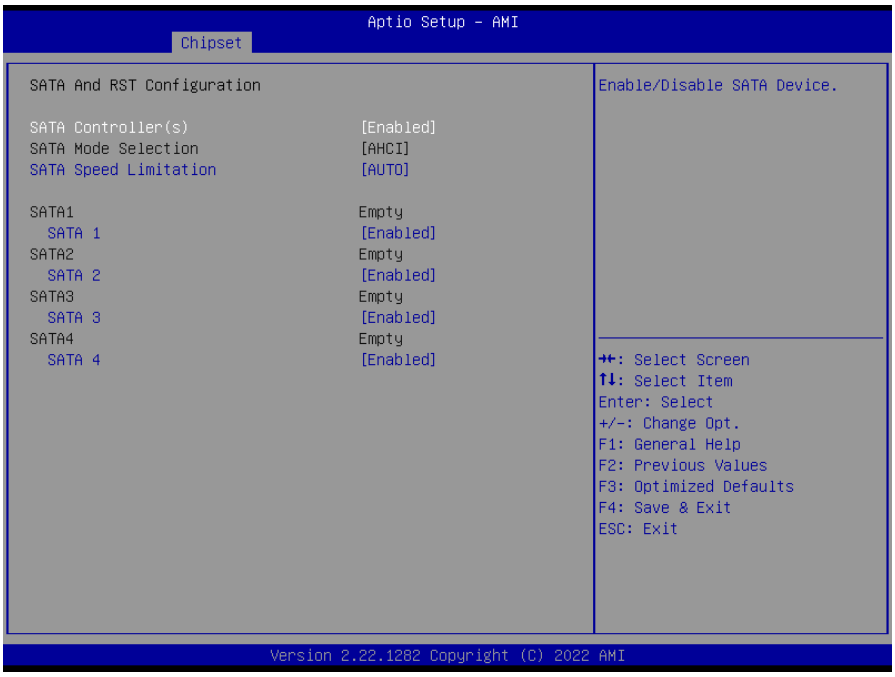
Item	Option	Description
PCIe Root Port 20 (PCIEX4_2.4)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.10 PCIE clocks



Item	Option	Description
Clock0 assignment	Platform-POR Enabled**[Default]**, Disabled	Platform-POR = clock is assigned to PCIe port or LAN according to board layout. Enabled = keep clock enabledeven if unused. Disabled = Disable clock.
ClkReq for Clock0	Platform-POR Disabled**[Default]**,	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.
Clock4 assignment	Platform-POR Enabled**[Default]**, Disabled	Platform-POR = clock is assigned to PCIe port or LAN according to board layout. Enabled = keep clock enabledeven if unused. Disabled = Disable clock.
ClkReq for Clock4	Platform-POR Disabled**[Default]**,	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.

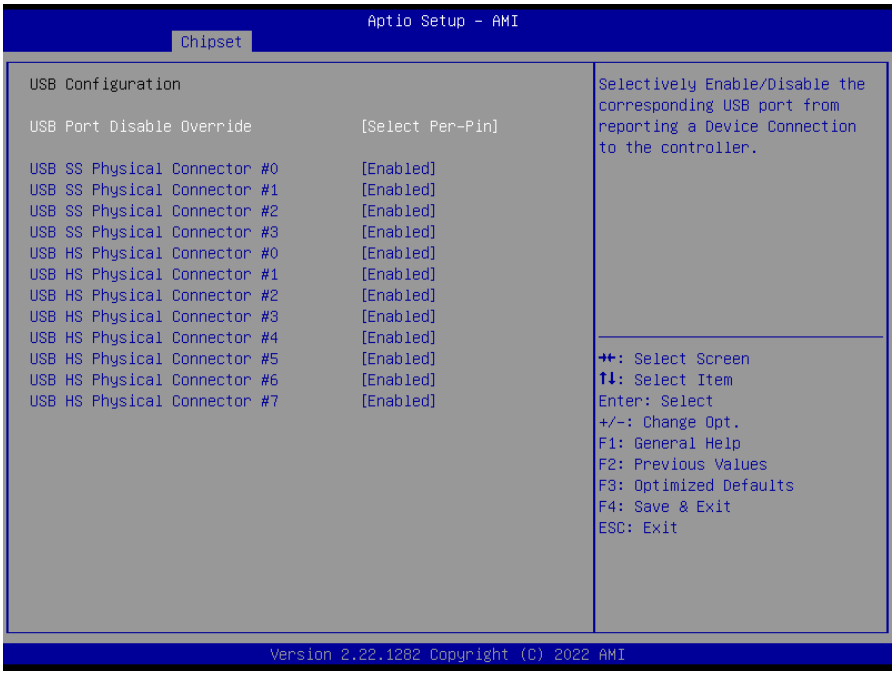
3.6.3.2.2 SATA And RST Configuration



Item	Options	Description
SATA Controller(s)	Enabled**[Default]** Disabled,	Enable/Disable SATA Device.
SATA Speed Limitation	AUTO**[Default]** Gen1 1.5 Gb/s Gen2 3.0 Gb/s Gen3 6.0 Gb/s	Set the maximum speed of SATA.
SATA1/2/3/4	Disabled Enabled**[Default]**	Enable or Disable SATA Port

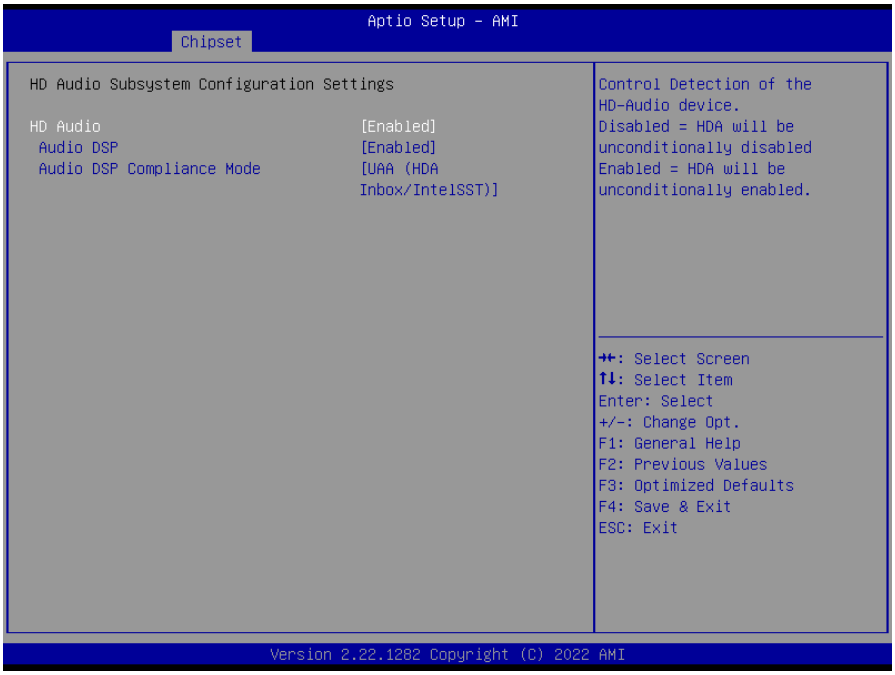
3.6.3.2.3 USB Configuration

Item	Option	Description
USB Port Disable Override	Disabled**[Default]** Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.



