

# ESM-CFH

9th/8th Gen Intel Xeon®/Core™ Processor i7/i5/i3 Type6  
COMe Basic Module with Intel® CM246/ QM370 Chipset

## User's Manual

2<sup>nd</sup> Ed –06 September 2019

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Part No. E2047289601R

## FCC Statement



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

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

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# 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-CFH COMe Module
- 1 x Desiccant (5g)
- 5 x Screws



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

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### 1.3 Document Amendment History

Revision	Date	By	Comment
1 <sup>st</sup>	July 2019		Initial Release
2 <sup>nd</sup>	September 2019		Update 1.5 System Specifications



## 1.4 Manual Objectives

This manual describes in details of the ESM-CFH 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-CFH 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	
<b>CPU</b>	<p>Mobile 9th Generation Intel® Xeon®, Core™, Pentium® and Celeron® Processors - 14nm process</p> <ul style="list-style-type: none"> <li>• Xeon® E-2276ME 45W (35W cTDP), 6C/GT2 (ECC/non-ECC)</li> <li>• Xeon® E-2276ML* 25W, 6C/GT2 (ECC/non-ECC)</li> <li>• Xeon® E-2254ME* 45W (35W cTDP), 4C/GT2 (ECC/non-ECC)</li> <li>• Xeon® E-2254ML* 25W, 4C/GT2 (ECC/non-ECC)</li> <li>• Core™ i7-9850HE 45W (35W cTDP), 6C/GT2 (non-ECC)</li> <li>• Core™ i7-9850HL* 25W, 6C/GT2 (non-ECC)</li> <li>• Core™ i3-9100HL 25W, 4C/GT2 (ECC/non-ECC)</li> <li>• Celeron® G4930E* 35W, 2C/GT1 (ECC/non-ECC)</li> <li>• Celeron® G4932E* 25W, 2C/GT1 (ECC/non-ECC)</li> </ul> <p>Mobile 8th Generation Intel Xeon® and Core™ Processors - 14nm process</p> <ul style="list-style-type: none"> <li>• Xeon® E-2176M* 45W (35W cTDP), 6C/GT2 (ECC/non-ECC)</li> <li>• Core™ i7-8850H* 45W (35W cTDP), 6C/GT2 (non-ECC)</li> <li>• Core™ i5-8400H 45W (35W cTDP), 4C/GT2 (non-ECC)</li> <li>• Core™ i3-8100H* 45W (35W cTDP), 4C/GT2 (ECC/non-ECC)</li> </ul> <p>* SKU is project based support. Please contact sales for details</p>
<b>BIOS</b>	<p>AMI uEFI BIOS, 128 Mbit SPI Flash ROM</p> <p>iAMT 12.0 supported (only on specific models with Xeon/i7/i5 SKU)</p>
<b>System Chipset</b>	<p>CM246 (supports ECC memory, Intel® AMT and PEG configuration)</p> <p>QM370 (supports Intel® AMT and PEG configuration)</p>
<b>I/O Chip</b>	EC(IT8528E)
<b>System Memory</b>	<p>Up to 3 x 260-pin DDR4-2400 SO-DIMM with up to 96 GByte (non-ECC/ECC)</p> <p>1:ECC supported only on specific models with Xeon &amp; i3 CPU paired with CM246 supports both ECC and non-ECC memory)</p>
<b>Watchdog Timer</b>	H/W Reset, 1sec. ~ 65535sec. and 1sec./step
<b>H/W Status Monitor</b>	Monitoring System Temperature, Voltage and FAN Status with Auto Throttling Control
<b>Expansion</b>	<p>1 x PCIe x16 Gen3 (configurable to 1 PCIe x16, 2 PCIe x8, or 1 PCIe x8 + 2 PCIe x4)</p> <p>8 x PCIe x1, configurable to x4 or x2</p> <p>*6 x PCIEx1 (PCIEx0~3 w/RST , PCIEx4,5)</p> <p>*2 x PCIEx1 (PCIEx6, PCIEx7)</p>
<b>TPM</b>	TPM 2.0
<b>I/O</b>	

<b>MIO</b>	4 x SATAIII 6.0Gb/s (Support RAID0,1,5,10) LPC, I2C, SPI, SMBus, 2 x UART(2-wire), SDIO (optional)
<b>USB</b>	4 x USB 3.1 Gen2 (USB3.2 Gen.2) (10 Gbps)/ USB 3.1 Gen1 (USB3.2 Gen.1) 8 x USB 2.0 (EHCI)
<b>GPIO</b>	8bit GPIO (Share with SDIO, Optional), WDG/HW monitor/FAN
<b>Display</b>	
<b>Chipset</b>	Intel® Coffee Lake Processor integrated Graphics
<b>Resolution</b>	eDP 1.4(optional): 4096 x 2304 @60Hz optional (only one display output) HDMI 1.4: 4096 x 2160 @30Hz (only one display output) DP 1.2: 4096 x 2304 @60Hz (only one display output) LVDS(via eDP-to-LVDS IC): 1920 x 1080 @60Hz VGA(via DP-to-VGA IC): 1920 x 1080 @60Hz
<b>Multiple Display</b>	supporting 3 independent and simultaneous display LVDS(eDP)+ VGA(HDMI)+DDI(HDMI or DP)
<b>HDMI</b>	HDMI 1.4
<b>LCD Interface</b>	Dual-channel 18/24-bit LVDS (LVDS via CH7511B)
<b>Audio</b>	
<b>AC97 Codec</b>	Intel HD audio I/F
<b>Ethernet</b>	
<b>LAN Chip</b>	Intel I219LM
<b>Ethernet Interface</b>	10/100/1000 GbE connection
<b>Mechanical &amp; Environmental</b>	
<b>Power Requirement</b>	+9~ +19V
<b>ACPI</b>	Single power ATX Support S0, S3, S4, S5 ACPI 4.0 Compliant
<b>Power Type</b>	AT/ATX
<b>Operating Temp.</b>	0 ~ 60 °C (32 ~ 140 °F)
<b>Storage Temp.</b>	40°C @ 95% Relative Humidity, Non-condensing
<b>Operating Humidity</b>	0% ~ 90% relative humidity, non-condensing
<b>Size (L x W)</b> (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")
<b>Weight</b>	0.44lbs(0.2kg)
<b>OS Support</b>	1) Microsoft® Windows 10 64-bit

## ESM-CFH User's Manual

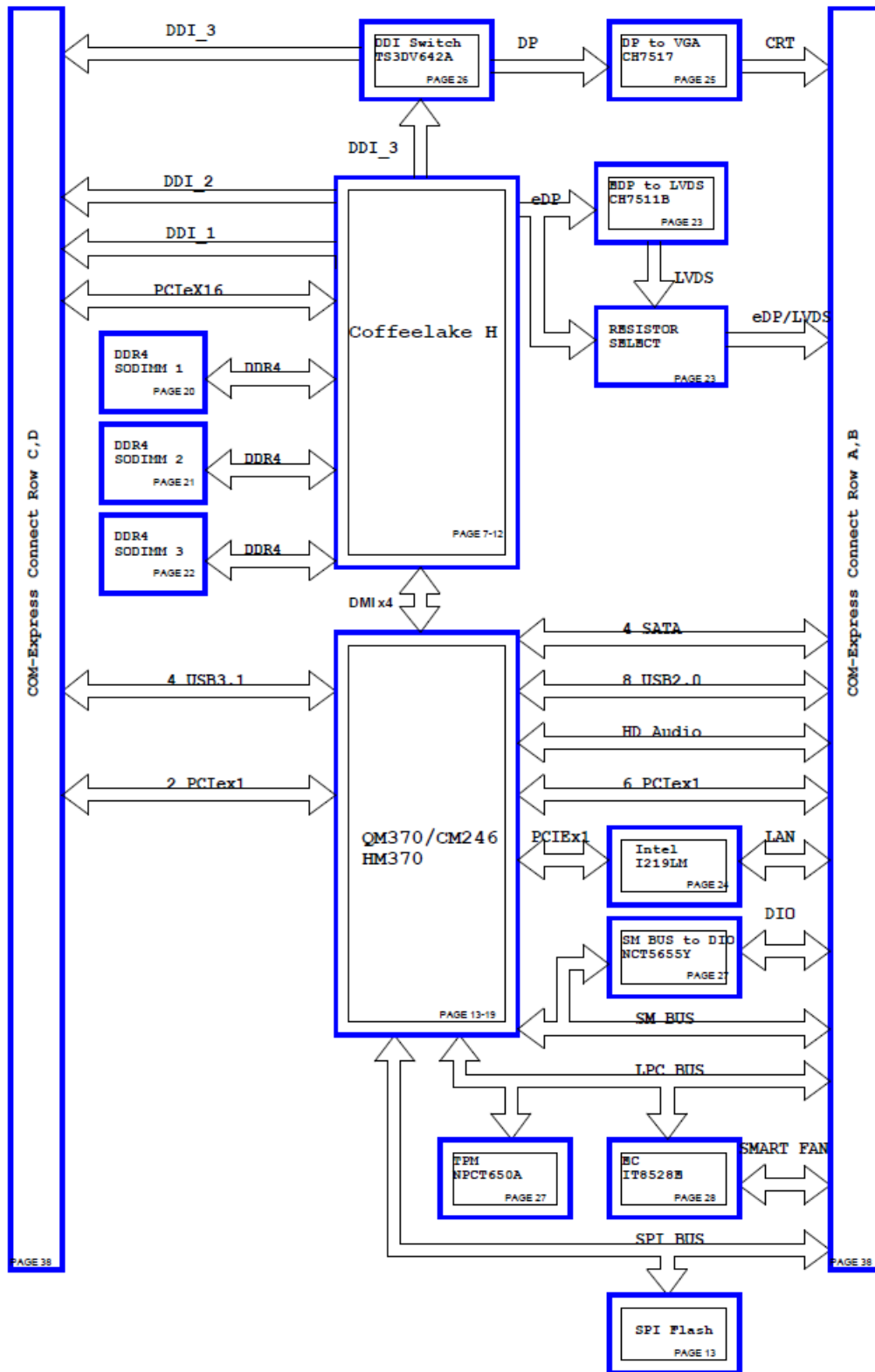
(listed in accordance with Intel document)	2) Linux
--------------------------------------------	----------



**Note:** Specifications are subject to change without notice.

## 1.6 Architecture Overview—Block Diagram

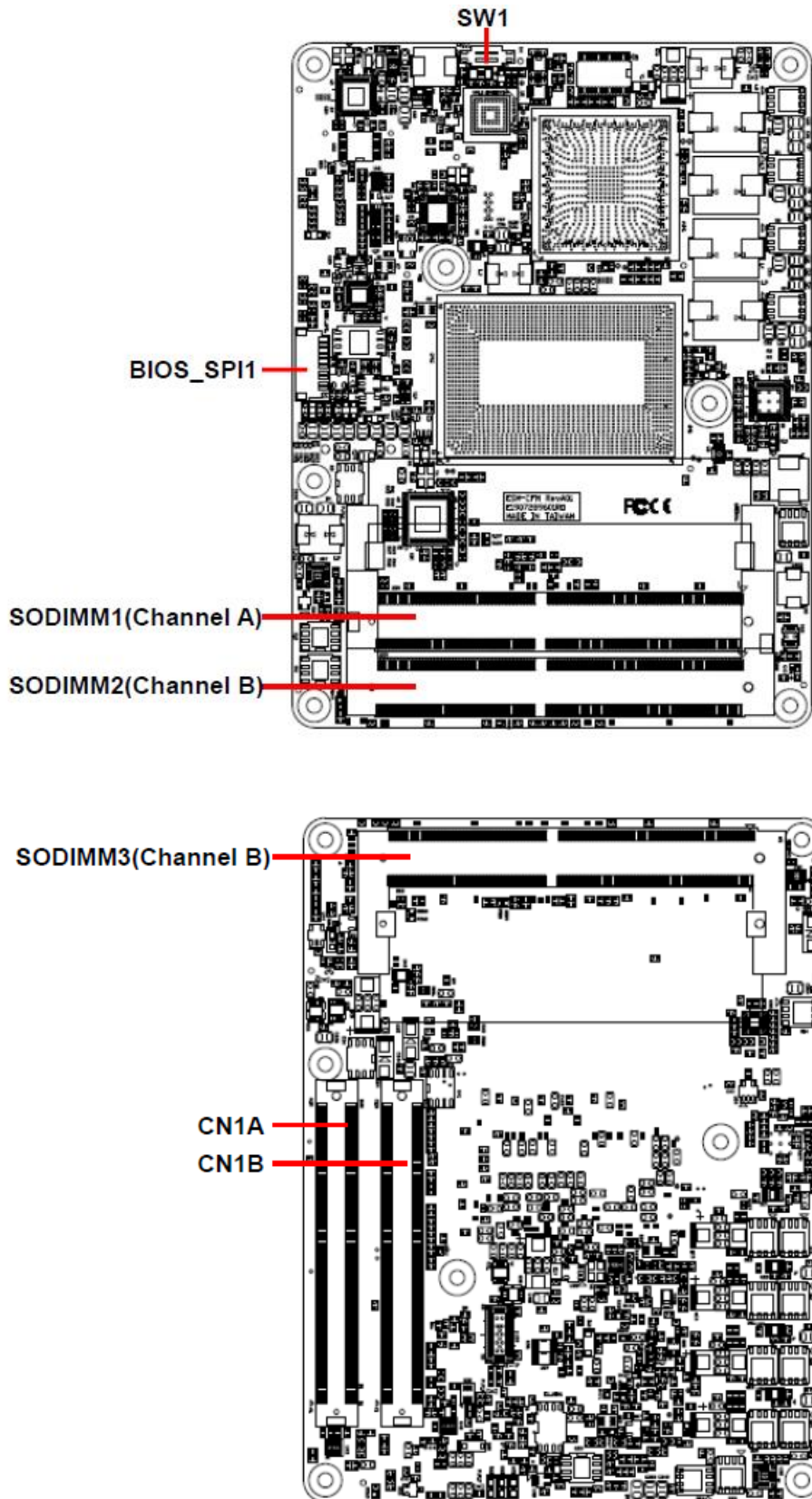
The following block diagram shows the architecture and main components of ESM-CFH.



# 2. Hardware Configuration

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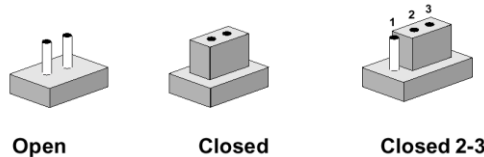
## 2.1 Product Overview



## 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.



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



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.

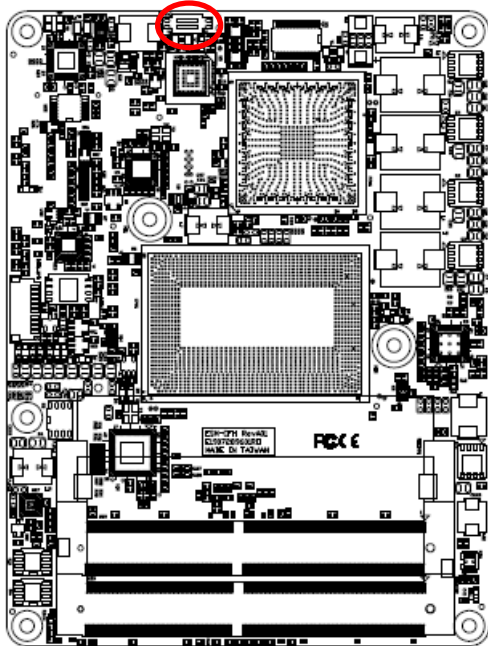
### Connectors

Label	Function	Note
BIOS_SPI1	(Reserved for BIOS programming)	10 x 1 wafer, pitch 1.00mm
SODIMM1(Channel A)	260-pin DDR4 SDRAM DIMM socket 1	
SODIMM1(Channel B)	260-pin DDR4 SDRAM DIMM socket 2	
SODIMM1(Channel B)	260-pin DDR4 SDRAM DIMM socket 3	
CN1A	COM Express connector 1	
CN1B	COM Express connector 2	
SW1	AT/ATX mode selector	



## 2.3 Setting Jumpers & Connectors

### 2.3.1 AT/ATX mode selector (SW1)



AT/ATX mode



AT mode

OFF	1	→	ON
	2		

ATX mode\*

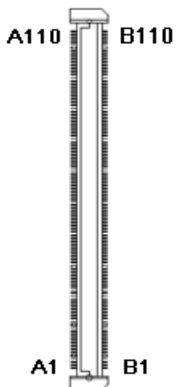
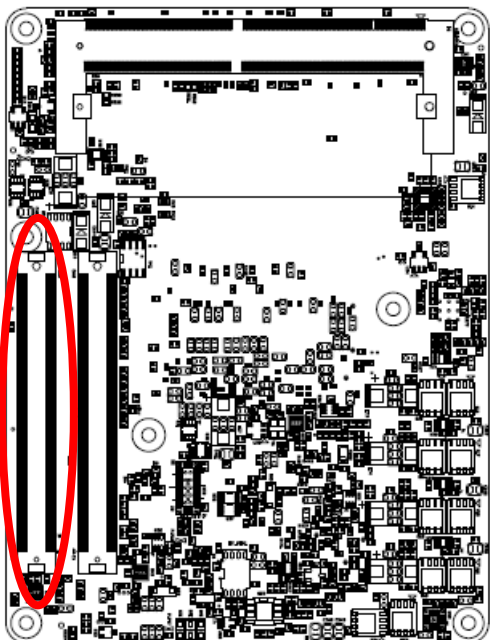
OFF	1	←	ON
	2		

\*Default

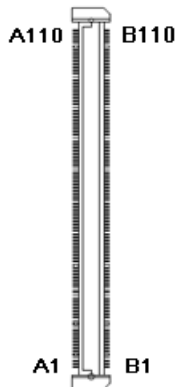
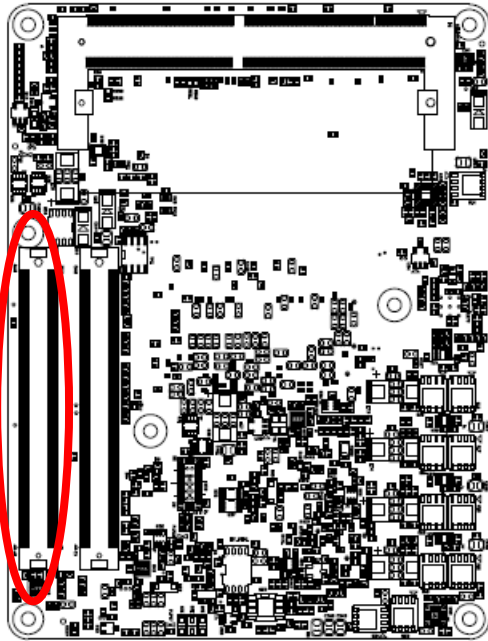
#### 2.3.1.1 Signal Description –AT/ATX mode selection

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

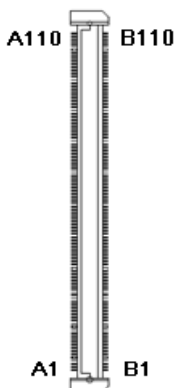
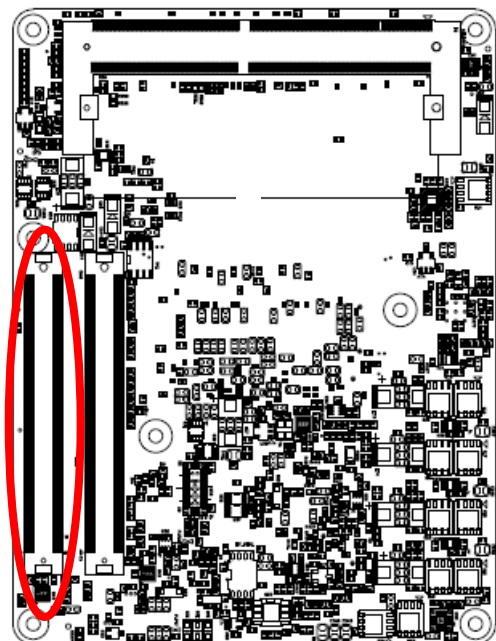
2.3.2 COM Express Connector 1 (CN1A)



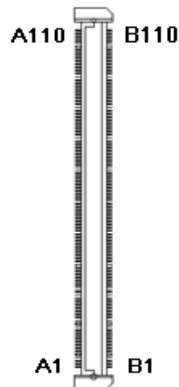
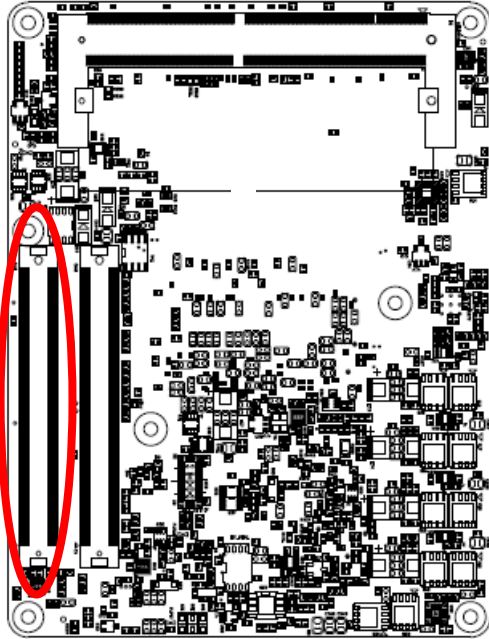
Signal	PIN	PIN	Signal
GND	A110	B110	GND
VCC	A109	B109	VCC
VCC	A108	B108	VCC
VCC	A107	B107	VCC
VCC	A106	B106	VCC
VCC	A105	B105	VCC
VCC	A104	B104	VCC
LID#	A103	B103	SLEEP#
SER1_RX	A102	B102	FAN_TACHIN
SER1_TX	A101	B101	FAN_PWMOUT
GND	A100	B100	GND
SER0_RX	A99	B99	NC
SER0_TX	A98	B98	NC
TYPE10#	A97	B97	SPI_CS#
TPM_PP	A96	B96	VGA_I2C_DAT
SPI_MOSI	A95	B95	VGA_I2C_CK
SPI_CLK	A94	B94	VGA_VSYNC
GPO0	A93	B93	VGA_HSYNC
SPI_MISO	A92	B92	VGA_BLU
+3.3V	A91	B91	VGA_GRN
GND	A90	B90	GND
PCIE_CLK_REF-	A89	B89	VGA_RED
PCIE_CLK_REF+	A88	B88	BIOS_DIS1#
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	A50	B50	CB_RESET#
GBE0_SDP	A49	B49	SYS_RESET#
RSVD1	A48	B48	USB0_HOST_PRSENT
+3.3V	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#
BIOS_DIS0#	A34	B34	I2C_DATA
HAD_SDOOUT	A33	B33	I2C_CLK
HAD_BITCLK	A32	B32	SPKR
GND	A31	B31	GND
HDA_RST#	A30	B30	HDA_SDI0
HDA_SYNC	A29	B29	HDA_SDI1
(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	SUS_STAT#
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
GBE0_MDI1-	A9	B9	NC
GBE0_LINK#	A8	B8	NC
GBE0_MDI2+	A7	B7	LPC_AD3
GBE0_MDI2-	A6	B6	LPC_AD2
GBE0_LINK1000#	A5	B5	LPC_AD1
GBE0_LINK100#	A4	B4	LPC_AD0
GBE0_MDI3+	A3	B3	LPC_FRAME#
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
HDA_SDI[0:1]	Audio CODEC Serial Data
HDA_BITCLK	HD Audio Clock
HDA_SDOOUT	HD Audio Data

2.3.2.1.2 Gigabit Ethernet Signals

Signal	Signal Description																				
GBE0_MD[0:3] +/-	Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0,1,2,3. The MDI can operate in 1000, 100 and 10 Mbit / sec modes. Some pairs are unused in some modes, per the following:																				
	<table border="1"> <thead> <tr> <th></th> <th>1000B-T</th> <th>100B-T</th> <th>10B-T</th> </tr> </thead> <tbody> <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> </tbody> </table>		1000B-T	100B-T	10B-T	MDI[0] +/-	B1_DA+	TX+/-	TX+/-	MDI[1] +/-	B1_DB+	RX+/-	RX+/-	MDI[2] +/-	B1_DC+	X	X	MDI[3] +/-	B1_DD+	X	X
		1000B-T	100B-T	10B-T																	
	MDI[0] +/-	B1_DA+	TX+/-	TX+/-																	
	MDI[1] +/-	B1_DB+	RX+/-	RX+/-																	
MDI[2] +/-	B1_DC+	X	X																		
MDI[3] +/-	B1_DD+	X	X																		
GBE0_ACT#	Gigabit Ethernet Controller 0 activity indicator, active low.																				
GBE0_Link#	Gigabit Ethernet Controller 0 link indicator, active low.																				
GBE0_Link100#	Gigabit Ethernet Controller 0 100 Mbit / sec link indicator, active low.																				
GBE0_Link1000#	Gigabit Ethernet Controller 0 1000 Mbit / sec link indicator, active low.																				

