EPX-EHLP

Intel® Elkhart Lake 2.5” Pico ITX motherboard

User’s Manual

2nd Ed – 10 February 2023

Part No. E2047EPHP01R

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.

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1. Collect all the information about the problem encountered. (For example, CPU type and speed, Avalue's products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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 EPX-EHLP motherboard

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

1.3 Document Amendment History

Revision	Date	By	Comment
1st	January 2023	Avalue	Initial Release
2nd	February 2023	Avalue	Update System Specifications

1.4 Manual Objectives

This manual describes in details Avalue Technology EPX-EHLP 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 EPX-EHLP 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 CMOS RAM that make booting impossible. If this should happen, clear the CMOS 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

EPX-EHLP	
Product Features	Intel® Atom® x6000E Series and Celeron® J Series processors with CPU Bottom Mounted
	One 260-pin DDR4 2666MHz SO-DIMM socket, supports up to 32GB Max (Only Atom® x6000 Series Processors support IBECC)
	2 x Intel® I225/i226LM(I225/i226IT for wide temp version) 2.5 Gigabit Ethernet
	1 x Dual stack DP(Upper DP, Lower DP++), 1CH LVDS
	4 x USB 2.0 by pin header 2 x USB 3.1 Gen2 at I/O 1 x RS-232, 1 x RS-232/422/485 1 x M.2 Type B 2242/2260 with (1 x PCI-e x2 via OEM BIOS request) or (1 x PCI-e x1 + USB3.1 GEN 1)-Default or (1 x SATA III + USB3.1 GEN 1), USB2.0 Signal support SSD. (Default: SATA) 1 x M.2 Type E 2230 support WiFi module, USB 2.0 Signal GPIO 4bit DC in +12V
System	
CPU	Intel® Atom® x6000E Series and Intel® Pentium® and Celeron® J Series processors with CPU Bottom Mounted
BIOS	AMI uEFI BIOS, 256Mbit SPI Flash ROM
I/O Chip	EC ITE IT5571 (IT5571VG-I for wide temp version)
System Memory	One 260-pin DDR4 2666MHz SO-DIMM socket, supports up to 32GB Max (Only Atom® x6000 Series Processors support IBECC) *Note: Due to mainboard design limitation, the mainboard is not recommend to use DDR4 3200MHz SO-DIMM.
Watchdog Timer	H/W Reset, 1sec. – 65535sec./min.1sec. or 1min. step
H/W Status Monitor	CPU temperature monitoring Voltages monitoring
Expansion Slot	
M.2 Key B	1 x M.2 Type B 2242/2260 with (1 x PCI-e x2 via OEM BIOS request) or (1 x PCI-e x 1 + USB3.1 GEN1) or (1 x SATA III + USB3.1 GEN1), USB2.0 Signal, support SSD. 1 x M.2 Type E 2230 support WiFi module, USB 2.0 Signal
Storage	
M.2	1 x M.2 Type B 2242/2260 PCI-e or SATA SSD
Edge I/O	
LAN	2 x Intel® I225/i226LM(I225/i226IT for wide temp version) 2.5 Gigabit Ethernet

USB 3.1	1 x Dual stack USB 3.1 GEN 2 connector
DP	1 x Dual stack DP(Upper DP, Lower DP++)
DC Input	1 x DC Jack lockable connector type
Onboard I/O	
COM	COM 1 : (JCOM1) 1 x 2 x 5 pin, pitch 1.27mm connector for RS-232/422/485 COM 2 : (JCOM2) 1 x 2 x 5 pin, pitch 1.27mm connector for RS-232
USB 2.0	1 x 2 x 6 pin, pitch 1.27mm connector for 4 USB 2.0 (JUSB1)
GPIO	1 x 2 x 6 pin, pitch 1.25mm connector for GPIO: 4bits (JDIO1)
Front Panel	1 x 2 x 5 pin, pitch 1.00mm connector for front panel (JFP1)
RTC Battery	1 x horizontal type battery connector (Battery cable 170mm length) (JBT1)
AT/ATX Selector	1 x 2 x 2 pin, pitch 1.27mm switch for AT/ATX mode (AT_CMOS1)
LVDS	CH7511B-BFI Single channel 18/24-bits LVDS 1 x 2 x 15 pin, pitch 1.00mm connector for LVDS (JLVDS1)
LCD Inverter	PWM Mode (By Resistance) Backlight signal combined into LVDS connector.
BIOS SPI	1 x 2 x 6 pin, pitch 1.00mm connector for BIOS SPI (JESPI1,)/80 port
EC Debug/ eSPI	1 x 1 x 10 pin, pitch 1.00mm connector for EC+BIOS debug (JSPI_EC1,)
Activity Indicator LED	By Activity Indicator LED (Boot LED, D23)
Display	
Graphic Chipset	Intel® UHD Graphics for 10th Gen Intel® Processors
Spec. & Resolution	One dual stack DP(Upper DP, Lower DP++): 4096 x 2160@60 Hz LVDS: 1366 x 768 Single channel 18/24-bits LVDS (Chrontel CH7511B-BF (CH7511B-BFI for wide temp version) eDP to LVDS) Note: This is Intel resolution. DQV actual test resolution as below: DP: 3840x2160(60Hz) LVDS: 1366 x 768 Single channel 18/24-bits
Multiple Display	Triple Display
Ethernet	
LAN Chipset	2 x Intel® I225/i226LM(I225/i226IT for wide temp version) 2.5 Gigabit Ethernet
LAN Spec.	10/100/1000 Base-Tx GbE compatible 2.5 Gigabit Ethernet
Mechanical & Environmental Specification	
Power Requirement	DC in +12V
ACPI	Single power ATX Support S0, S3, S4, S5 ACPI 5.1 Compliant
Power Mode	AT / ATX mode Switchable Through Jumper
Operating Temp.	0~60°C (32~140°F) Elkhart Lake J Series CPU SKU

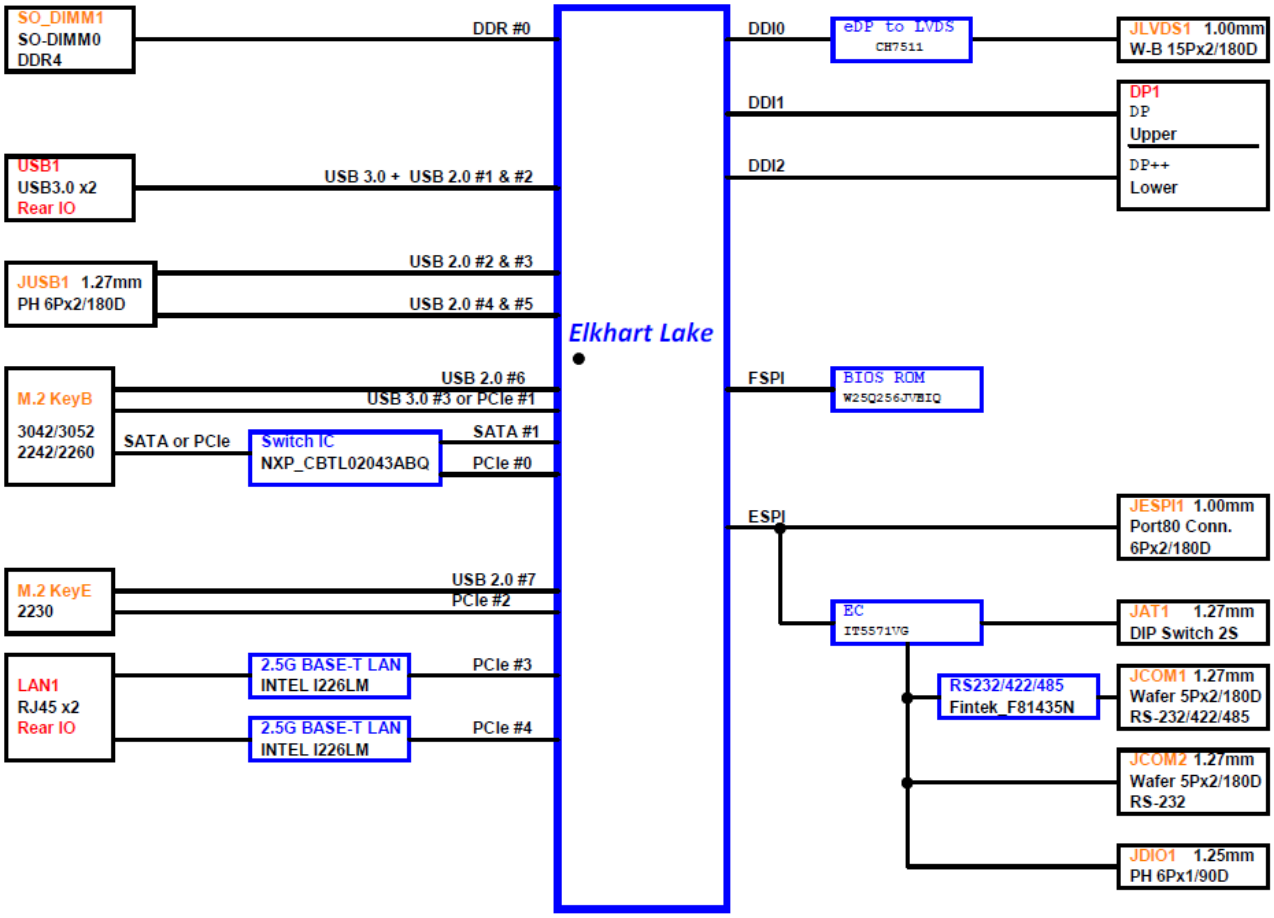
	-20~60°C (-4~140°F) Elkhart Lake Atom Series CPU SKU w/HDD/SSD, ambient with 0.5 m/s Air flow
Storage Temp.	-40~ +75°C
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Size (L x W)	2.5" SBC Form Factor 3.937" x 2.834" (100mm x 72mm)
Weight	0.40kg
Vibration Test	Package Vibration Test Reference IEC60068-2-64 Testing procedures Test Fh: Vibration broadband random Test PSD: 0.026G²/Hz, 2.16 Grms Non-operation mode Test Frequency: 5-500Hz Test Axis: X,Y and Z axis 30 min. per each axis IEC 60068-2-64 Test:Fh Random Vibration Operation Reference IEC60068-2-64 Testing procedures Test Fh : Vibration broadband random Test PSD: 0.00454G²/Hz, 1.5 Grms Operation mode Test Frequency : 5-500Hz Test Axis : X,Y and Z axis 30 minutes per each axis IEC 60068-2-64 Test:Fh Random Vibration Non Operation Reference IEC60068-2-64 Testing procedures Test Fh : Vibration broadband random Test PSD: 0.01818G²/Hz, 3.0 Grms Non Operation mode Test Frequency : 5-500Hz Test Axis : X,Y and Z axis 30 minutes per each axis IEC 60068-2-64 Test:Fh
Drop Test	Packing Drop Reference ISTA 2A, Method : IEC-60068-2-32 Test: Ed Drop Test

	1 One corner , three edges, six faces 2 ISTA 2A, IEC-60068-2-32 Test:Ed
OS Information	Win10 64bit, Linux

Note: Specifications are subject to change without notice.

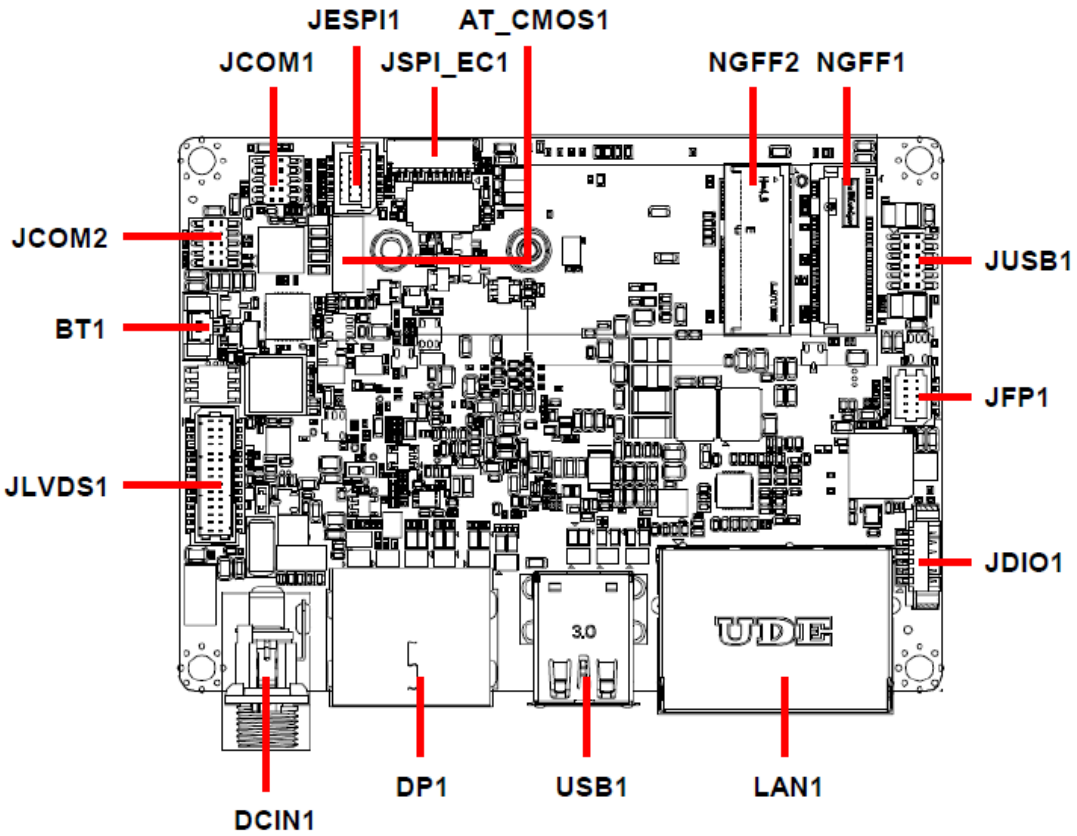
1.6 Architecture Overview—Block Diagram

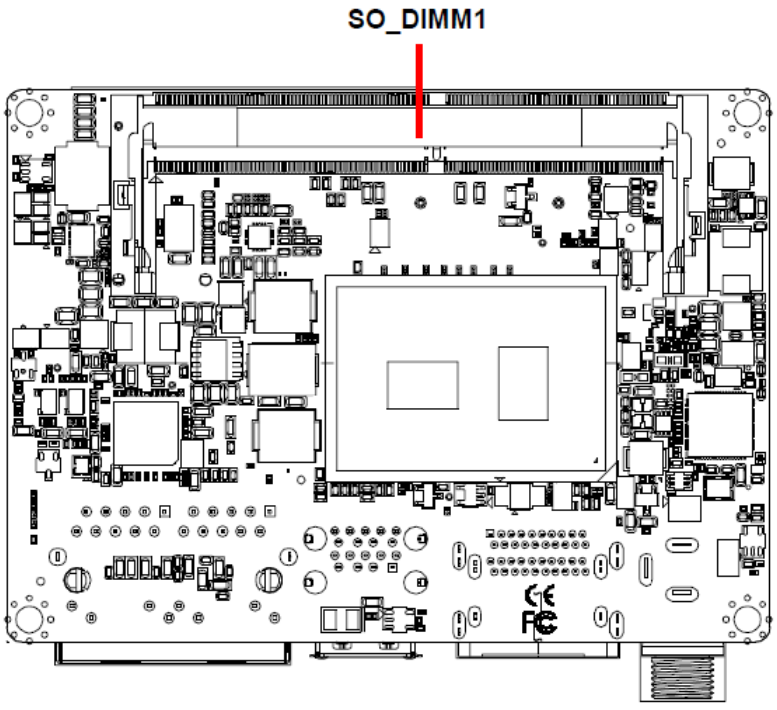
The following block diagram shows the architecture and main components of EPX-EHLP.