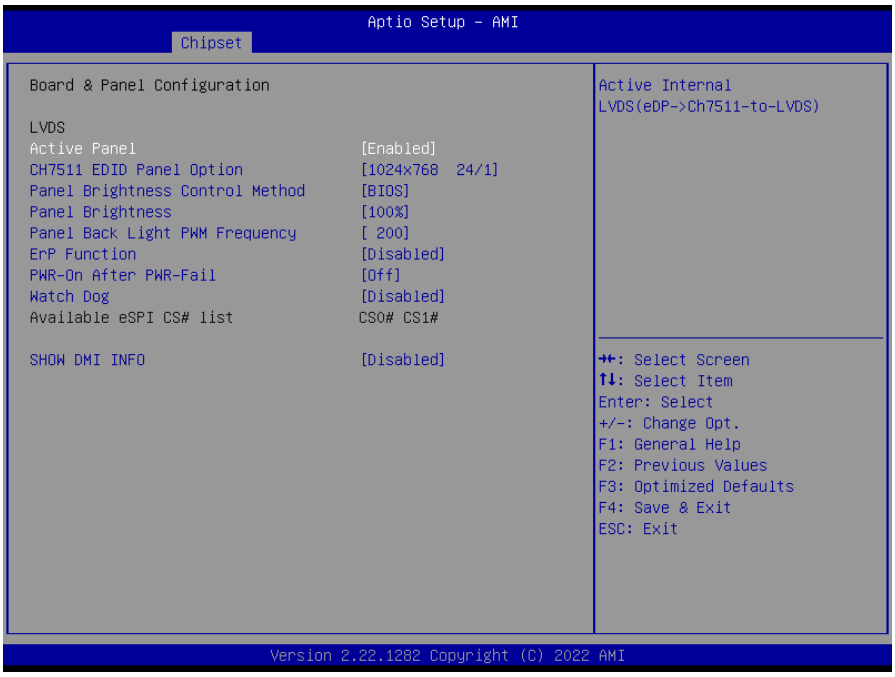
Item	Option	Description
USB Port Disable Override	Disabled Select Per-Pin**[Default]**	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.
USB SS Physical Connector #0/1/2/3	Disabled Enabled**[Default]**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.
USB HS Physical Connector #0/1/2/3/4/5/6/7	Disabled Enabled**[Default]**	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.

3.6.3.2.4 HD Audio Configuration



Item	Option	Description
HD Audio	Disabled Enabled**[Default]**	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.
Audio DSP	Disabled Enabled**[Default]**	Enable/Disable Audio DSP.
Audio DSP Compliance Mode	Non-UAA (IntelSST) UAA (HDA Inbox/IntelSST)**[Default]**	Specifies DSP enabled system compliance: 1.Non-UAA (IntelSST driver support only – CC_040100) 2. UAA (HD Audio Inbox or IntelSST driver support – CC_040380) Note: NHLT (DMIC/BT/I2S configuration)is published for non-UAA only.

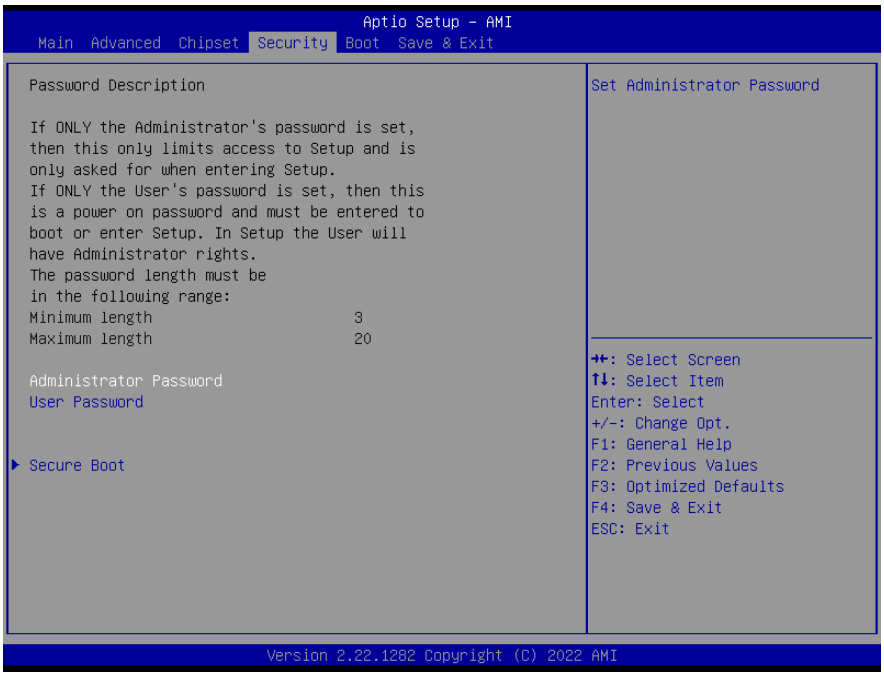
3.6.3.3 Board & Panel Configuration



Item	Option	Description
Active Panel	Disabled Enabled**[Default]**	Active Internal LVDS(eDP->Ch7511-to-LVDS)
CH7511 EDID Panel Option	1024x768 24/1**[Default]** 800x600 18/1 1024x768 18/1 1366x768 18/1 1024x600 18/1 1280x800 18/1 1920x1200 24/2 1920x1080 18/2 1280x1024 24/2 1440x900 18/2 1600x1200 24/2 1366x768 24/1 1920x1080 24/2 1680x1050 24/2	Port1-EDP to LVDS(Chrotel 7511) Panel EDID Option
Panel Brightness Control Method	BIOS**[Default]** OS Driver	Panel Brightness Control Method. 1.BIOS 2.Brightness Button 3.Variable Resistor 4.OS Driver
Panel Brightness	00% 25% 50% 75% 100%**[Default]**	Select Panel back light PWM duty.
Panel Back Light PWM Frequency	200**[Default]** 300 400 500	Select Panel back light PWM Frequency.