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
PCIE0_CK_REF +/-	Reference clock output for PCI Express lanes 0-7 and for PCI Express Graphics lanes 0-15

## 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.
LVDS_A/EDP_TX [0:3] +/-	LVDS Channel A differential pairs.
LVDS_B[0:3] +/-	LVDS Channel B differential pairs.
LVDS_VDD_EN/EDP_VDD_EN	LVDS panel power enables.
LVDS_A_CK/EDP_TX3 +/-	LVDS Channel A differential clock.
LVDS_B_CK +/-	LVDS Channel A differential clock.

## 2.3.2.1.5 LPC Signals

Signal	Signal Description
LPC_FRAME#	LPC frame indicates the start of an LPC cycle
LPC_AD[0:3]	LPC multiplexed address, command and data bus
LPC_CLKOUT1	LPC clock output - 33MHz nominal
LPC_SERIRQ	LPC serial interrupt

## 2.3.2.1.6 GPIO Signals

Signal	Signal Description
GPI[0:4]	General purpose input pins.
GPO[0:4]	General purpose output pins.

## 2.3.2.1.7 Power &amp; System Management Signals

Signal	Signal Description
SUS_S3#	Indicates system is in Suspend to RAM state. Active low output.
SUS_S4#	Indicates system is in Suspend to Disk state. Active low output.
SUS_S5#	Indicates system is in Soft Off state.
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.

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SMB_ALERT#	System Management Bus Alert - input can be used to generate an SMI# (System Management Interrupt) or to wake the system.
SUS_STAT#	Indicates imminent suspend operation.
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 VGA Signals

Signal	Signal Description
VGA_RED	Red for monitor. Analog DAC output.
VGA_GRN	Green for monitor. Analog DAC output.
VGA_BLU	Blue for monitor. Analog DAC output.
VGA_HSYNC	Horizontal sync output to VGA monitor
VGA_VSYNC	Vertical sync output to VGA monitor



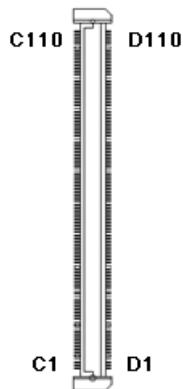
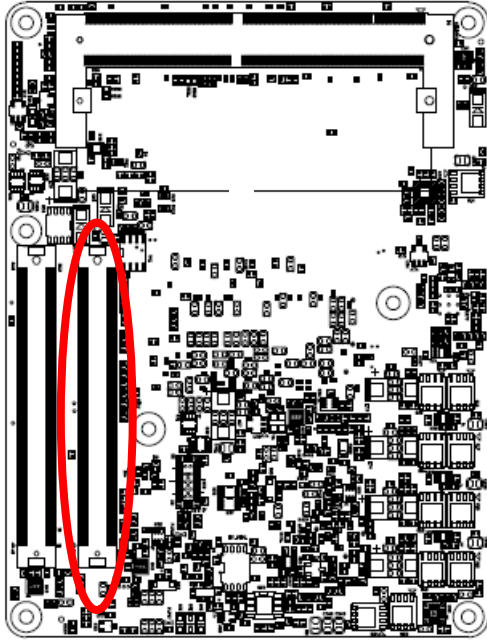
VGA_I <sup>2</sup> C_CK	DDC clock line (I2C port dedicated to identify VGA monitor capabilities)
VGA_I <sup>2</sup> C_DAT	DDC data line.

## 2.3.2.1.12 COM.0 Pins Signals

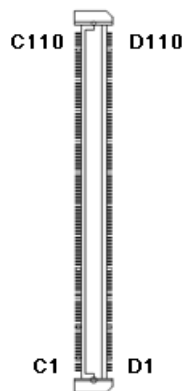
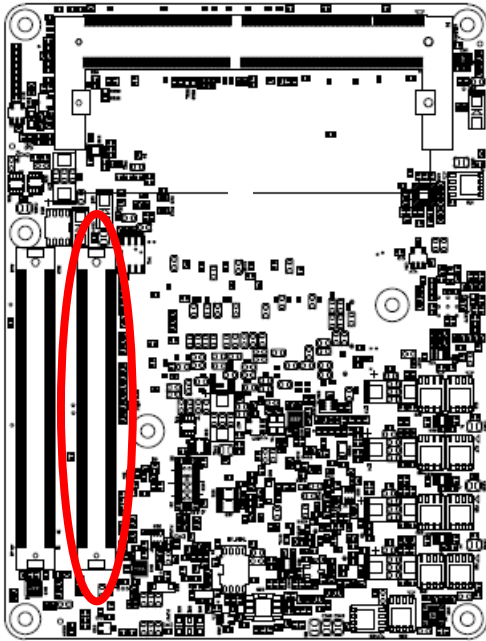
Signal	Signal Description
SER0/1_TX	TTL level outputs from the Module.
SER0/1_RX	TTL level inputs from the Module.

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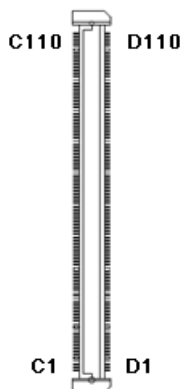
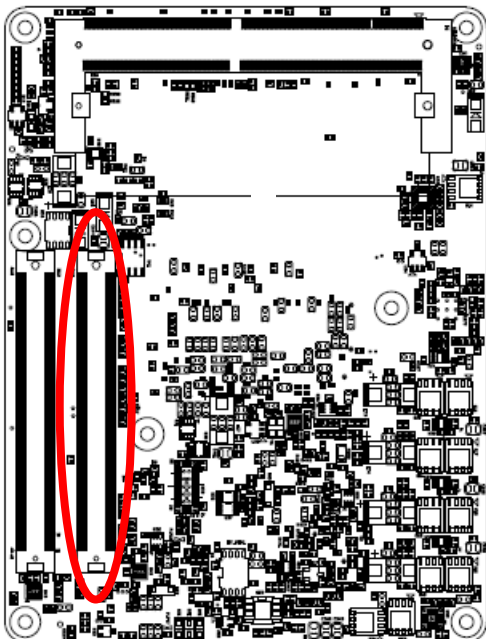
## 2.3.3 COM Express Connector 2 (CN1B)



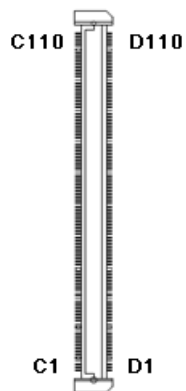
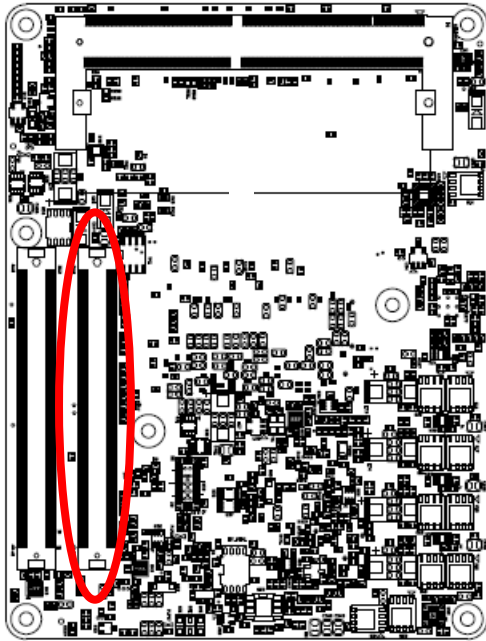
Signal	PIN	PIN	Signal
GND	C110	D110	GND
VCC	C109	D109	VCC
VCC	C108	D108	VCC
VCC	C107	D107	VCC
VCC	C106	D106	VCC
VCC	C105	D105	VCC
VCC	C104	D104	VCC
GND	C103	D103	GND
PEG_RX15-	C102	D102	PEG_TX15-
PEG_RX15+	C101	D101	PEG_TX15+
GND	C100	D100	GND
PEG_RX14-	C99	D99	PEG_TX14-
PEG_RX14+	C98	D98	PEG_TX14+
NC	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_CTRLCLK_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

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### 2.3.3.1 Signal Description – COM Express Connector 2 (CN1B)

#### 2.3.3.1.1 USB3.1 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 CTRLCLK and CTRLDATA signals.
DDI[1:3]_CTRLCLK_AUX+	DP AUX+function if DDI[1:3]_DDC_AUX_SEL is no connect HDMI/DVI I2C 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 I2C 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

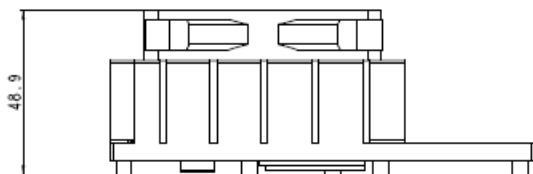
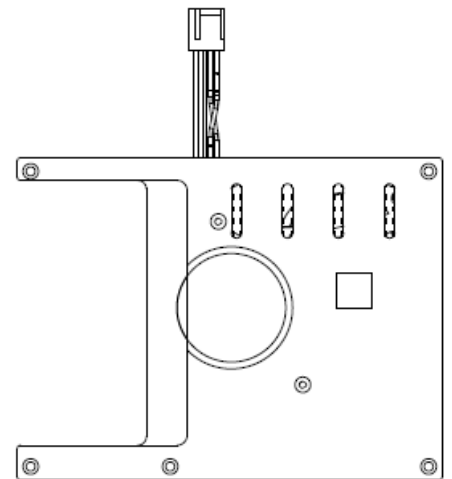
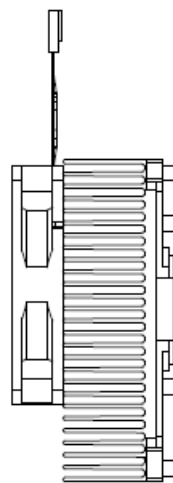
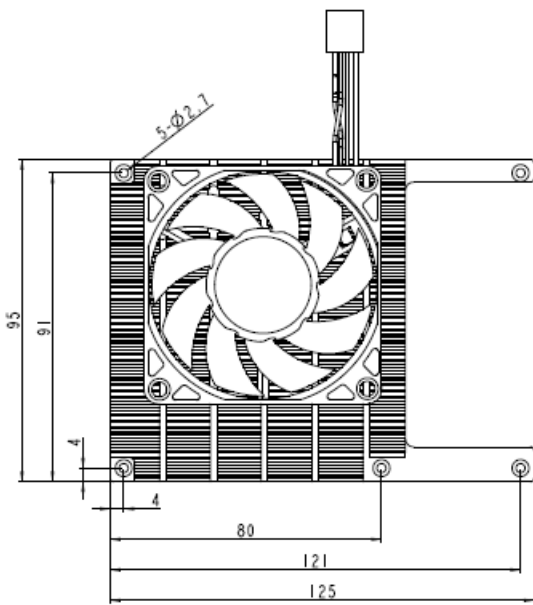
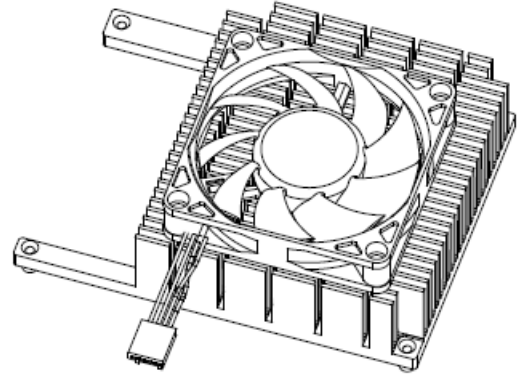
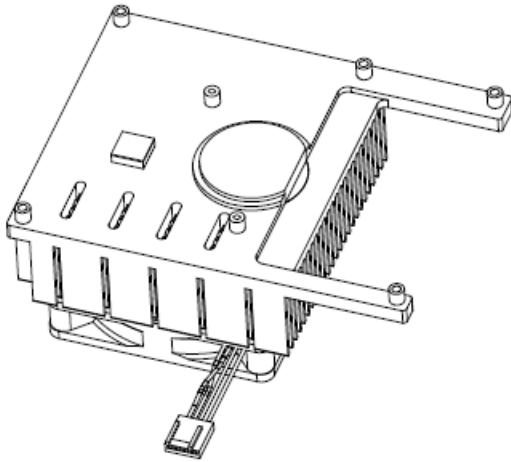
Signal	Signal Description
PCIE_TX[6:7] +/-	PCI Express Differential Transmit Pair 6-7
PCIE_RX[6:7] +/-	PCI Express Differential Receive Pair 6-7

#### 2.3.3.1.4 PEG PCI Express Lanes Signals

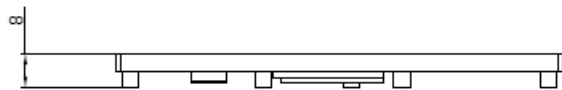
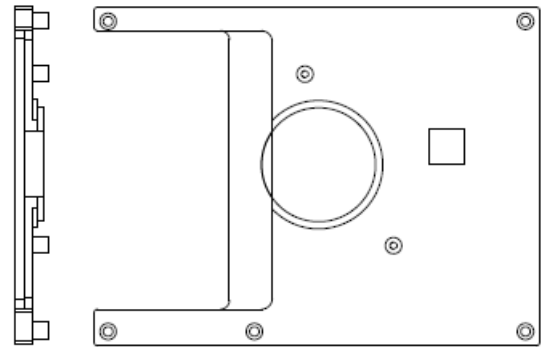
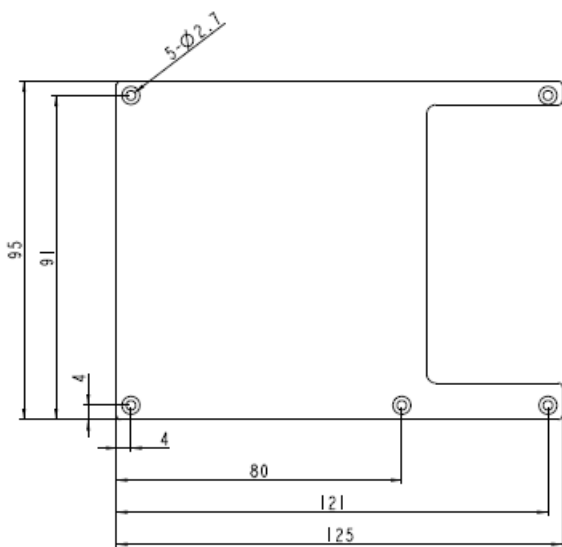
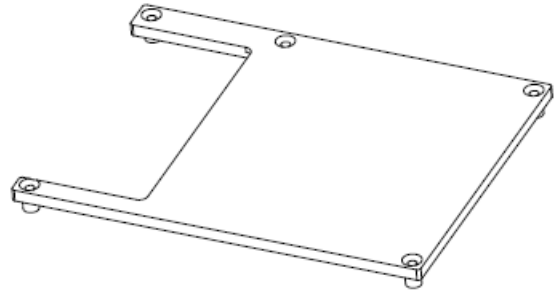
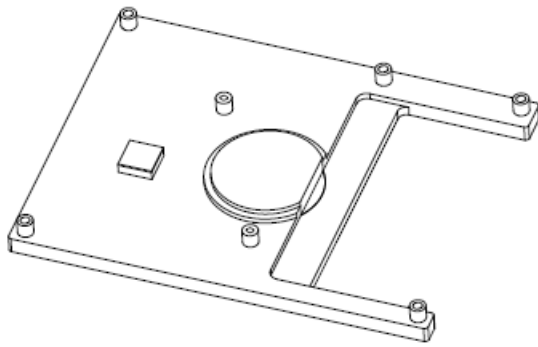
Signal	Signal Description
PEG_TX[0:15]+ PEG_TX[0:15]-	PCI Express Graphics transmit differential paris.
PEG_RX[0:15]+ PEG_RX[0:15]-	PCI Express Graphics recevie differential paris.

## 2.4 Installing Cooler / Heat spreader

### Cooler

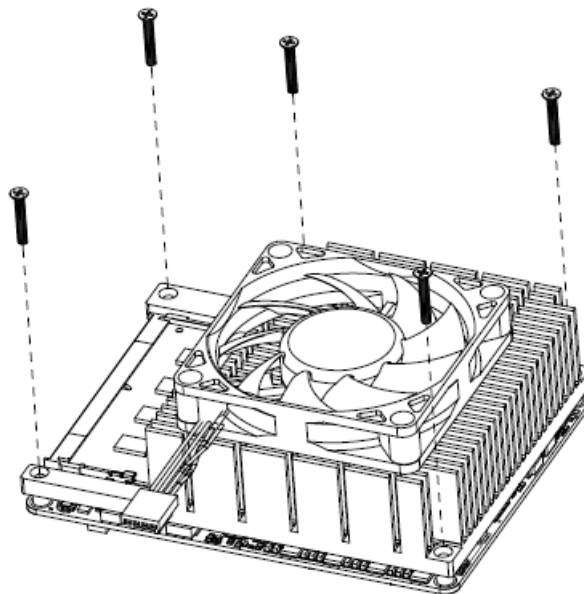
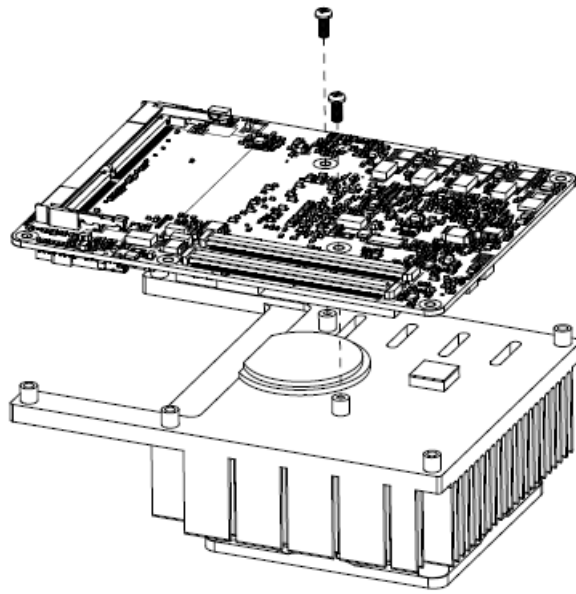


Heat spreader





**Cooler**



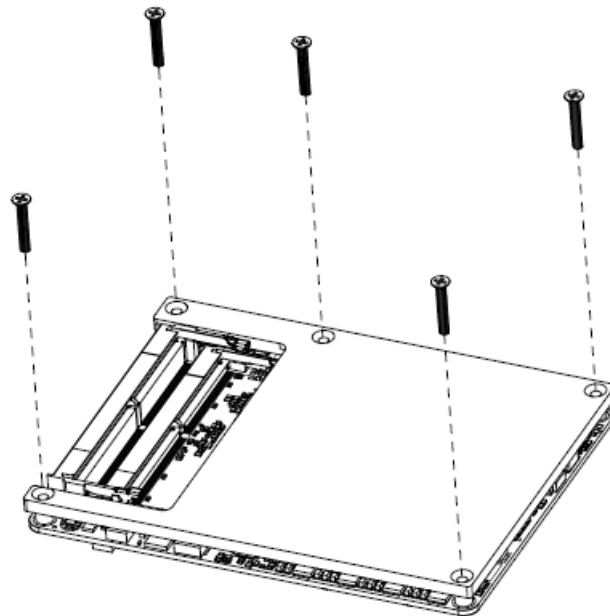
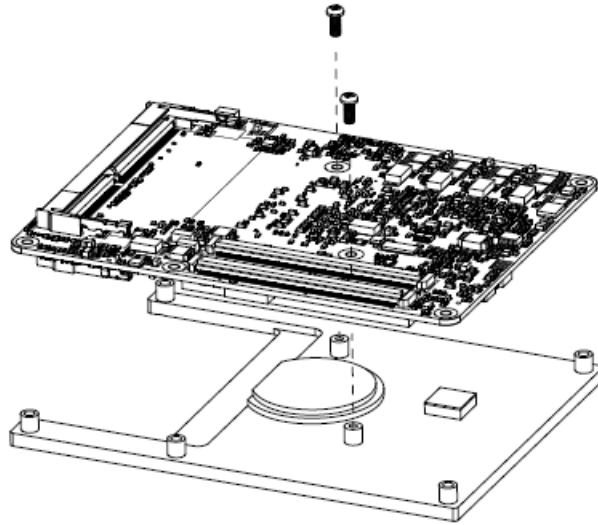
**Step1.** Using 7 screws (M2.5-12L) to lock the Heatsink from PCB backside.

**Note:**

Screw Size/Q'TY

- M2.5-12L Ni\*7pcs

Heat spreader



**Step1.** Using 7 screws (M2.5-12L) to lock the Heat spreader from PCB backside.

**Note:**

Screw Size/Q'TY

- M2.5-12L Ni\*7pcs

# 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

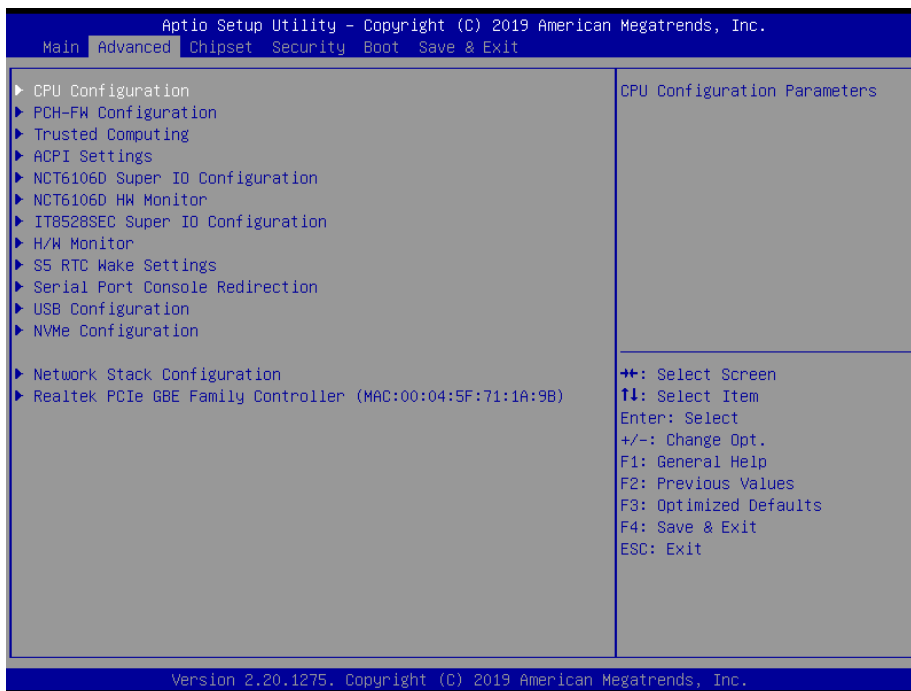
Use the system time option to set the system time. Manually enter the hours, minutes and seconds.