2. Hardware Configuration

2.1 Product Overview

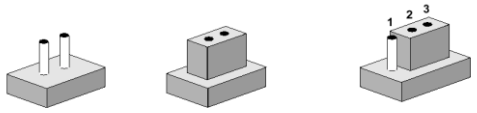




2.2 Jumper and Connector List

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
AT_CMOS1	AT/ATX mode selector	
BT1	Battery connector	2 x 1 wafer, pitch 1.25 mm
JFP1	Miscellaneous setting connector	5 x 2 wafer, pitch 1.00 mm
DCIN1	DC Power-in connector	
DP1	DP connector	
LAN1	RJ-45 Ethernet connector	
JCOM1/2	Serial port 1/2 connector	5 x 2 header, pitch 1.27 mm
JLVDS1	LVDS connector	15 x 2 wafer, pitch 1.00 mm
JDIO1	General purpose I/O connector	6 x 1 wafer, pitch 1.25 mm
JSPI_EC1	JSPI_EC connector	10 x 1 wafer, pitch 1.00 mm
JESPI1	JESPI connector	6 x 2 wafer, pitch 1.00 mm

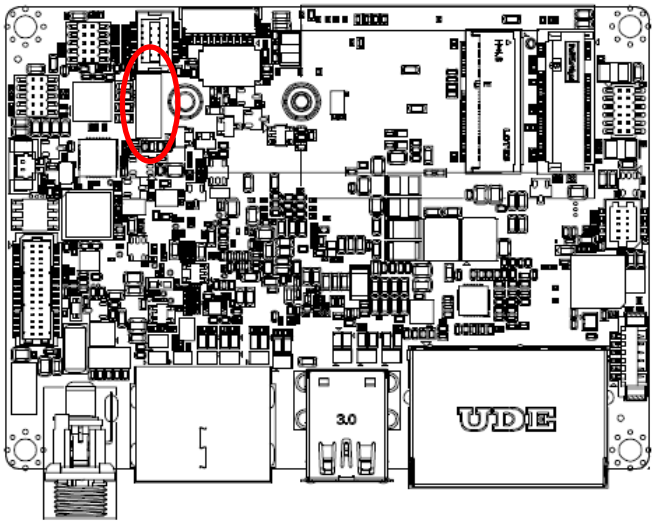
JUSB1	USB connector	6 x 2 header, pitch 1.27 mm
USB1	USB3.0 connector	
SO_DIMM1	260-pin DDR4	
NGFF1	M.2 B key slot	
NGFF2	M.2 E Key slot	

Note: Please note interferance may occcur if customer may use both Key E & Key B modules together.

It is recommend to use standard 1.5mm thickness for Key E module. Bottom of Key B module height shall not be thicker than 1.1mm.

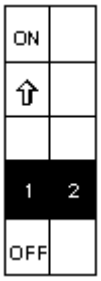
2.3 Setting Jumpers & Connectors

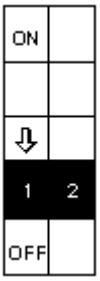
2.3.1 AT/ATX mode selector (AT_CMOS1)



AT/ATX mode

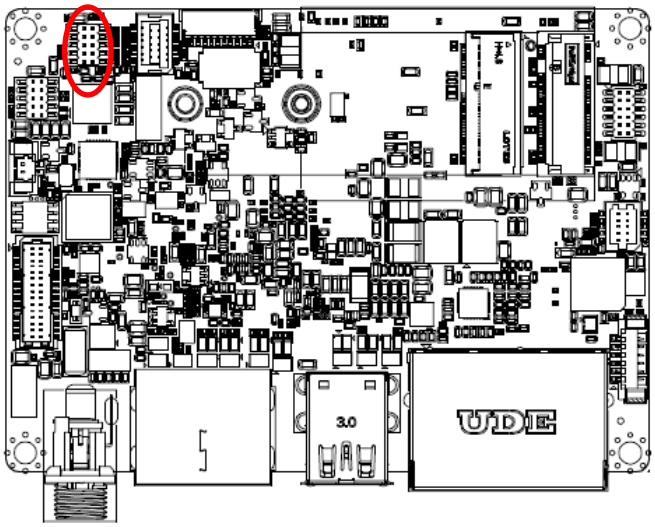
AT mode* **ATX mode**

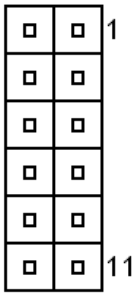




***Default**

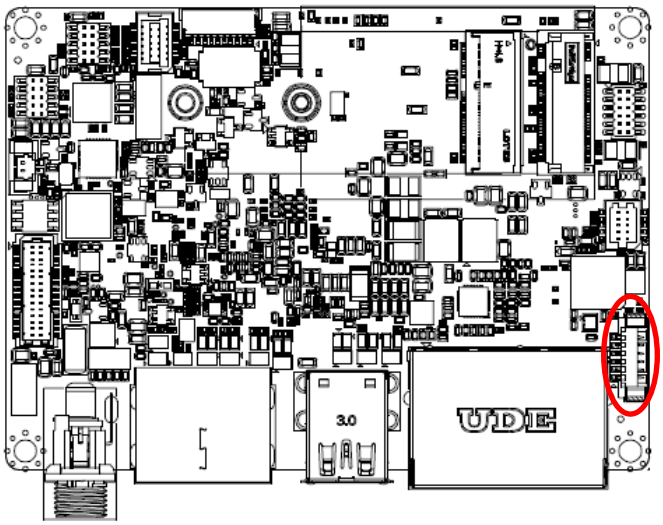
2.3.2 JESPI connector (JESPI 1)





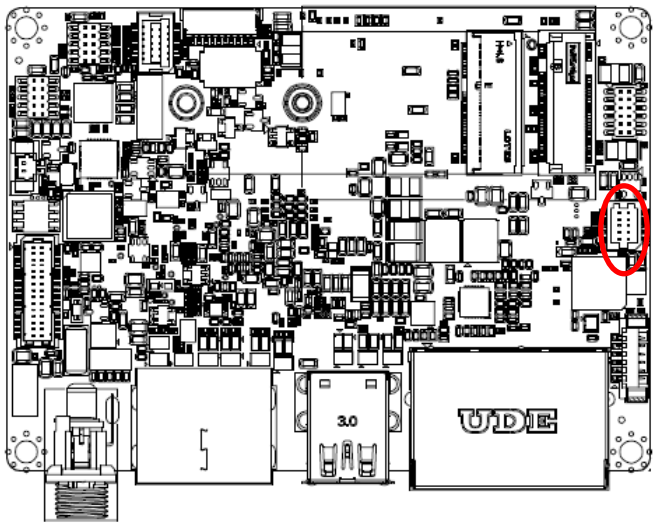
Signal	PIN	PIN	Signal
CN_ESPI_IO0	2	1	+3.3_ ESPI
CN_ESPI_IO1	4	3	PLT_RST_BUT#
CN_ESPI_IO2	6	5	ESPI_CS#0
CN_ESPI_IO3	8	7	CN_ESPI_CLK
NC	10	9	GND
ESPI_RST	12	11	ESPI_ALERT#0

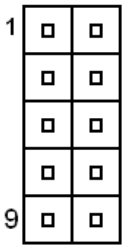
2.3.3 General purpose I/O connector (JDIO1)



Signal	PIN
GND	6
EC_DI1	5
EC_DI0	4
EC_DO1	3
EC_DO0	2
+3.3V	1

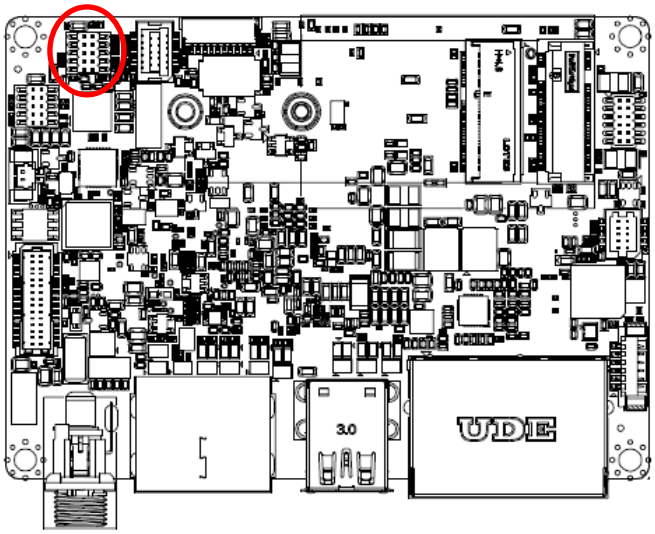
2.3.4 Miscellaneous setting connector (JFP1)

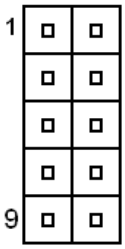




Signal	PIN	PIN	Signal
PWR_LED+	1	2	HDD_LED+
PWR_LED#	3	4	HDD_LED#
PWR_BTN_IN_EC#	5	6	PMC_RSTBTN#
GND	7	8	GND
NC	9	10	NC

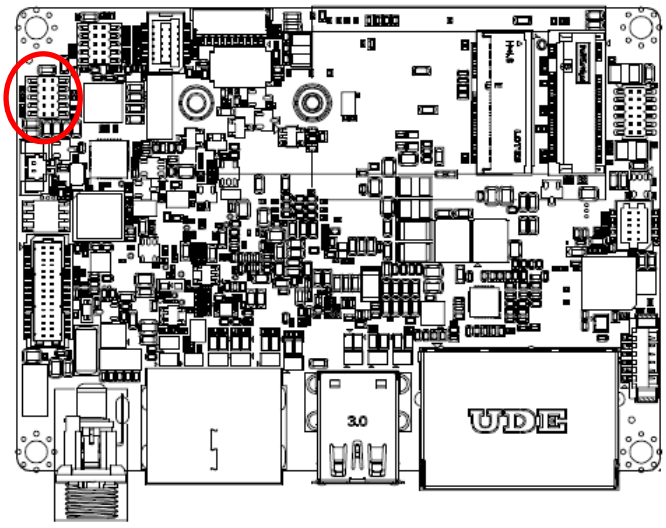
2.3.5 Serial port 1 connector (JCOM1)

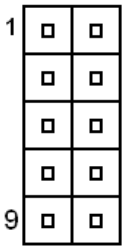




Signal	PIN	PIN	Signal
COM_DCD#_TXN_1	1	2	COM_RXD#_TXP_1
COM_TXD_RXP_1	3	4	COM_DTR#_RXN_1
GND	5	6	COM_DSR#_1
COM_RTS#_1	7	8	COM_CTS#_1
COM_RI#_1	9	10	NC

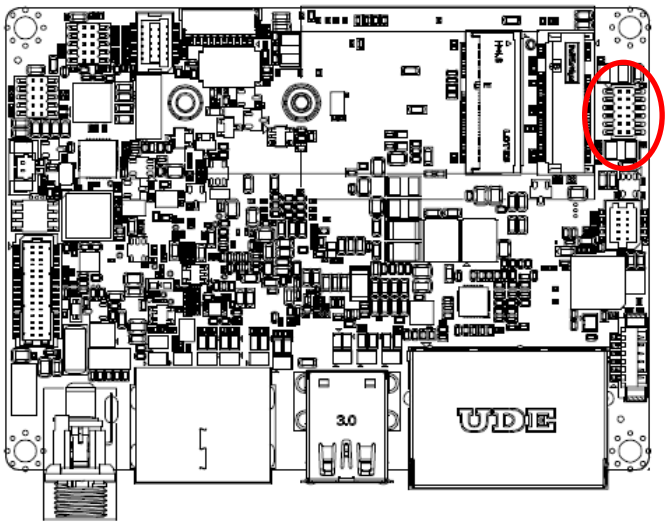
2.3.6 Serial port 2 connector (JCOM2)

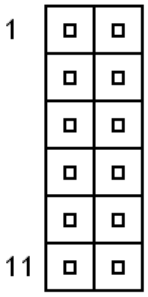




Signal	PIN	PIN	Signal
COM_DCD# _2	1	2	COM_RXD#_2
COM_TXD_ 2	3	4	COM_DTR#_2
GND	5	6	COM_DSR#_2
COM_RTS#_2	7	8	COM_CTS#_2
COM_RI#_2	9	10	NC

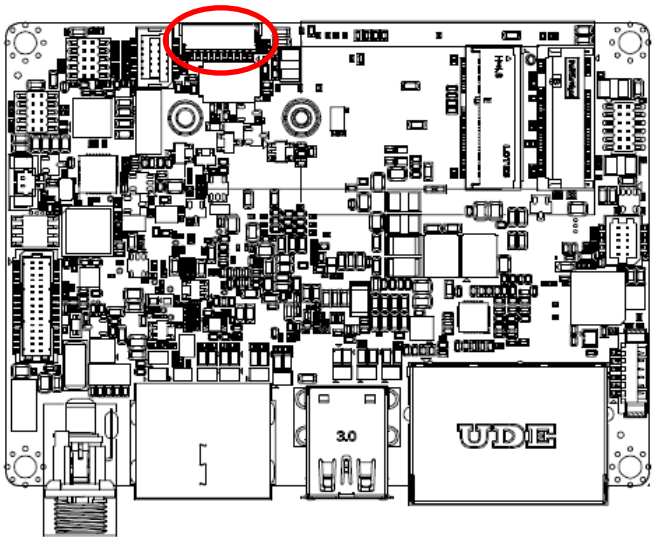
2.3.7 USB connector (JUSB 1)

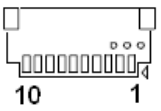




Signal	PIN	PIN	Signal
GND	1	2	+5A_USB23
USB_R_DN2	3	4	USB_R_DN3
USB_R_DN2	5	6	USB_R_DN3
USB_R_DN4	7	8	USB_R_DN5
USB_R_DN4	9	10	USB_R_DN5
GND	11	12	+5A_USB45

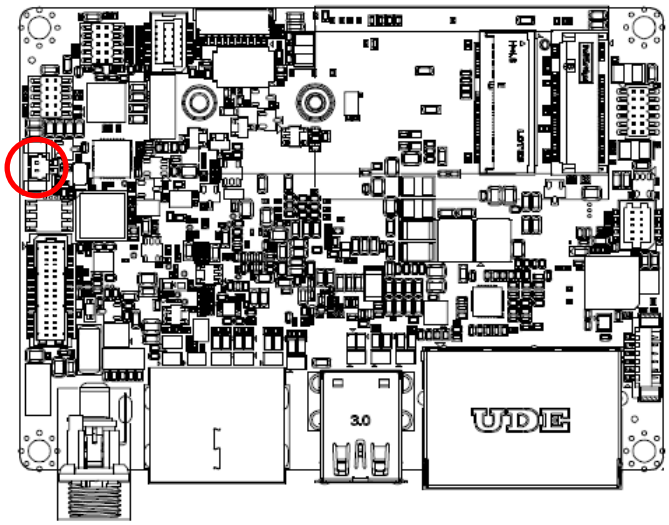
2.3.8 SPI header (JSPI_EC1)