	700 1k 2k 3k 5k 10k 20k	
ErP Function	Disabled**[Default]** Enabled	ErP Function (Deep S5).
PWR-On After PWR-Fail	Off**[Default]** On Last state	AC loss resume.
Watch Dog	Disabled**[Default]** 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
SHOW DMI INFO	Disabled**[Default]** Enabled	SHOW DMI INFO

3.6.4 Security



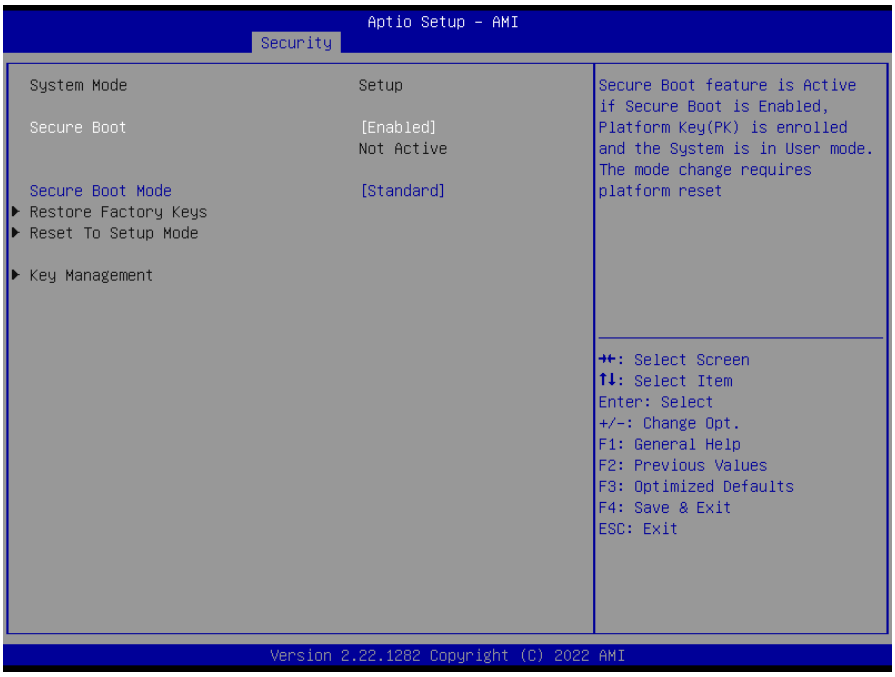
- **Administrator Password**

Set setup Administrator Password

- **User Password**

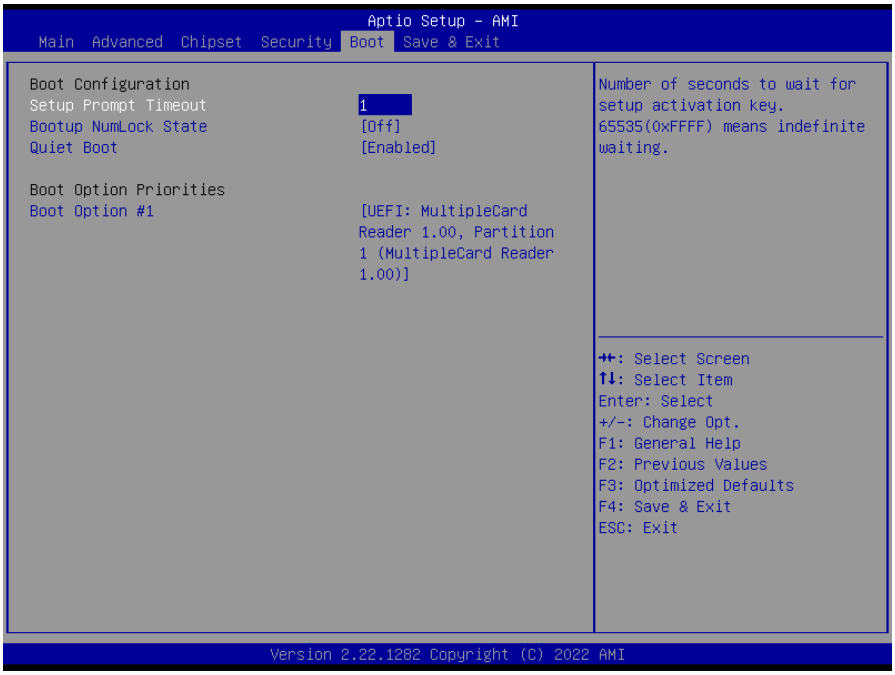
Set User Password

3.6.4.1 Secure Boot



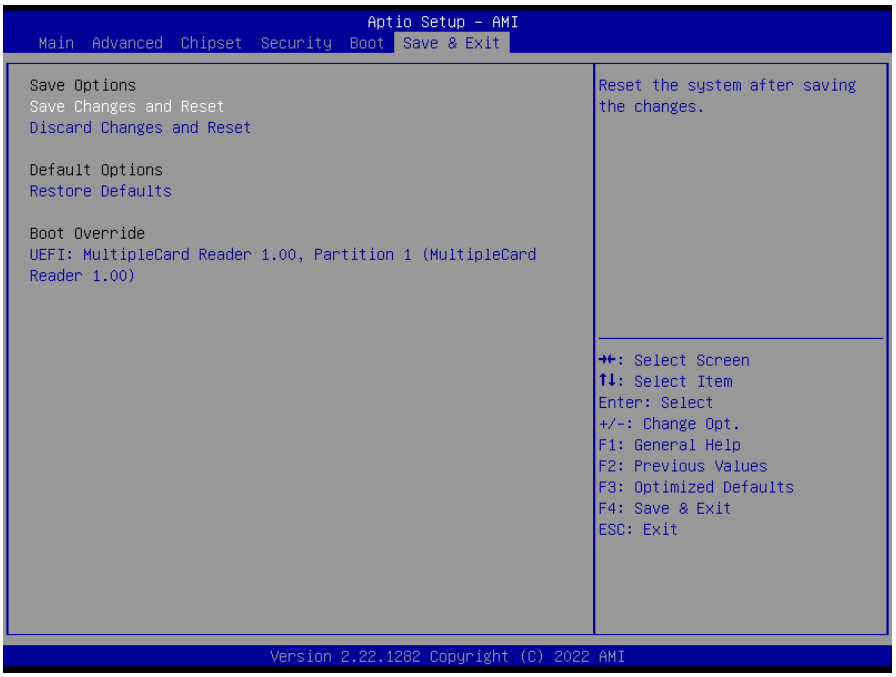
Item	Option	Description
Secure Boot	Disabled Enabled**[Default]**	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode chagne requires platform reset
Secure Boot Mode	Standard**[Default]** Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically user without full authentication

3.6.5 Boot



Item	Option	Description
Setup Prompt Timeout	1	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On Off**[Default]**	Select the keyboard NumLock state
Quiet Boot	Disabled Enabled**[Default]**	Enables or disables Quiet Boot option
Boot Option #1	Set the system boot order	

3.6.6 Save and exit



3.6.6.1 Save Changes and Reset

Reset the system after saving the changes.