**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.

### 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

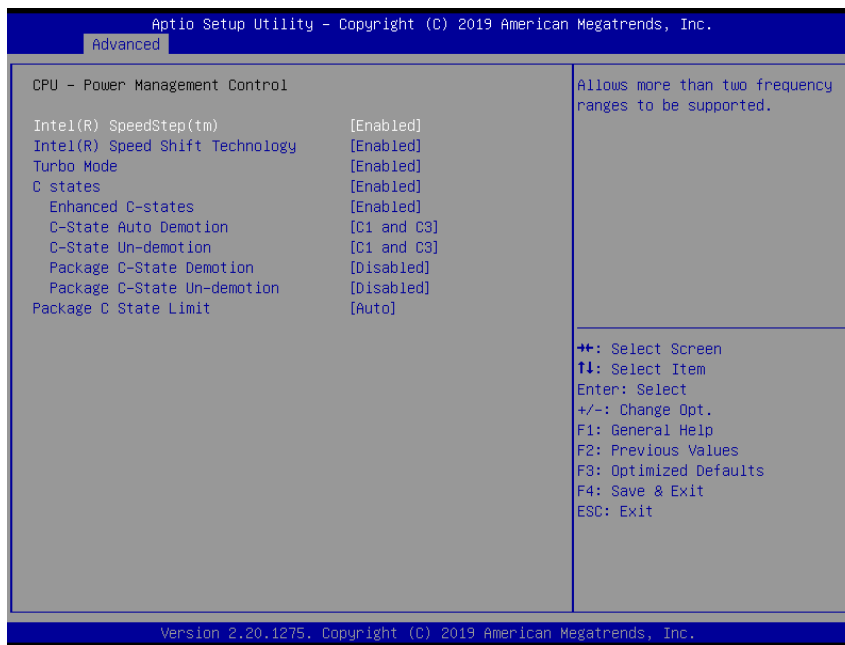
Use the CPU configuration menu to view detailed CPU specification and configure the CPU.





Item	Options	Description
<b>Intel (VMX) Virtualization Technology</b>	Disabled Enabled[Default]	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
<b>Active Processor Cores</b>	All[Default] 1 2 3 4 5 6 7 8	Number of cores to enable in each processor package.

### 3.6.2.1.1 CPU – Power Management Control

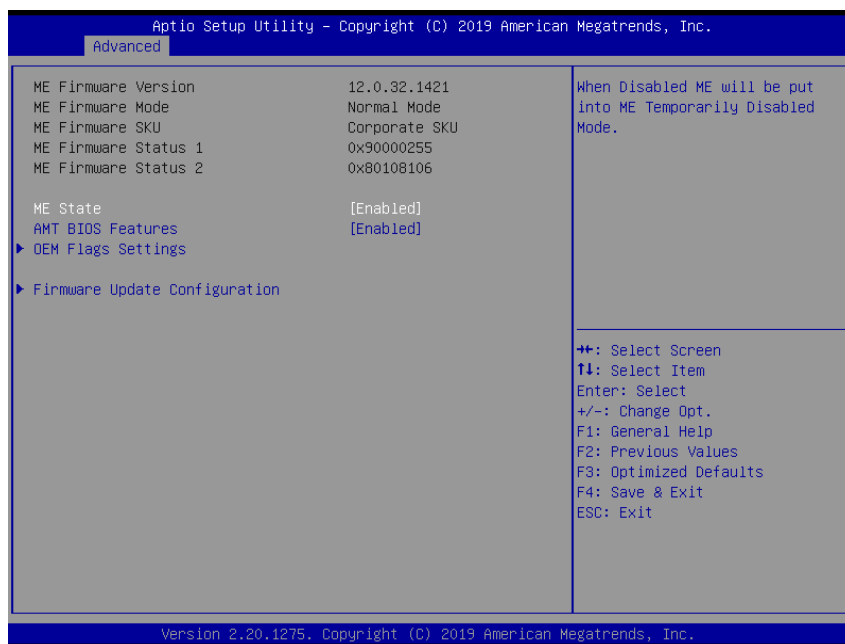


Item	Option	Description
<b>Intel® SpeedStep™</b>	Enabled[Default], Disabled	Allows more than two frequency ranges to be supported.
<b>Intel® Speed Shift Technology</b>	Enabled[Default], Disabled	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
<b>Turbo Mode</b>	Enabled[Default], Disabled	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).
<b>C States</b>	Enabled[Default], Disabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100391151632tilized.
<b>Enhanced C-states</b>	Enabled[Default], Disabled	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
<b>C-State Auto Demotion</b>	Disabled,	Configure C-State Auto Demotion.

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	C1 C3 C1 and C3[Default]	
<b>C-State Un-demotion</b>	Disabled, C1 C3 C1 and C3[Default]	Configure C-State Un-demotion.
<b>Package C-State Demotion</b>	Enabled Disabled[Default],	Package C-State Demotion.
<b>Package C-State Un-demotion</b>	Enabled Disabled[Default],	Package C-State Un-demotion.
<b>Package C State Limit</b>	C0/C1 C2 C3 C6 C7 C7S C8 C9 C10 CPU Default Auto[Default]	Maximum Package C State Limit Setting. CPU Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C State Limit.

### 3.6.2.2 PCH-FW Configuration



Item	Options	Description
<b>ME State</b>	Disabled, Enabled[Default]	When Disabled ME will be put into ME Temporarily Disabled Mode.
<b>AMT BIOS Features</b>	Disabled, Enabled[Default]	When disable AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW.

### 3.6.2.2.1 OEM Flags Settings



Item	Option	Description
Unconfigure ME	Disabled[Default], Enabled	OEMFlag Bit 15: Unconfigure ME with resetting MEBx password to default.

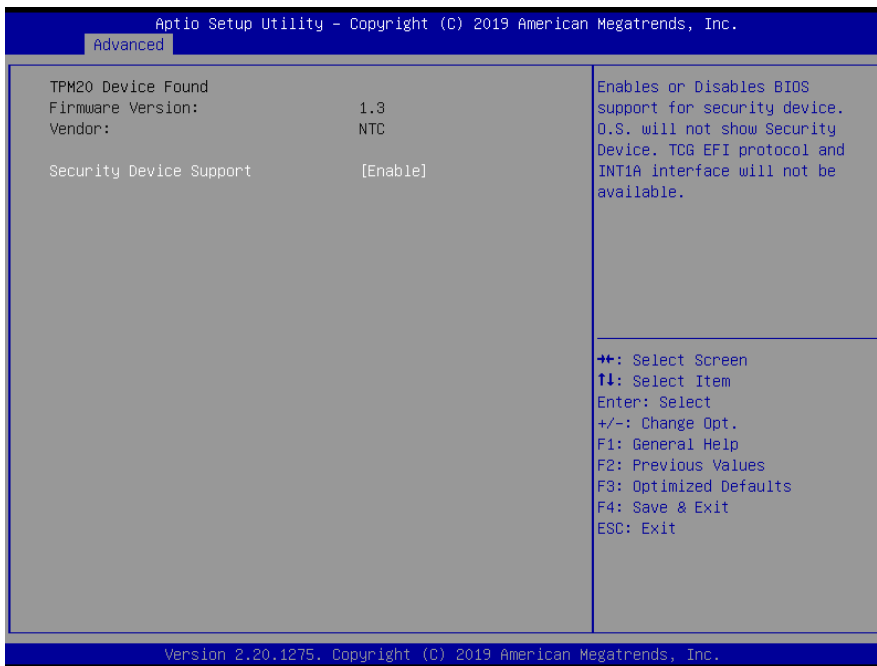
### 3.6.2.2.2 Firmware Update Configuration



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

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## 3.6.2.3 Trusted Computing



Item	Options	Description
<b>Security Device Support</b>	Disable, Enable[ <b>Default</b> ]	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.

## 3.6.2.4 APCI Settings

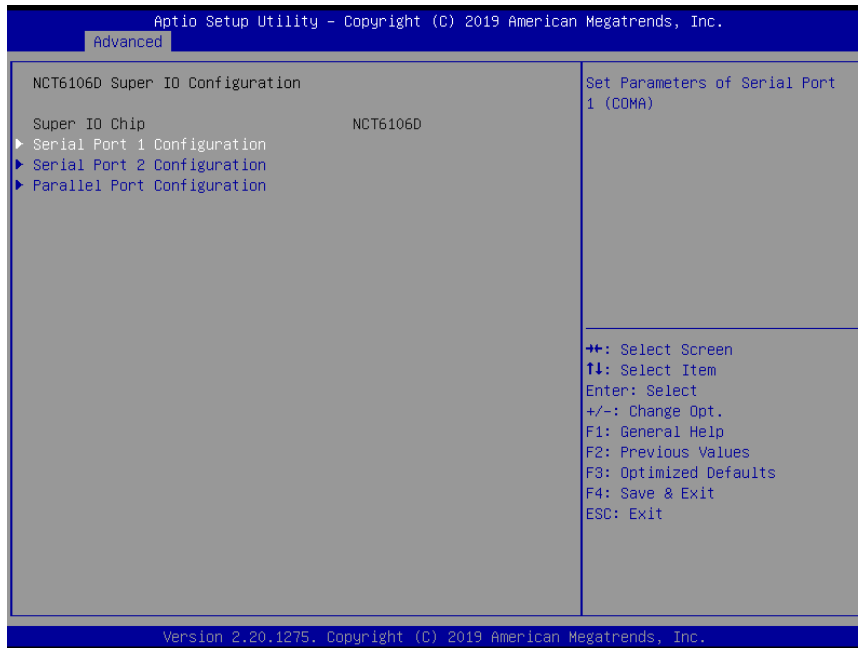


Item	Options	Description
<b>Enable Hibernation</b>	Disabled Enabled[ <b>Default</b> ],	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option

		may not be effective with some OS.
<b>ACPI Sleep State</b>	Suspend Disabled, S3 (Suspend to RAM)[Default]	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

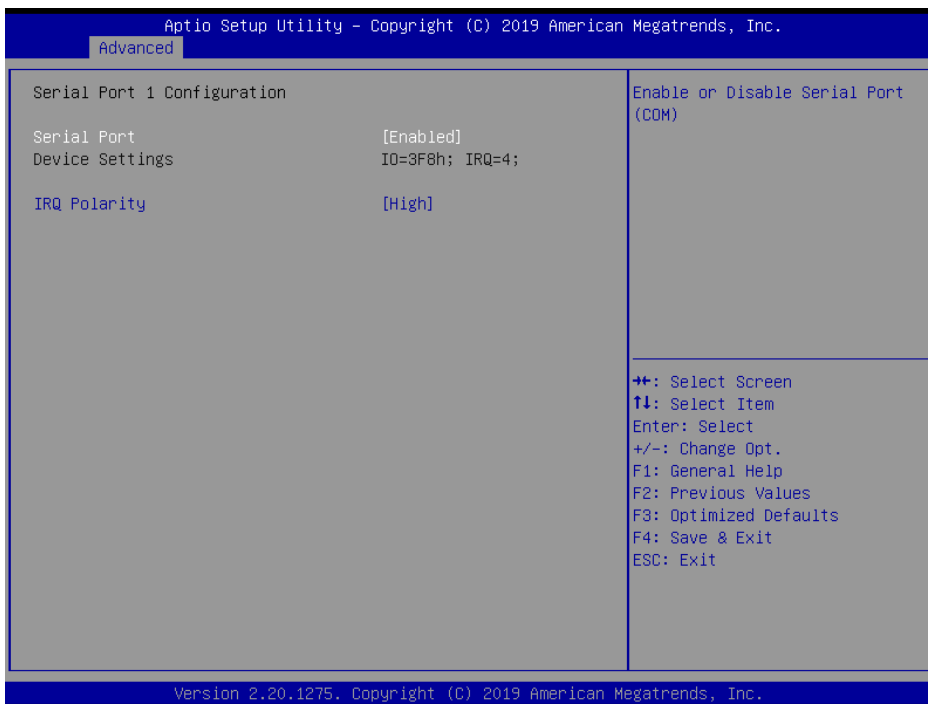
### 3.6.2.5 NCT6106D Super IO Configuration

You can use this item to set up or change the NCT6106D Super IO configuration for serial ports. Please refer to 3.6.2.5.1~ 3.6.2.5.3 for more information.



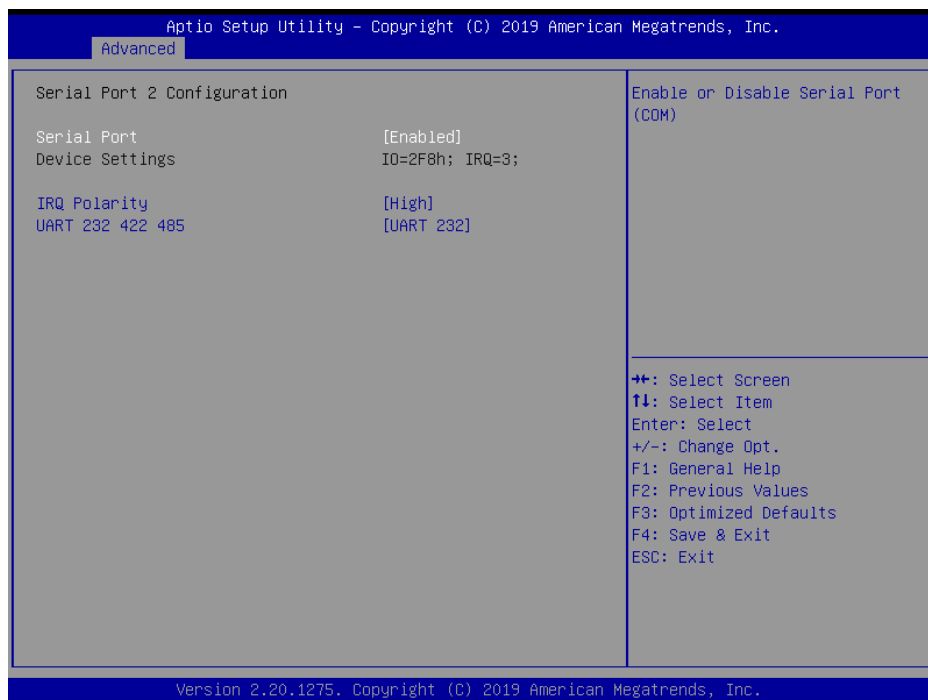
Item	Description
<b>Serial Port 1 Configuration</b>	Set Parameters of Serial Port 1 (COMA).
<b>Serial Port 2 Configuration</b>	Set Parameters of Serial Port 2 (COMB).
<b>Parallel Port Configuration</b>	Set Parameters of Parallel Port (LPT/LPTE).

3.6.2.5.1 Serial Port 1 Configuration



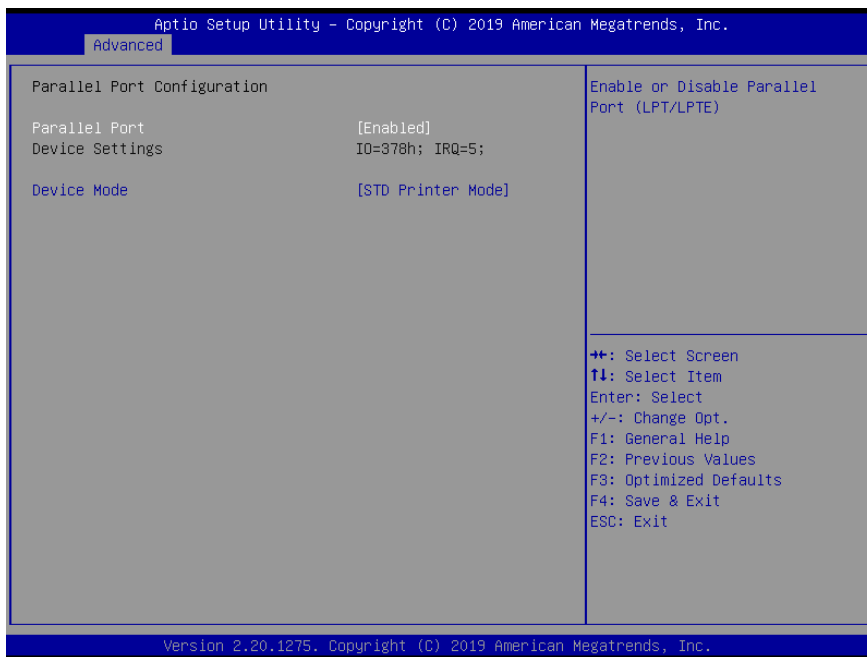
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).
IRQ Polarity	High[Default] Low	Low or High for both COM1 IRQ4/COM2 IRQ3.

3.6.2.5.2 Serial Port 2 Configuration



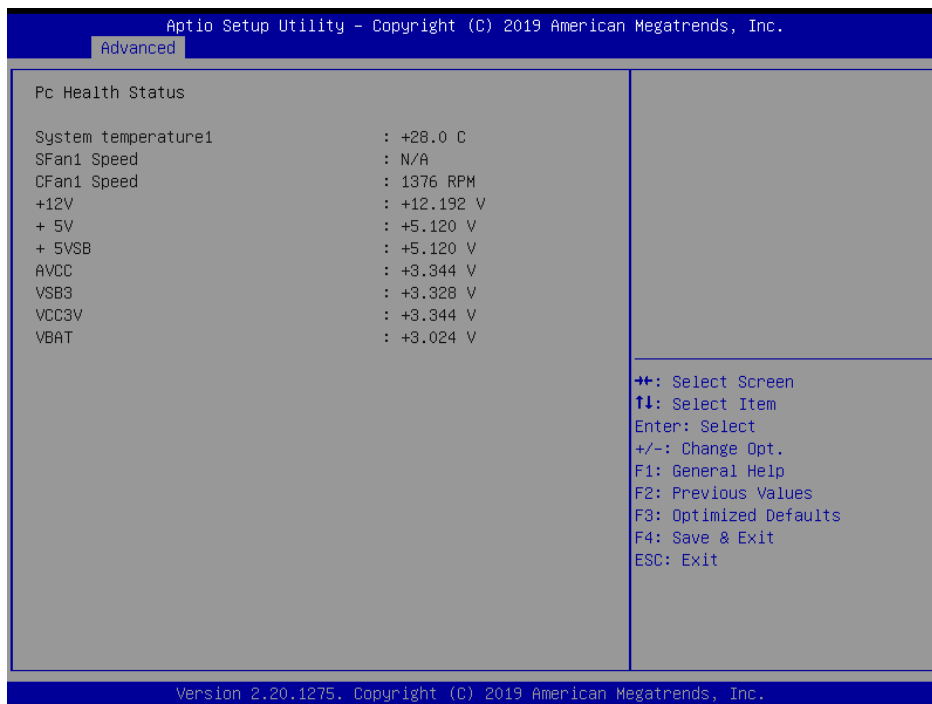
Item	Option	Description
Serial Port	Enabled[Default], Disabled	Enable or Disable Serial Port (COM).
IRQ Polarity	High[Default] Low	Low or High for both COM1 IRQ4/COM2 IRQ3.
UART 232 422 485	UART 232[Default] UART 485 UART 422	Change the Serial Port as RS232/422/485.

### 3.6.2.5.3 Parallel Port Configuration

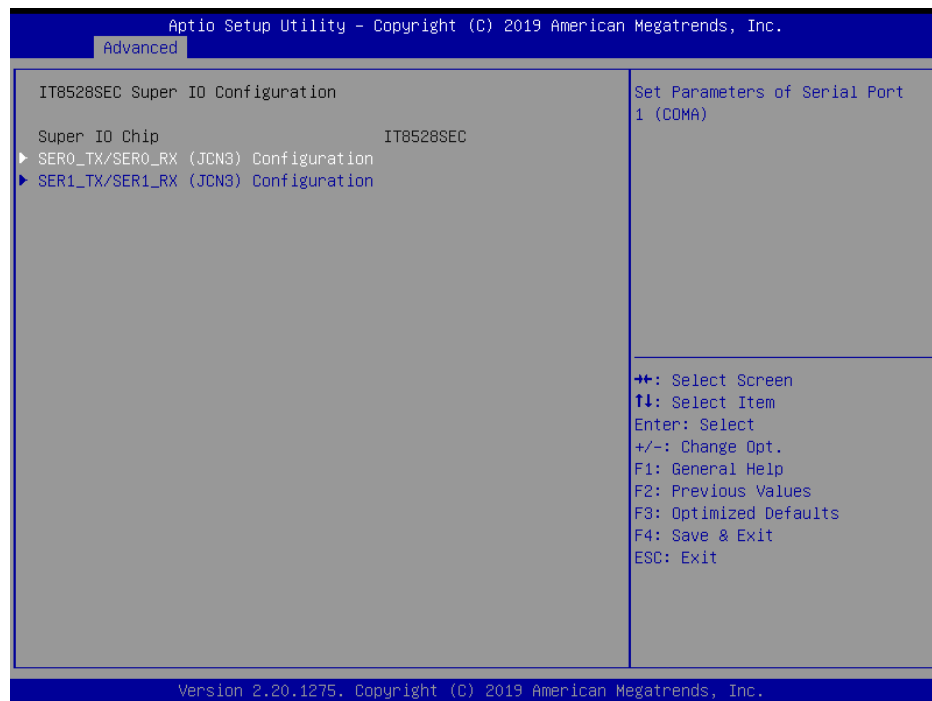


Item	Option	Description
Parallel Port	Enabled[Default], Disabled	Enable or Disable Parallel Port (LPT/LPTE).
Device Mode	STD Printer Mode[Default] SPP Mode EPP-1.9 and SPP Mode EPP-1.7 and SPP Mode ECP Mode ECP and EPP 1.9 Mode ECP and EPP 1.7 Mode	Change the Printer Port mode.