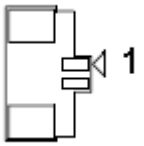




Signal	PIN
EC_SMDAT_DBG	1
EC_SMCLK_DBG	2
NC	3
SPI_HOLD#	4
SPI_MOSI	5
SPI_MISO	6
SPI_CLK	7
SPI_CS#0	8
GND	9
+V3.3A_SPI	10

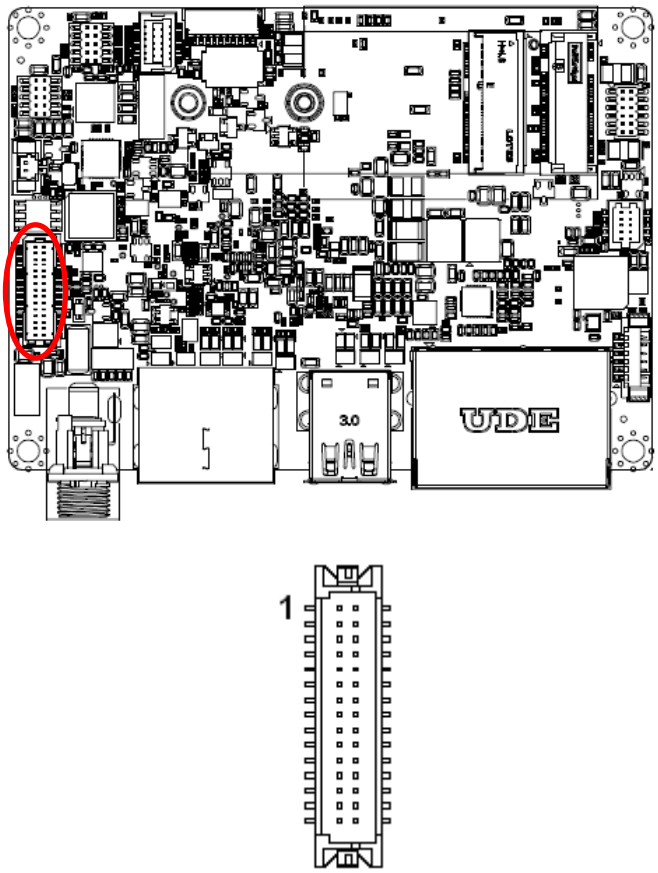
2.3.9 Battery connector (BT1)





Signal	PIN
+3.3VSB	1
GND	2

2.3.10 LVDS connector (JLVDS1)



Signal	PIN	PIN	Signal
+V3.3_LVDS	1	2	+V5_LVDS
GND	3	4	GND
GND	5	6	GND
GND	7	8	GND
LVDS_DATA1_P	9	10	LVDS_DATA0_P
LVDS_DATA1_N	11	12	LVDS_DATA0_N
GND	13	14	GND
LVDS_DATA3_P	15	16	LVDS_DATA2_P
LVDS_DATA3_N	17	18	LVDS_DATA2_N
GND	19	20	GND
LVDS_BKLTEN	21	22	LVDS_CLK1_P
VBRIGHT	23	24	LVDS_CLK1_N
GND	25	26	GND
+12V	27	28	+5V
GND	29	30	GND

Note:

Mainboard Connector: Aces 50238-03071-003 or Equivalent

User Side Connector: WELL-LIN 1010-H-2X15P or Equivalent

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 <DEL> or <ESC> immediately after switching the system on, or
By pressing the <DEL> or <ESC> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <DEL> or <ESC> 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
Enter	Select
+/-	Value
ESC	Exit
F1 key	General Help
F2 key	Previous Values
F3 key	Optimized Defaults
F4 key	Save & Exit Setup
<K>	Scroll help area upwards
<M>	Scroll help area downwards

- **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 <Enter> key.

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 AMI BIOS supports an override to the NVRAM settings which resets your system to its defaults.

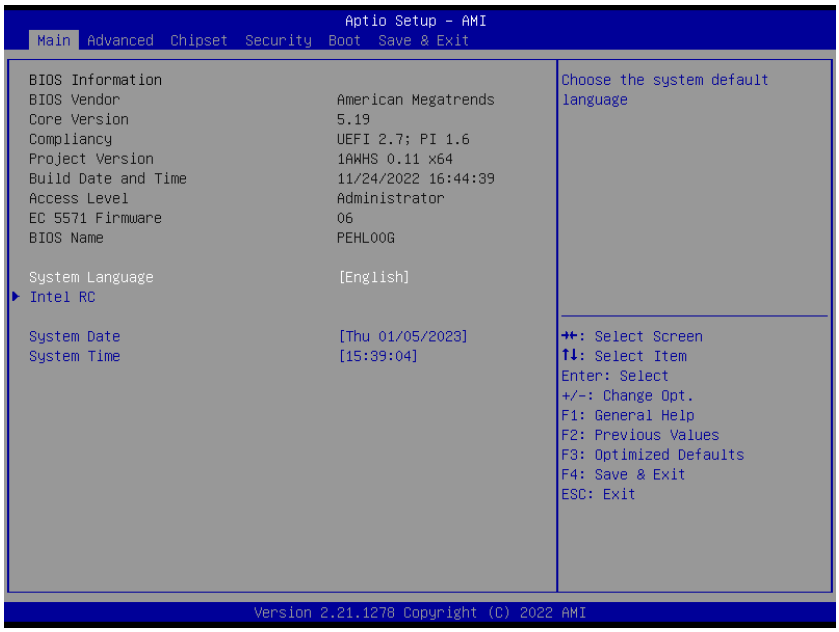
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance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

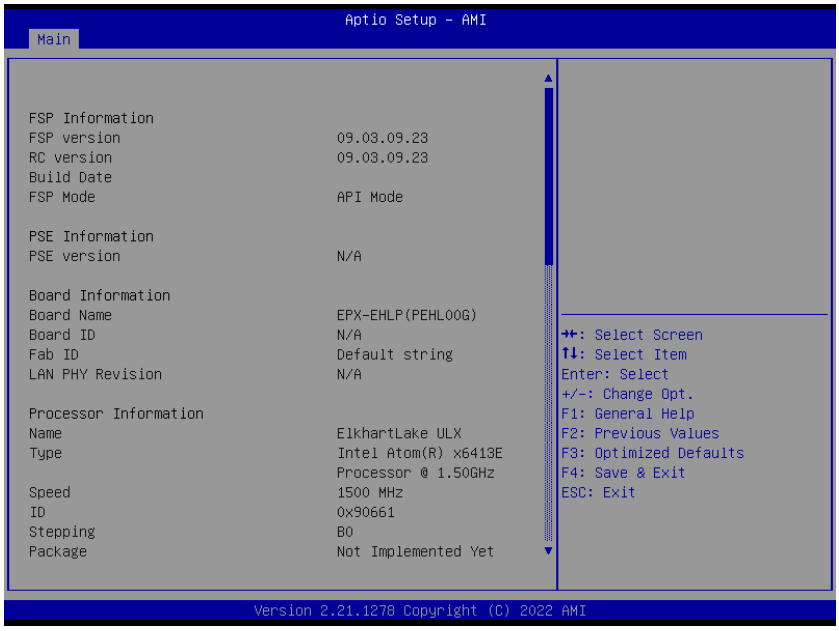
3.6 BIOS setup

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.

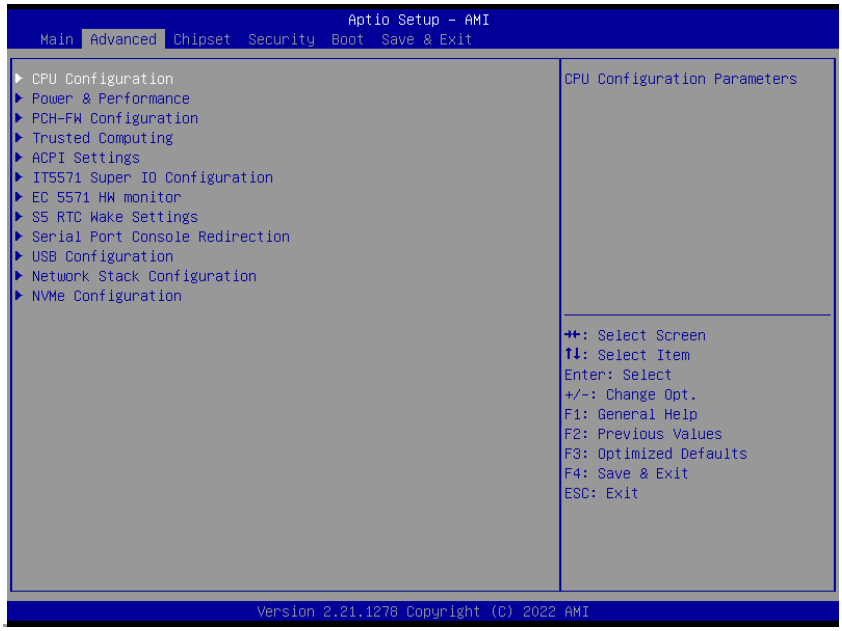
3.6.1.3 System Time

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

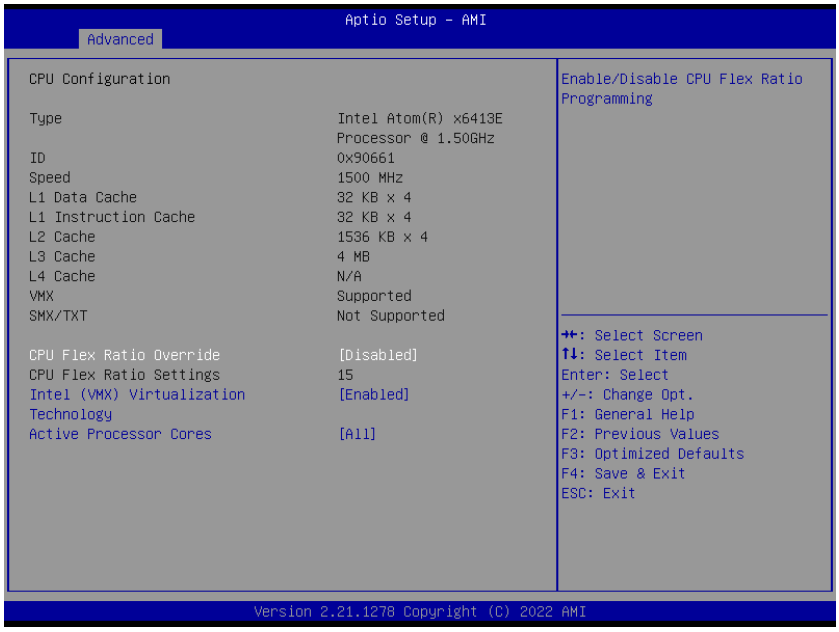
Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com.tw) to download the latest product and BIOS information.

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.

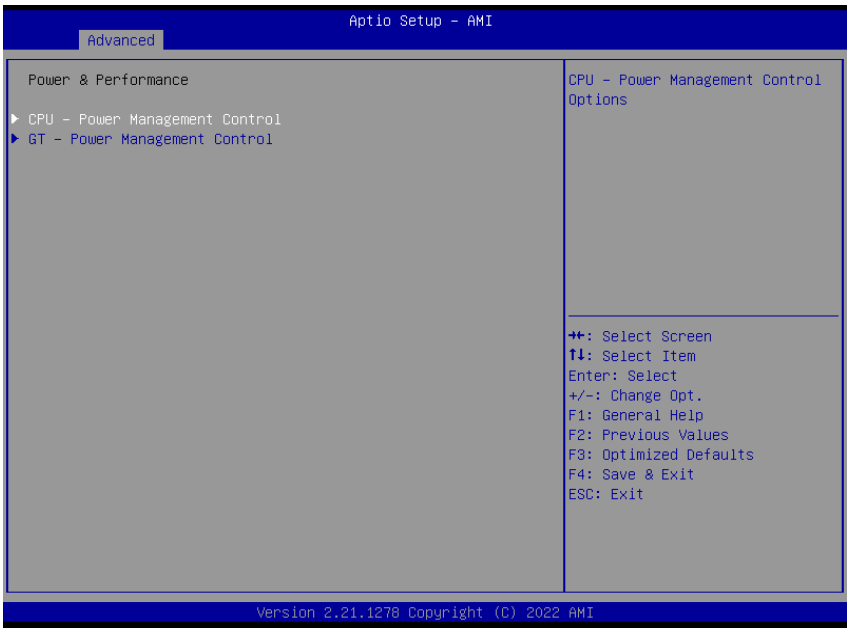


3.6.2.1 CPU Configuration

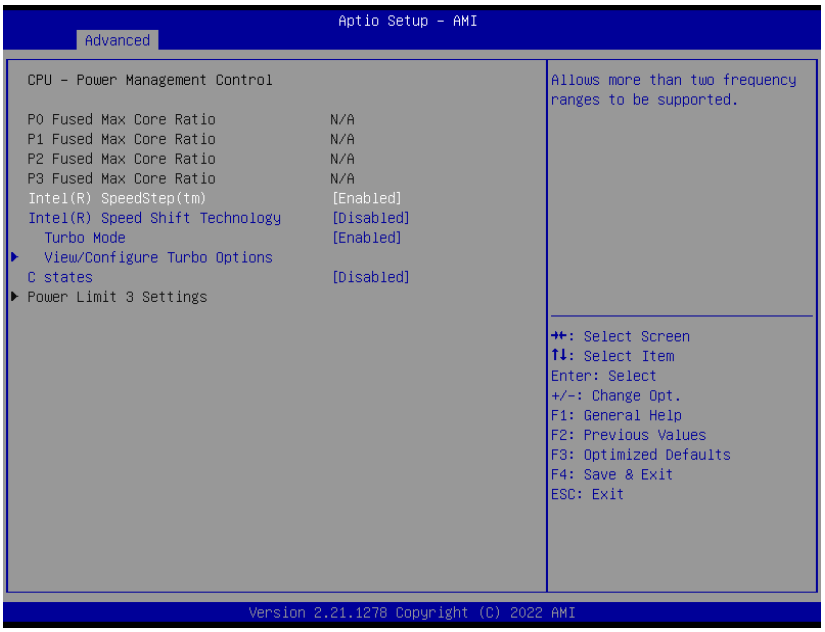


Item	Options	Description
CPU Flex Ratio Override	Disabled**[Default]**, Enabled	Enables/Disables CPU Flex Ratio Programming
Intel (VMX) Virtualization Technology	Disabled, Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active 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