3.6.6.2 Discard Changes and Reset

Any changes made to BIOS settings during this session of the BIOS setup program are discarded. The setup program then exits and reboots the controller.

3.6.6.3 Restore Defaults

This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting.

3.6.6.4 Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

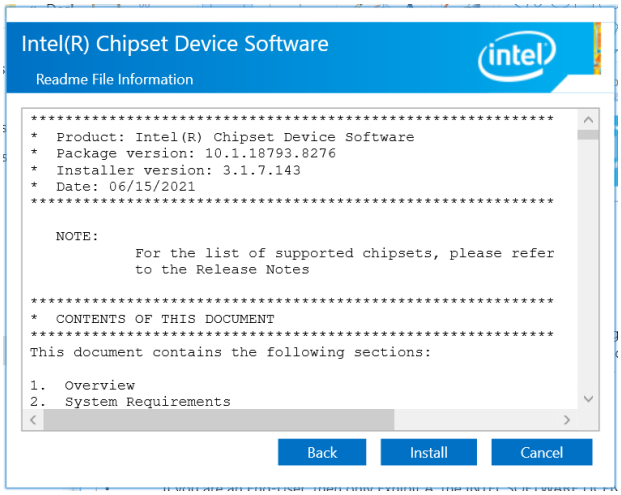
4. Drivers Installation

Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

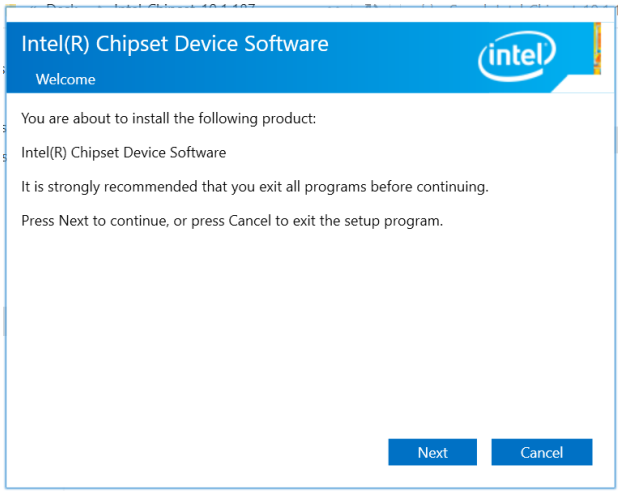
4.1 Install Chipset Driver

All drivers can be found on the Avalue Official Website: http://www.avalue.com.tw.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



Step 3. Click **Install**.



Step1. Click **Next**.

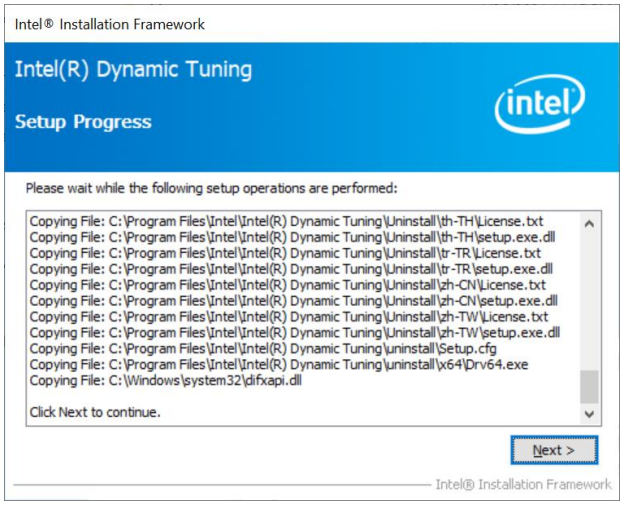
Step 4. Complete setup.

Step 2. Click **Accept**.

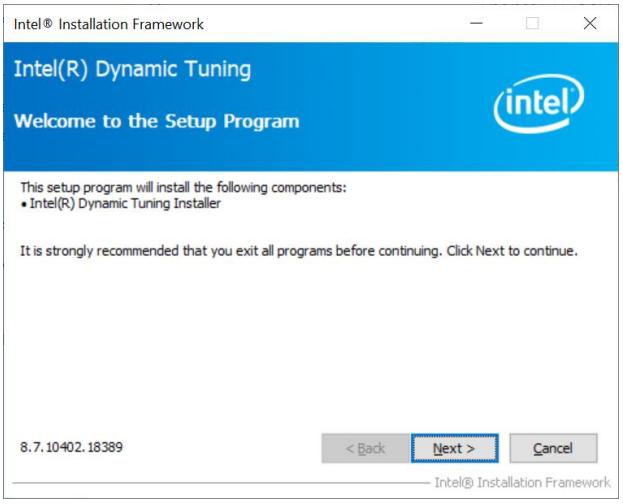
4.2 Install Dynamic Tuning Driver

All drivers can be found on the Avalue Official Website: http://www.avalue.com.tw.