3.6.2.6 NCT6106D HW Monitor

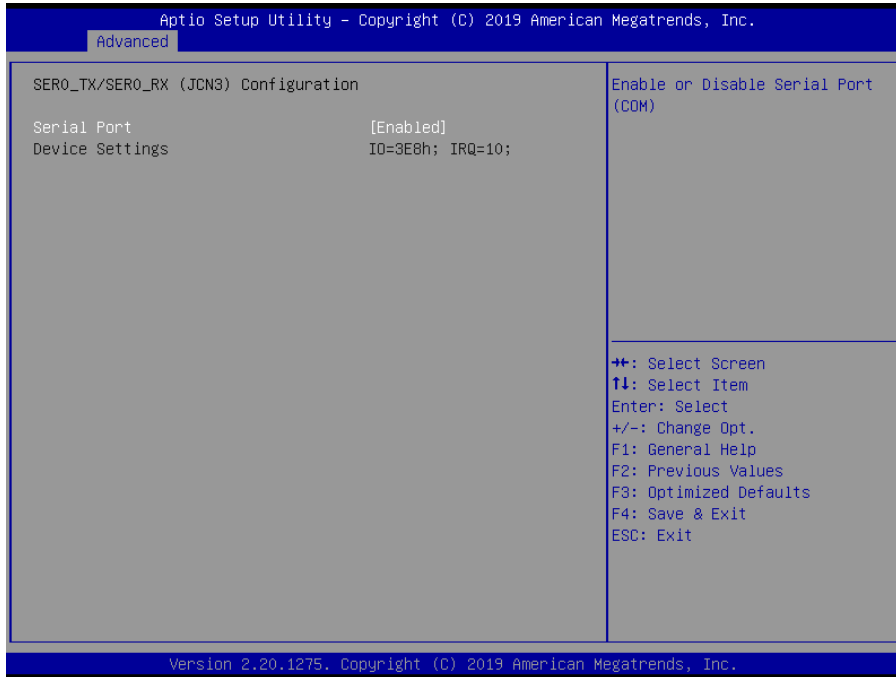


3.6.2.7 IT8528SEC Super IO Configuration





### 3.6.2.7.1 SER0\_TX/SER0\_RX (JCN3) Configuration



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

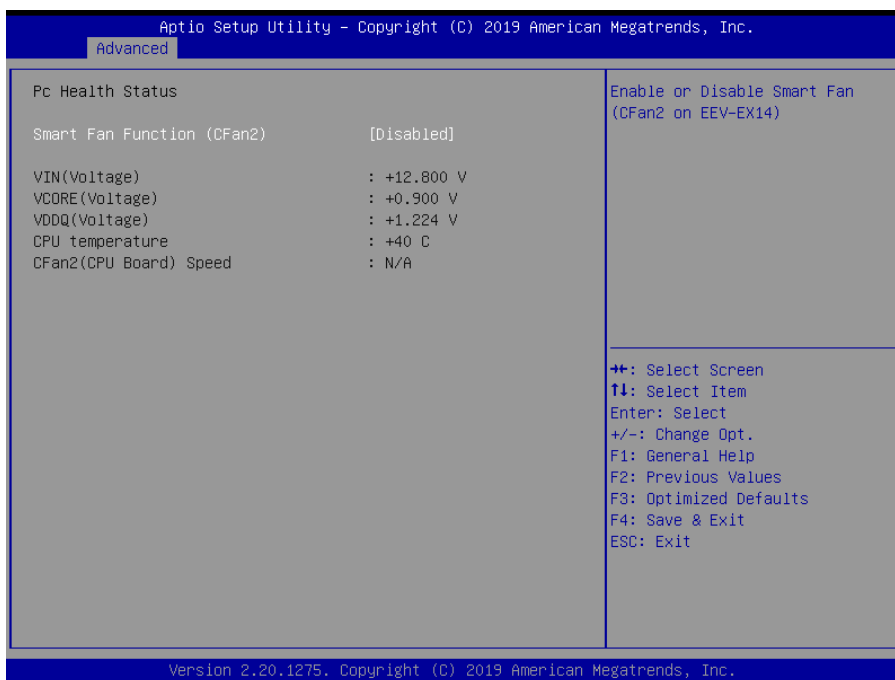
### 3.6.2.7.2 SER1\_TX/SER1\_RX (JCN3) Configuration



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

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## 3.6.2.8 HW Monitor

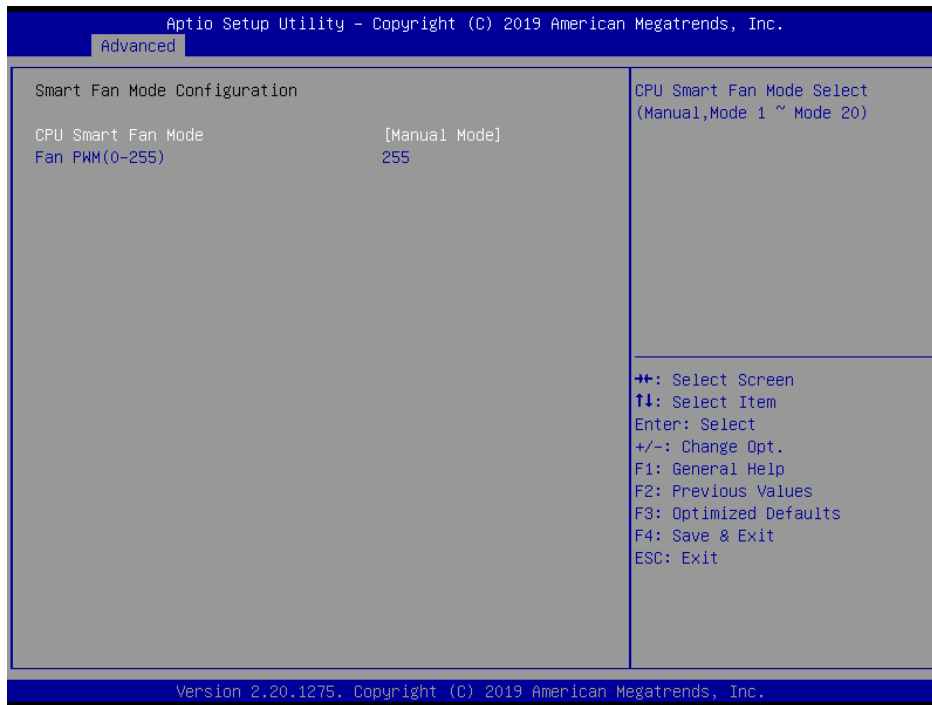


Item	Options	Description
Smart Fan Function(CFan2)	Enabled, Disabled[Default]	Enables or Disables Smart Fan(CFan2 on EEV-EX14).



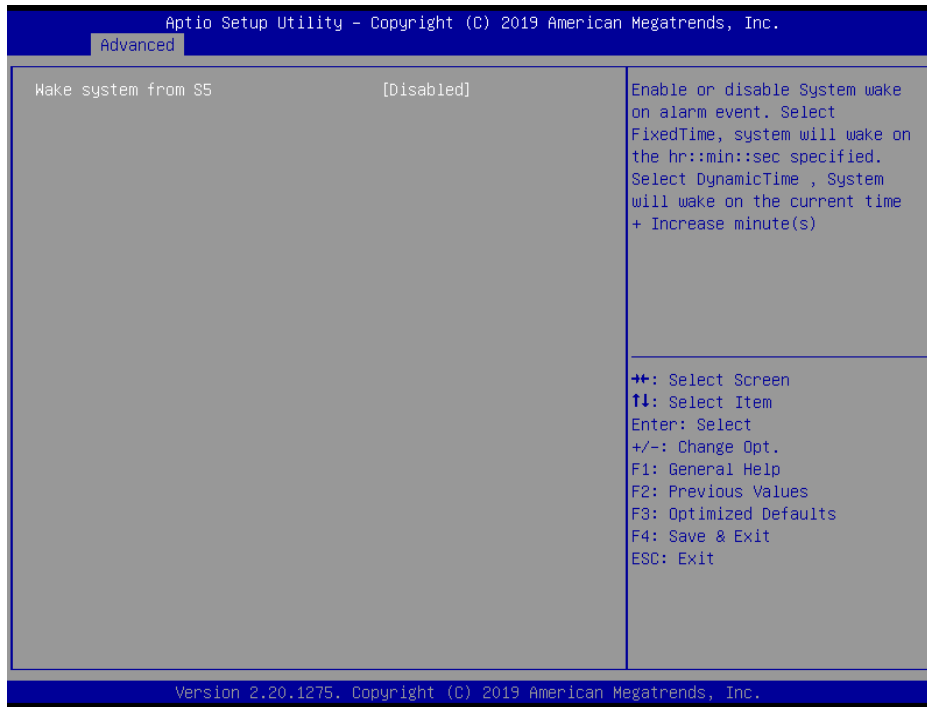
Item	Options	Description
Smart Fan Function(CFan2)	Enabled[Default], Disabled	Enables or Disables Smart Fan(CFan2 on EEV-EX14).

### 3.6.2.8.1 Smart Fan Mode Configuration

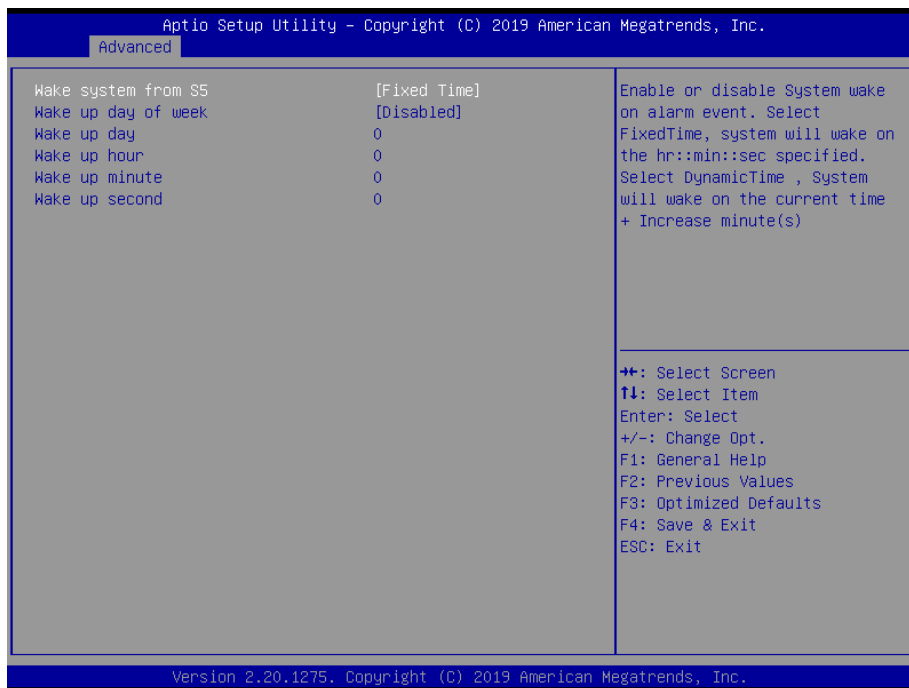


Item	Option	Description
<b>CPU Smart Fan Mode</b>	Manual Mode[Default]/ Mode 01/Mode 02/Mode 03/ Mode 04/Mode 05/Mode 06/ Mode 07/Mode 08/Mode 09/ Mode 10/Mode 11/Mode 12/ Mode 13/Mode 14/Mode 15/ Mode 16/Mode 17/Mode 18/ Mode 19/Mode 20	CPU Smart Fan Mode Select(Manual, Mode1 ~ Mode 20).
<b>Fan PWM(0-255)</b>	0-255	Fan PWM duty(0-255).

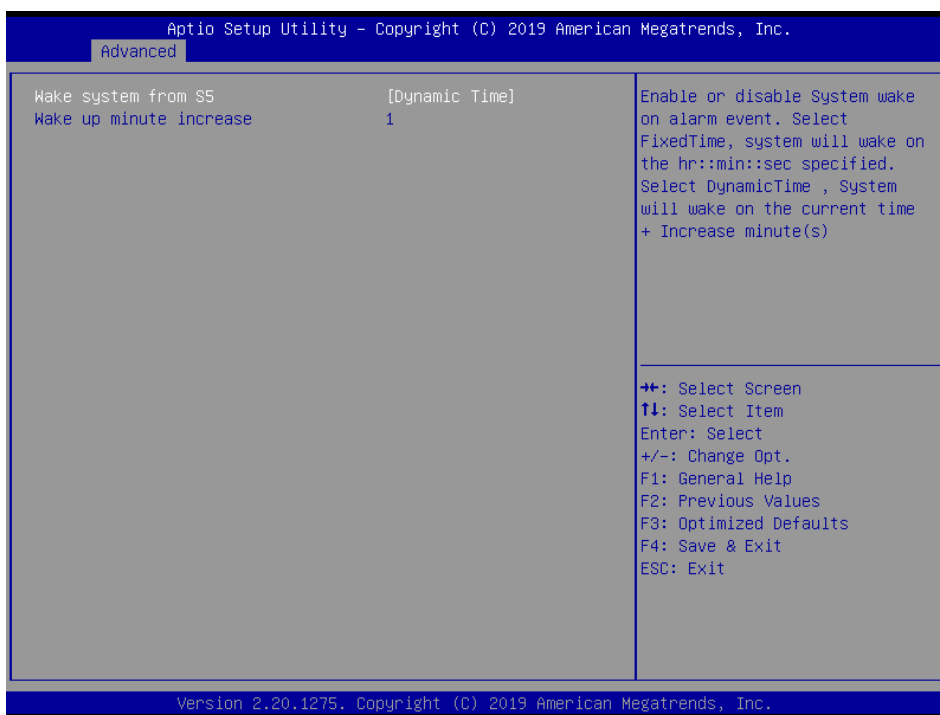
3.6.2.9 S5 RTC Wake Settings



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

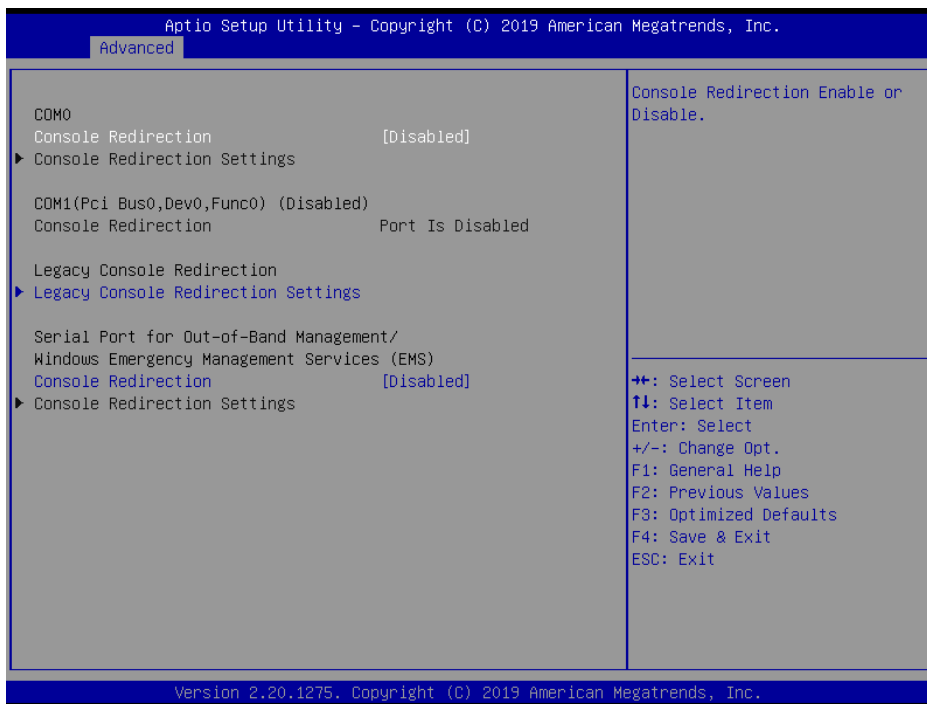


Item	Options	Description
Wake system from S5	Disabled, Fixed Time[Default] Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).
Wake up day of week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



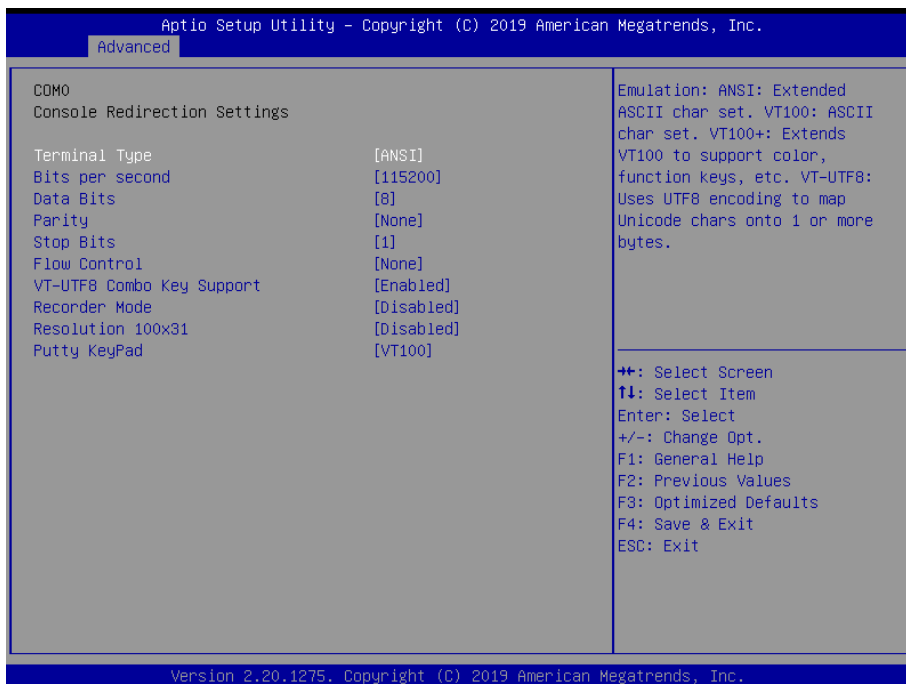
Item	Options	Description
Wake system from S5	Disabled, Fixed Time Dynamic Time[Default]	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).
Wake up minute increase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

3.6.2.10 Serial Port Console Redirection



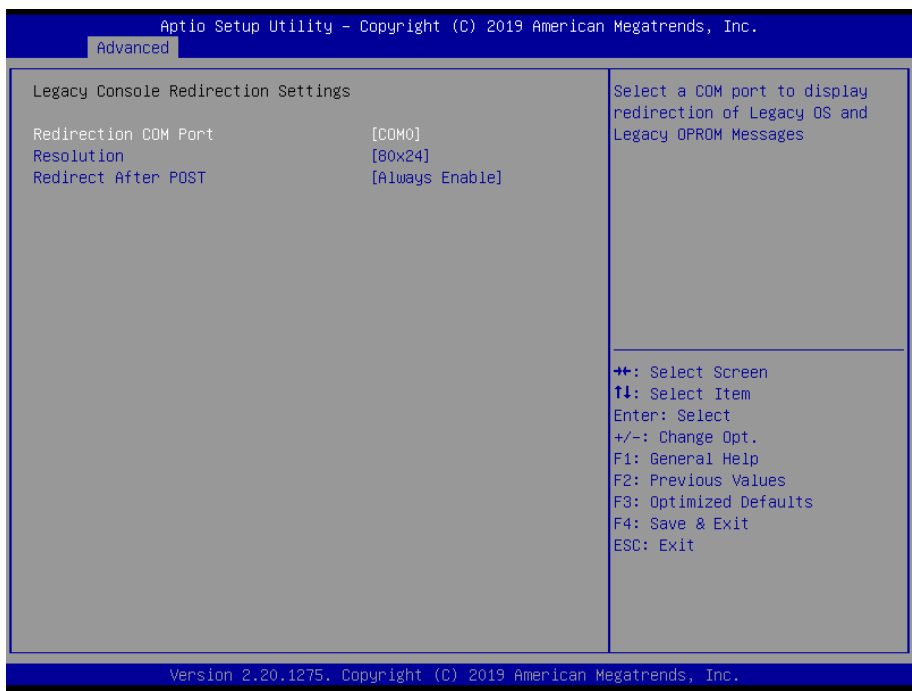
Item	Options	Description
Console Redirection	Disabled[Default], Enabled	Console Redirection Enable or Disable.

3.6.2.10.1 COM0



Item	Option	Description
<b>Terminal Type</b>	VT100 VT100+ VT-UTF8 ANSI[Default]	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
<b>Bits per second</b>	9600 19200 38400 57600 115200[Default]	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
<b>Data Bits</b>	7 8[Default]	Data Bits.
<b>Parity</b>	None[Default] Even Odd Mark	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection.
<b>Stop Bits</b>	1[Default] 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
<b>Flow Control</b>	None[Default] Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
<b>VT-UTF8 Combo Key Support</b>	Disabled, Enabled[Default]	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
<b>Recorder Mode</b>	Disabled[Default], Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
<b>Resolution 100x31</b>	Disabled[Default], Enabled	Enables or disables extended terminal resolution.
<b>Putty KeyPad</b>	VT100[Default] LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

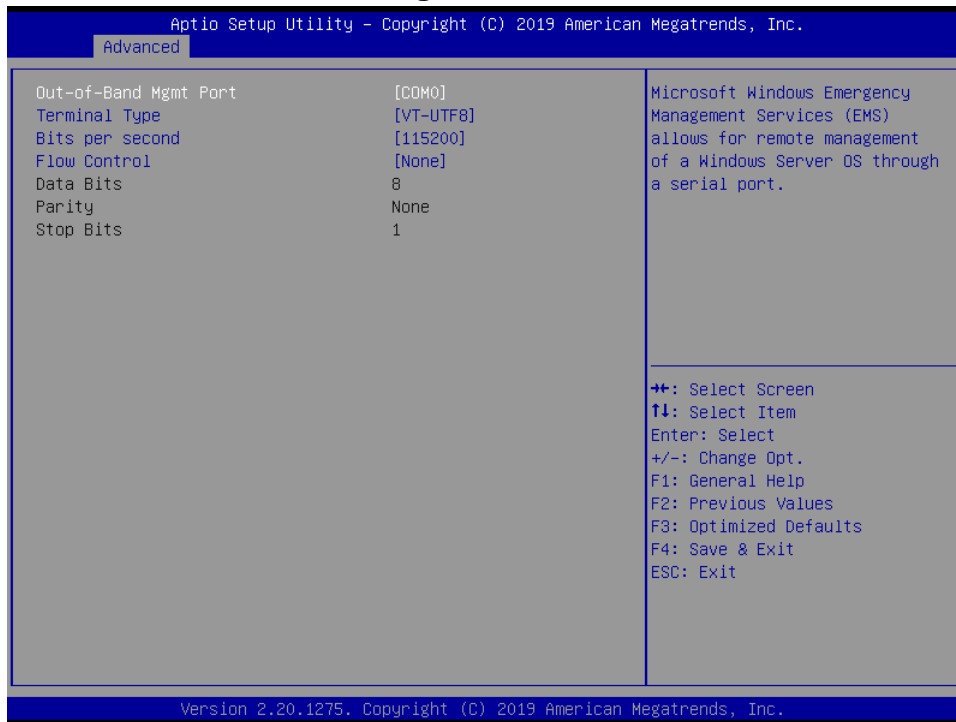
3.6.2.10.2 Legacy Console Redirection Settings



Item	Option	Description
<b>Redirection COM Port</b>	COM0[ <b>Default</b> ]	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
<b>Resolution</b>	80x24[ <b>Default</b> ] 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
<b>Redirect After POST</b>	Always Enable[ <b>Default</b> ] BootLoader	When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable.