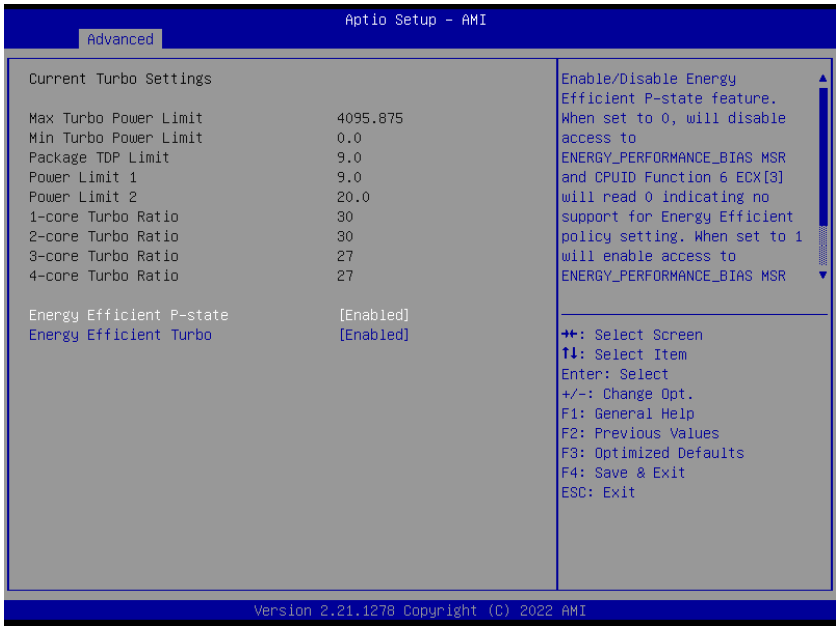


3.6.2.2.1 CPU - Power Management Control



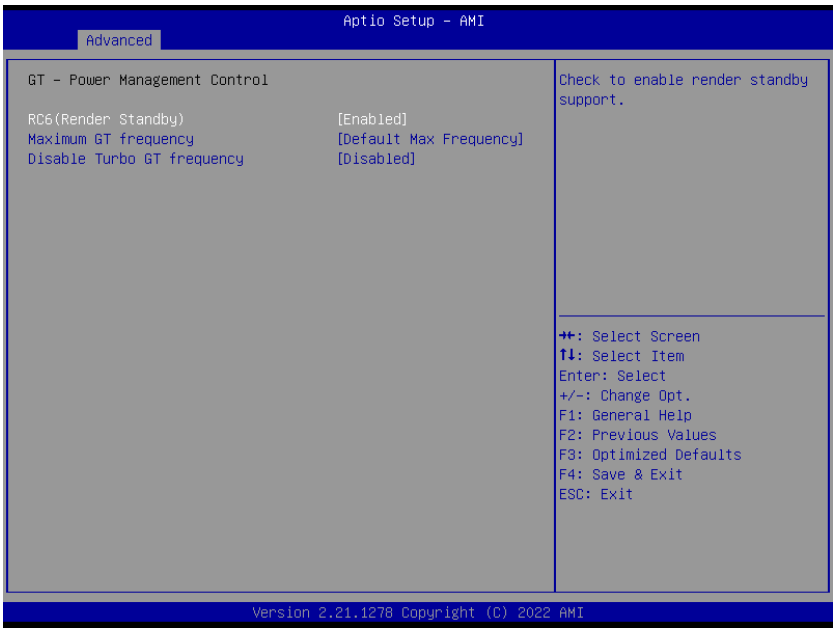
Item	Options	Description
Intel(R) SpeedStep(tm)	Disabled Enabled**[Default]**,	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Disabled**[Default]** Enabled,	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Disabled Enabled**[Default]**,	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). Auto means enabled.
C states	Disabled**[Default]** Enabled,	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

3.6.2.2.1.1 View/Configure Turbo Options



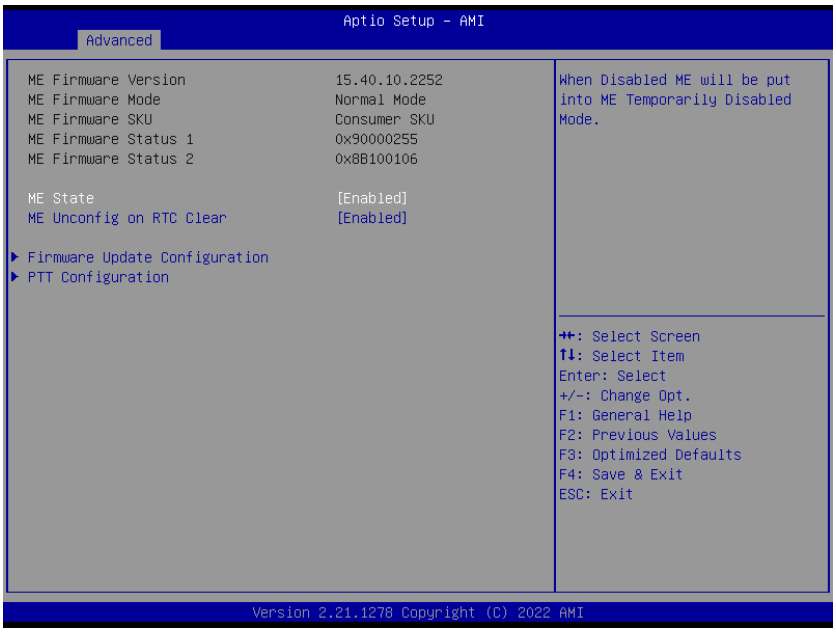
Item	Options	Description
Energy Efficient P-state	Disabled Enabled**[Default]**,	Enable/Disable Energy Efficient P-state feature. When set to 0, will disable access to ENERGY_PERFORMANCE_BIAS MSR and CPUID Function 6 ECX[3] will read 0 indicating no support for Energy Efficient policy setting. When set to 1 will enable access to ENERGY_PERFORMANCE_BIAS MSR 1B0h and
Energy Efficient Turbo	Disabled**[Default]** Enabled,	Enable/Disable Energy Efficient Turbo Feature. This feature will opportunistically lower the turbo frequency to increase efficiency. Recommended only to disable in overclocking situations where turbo frequency must remain constant. Otherwise, leave enabled.

3.6.2.2.2 GT - Power Management Control



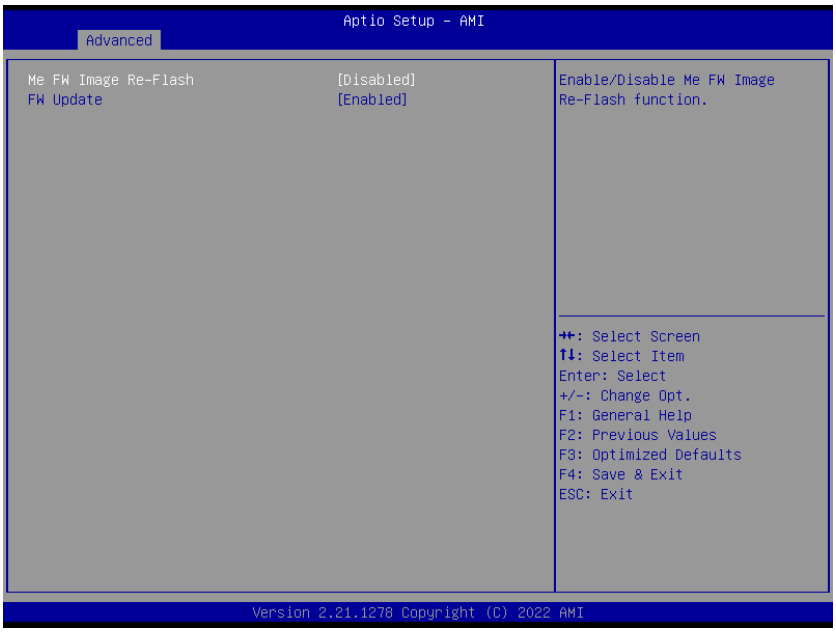
Item	Options	Description
RC6(Render Standby)	Disabled Enabled**[Default]**,	Cheak to enable render standby support.
Maximum GT frequency	Default Max Frequency**[Default]**, 100Mhz/150Mhz/200Mhz/250Mhz/300Mhz/ 350Mhz/400Mhz/450Mhz/500Mhz/550Mhz/ 600Mhz/650Mhz/700Mhz/750Mhz/800Mhz/ 850Mhz/900Mhz/950Mhz/1000Mhz/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

3.6.2.3 PCH-FW Configuration



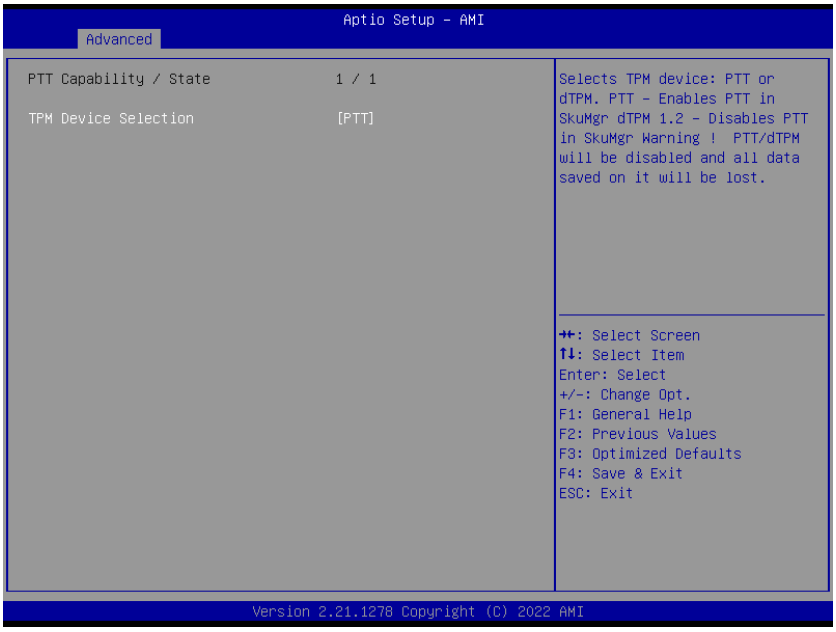
Item	Options	Description
ME State	Disabled Enabled**[Default]**,	When Disabled ME will be put into ME Temporarily Disabled Mode.
ME Unconfig on RTC Clear	Disabled Enabled**[Default]**,	When Disabled ME will not be unconfigured on RTC Clear

3.6.2.3.1 Firmware Update Configuration



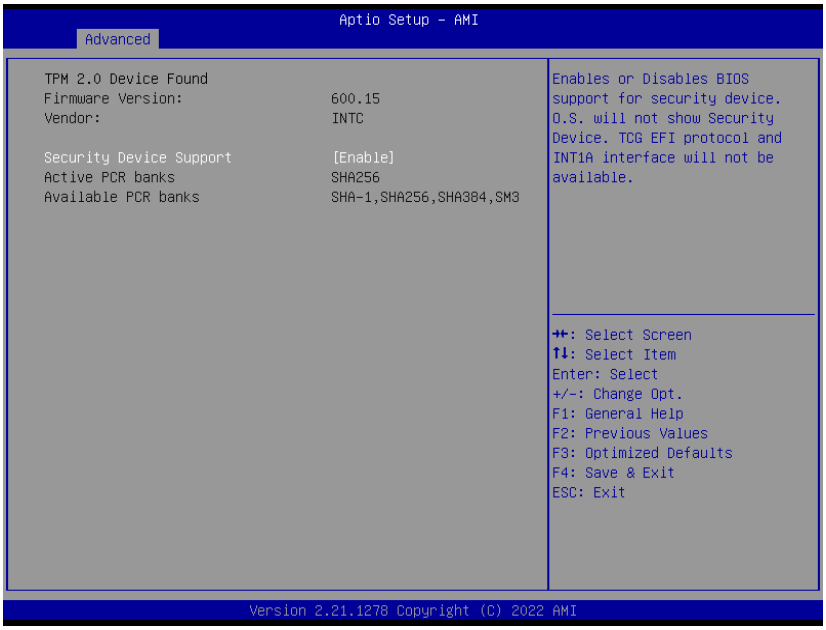
Item	Options	Description
Me FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.
FW Update	Disabled Enabled**[Default]**,	Enable/Disable ME FW Update function.

3.6.2.3.2 PTT Configuration



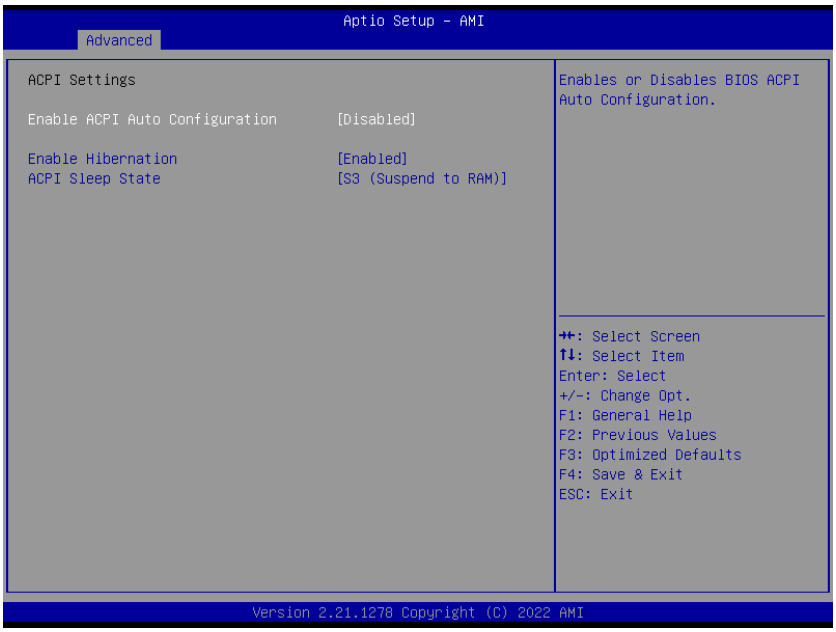
Item	Options	Description
TPM Device Selection	dTPM PTT**[Default]**,	Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.

3.6.2.4 Trusted Computing



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

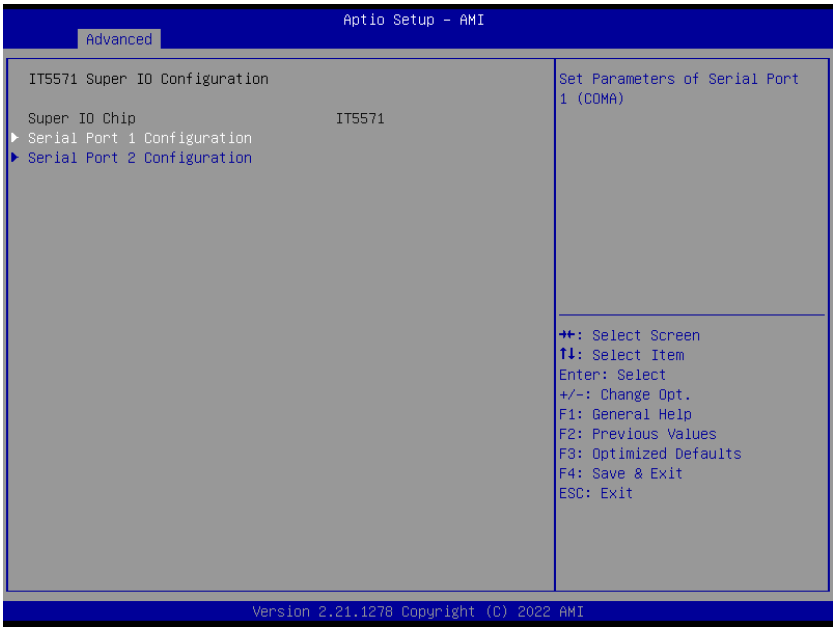
3.6.2.5 ACPI Settings



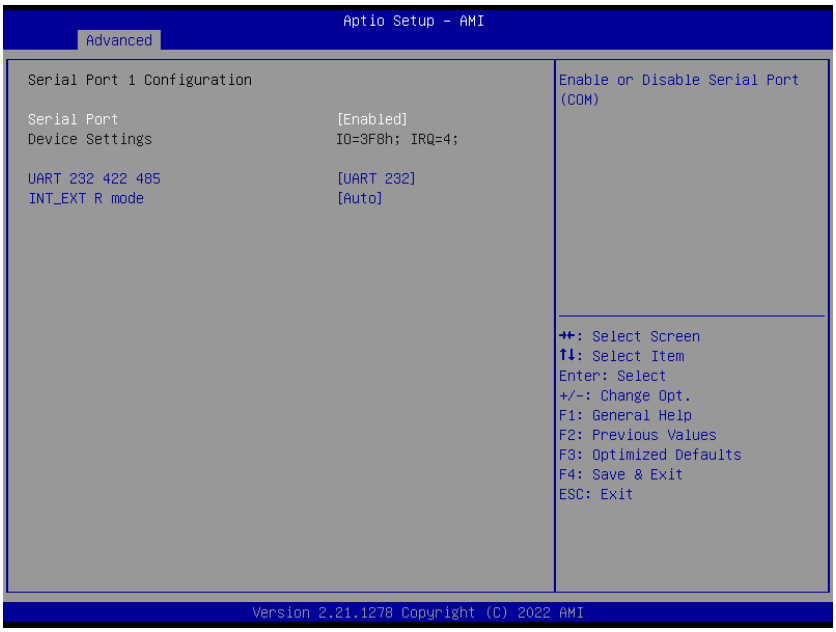
Item	Options	Description
Enable ACPI Auto Configuration	Disabled**[Default]** Enabled	Enables or Disables BIOS ACPI Auto Configuration
Enable Hibernation	Disabled Enabled**[Default]**	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some operating 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 for more information.