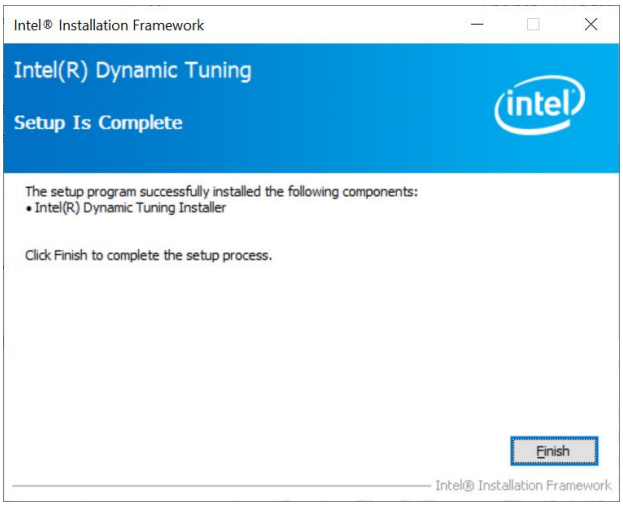
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



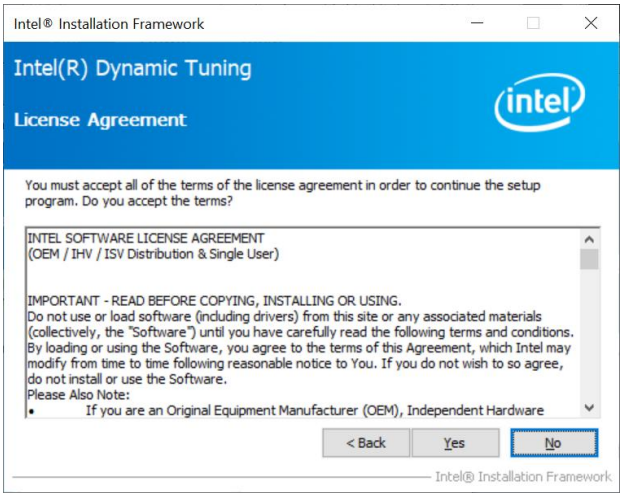
Step 3. Click **Next** to continue installation.



Step1. Click **Next** to start installation.



Step 4. Click **Finish** to complete setup.



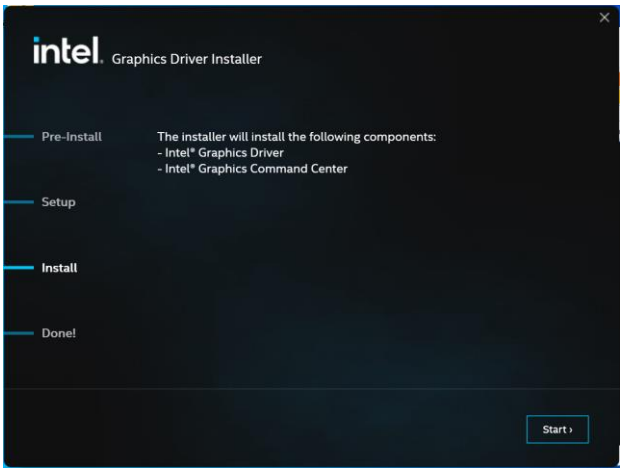
Step 2. Click **Yes**.

4.3 Install VGA Driver

All drivers can be found on the Avalue Official Website:

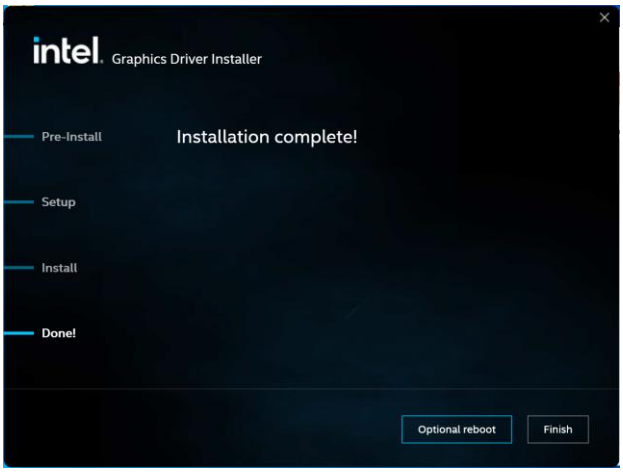
http://www.avalue.com.tw.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.

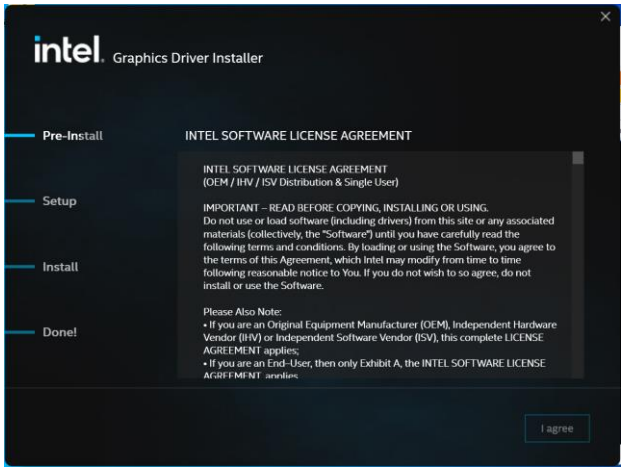


Step 3. Click **Start.**

Step 1. Click **Begin installation**.



Step 4. Complete setup.



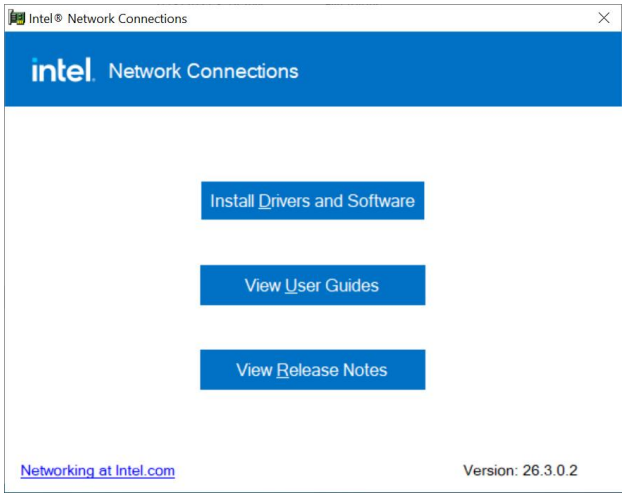
Step 2. Click **I agree**.

4.4 Install Ethernet Driver

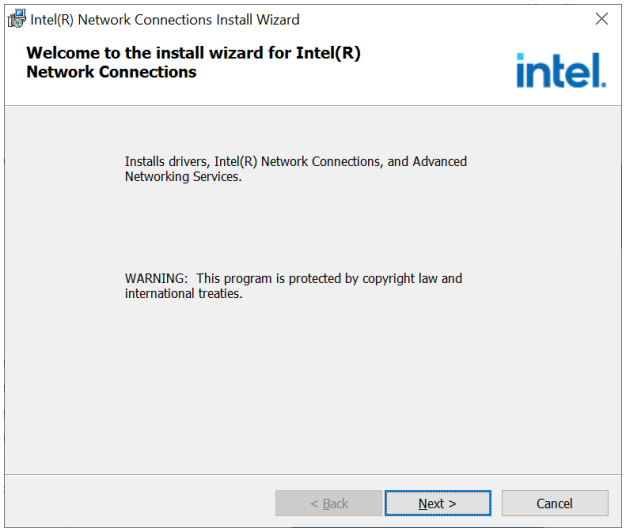
All drivers can be found on the Avalue Official Website:

http://www.avalue.com.tw.