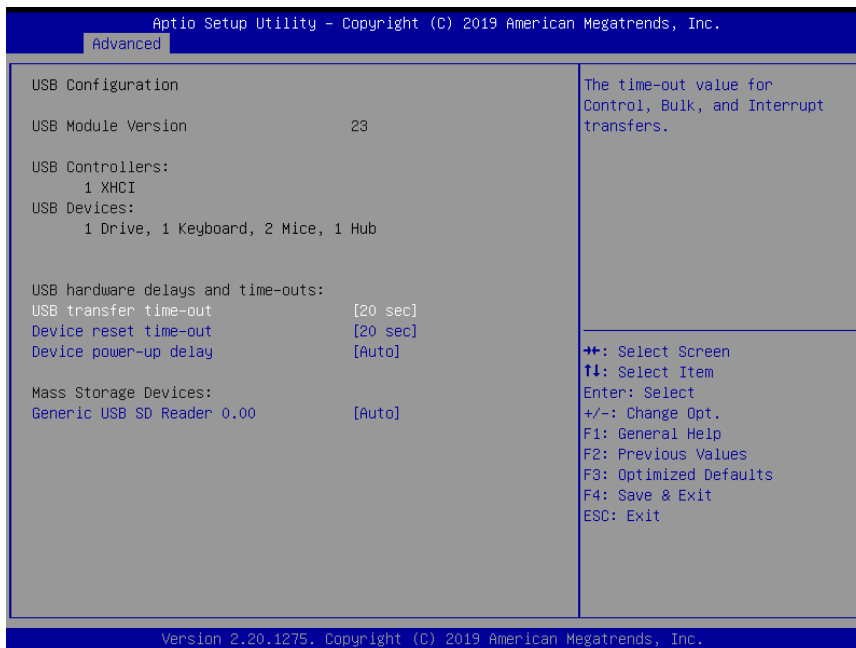
### 3.6.2.10.3 Console Redirection Settings



Item	Option	Description
<b>Out-of-Band Mgmt Port</b>	COM0[Default]	Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.
<b>Terminal Type</b>	VT100 VT100+ VT-UTF8[Default] ANSI	VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.
<b>Bits per second</b>	9600 19200 57600 115200[Default]	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
<b>Flow Control</b>	None[Default] Hardware RTS/CTS Software Xon/Xoff	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

3.6.2.11 USB Configuration

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



Item	Options	Description
<b>USB transfer time-out</b>	1 sec 5 sec 10 sec 20 sec <b>[Default]</b>	The time-out value for Control, Bulk, and Interrupt transfers.
<b>Device reset time-out</b>	10 sec 20 sec <b>[Default]</b> 30 sec 40 sec	USB mass storage device Start Unit command time-out.
<b>Device power-up delay</b>	Auto <b>[Default]</b> 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 from Hub descriptor.
<b>Mass Storage Devices</b>	Auto <b>[Default]</b> 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 NVMe Configuration

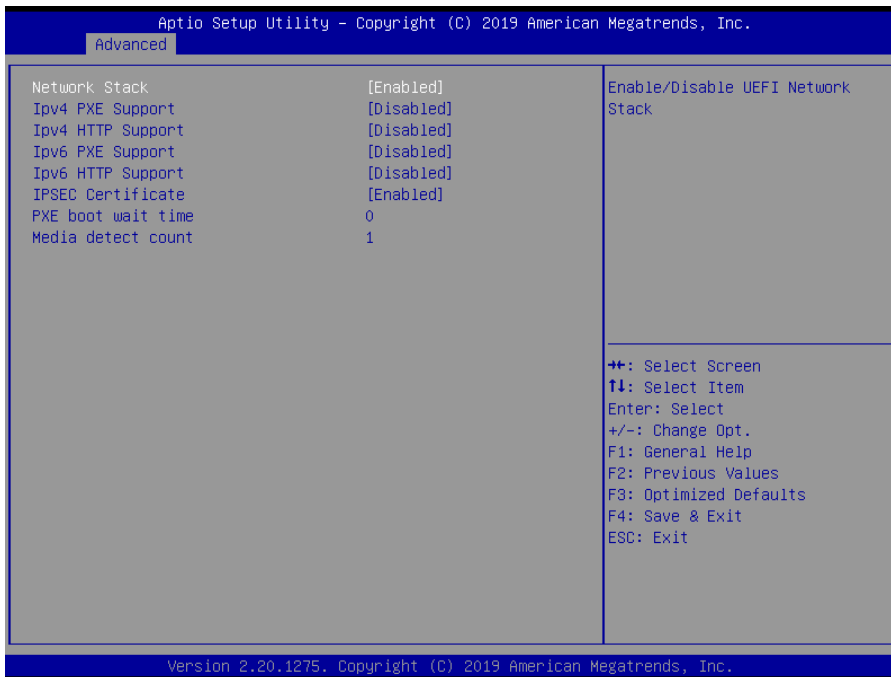


### 3.6.2.13 Network Stack Configuration



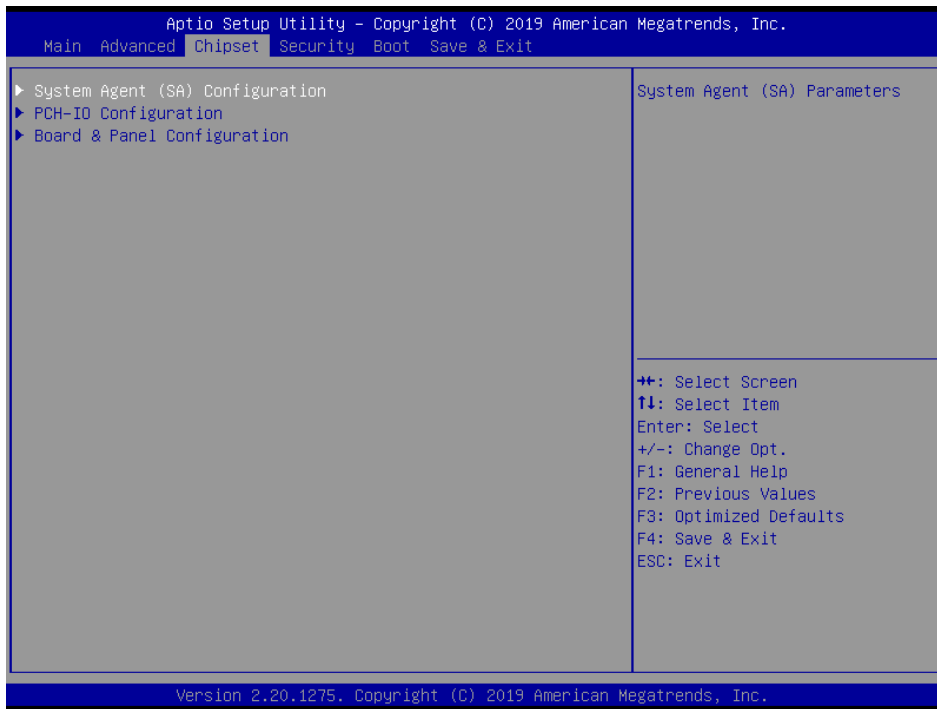
Item	Options	Description
Network Stack	Enabled Disabled[Default]	Enable/Disable UEFI Network Stack.

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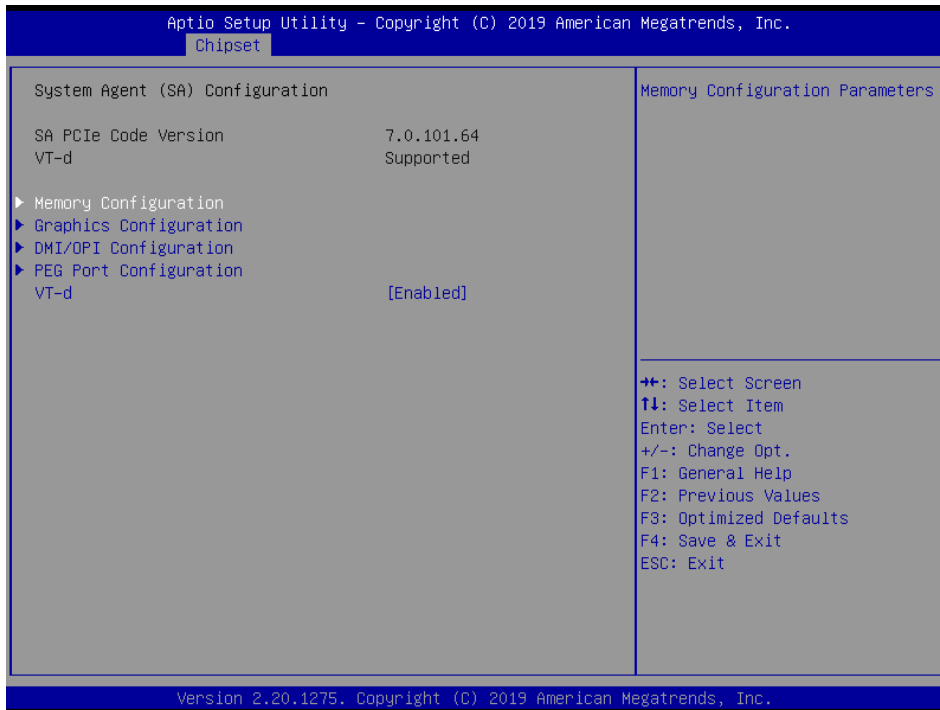


Item	Options	Description
<b>Network Stack</b>	Enabled[ <b>Default</b> ] Disabled	Enable/Disable UEFI Network Stack.
<b>Ipv4 PXE Support</b>	Enabled Disabled[ <b>Default</b> ]	Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.
<b>Ipv4 HTTP Support</b>	Enabled Disabled[ <b>Default</b> ]	Enable Ipv4 HTTP Boot Support. If disabled IPV4 HTTP boot option will not be created.
<b>Ipv6 PXE Support</b>	Enabled Disabled[ <b>Default</b> ]	Enable Ipv6 PXE Boot Support. If disabled IPV6 PXE boot option will not be created.
<b>Ipv6 HTTP Support</b>	Enabled Disabled[ <b>Default</b> ]	Enable Ipv6 HTTP Boot Support. If disabled IPV6 HTTP boot option will not be created.
<b>IPSEC Certificate</b>	Enabled[ <b>Default</b> ] Disabled	Support to Enable/Disable IPSEC certificate for Ikev.
<b>PXE boot wait time</b>	0[ <b>Default</b> ] ~ 5	Wait time to press ESC key to abort the PXE boot.
<b>Media detect count</b>	1[ <b>Default</b> ] ~ 50	Number of times presence of media will be checked.

### 3.6.3 Chipset

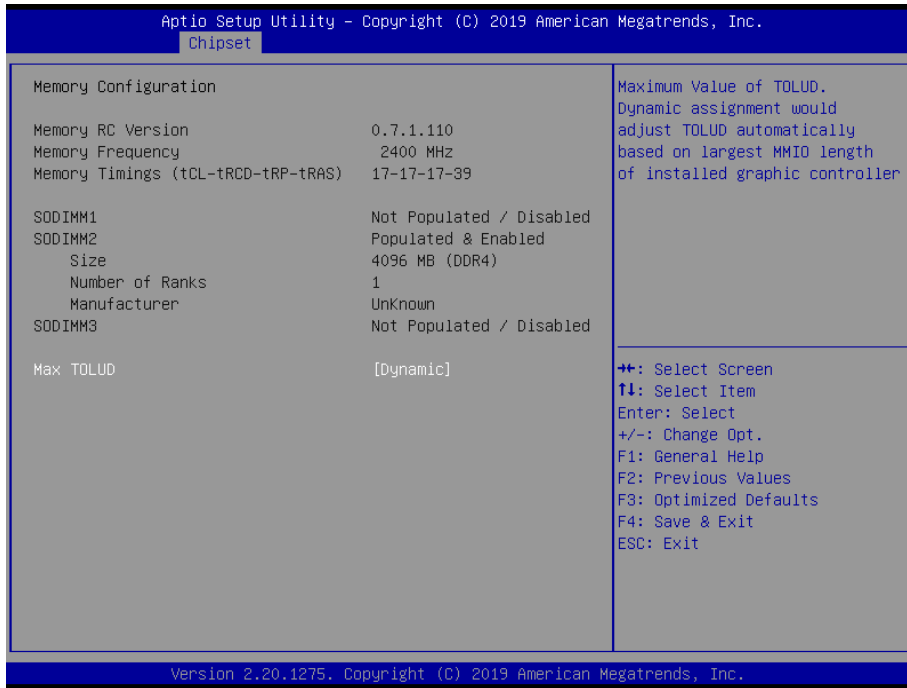


#### 3.6.3.1 System Agent (SA) Configuration



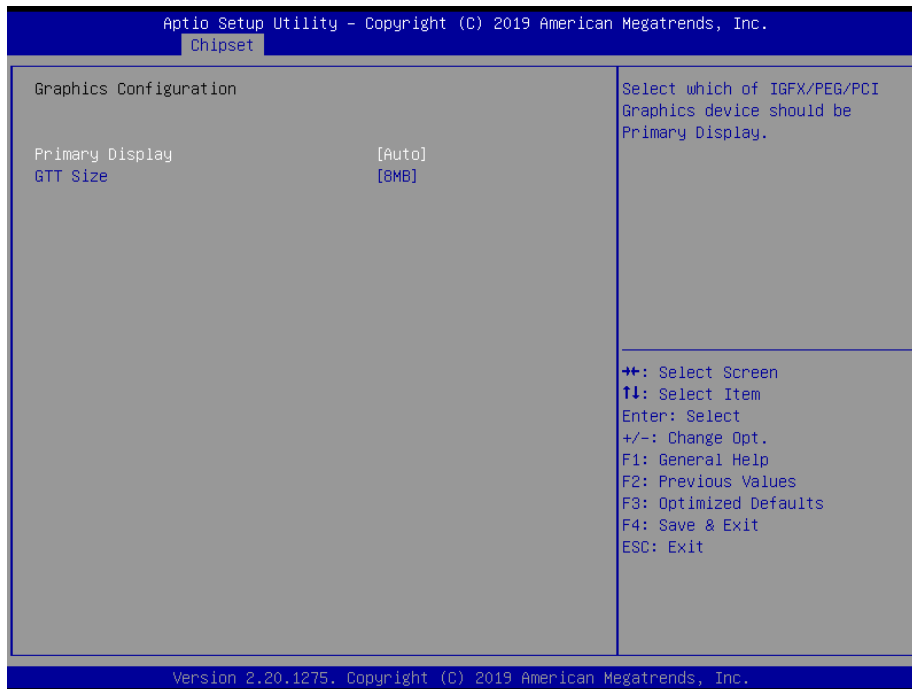
Item	Option	Description
VT-d	Enabled[Default] Disabled	VT-d capability.

3.6.3.1.1 Memory Configuration



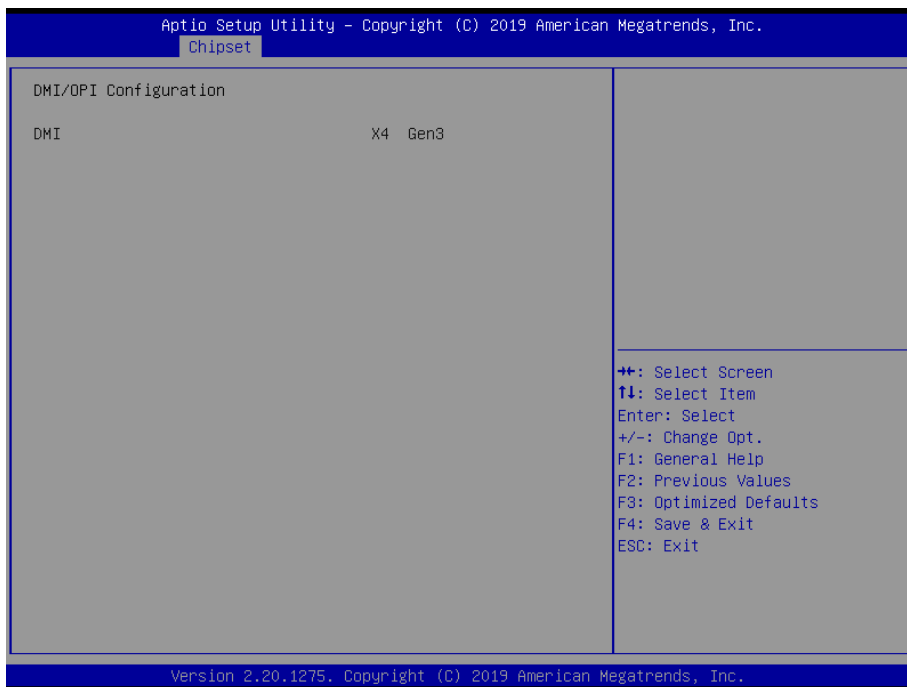
Item	Option	Description
<b>Max TOLUD</b>	Dynamic[Default]	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
	1 GB	
	1.25 GB	
	1.5 GB	
	1.75 GB	
	2 GB	
	2.25 GB	
	2.5 GB	
	2.75 GB	
3 GB		

### 3.6.3.1.2 Graphics Configuration

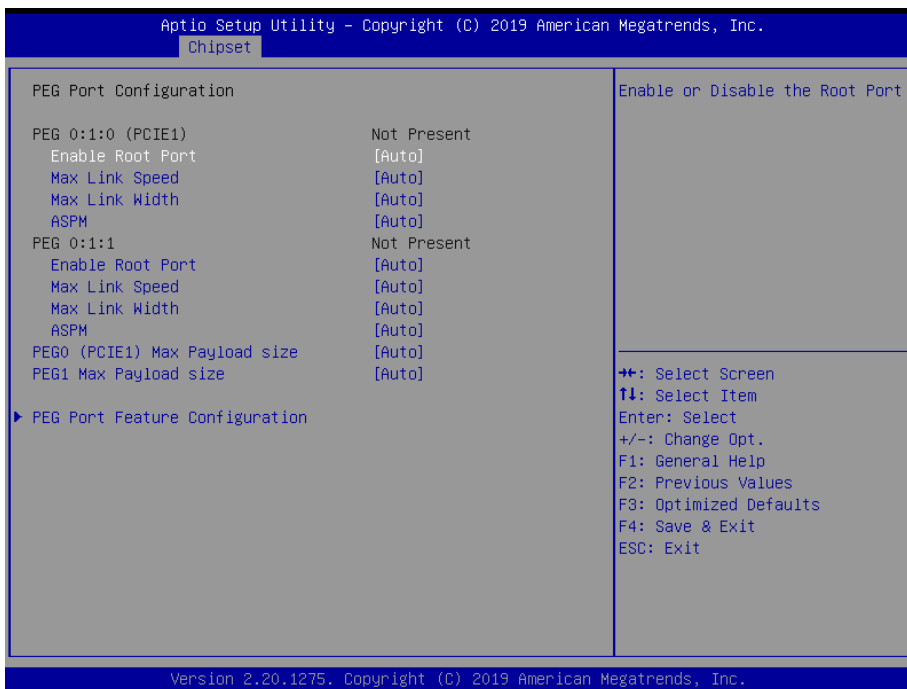


Item	Option	Description
<b>Primary Display</b>	Auto[Default]	Select which of IGFX/PEG/PCI Graphics device should be Primary Display.
	IGFX	
	PEG	
	PCI	
<b>GTT Size</b>	2MB	Select the GTT Size.
	4MB	
	8MB[Default]	

### 3.6.3.1.3 DMI/OPI Configuration



### 3.6.3.1.4 PEG Port Configuration



Item	Option	Description
Enable Root Port	Disabled Enabled	Enable or Disable the Root Port.



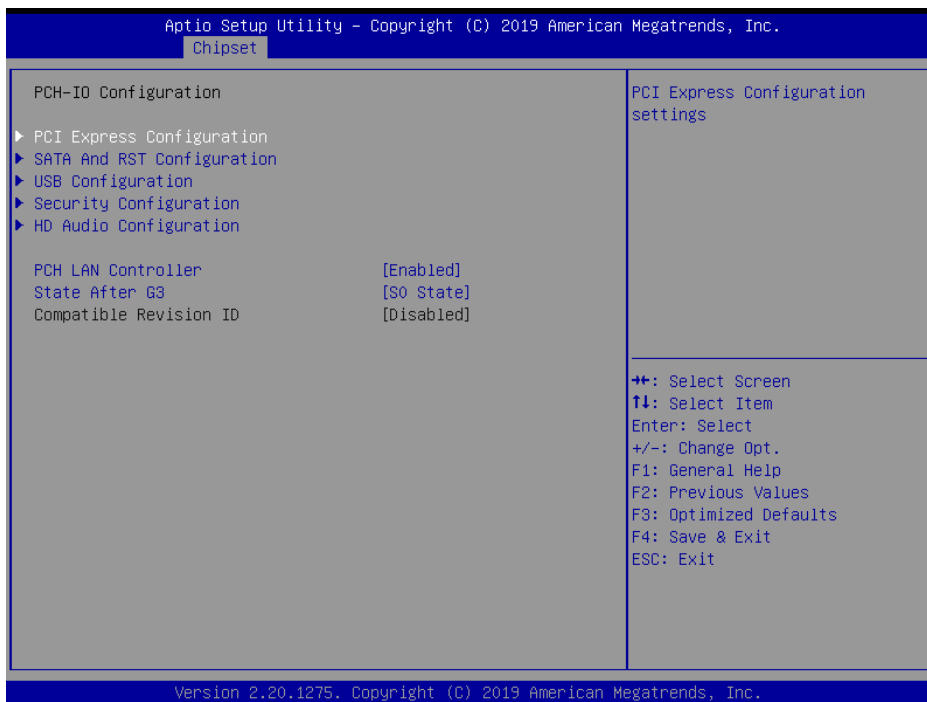
	Auto[Default]	
<b>Max Link Speed</b>	Auto[Default] Gen1 Gen2 Gen3	Configure PEG 0:1:0 Max Speed.
<b>Max Link Width</b>	Auto[Default] Force X1 Force X2 Force X4 Force X8	Force PEG link to retrain to X1/2/4/8.
<b>ASPM</b>	Disabled Auto[Default] ASPM L0s ASPM L1s ASPM L0sL1	Control ASPM support for the PEG 0. This has no effect if PEG is not the currently active device.
<b>PEG0(PCIE1) Max Payload size</b>	Auto[Default] 128 256 TLP	Select PEG0 Max Payload Size; Choose Auto(Default Device Capability) or force to 128/256 Bytes.
<b>PEG1 Max Payload size</b>	Auto[Default] 128 256 TLP	Select PEG1 Max Payload Size; Choose Auto(Default Device Capability) or force to 128/256 Bytes.

### 3.6.3.1.4.1 PEG Port Feature Configuration



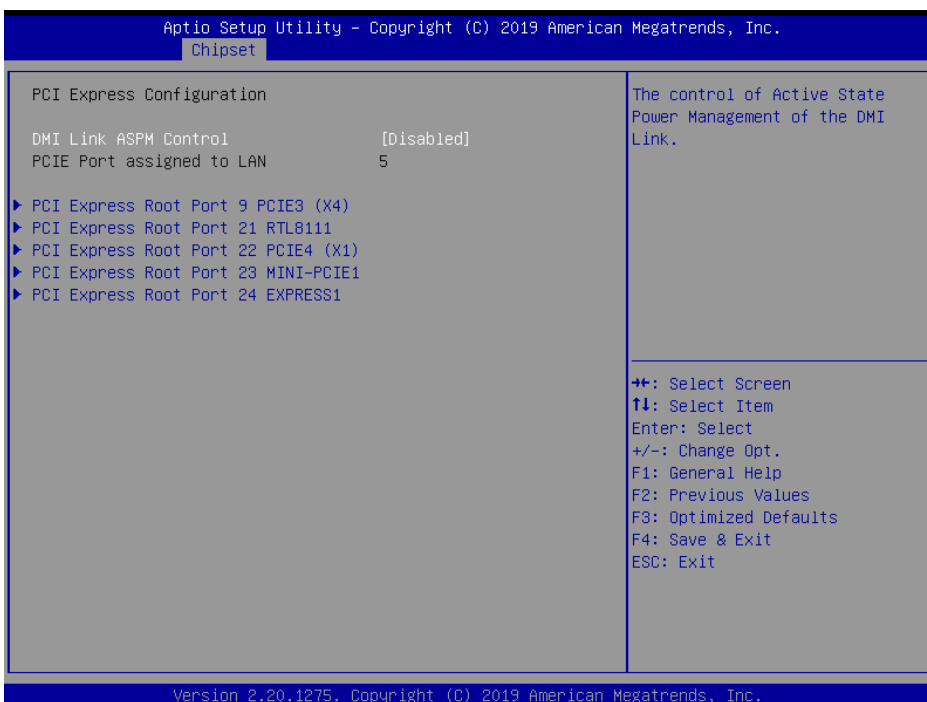
Item	Option	Description
<b>Detect Non-Compliance Device</b>	Enabled, Disabled[Default]	Detect Non-Compliance PCI Express Device in PEG.