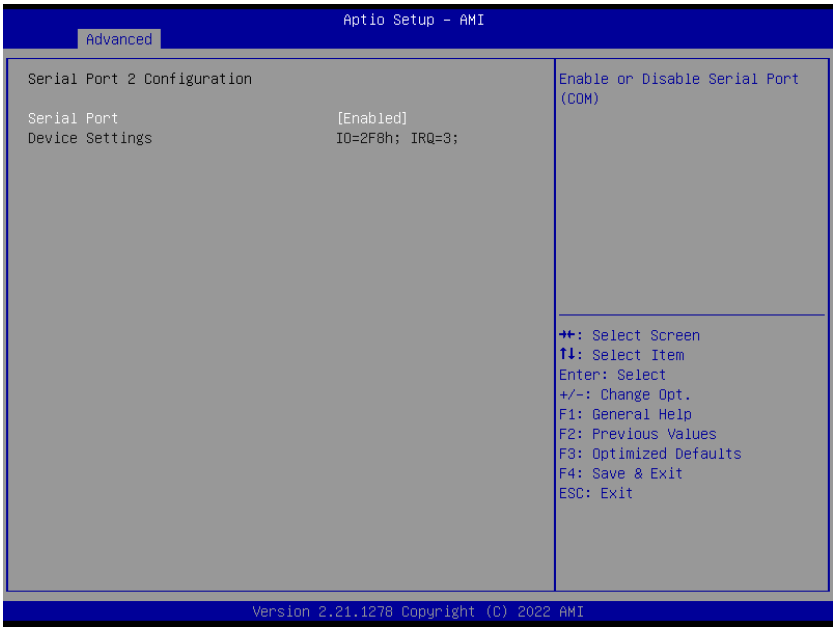


3.6.2.6.1 Serial Port 1 Configuration



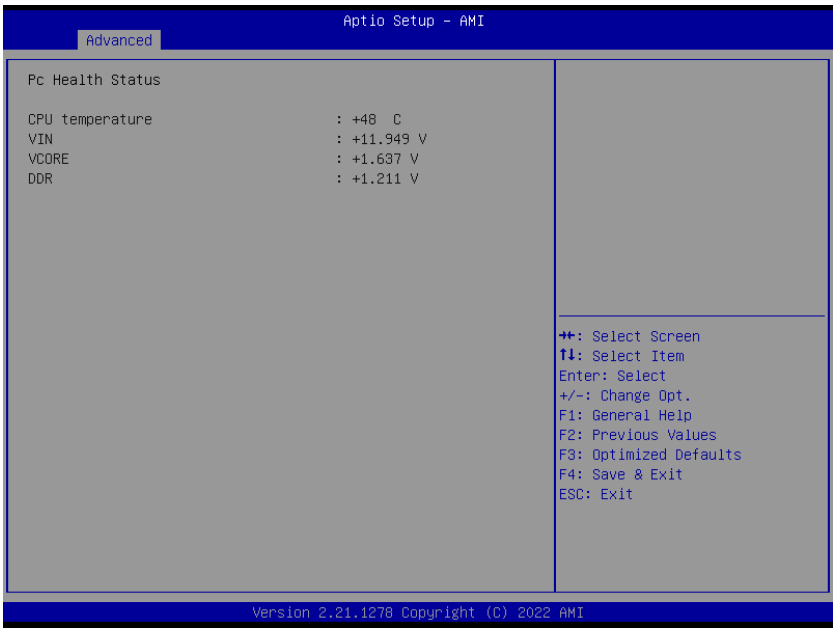
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**	Enable or Disable Serial Port (COM)
UART 232 422 485	UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485
INT_EXT R mode	Auto**[Default]** Non INT+EXT R EXT R INT R INT+EXT R	Enable switches for internal and external resistors

3.6.2.6.2 Serial Port 2 Configuration



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

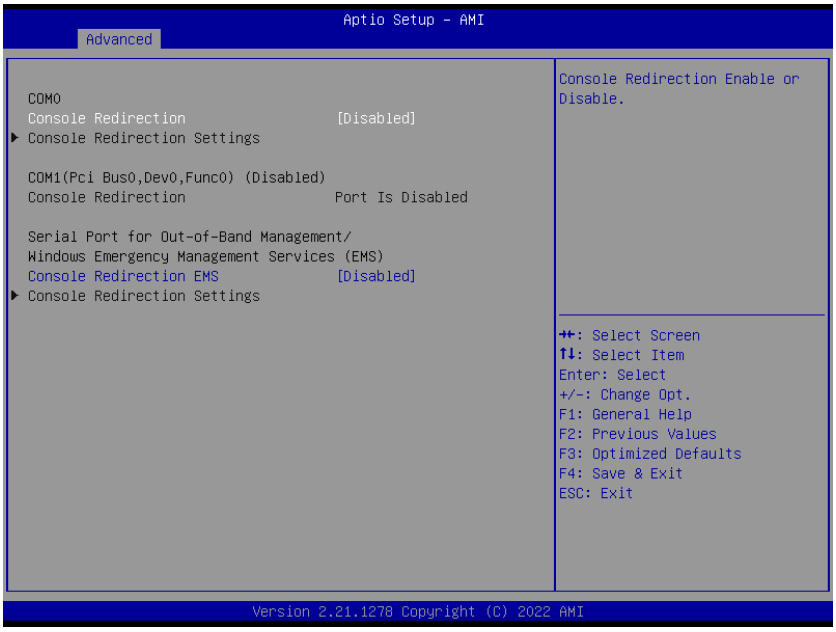
3.6.2.7 H/W Monitor



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 Dynamic Time, System will wake on the current time + Increase minute(s).

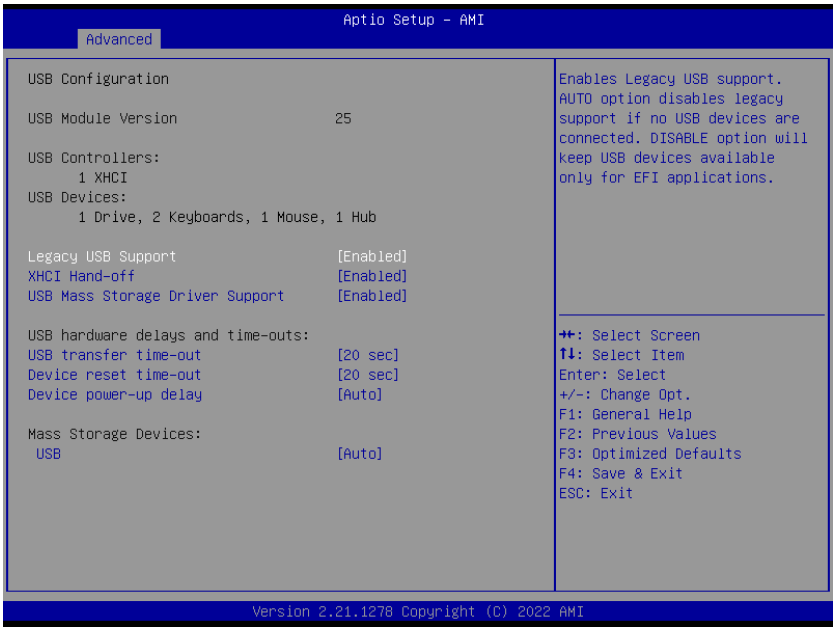
3.6.2.9 Serial Port Console Redirection



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

3.6.2.10 USB Configuration

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



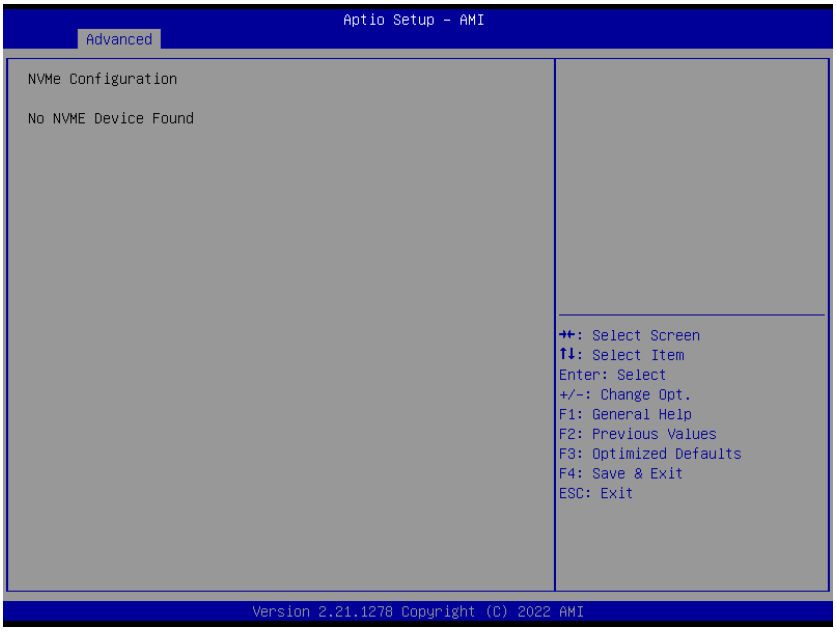
Item	Options	Description
Legacy USB Support	Enabled**[Default]** Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

XHCI Hand-off	Enabled**[Default]** Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Disabled Enabled**[Default]**	Enable/Disable USB Mass Storage Driver Support.
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.
USB	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.

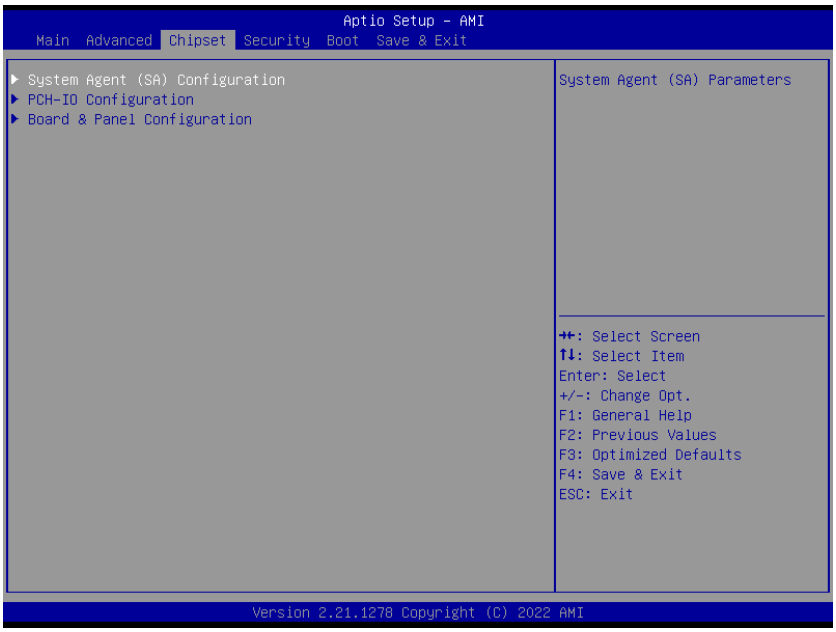
3.6.2.11 Network Stack Configuration

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

3.6.2.12 NVMe Configuration



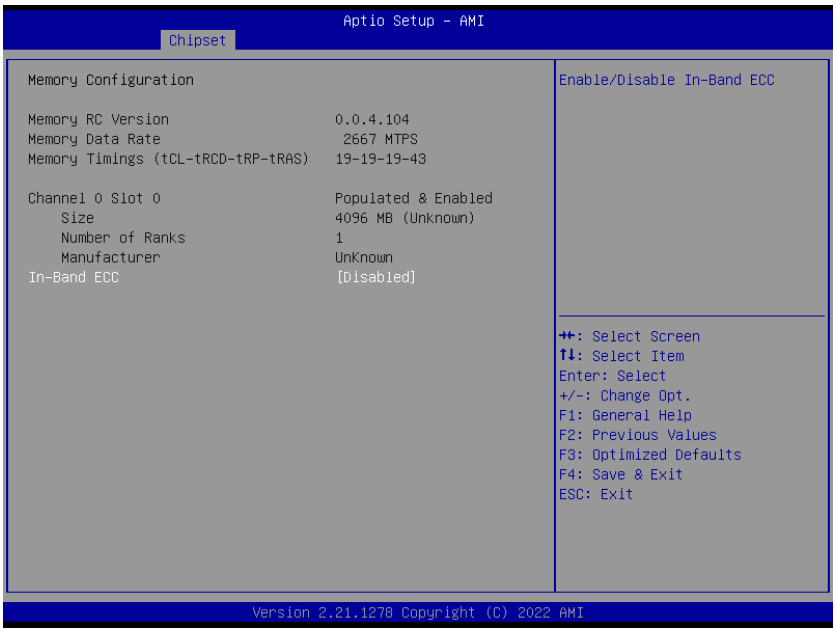
3.6.3 Chipset



3.6.3.1 System Agent (SA) Configuration

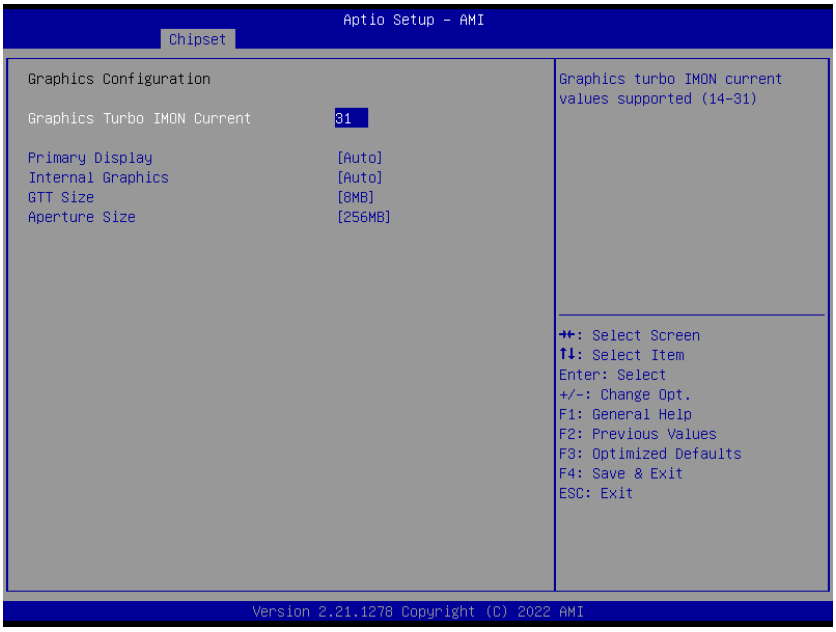
Item	Options	Description
VT-d	Disabled Enabled**[Default]**,	VT-d capability
Above 4GB MMIO BIOS assignment	Disabled**[Default]**, Enabled	Enable/Disable above 4GB MemoryMappedIO BIOS assignment This is enabled automatically when Aperture Size is set to 2048MB.