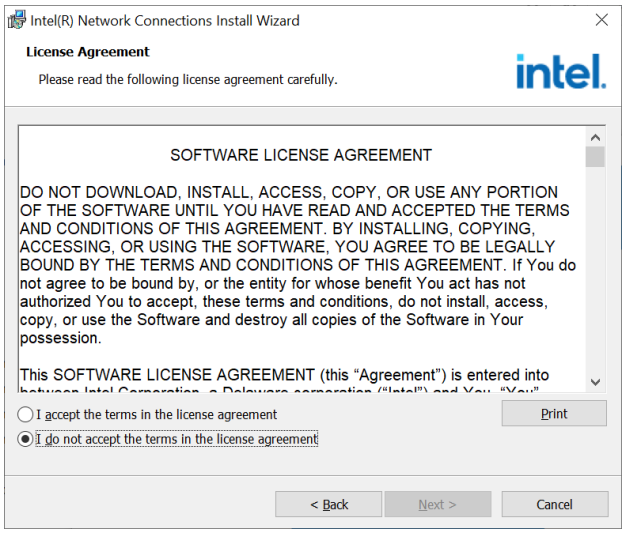
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



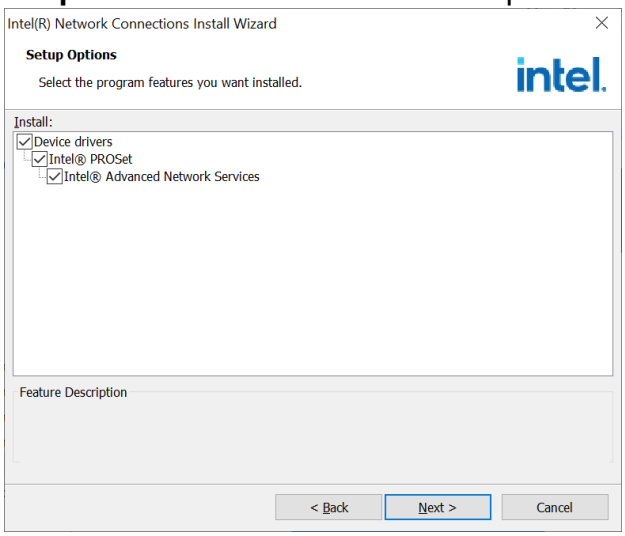
Step 1. Click **Install Drivers and Software**.



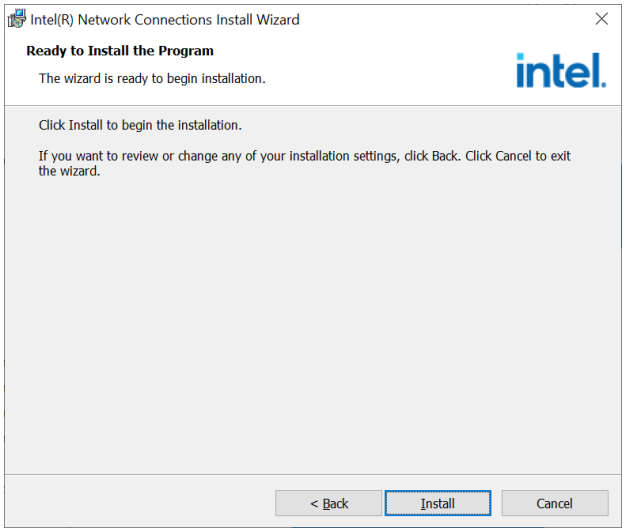
Step 2. Click **Next**.



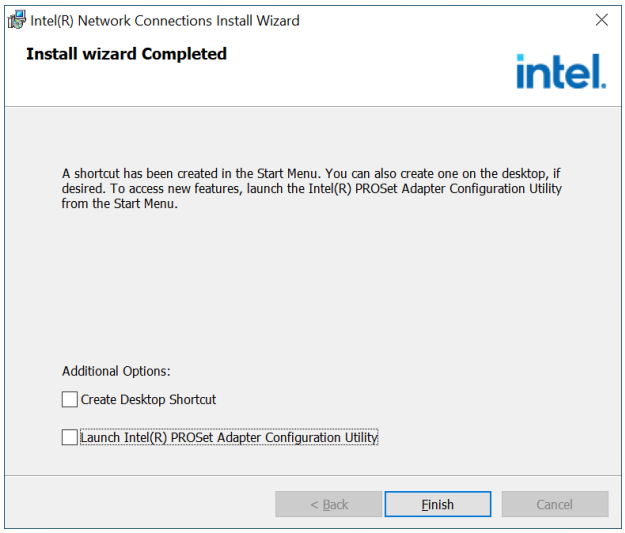
Step 3. Click **Next** to continue setup.



Step 4. Click **Next**.



Step 5. Click **Install**.

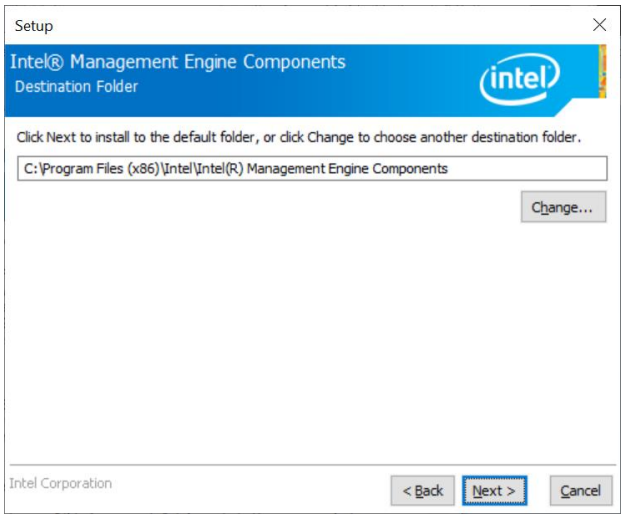


Step 6. Click **Finish** to complete the setup.