3.6.3.2 PCH-IO Configuration



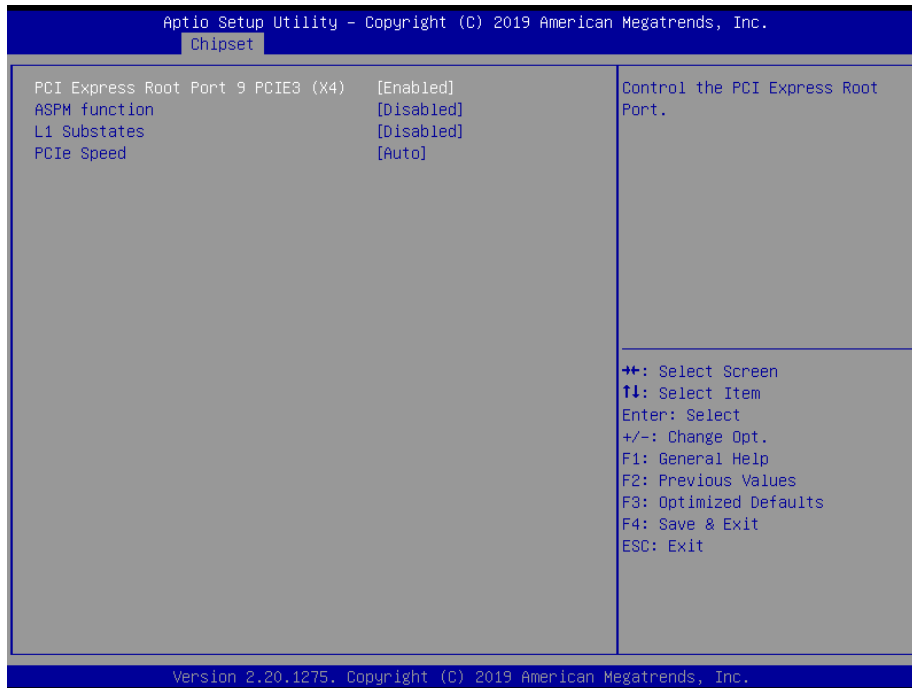
Item	Option	Description
PCH LAN Controller	Disabled	Enable/Disable onboard NIC.
	Enabled[Default]	
State After G3	S0 State[Default]	Specify what state to go to when power is re-applied after a power failure (G3 state).
	S5 State	

3.6.3.2.1 PCI Express Configuration



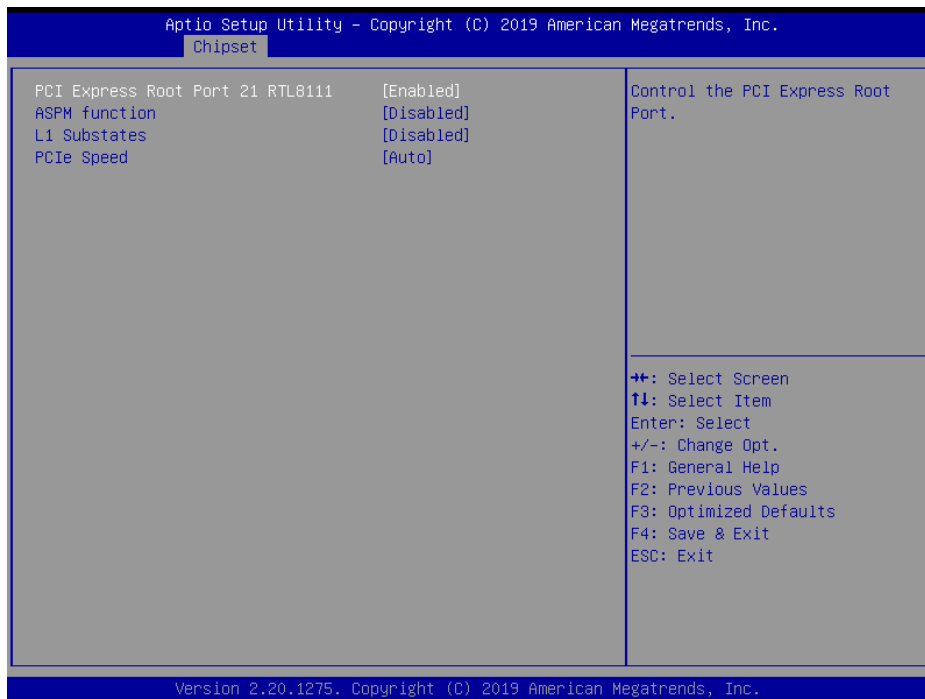
Item	Option	Description
<b>DMI Link ASPM Control</b>	Disabled[Default] L0s L1 L0sL1 Auto	The control of Active State Power Management of the DMI Link.

### 3.6.3.2.1.1 PCI Express Root Port 9 PCIE3 (x4)



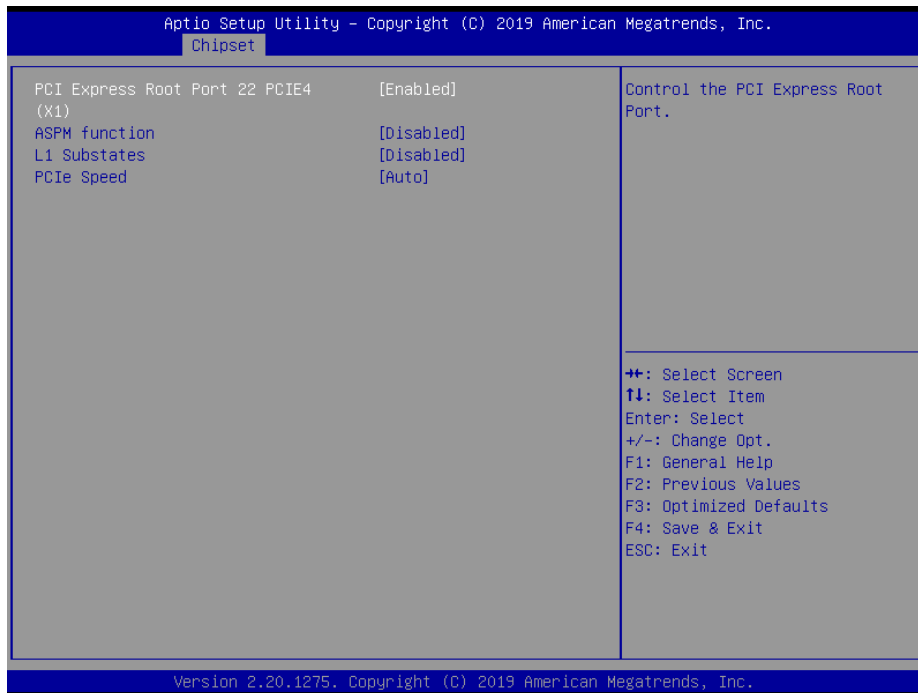
Item	Option	Description
<b>PCI Express Root Port 9 PCIE3 (x4)</b>	Enabled[Default], Disabled	Control the PCI Express Root Port.
<b>ASPM function</b>	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
<b>L1 Substates</b>	Disabled[Default], L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
<b>PCIe Speed</b>	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.2 PCI Express Root Port 21 RTL8111



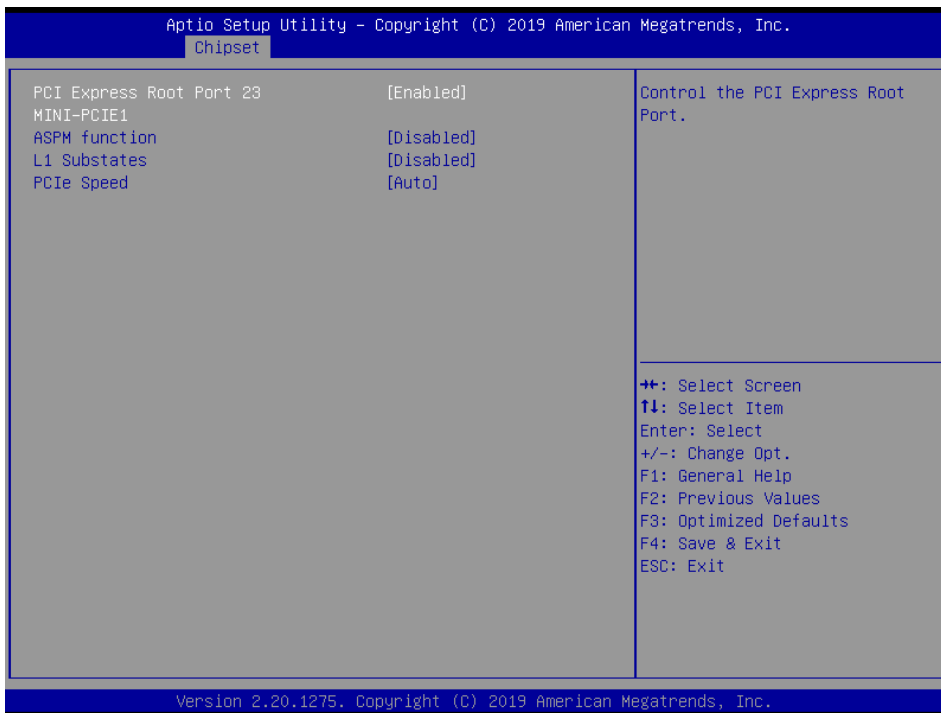
Item	Option	Description
<b>PCI Express Root Port 21 RTL8111</b>	Enabled[Default], Disabled	Control the PCI Express Root Port.
<b>ASPM function</b>	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
<b>L1 Substates</b>	Disabled[Default], L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
<b>PCIe Speed</b>	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.3 PCI Express Root Port 22 PCIE4 (x1)



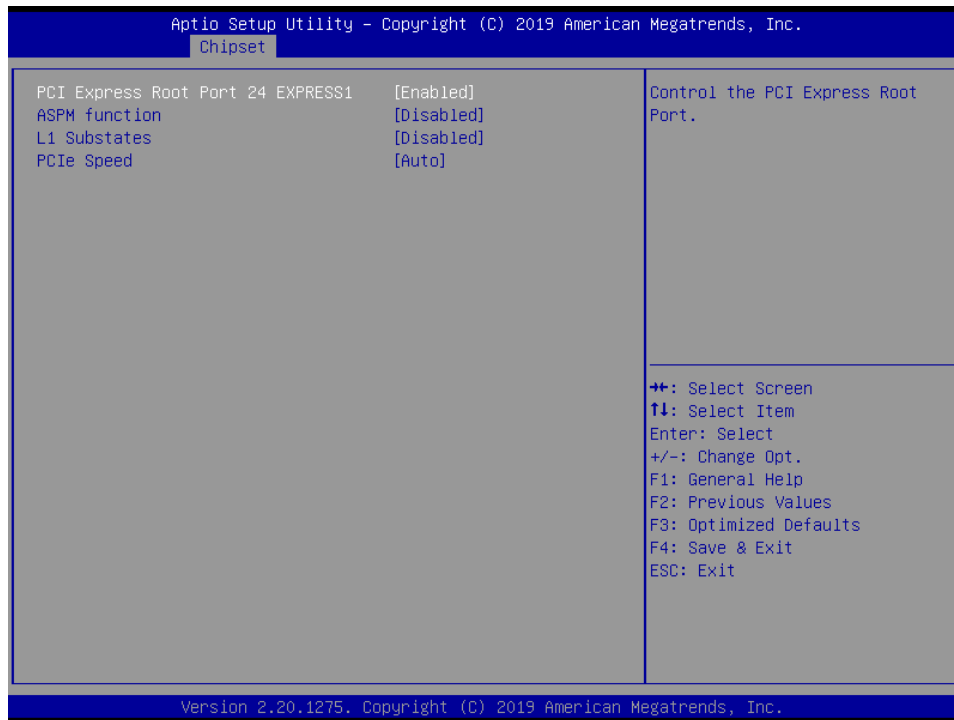
Item	Option	Description
<b>PCI Express Root Port 22 PCIE4 (x1)</b>	Enabled[ <b>Default</b> ], Disabled	Control the PCI Express Root Port.
<b>ASPM function</b>	Disabled[ <b>Default</b> ], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
<b>L1 Substates</b>	Disabled[ <b>Default</b> ], L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
<b>PCIe Speed</b>	Auto[ <b>Default</b> ] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.4 PCI Express Root Port 23 MINI-PCIE1



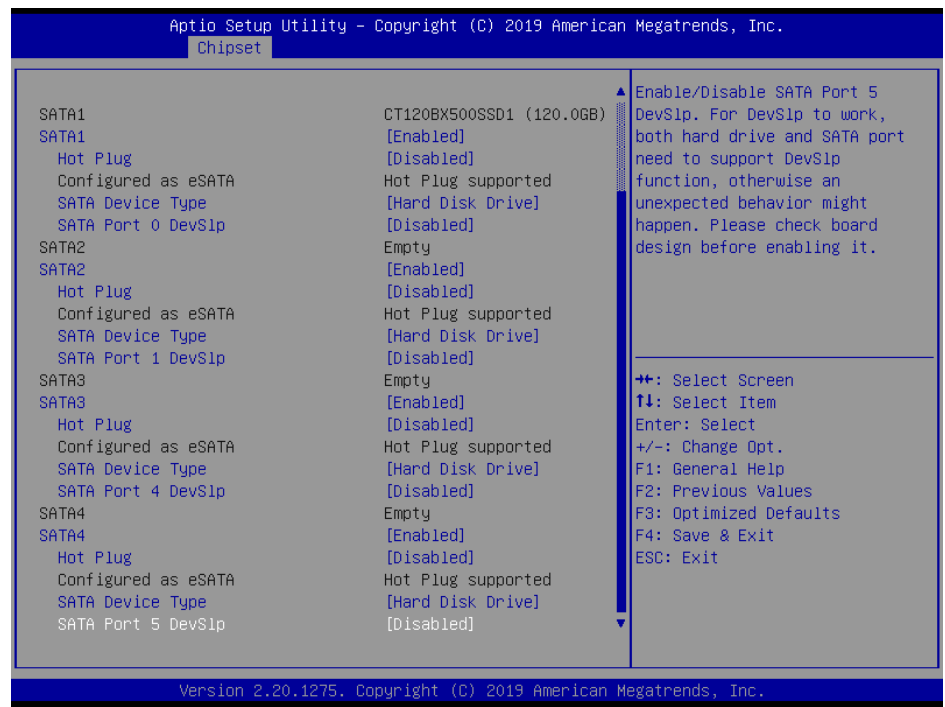
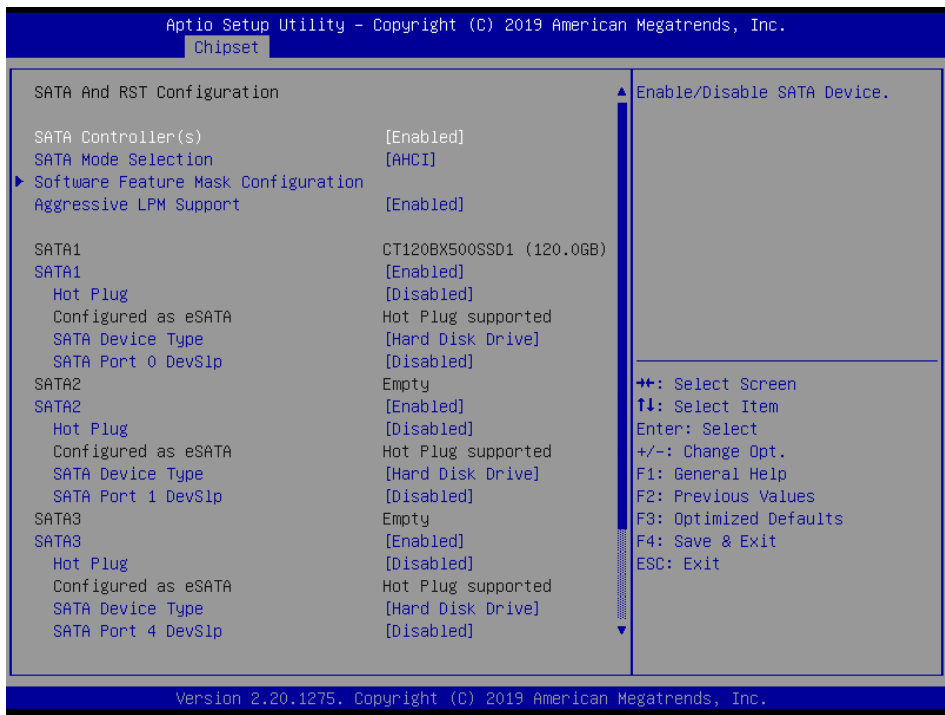
Item	Option	Description
<b>PCI Express Root Port 23 MINI-PCIE1</b>	Enabled[Default], Disabled	Control the PCI Express Root Port.
<b>ASPM function</b>	Disabled[Default], L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
<b>L1 Substates</b>	Disabled[Default], L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
<b>PCIe Speed</b>	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

### 3.6.3.2.1.5 PCI Express Root Port 24 EXPRESS1



Item	Option	Description
<b>PCI Express Root Port 24 EXPRESS1</b>	Enabled[Default], Disabled	Control the PCI Express Root Port.
<b>ASPM function</b>	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.
<b>L1 Substates</b>	Disabled[Default] L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
<b>PCIe Speed</b>	Auto[Default] Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.2 SATA And RST Configuration

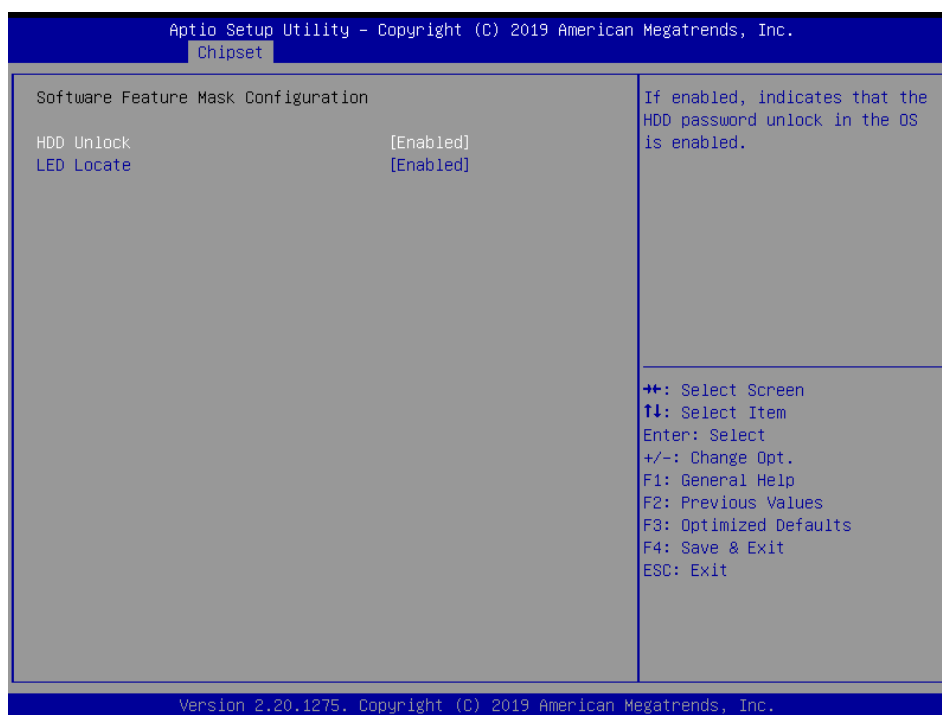


Item	Options	Description
SATA Controller(s)	Enabled[Default] Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI[Default], Intel RST Premium With Intel Optane System Acceleration	Determines how SATA controller(s) operate.



<b>Aggressive LPM Support</b>	Disabled Enabled[Default]	Enable PCH to aggressively enter link power state.
<b>SATA1/2/3/4</b>	Disabled Enabled[Default]	Enable or Disable SATA Port.
<b>Hot Plug</b>	Disabled[Default] Enabled	Designates this port as Hot Pluggable.
<b>SATA Device Type</b>	Hard Disk Drive[Default] Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.
<b>SATA Port 0/1/4/5 DevSlp</b>	Disabled[Default] Enabled	Enable/Disable SATA Port 0/1/4/5 DevSlp. For DevSlp to work , both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behaviour might happen. Please check board design before enabling it.

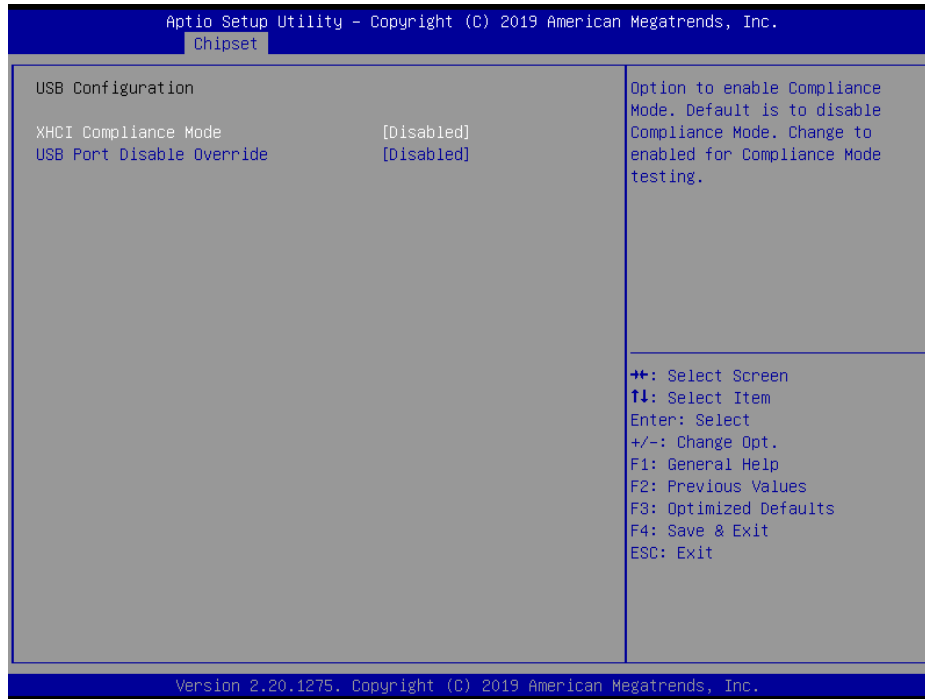
### 3.6.3.2.2.1 Software Feature Mask Configuration



Item	Option	Description
<b>HDD Unlock</b>	Disabled Enabled[Default],	If enabled, indicates that the HDD password unlock in the OS is enabled.
<b>LED Locate</b>	Disabled Enabled[Default],	If enabled, indicates that the LED/SGPIO hardware is attached and ping to locate feature is enabled on OS.