3.6.3.1.1 Memory Configuration



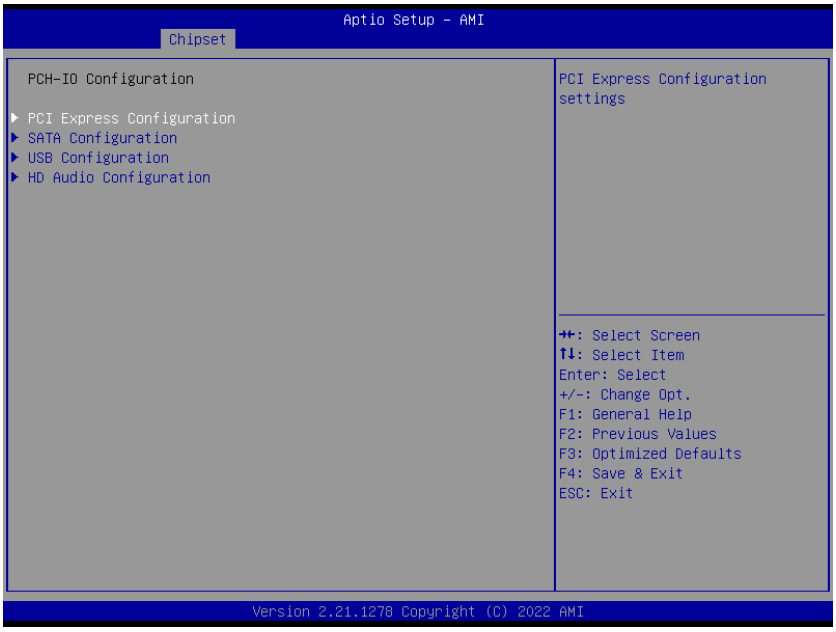
Item	Option	Description
In-Band ECC	Enabled Disabled**[Default]**,	Enable/Disable In-Band ECC

3.6.3.1.2 Graphics Configuration

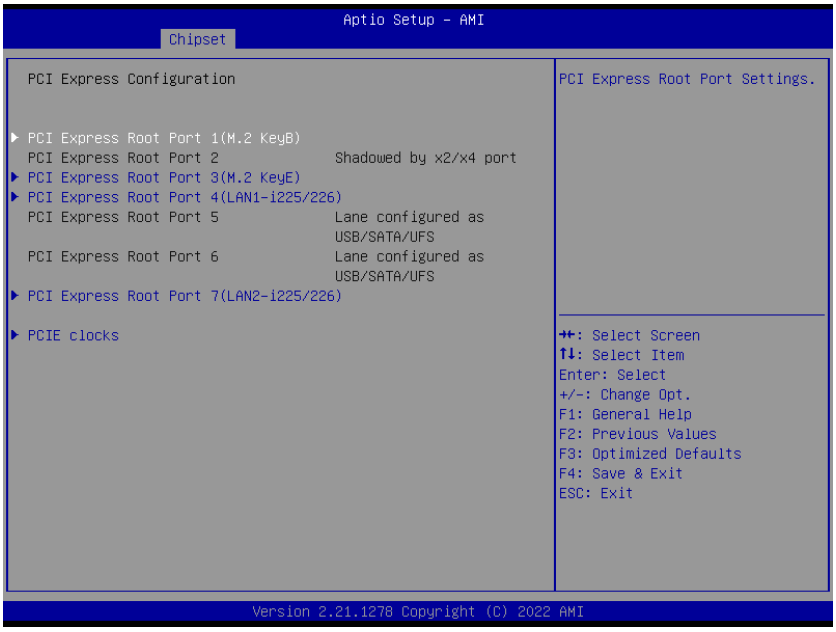


Item	Option	Description
Graphics Turbo IMON Current	31	Graphics Turbo IMON Current values supported (14-31)
Primary Display	Auto**[Default]** IGFX PEG/PCI	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.
Internal Graphics	Auto**[Default]** Disabled Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2MB 4MB 8MB**[Default]**	Select the GTT Size
Aperture Size	128MB 256MB**[Default]** 512MB 1024MB	Select the Aperture Size Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To this feature, please disable CSM Support.

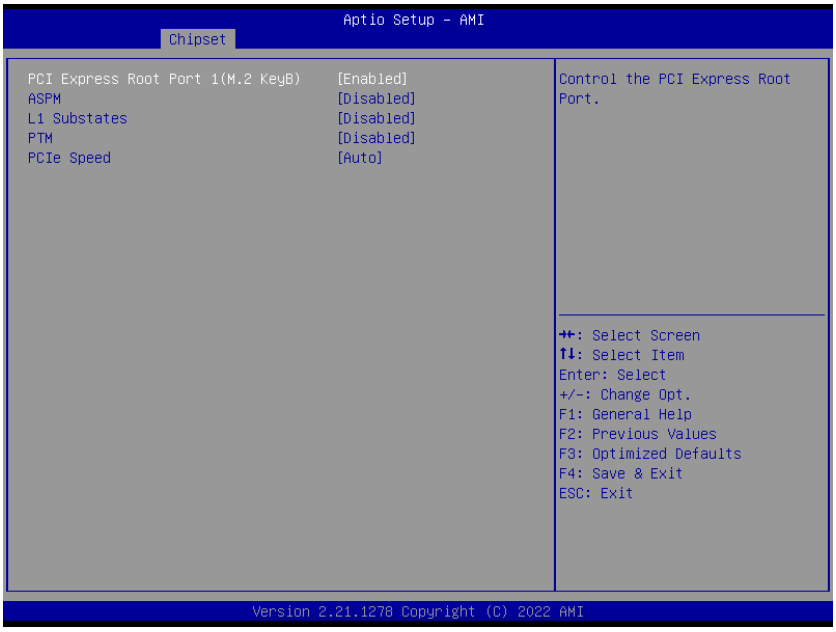
3.6.3.2 PCH-IO Configuration



3.6.3.2.1 PCI Express Configuration

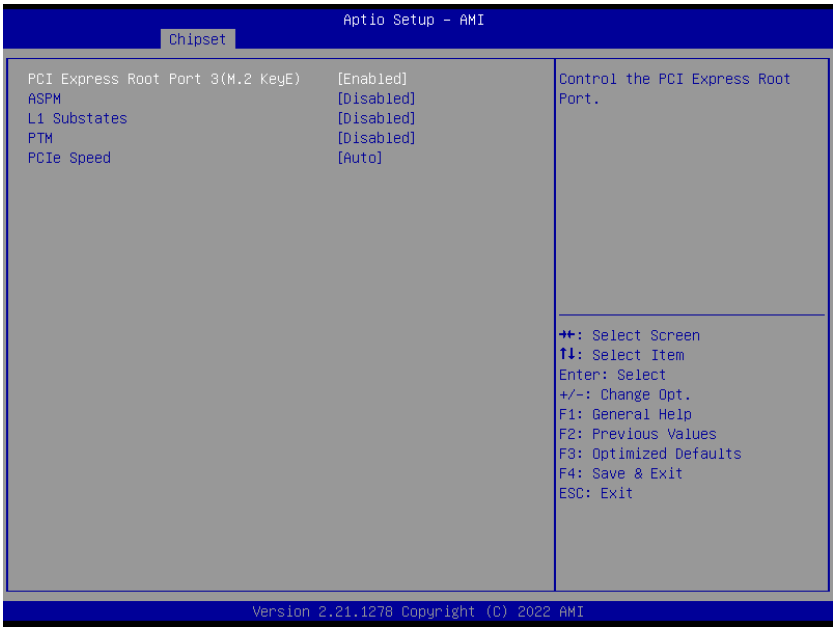


3.6.3.2.1.1 PCI Express Root Port 1(M.2 KeyB)



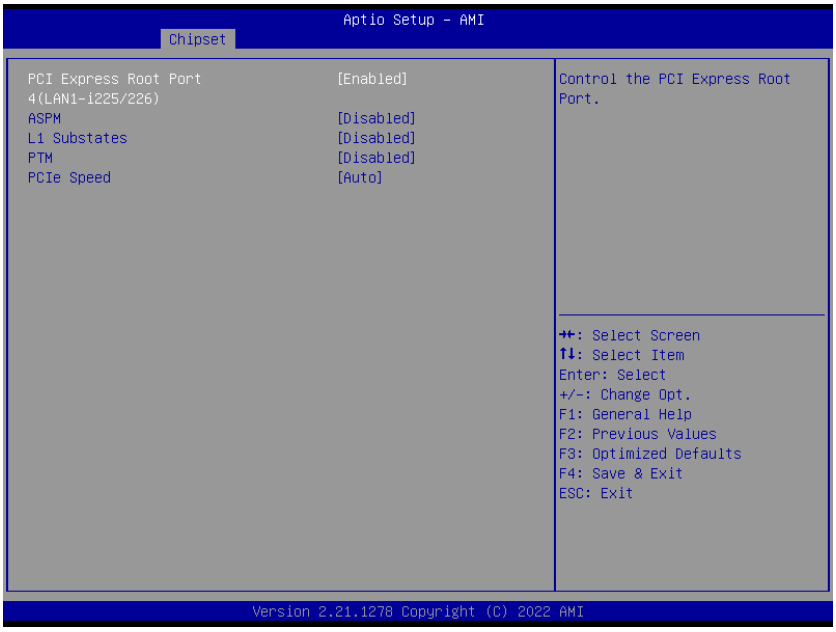
Item	Option	Description
PCI Express Root Port 1 (M.2 KeyB)	Disabled Enabled**[Default]**	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]** Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.2 PCI Express Root Port 3(M.2 KeyE)



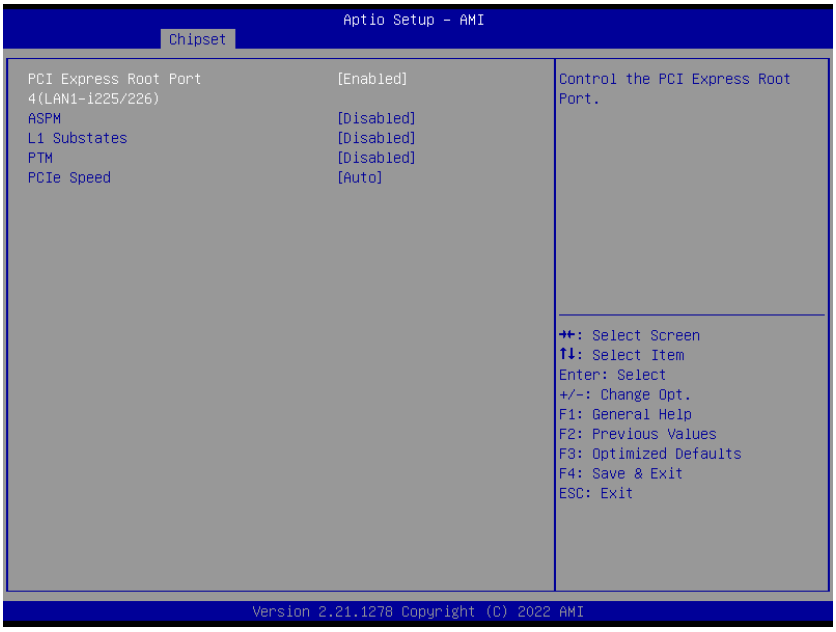
Item	Option	Description
PCI Express Root Port 3 (M.2 KeyE)	Disabled Enabled**[Default]**	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]** Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.3 PCI Express Root Port 4(LAN1-i225/226)



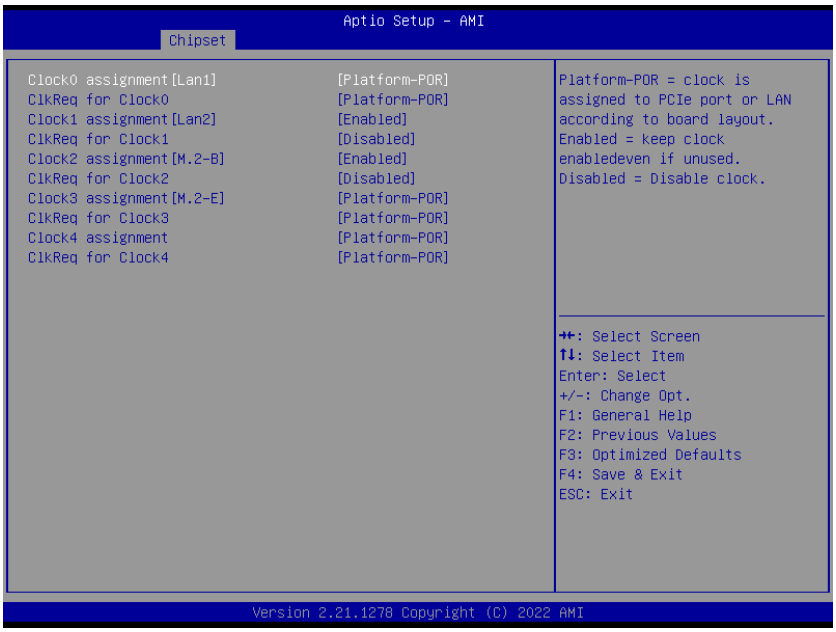
Item	Option	Description
PCI Express Root Port 4 (LAN1-i225/226)	Disabled Enabled**[Default]**	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]** Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.4 PCI Express Root Port 7(LAN2-i225/226)



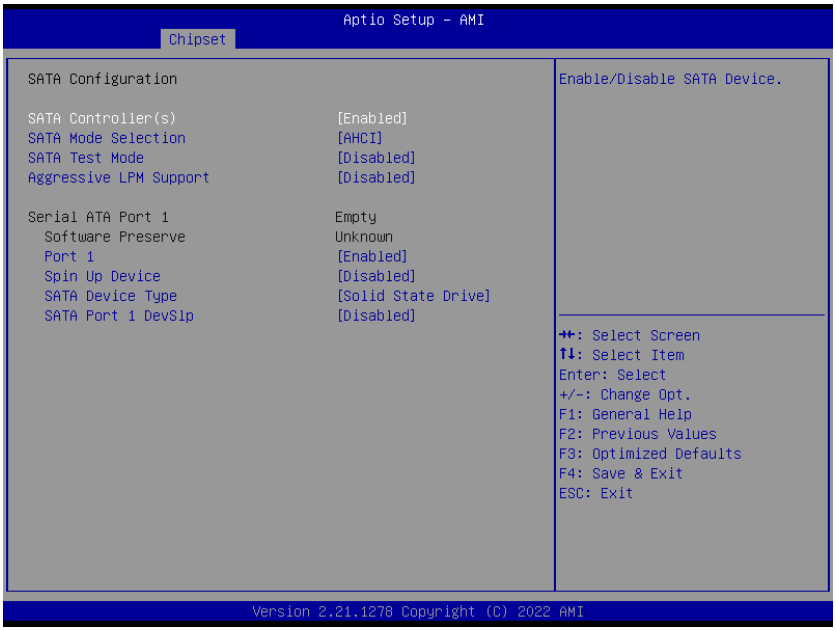
Item	Option	Description
PCI Express Root Port 7 (LAN2-i225/226)	Disabled Enabled**[Default]**	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]** Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed

3.6.3.2.1.5 PCI Express Root Port 7(LAN2-i225/226)



Item	Option	Description
Clock0 assignment[Lan1]	Platform-POR**[Default]** Enabled 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**[Default]** Disabled	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.
Clock1 assignment[Lan2]	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 Clock1	Platform-POR Disabled**[Default]**	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.
Clock2 assignment[M.2-B]	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 Clock2	Platform-POR Disabled**[Default]**	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.
Clock3 assignment[M.2-E]	Platform-POR**[Default]** Enabled 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 Clock3	Platform-POR**[Default]** Disabled	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.
Clock4 assignment	Platform-POR**[Default]** Enabled 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**[Default]** Disabled	Platform-POR = CLKREQ signal is assigned to CLKSRC according to board layout. Disabled = CLKREQ will not be used.