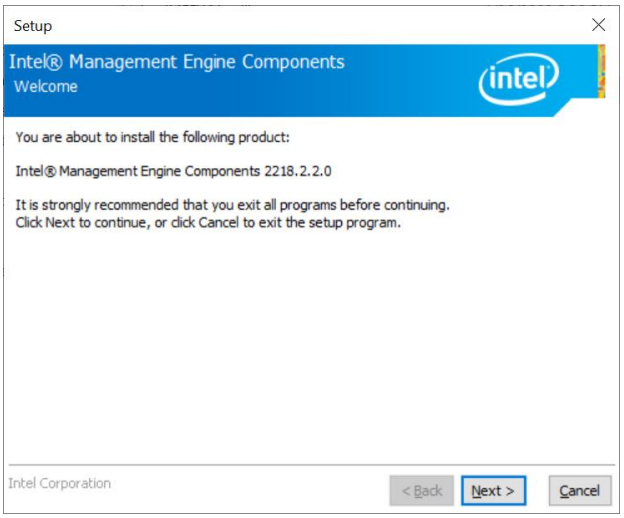
4.5 Install ME Driver

All drivers can be found on the Avalue Official Website:
http://www.avalue.com.tw.

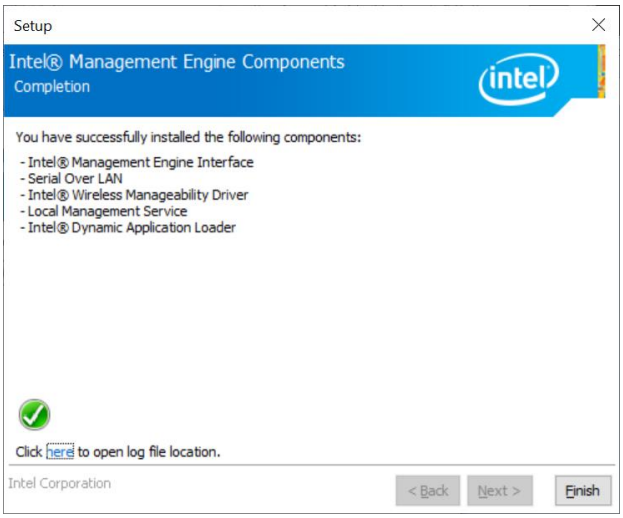
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



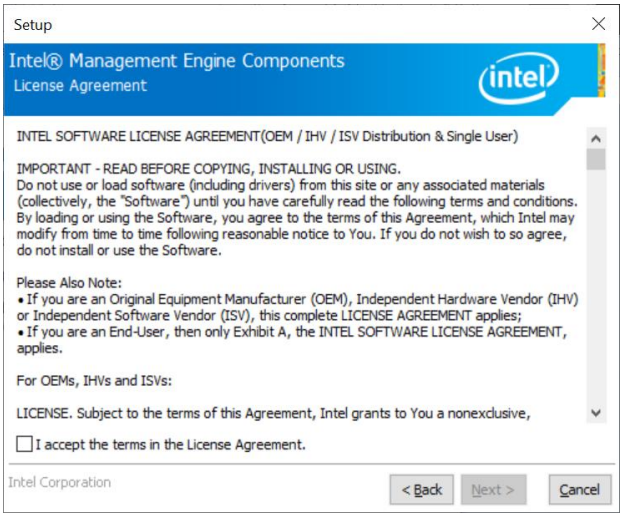
Step 3. Click **Next** to continue installation.



Step1. Click **Next** to start installation.



Step 4. Click **Finish** to complete setup.



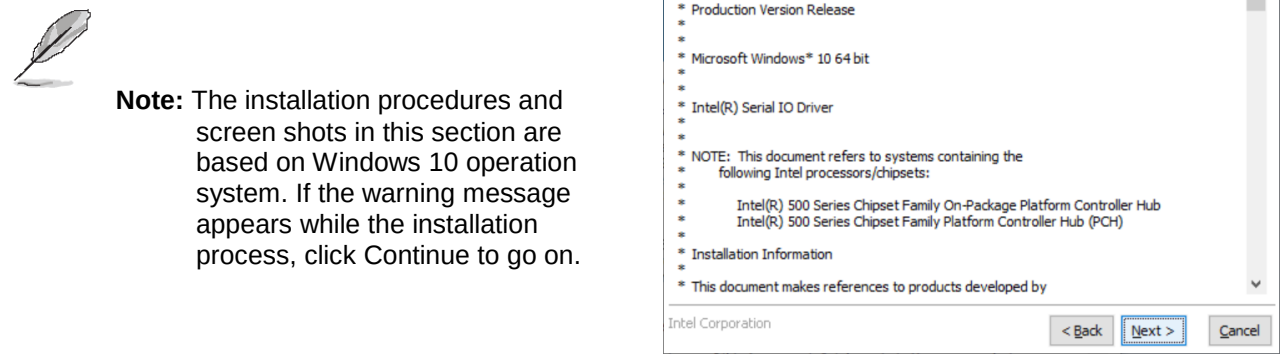
Step 2. Click **Next**.

4.6 Install Serial IO Driver

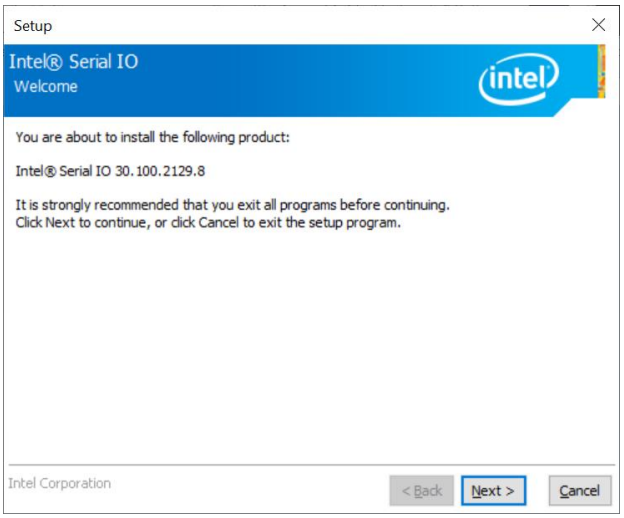
All drivers can be found on the Avalue Official Website:

http://www.avalue.com.tw.