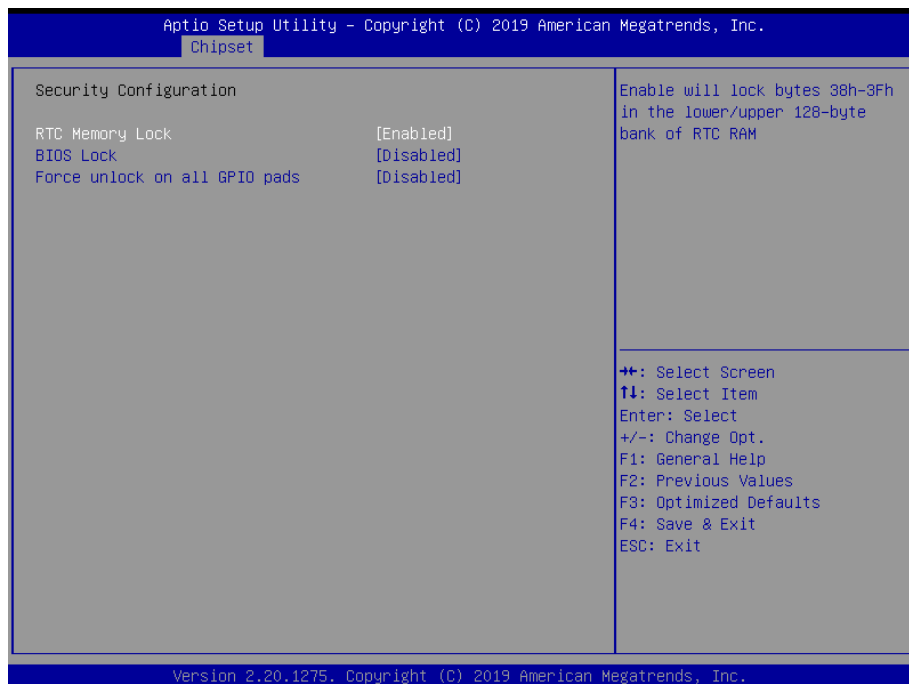
# ESM-CFH User's Manual

## 3.6.3.2.3 USB Configuration



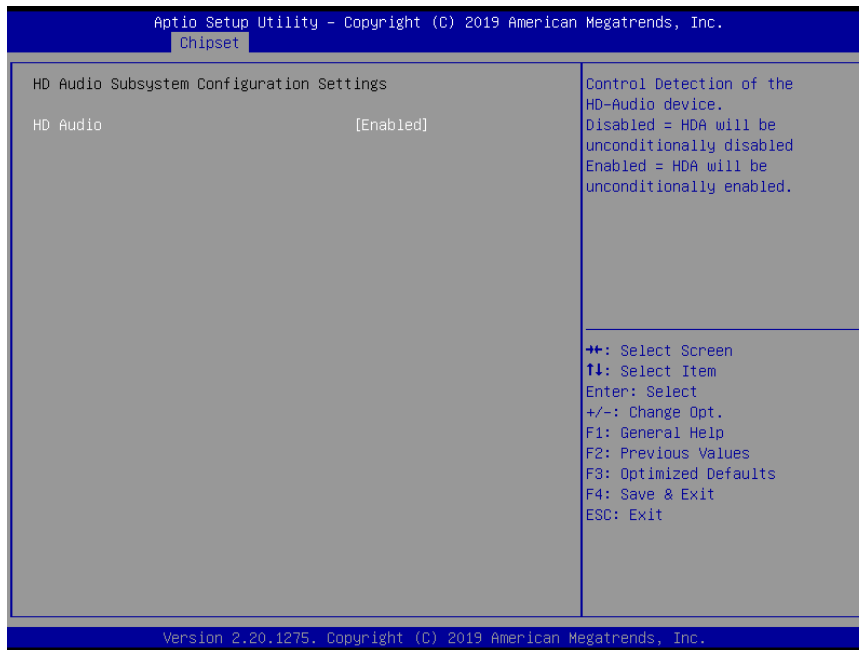
Item	Option	Description
<b>XHCI Compliance Mode</b>	Disabled[Default] Enabled	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.
<b>USB Port Disable Override</b>	Disabled[Default] Select Per-Pin	Selectively Enable/Disable the corresponding USB port from reporting a Device Connection to the controller.

## 3.6.3.2.4 Security Configuration



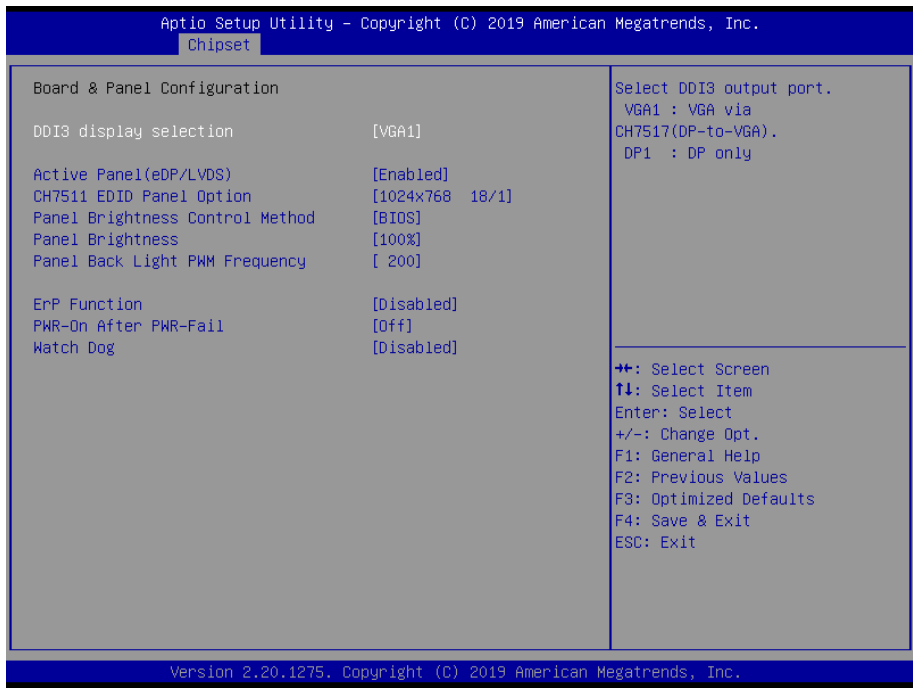
Item	Option	Description
RTC Memory Lock	Disabled Enabled[Default]	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
BIOS Lock	Disabled[Default] Enabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
Force unlock on all GPIO pads	Disabled[Default] Enabled	If Enabled BIOS will force all GPIO pads to be in unlocked state.

### 3.6.3.2.5 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

3.6.3.3 Board & Panel Configuration



Item	Option	Description
DDI3 display selection	VGA1[Default] DP1	Select DDI3 output port. VGA1 : VGA via CH7517(DP-to-VGA). DP1 : DP only.
Active Panel (eDP/LVDS)	Disabled Enabled[Default]	Active Internal LVDS(eDP->Ch7511-to-LVDS).
CH7511 EDID Panel Option	1024x768 24/1 800x600 18/1 1024x768 18/1[Default] 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	Port-EDP to LVDS(Chrotel 7511) Panel EDID Option.
Panel Brightness Control Method	BIOS[Default] OS Driver	Panel Brightness Control Method. 1.BIOS 2.OS Driver.
Panel Brightness	00% 25% 50% 75% 100%[Default]	Select Panel(eDP/LVDS) back light PWM duty.

<p><b>Panel Back Light PWM Frequency</b></p>	<p>200[Default] 300 400 500 700 1k 2k 3k 5k 10k 20k</p>	<p>Select Panel(eDP/LVDS) back light PWM Frequency.</p>
<p><b>ErP Function</b></p>	<p>Disabled[Default] Enabled</p>	<p>ErP Function (Deep S5).</p>
<p><b>PWR-On After PWR-Fail</b></p>	<p>Off[Default] On Last state</p>	<p>AC loss resume on ATX mode. If the machion is on AT mode, MB will always power on. Please check manual for module board setting of SW1. And check your carrier board setting too.</p>
<p><b>Watch Dog</b></p>	<p>Disabled[Default] 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min</p>	<p>Select WatchDog.</p>

### 3.6.4 Security



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- **Administrator Password**

Set setup Administrator Password

- **User Password**

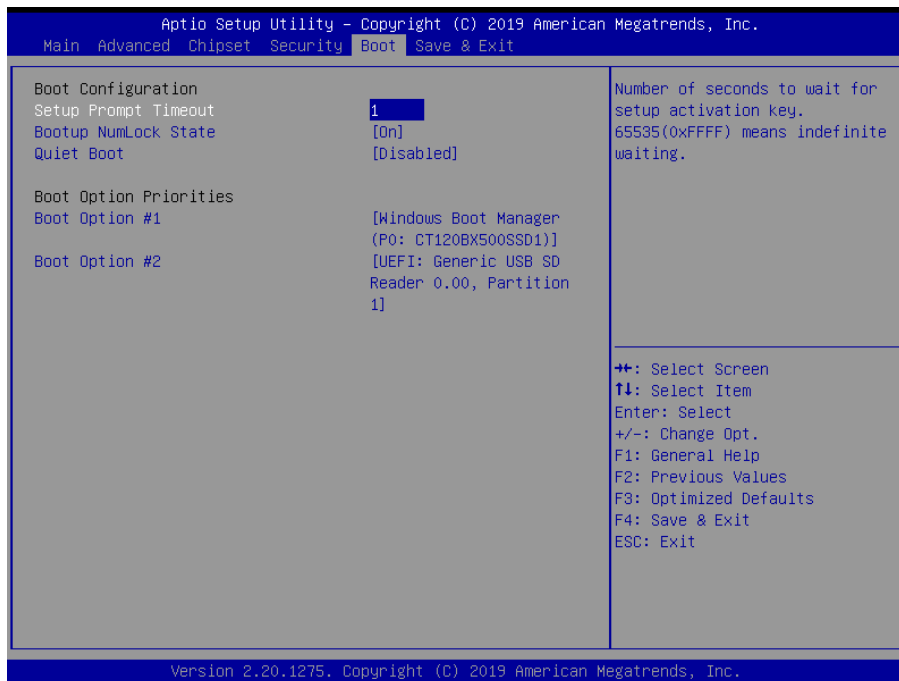
Set User Password

### 3.6.4.1 Secure Boot



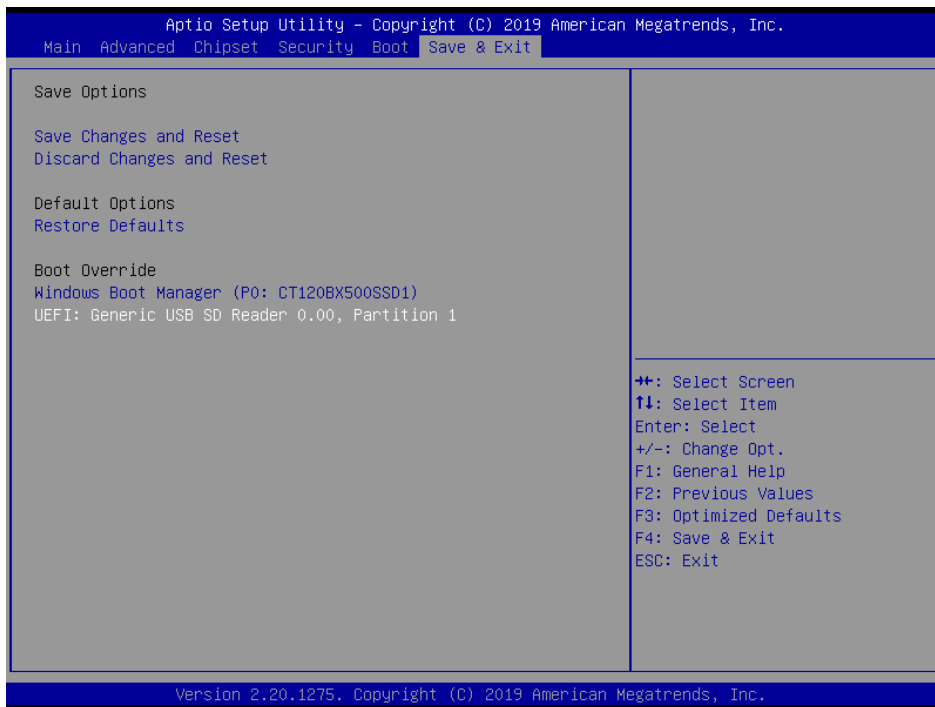
Item	Option	Description
<b>Secure Boot</b>	Disabled <b>[Default]</b> Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.
<b>Secure Boot Mode</b>	Standard Custom <b>[Default]</b>	Secure Boot mode selector: Standard/Custom. In Custom mode Secure Boot Variables can be configured without authentication.

### 3.6.5 Boot



Item	Option	Description
<b>Setup Prompt Timeout</b>	1~ 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
<b>Bootup NumLock State</b>	On[Default] Off	Select the Keyboard NumLock state
<b>Quiet Boot</b>	Disabled[Default] Enabled	Enables or disables Quiet Boot option
<b>Boot Option #1/2</b>	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.



# 4. Drivers Installation

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**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.

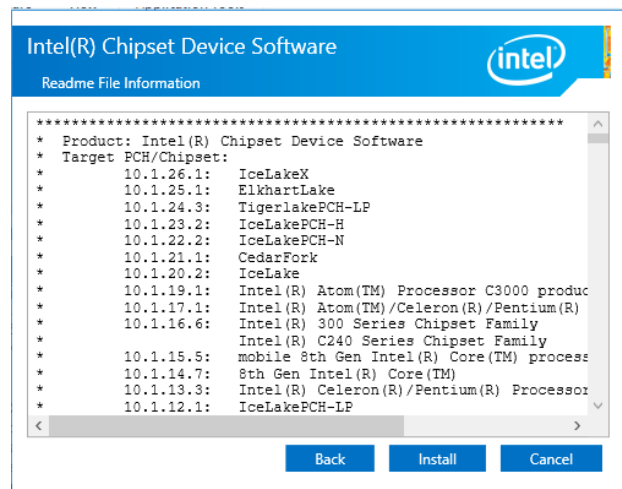
# ESM-CFH User's Manual

## 4.1 Install Chipset Driver

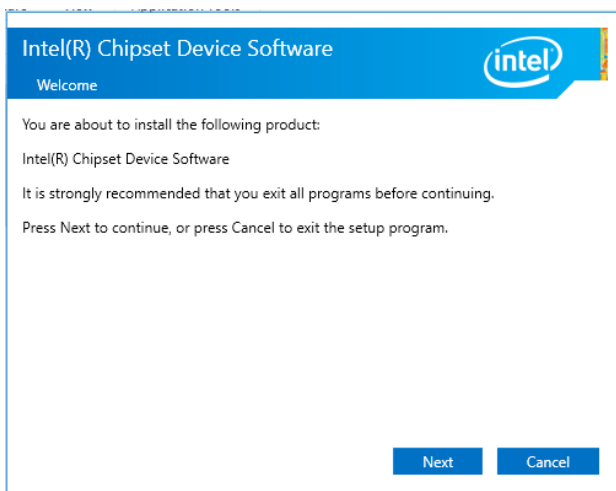
All drivers can be found on our website.



**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.



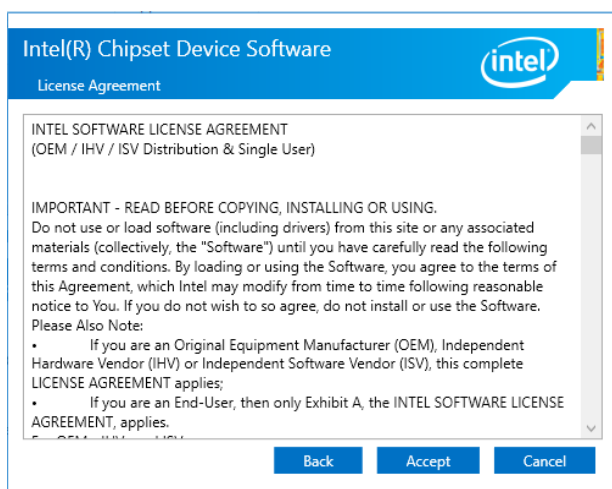
**Step 3. Click Install.**



**Step1. Click Next.**



**Step 4. Complete setup.**



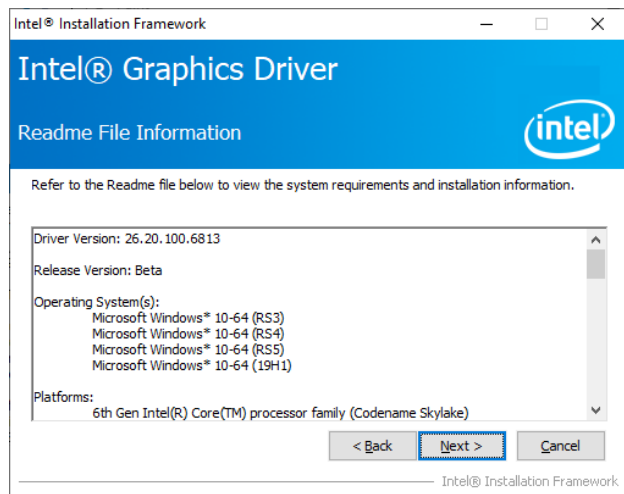
**Step 2. Click Accept.**

## 4.2 Install VGA Driver

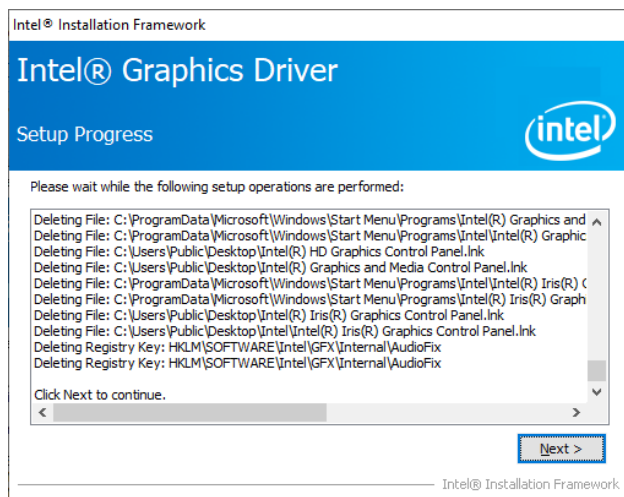
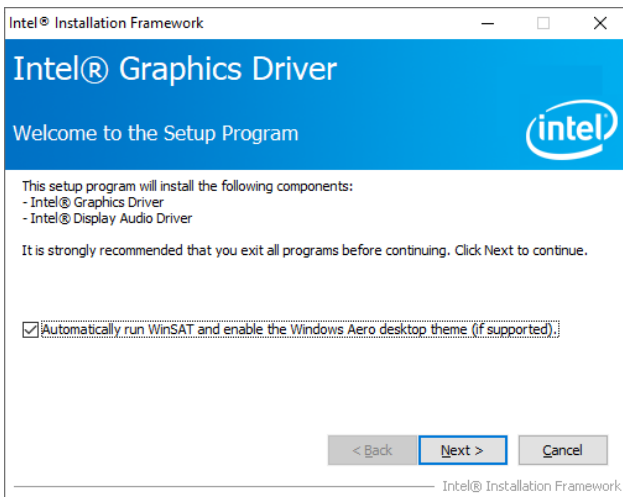
All drivers can be found on our website.



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

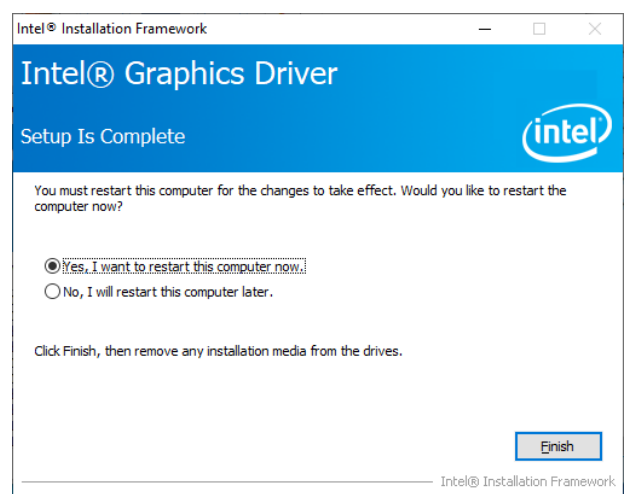
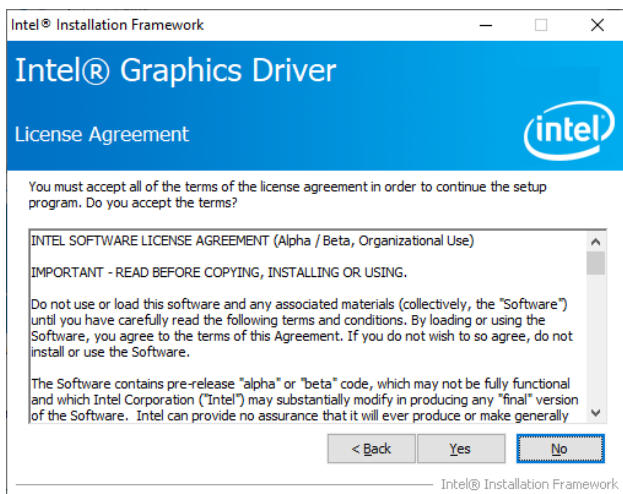


**Step 3. Click Next.**



**Step 1. Click Next** to continue installation.

**Step 4. Click Next.**



**Step 2.**  
Click **Yes** to accept license agreement.

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

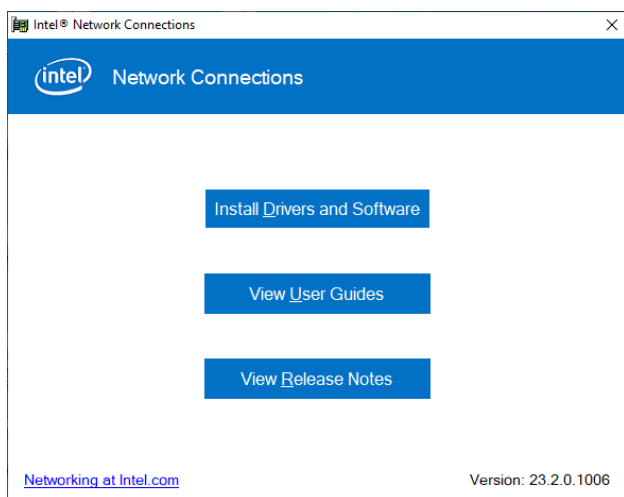
# ESM-CFH User's Manual

## 4.3 Install Ethernet Driver

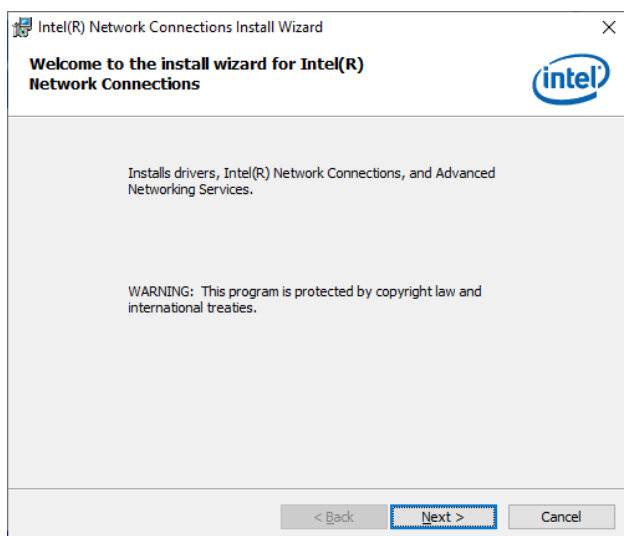
All drivers can be found on our website.



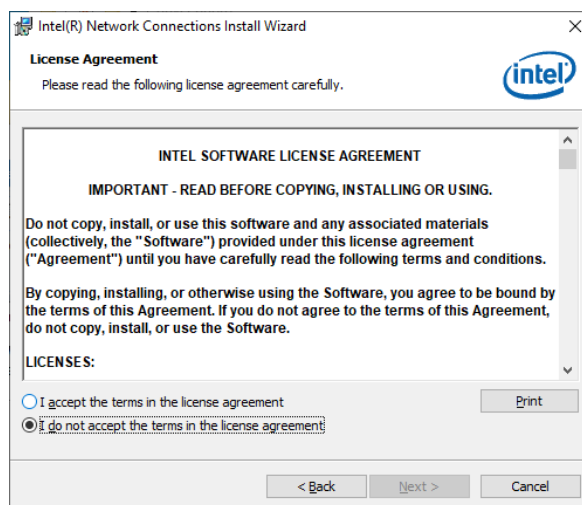
**Note:** The installation procedures and screen shots in this section are based on Windows 10 operation system.