3.6.3.2.2 SATA Configuration

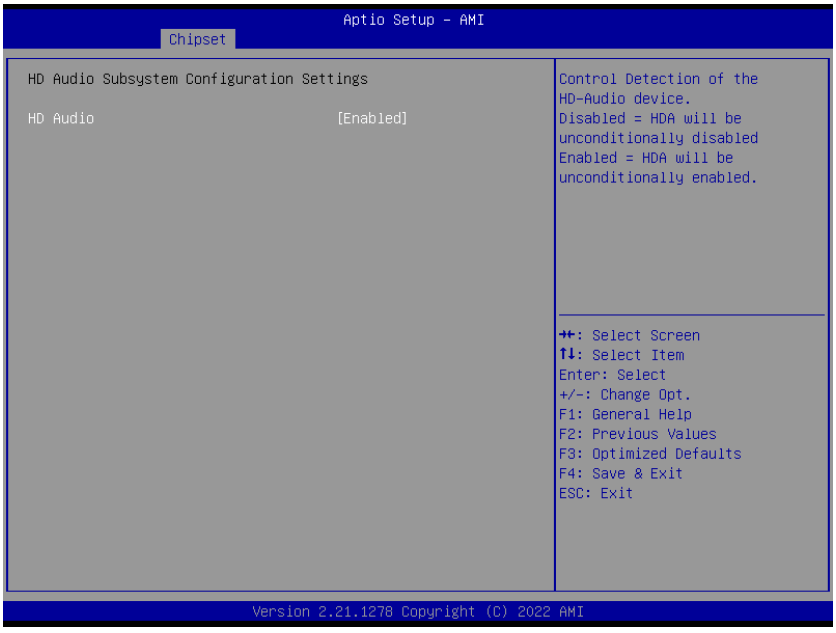


Item	Options	Description
SATA Configuration(S)	Enabled**[Default]**, Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI	Determines how SATA controller(s) operate.
SATA Test Mode	Enabled Disabled**[Default]**,	Test Mode Enable/Disable (Loop Back).
Aggressive LPM Support	Disabled**[Default]**, Enabled	Enable PCH aggressively enter link power state.
Port 1	Disabled Enabled**[Default]**,	Enable or Disable SATA Port
Spin Up Device	Disabled**[Default]**, Enabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive**[Default]**,	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Port 1 DevSlp	Disabled**[Default]**, Enabled	Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.

3.6.3.2.3 USB Configuration

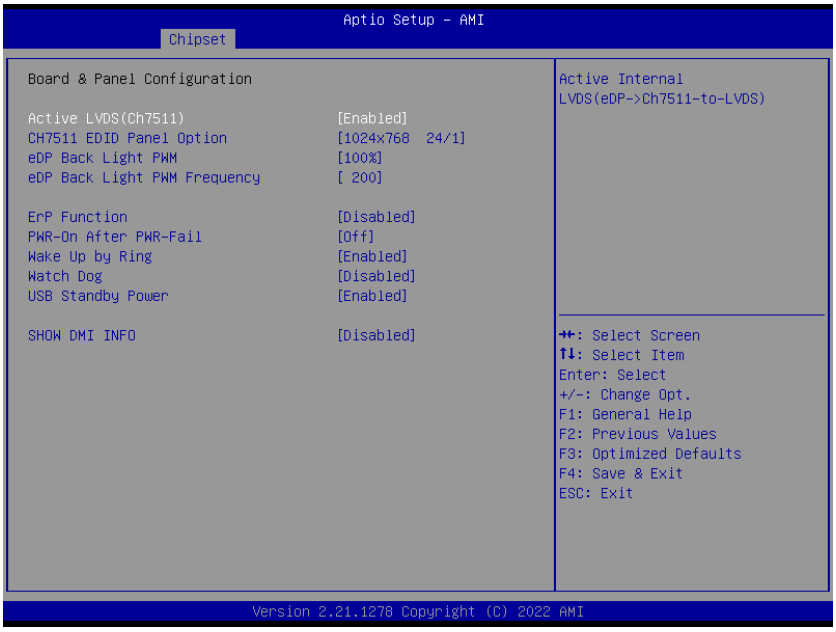
Item	Options	Description
XHCI Compliance Mode	Disabled Enabled**[Default]**,	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.
USB Port Disable Override	Disabled**[Default]**, Select Per-Pin	Selectively Enable/Disable the corresponding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

3.6.3.2.4 HD Audio Configuration



Item	Options	Description
HD Audio	Enabled**[Default]**, Disabled	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.

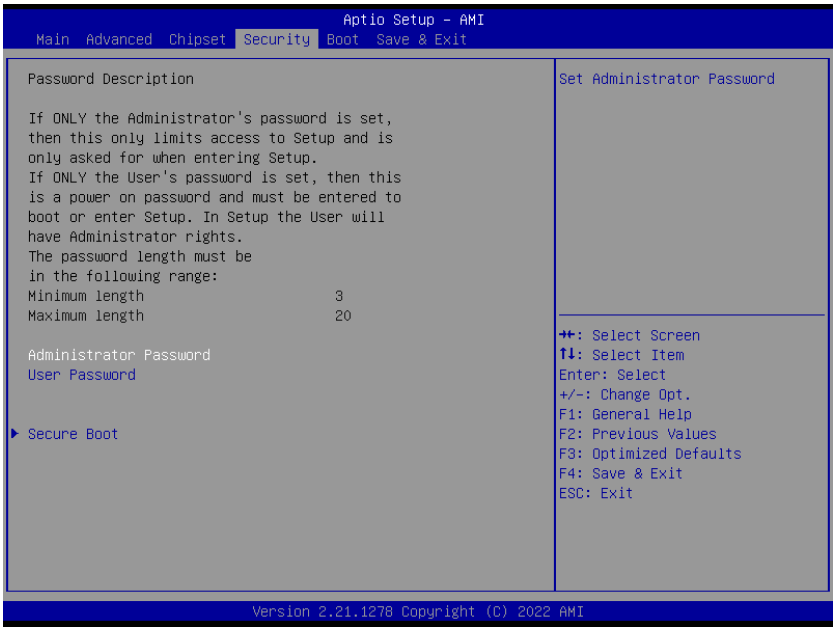
3.6.3.3 Board Configuration



Item	Options	Description
Active LVDS(Ch7511)	Enabled**[Default]**, Disabled	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 1366x768 24/1	Port1-EDP to LVDS(Chrotel 7511) Panel EDID Option
eDP Back Light PWM	00% 25% 50% 75% 100%**[Default]**,	Select eDP back light PWM duty.
eDP Back Light PWM Frequency	200**[Default]**, 300/400/500/700/1k/ 2k/3k/5k/10k/20k	Select eDP back light PWM Frequency.
ErP Function	Disabled**[Default]**, Enabled	ErP Function (Deep S5).
PWR-On After PWR-Fail	Off**[Default]**, On Last state	AC loss resume.
Wake Up by Ring	Disabled Enabled**[Default]**,	Wake Up by Ring from S3/S4/S5
Watch Dog	Disabled**[Default]**, 30 sec/40 sec/50 sec/ 1 min/2 min/10 min/30 min	Select WatchDog.

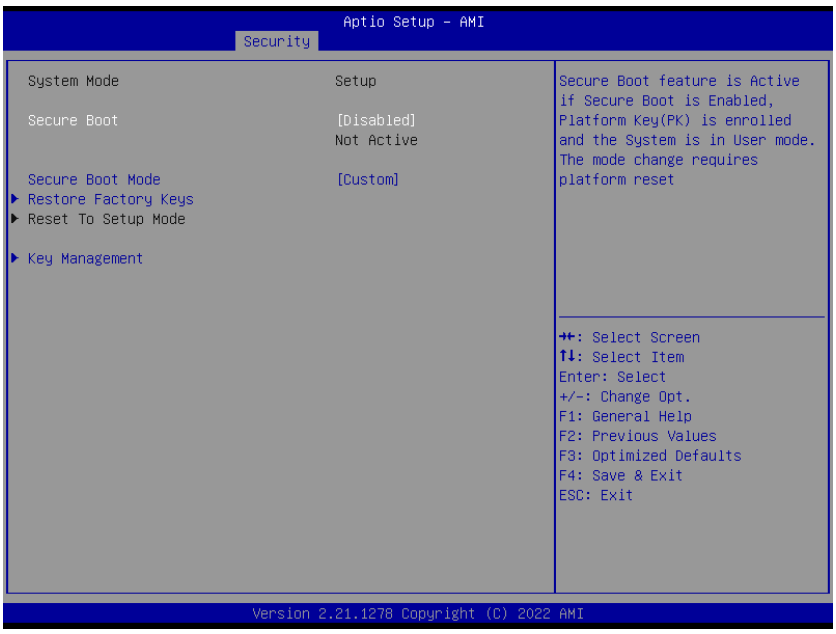
USB Standby Power	Disabled Enabled**[Default]**,	Enable/Disable USB Standby Power during S3/S4/S5
SHOW DMI INFO	Disabled**[Default]**, Enabled	SHOW DMI INFO

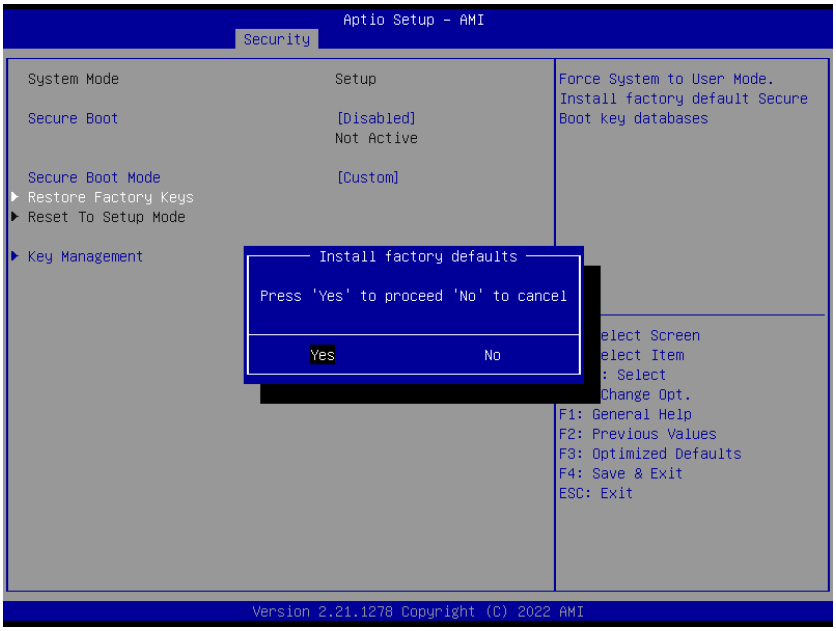
3.6.4 Security

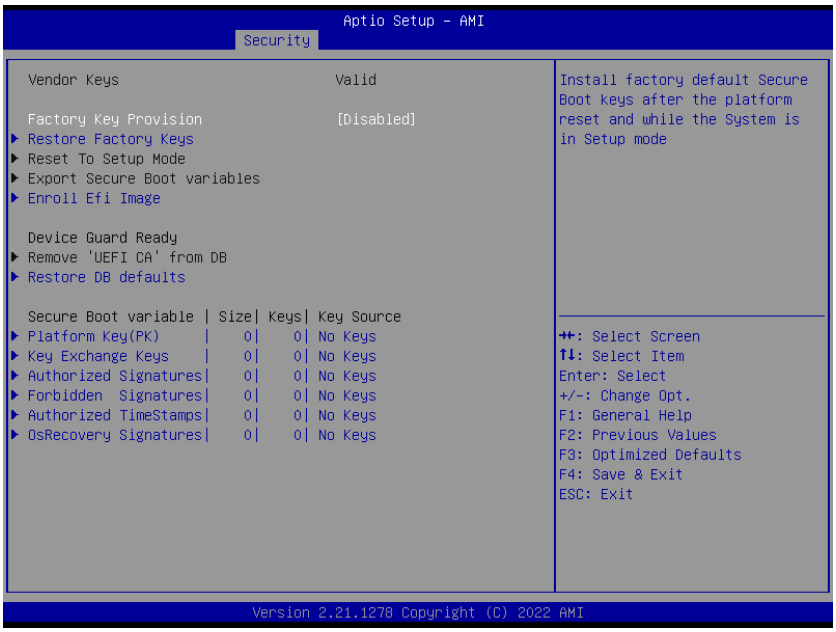


Item	Description
Administrator Password	Set Administrator Password
User Password	Set User Password