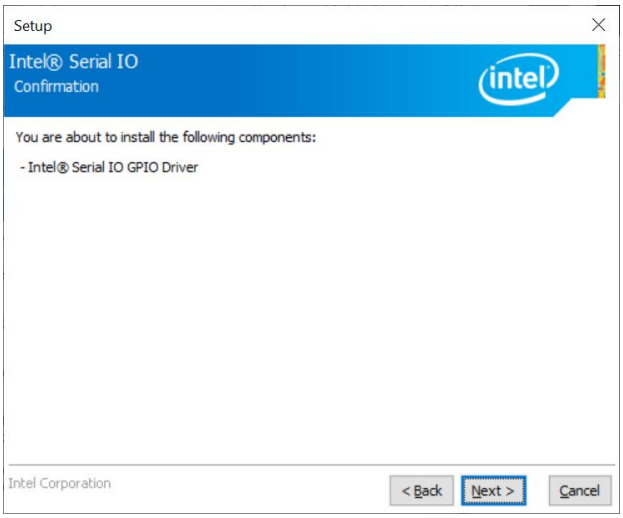
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



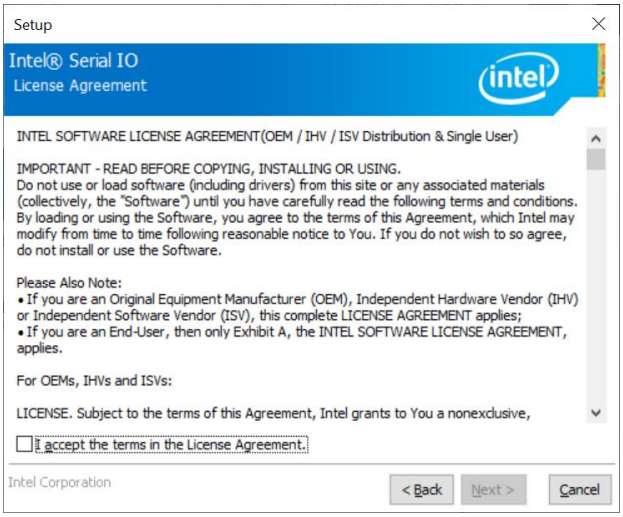
Step 3. Click **Next**.



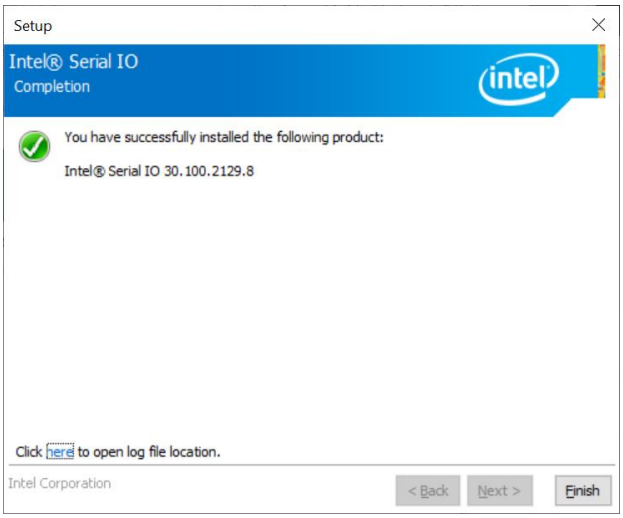
Step1. Click **Next** to start installation.



Step 4. Click **Next**.

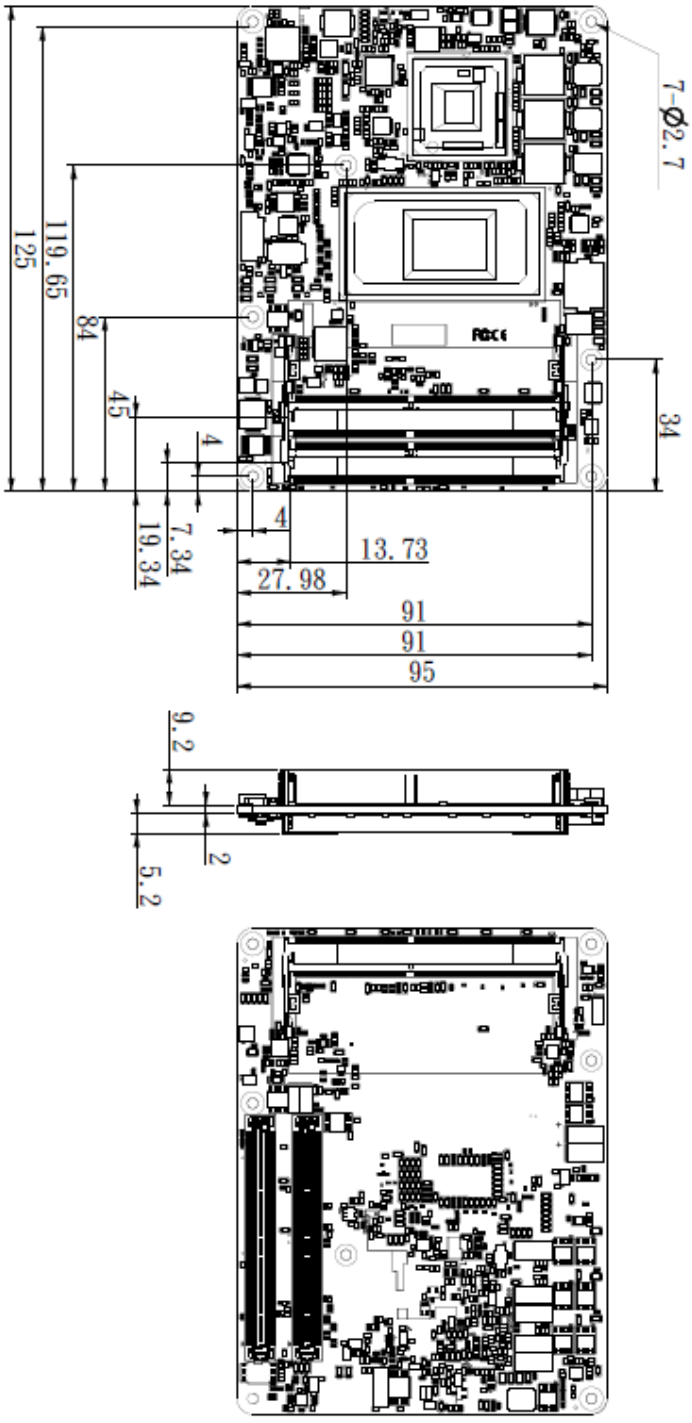


Step 2. Click **Next**.



Step 5. Click **Finish** to complete setup.

5. Mechanical Drawing



Unit: mm