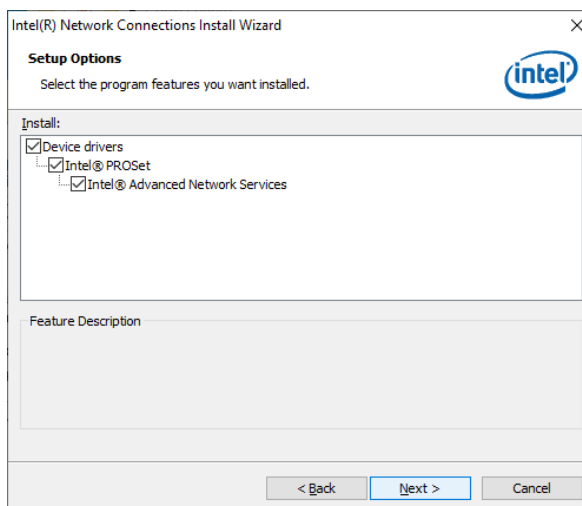
**Step 1. Click Install Drivers and Software.**



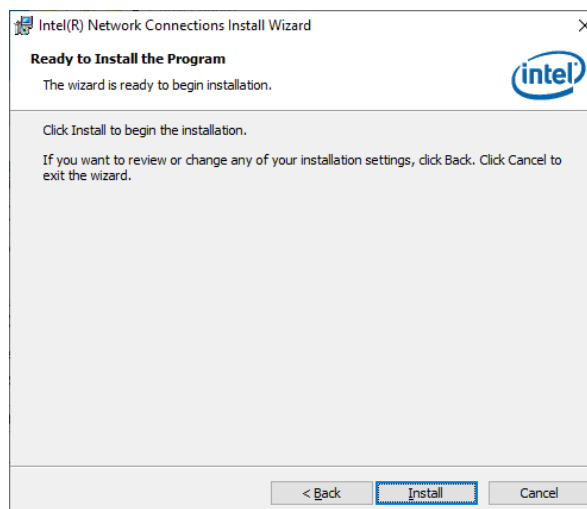
**Step 2. Click Next.**



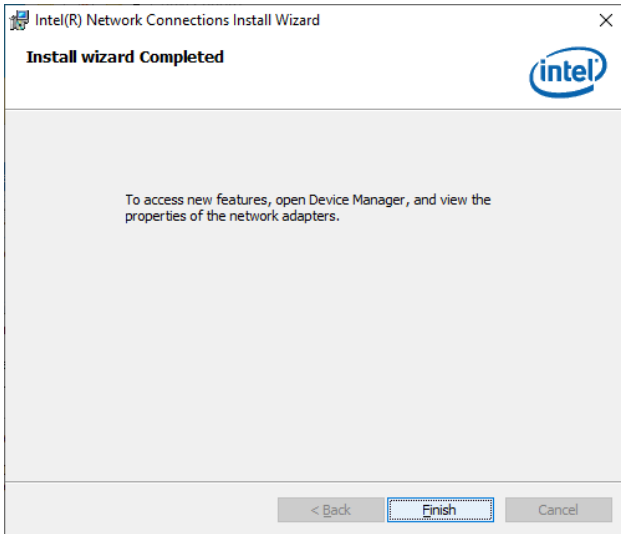
**Step 3. Click Next to continue setup.**



**Step 4. Click Next.**



**Step 5. Click Install.**



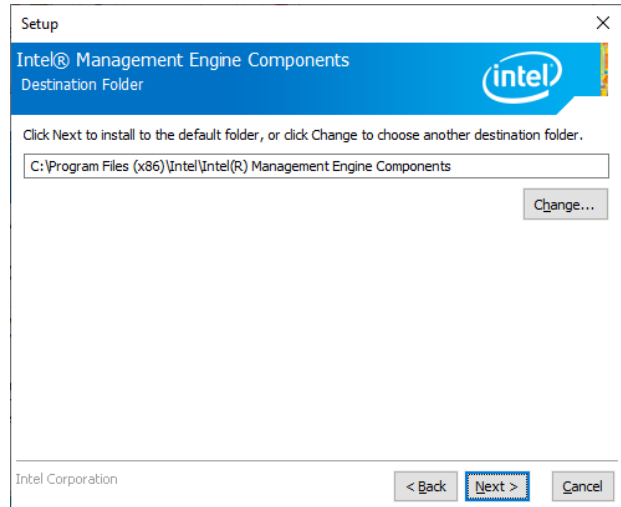
**Step 6.** Click **Finish** to complete the setup.

## 4.4 Install ME Driver

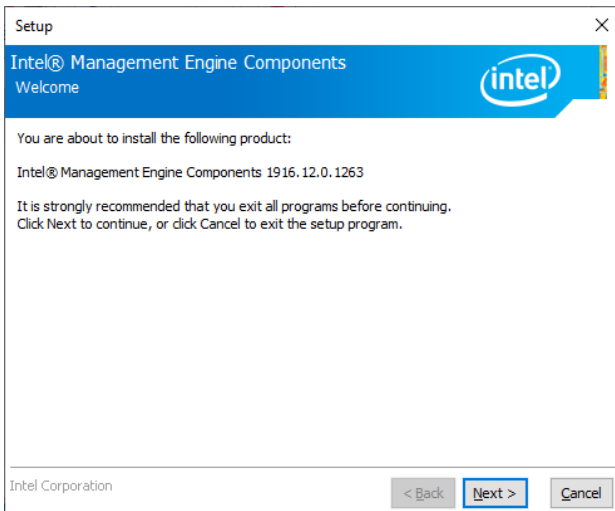
All drivers can be found on our website.



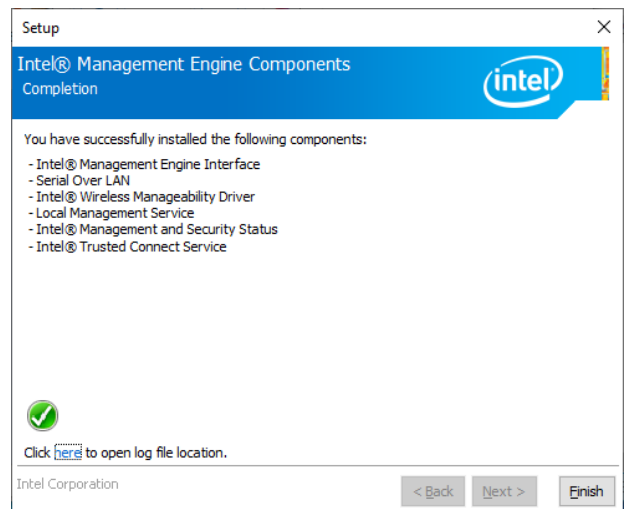
**Note:** The installation procedures and screen shots in this section are based on Windows 10 operation system.



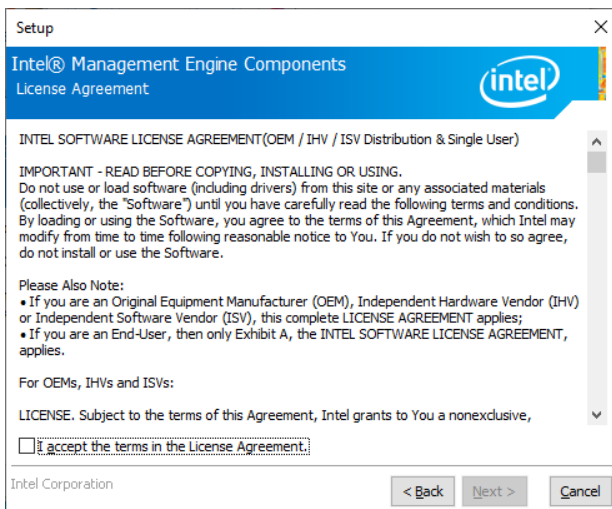
**Step 3. Click Next.**



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



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



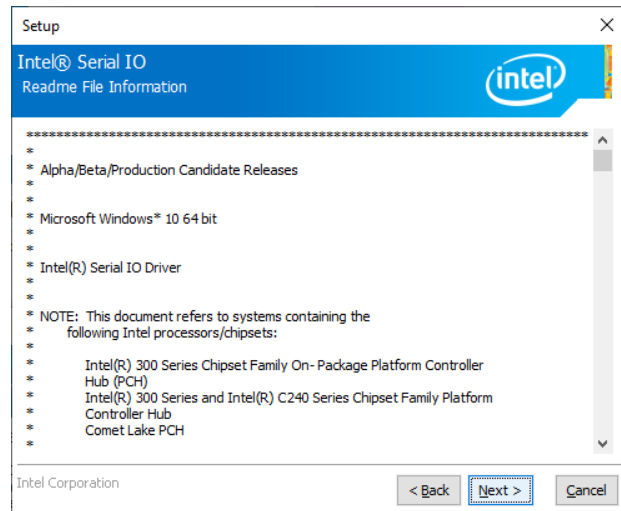
**Step 2. Click Next.**

## 4.5 Install Serial IO Driver

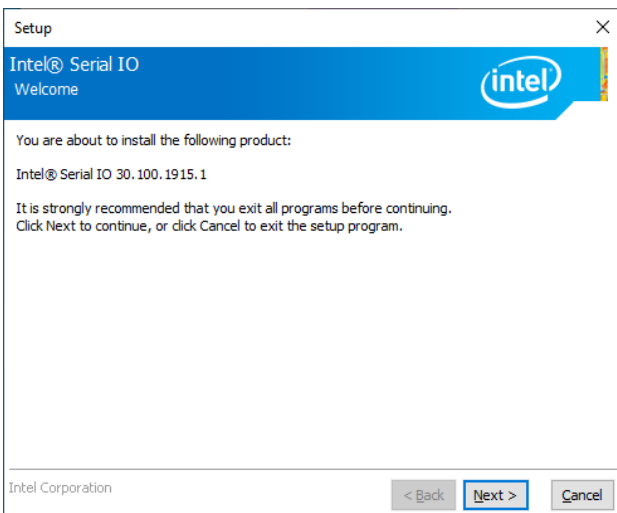
All drivers can be found on our website.



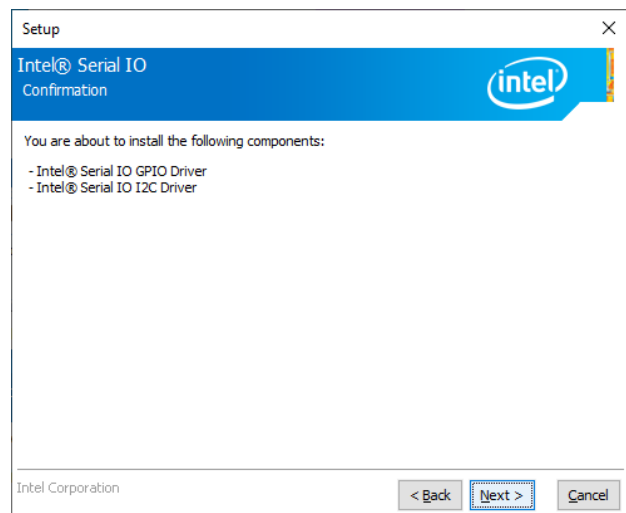
**Note:** The installation procedures and screen shots in this section are based on Windows 10 operation system.



**Step 3. Click Next.**



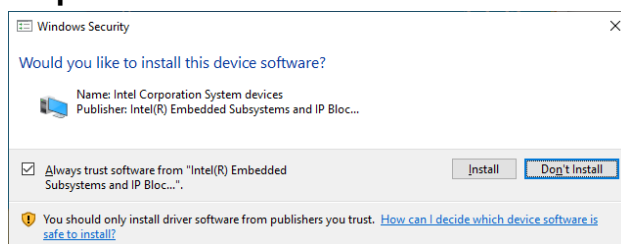
**Step 1. Click Next** to continue installation.



**Step 4. Click Next.**

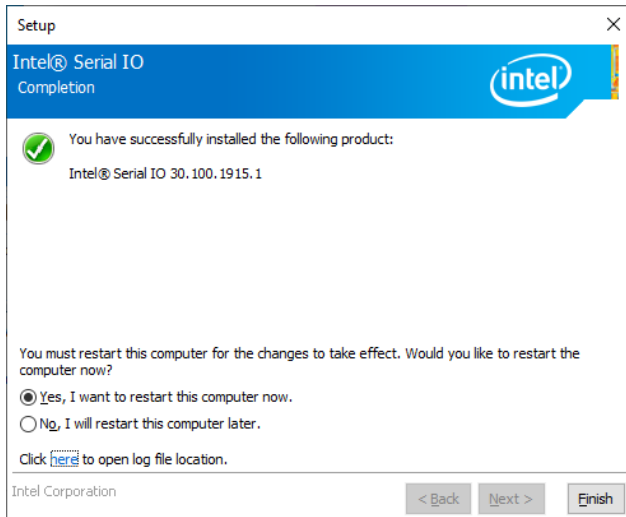


**Step 2. Click Next.**



**Step 5. Click Install.**

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

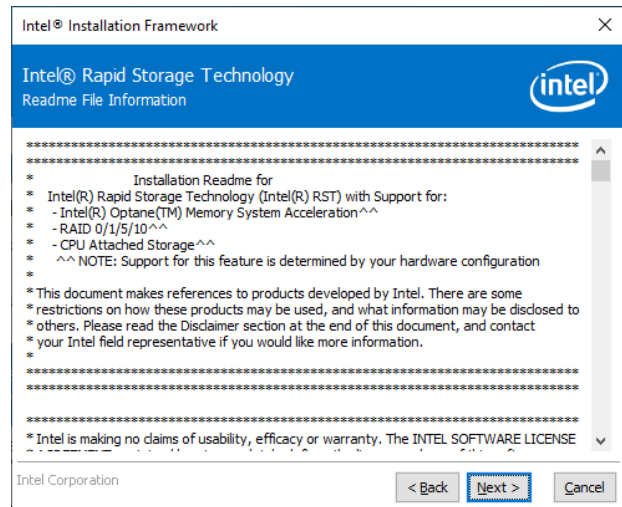


## 4.6 Install IRST Driver

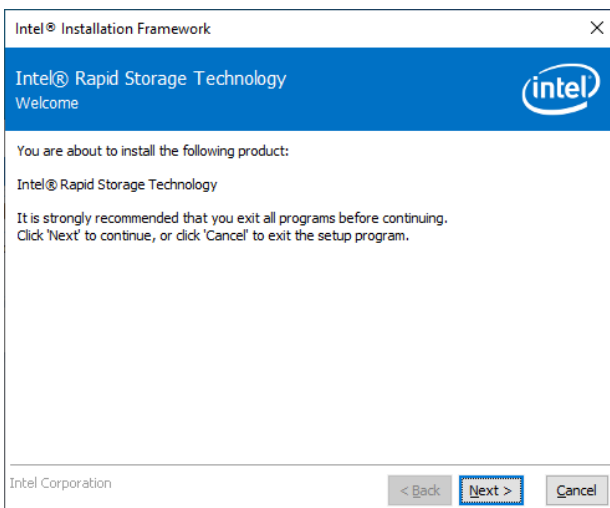
All drivers can be found on our website.



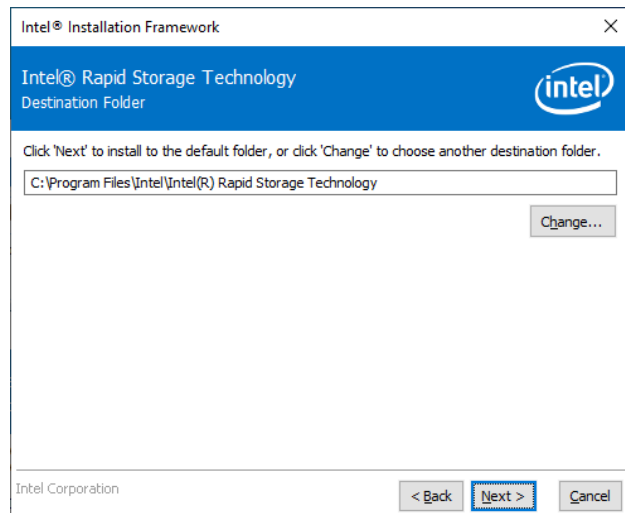
**Note:** The installation procedures and screen shots in this section are based on Windows 10 operation system.



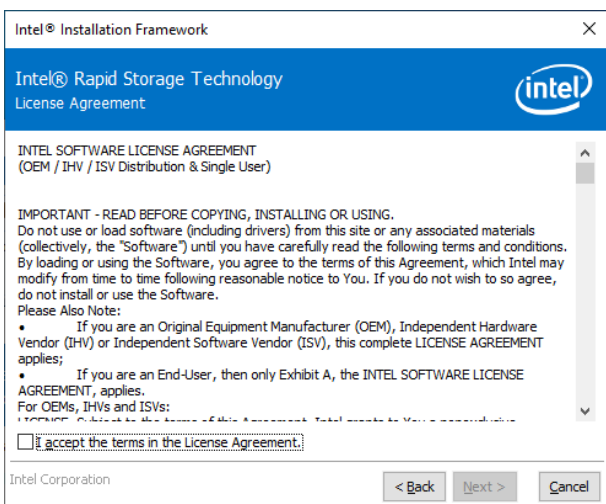
**Step 3. Click Next.**



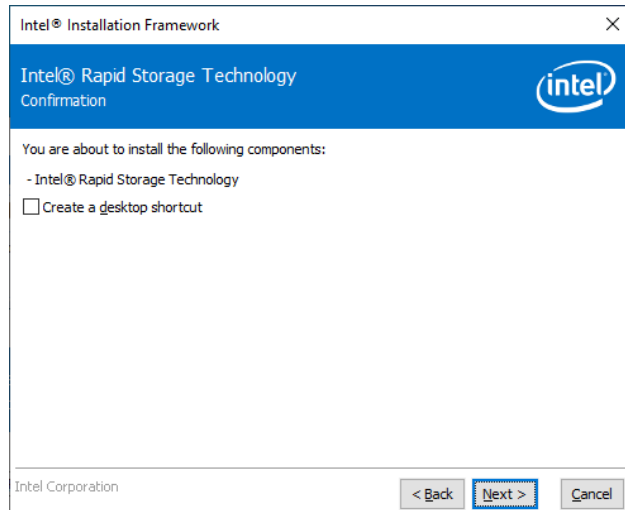
**Step 1. Click Next** to continue installation.



**Step 4. Click Next.**

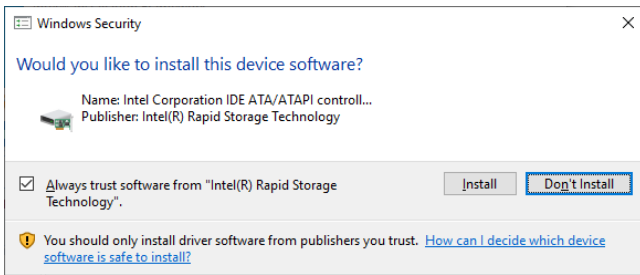


**Step 2. Click Next.**

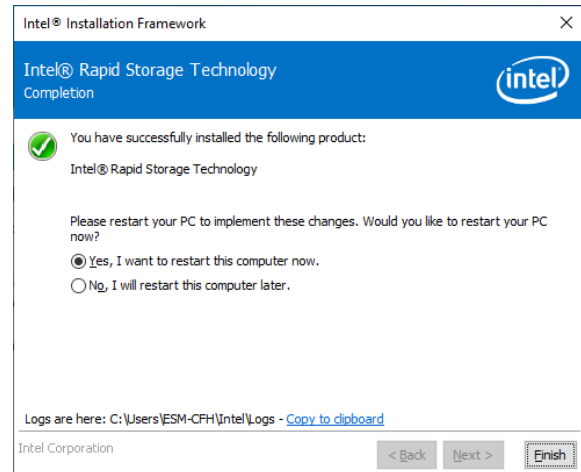


**Step 5. Click Next.**

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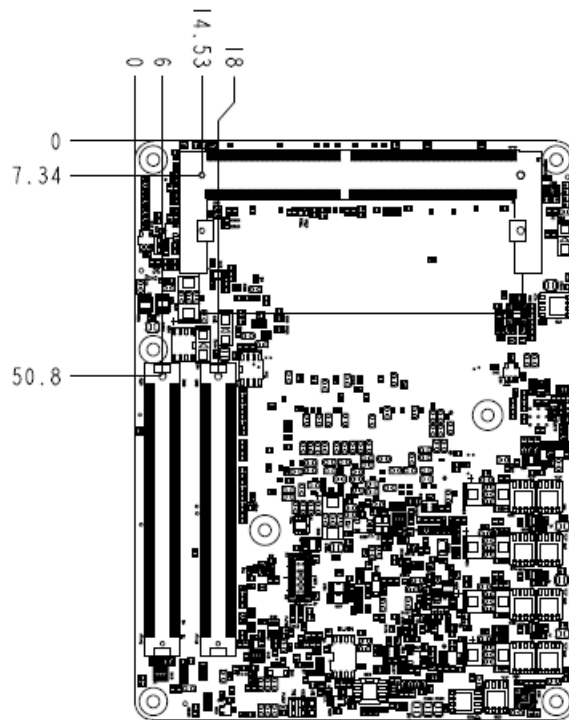
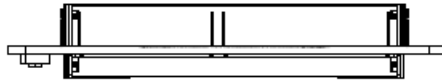
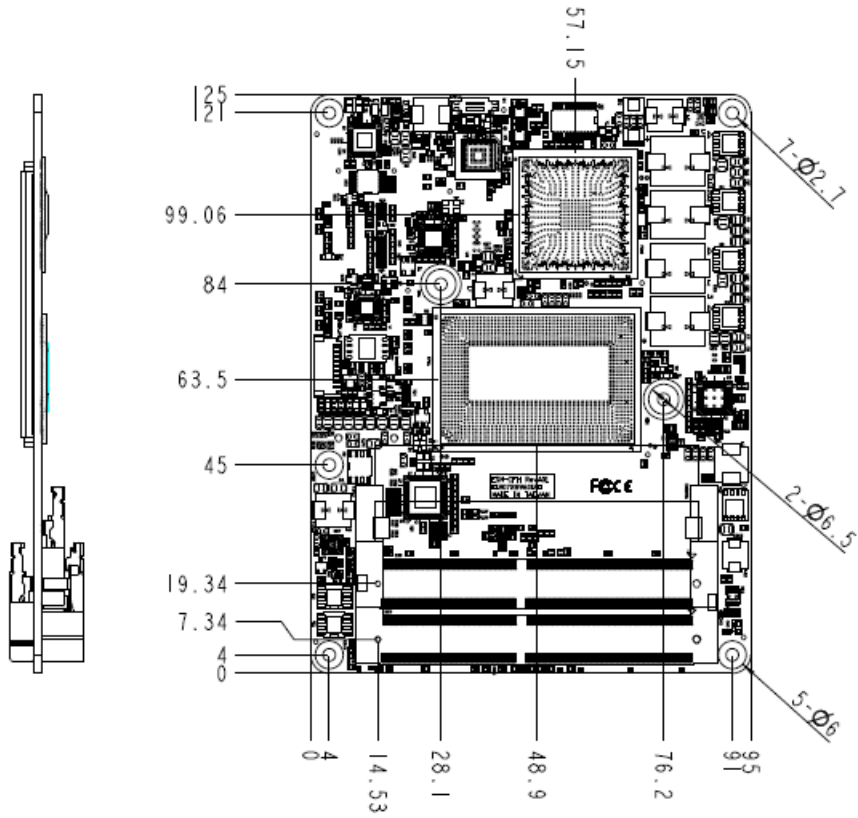
**Step 6. Click Install.**



**Step 7. Click Finish to complete setup.**

# 5. Mechanical Drawing

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Unit: mm