3.6.4.1 Secure Boot

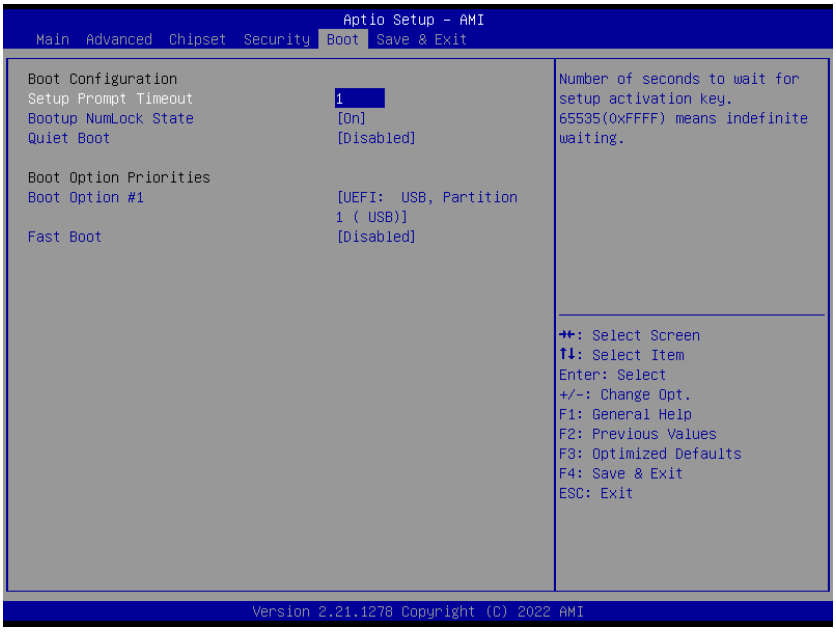






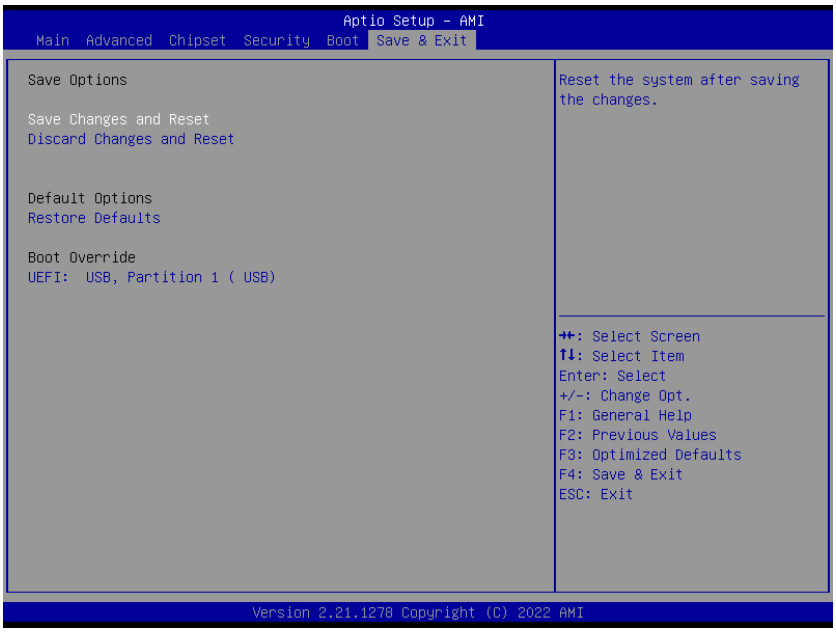
Item	Option	Description
Secure Boot	Disabled Enabled**[Default]**,	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset
Secure Boot Mode	Standard**[Default]**, Custom	Secure Boot mode options: Standard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

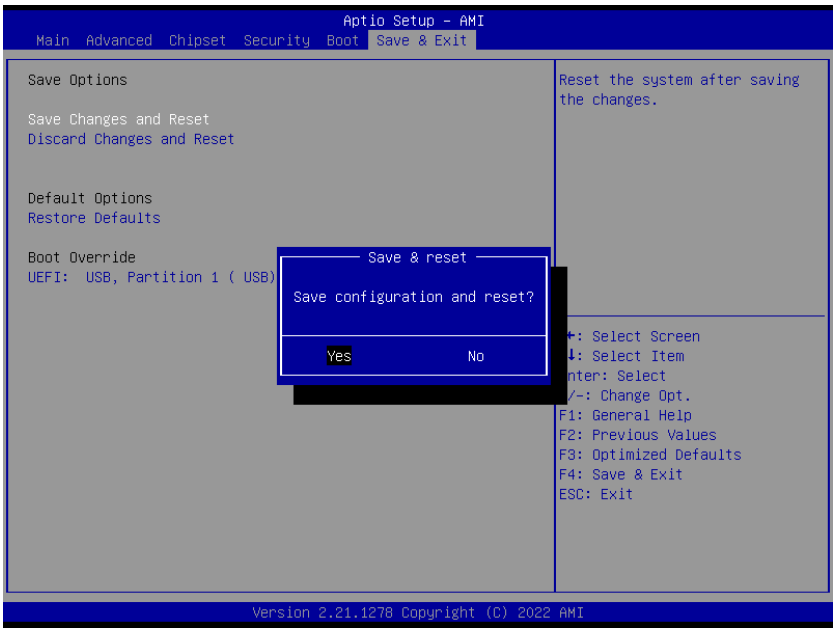
3.6.5 Boot



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**[Default]** Off	Select the keyboard NumLock state.
Quiet Boot	Disabled**[Default]** Enabled	Enable or disable Quiet Boot option.
Boot Option #1	Sets the system boot order	
Boot Option #2	Sets the system boot order	

3.6.6 Save & 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.

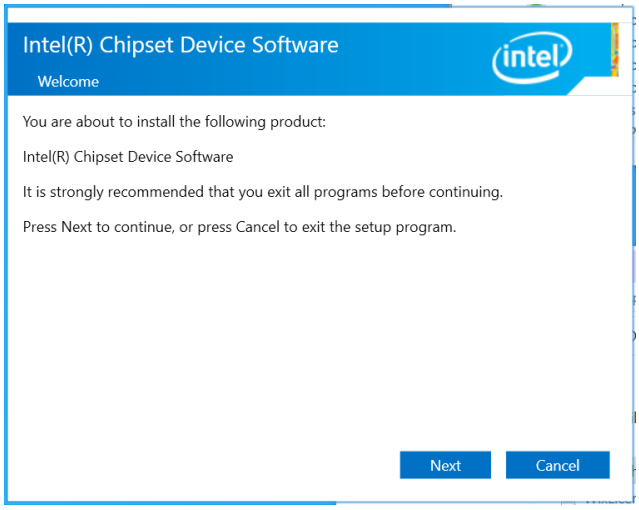
4. Drivers Installation

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.

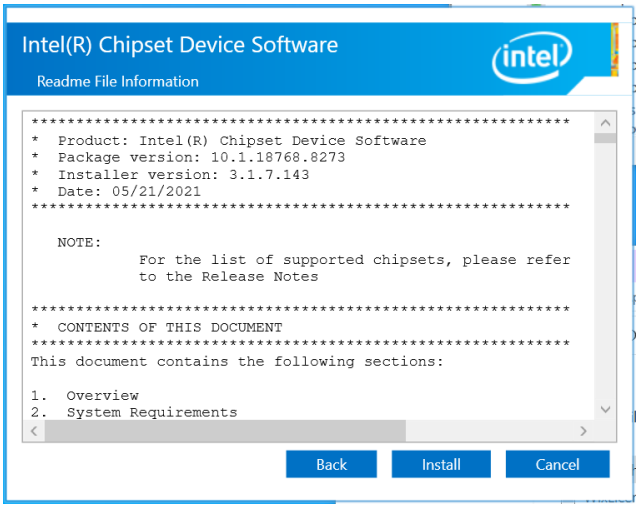
4.1 Install Chipset Driver

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

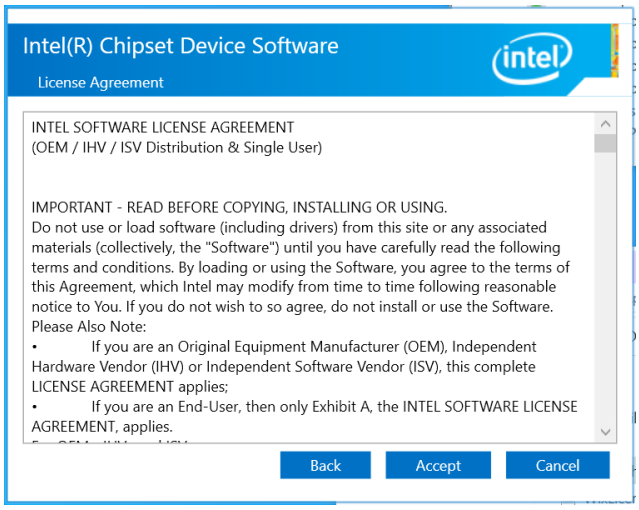
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Co



Step1. Click **Next**.



Step 3. Click **Install**.



Step 2. Click **Accept**.

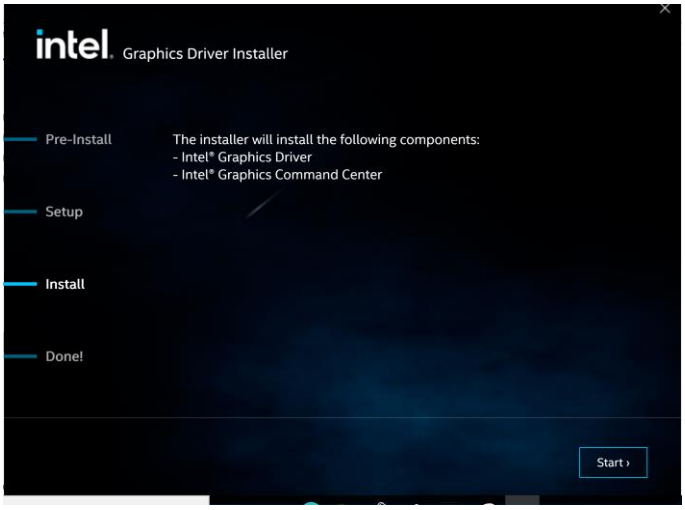
Step 4. Complete setup.

4.2 Install VGA Driver

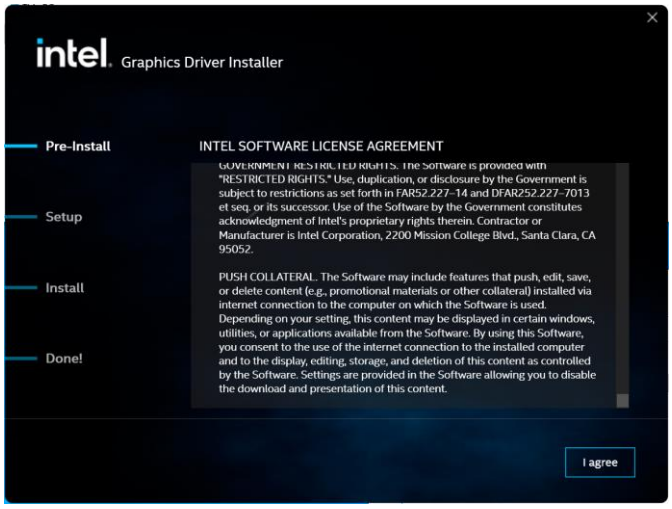
All drivers can be found on the Avalue Official Website:
http://www.avalue.com.tw.

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

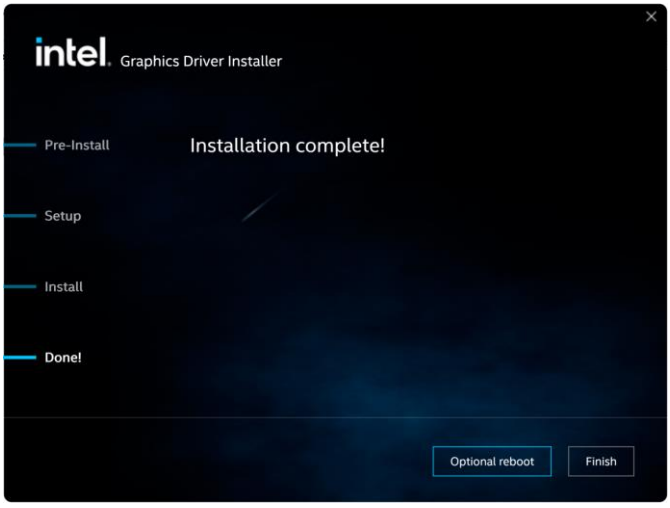
Step 1. Click **Next**.



Step 3. Click **Start.**



Step 2. Click **I agree**.

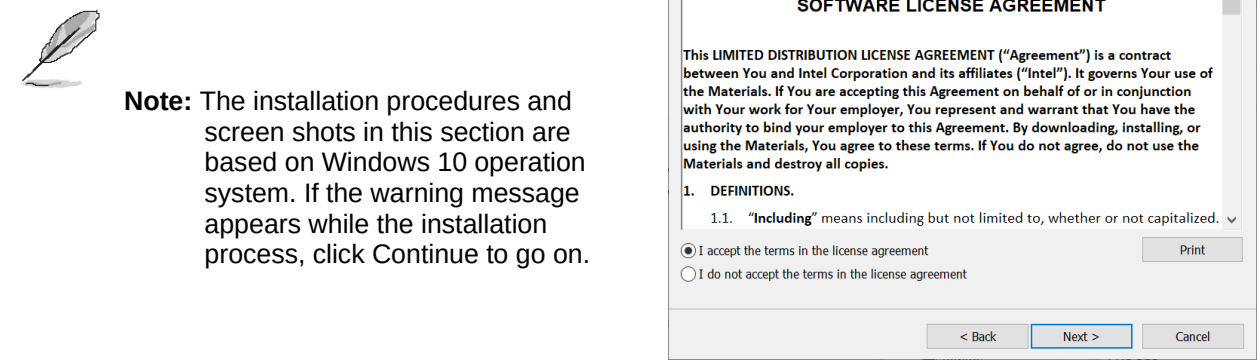


Step 4. Click **Finish** to complete the setup.

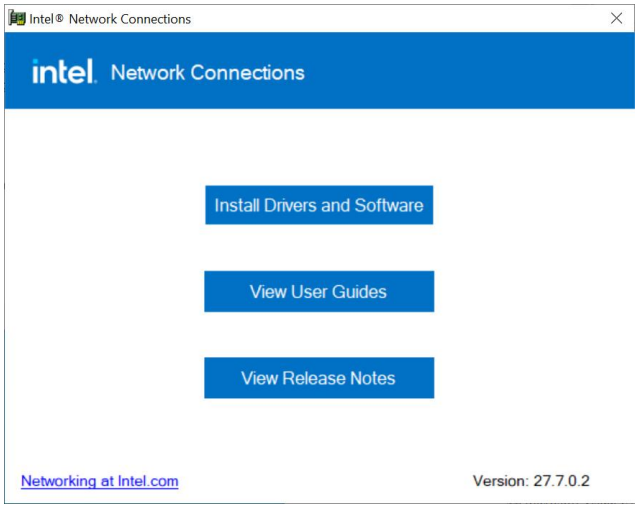
4.3 Install Ethernet Driver

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

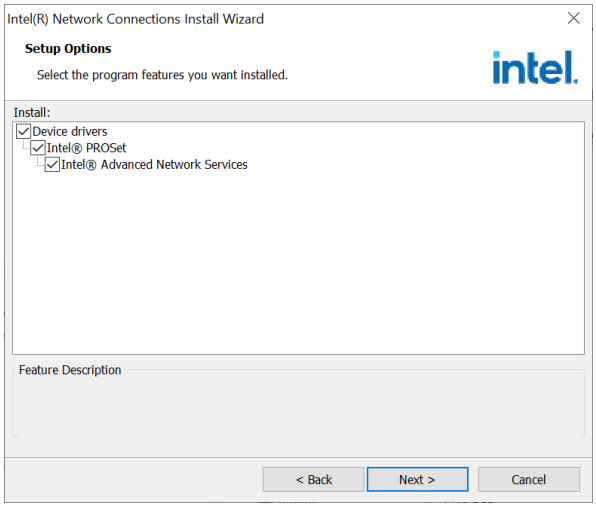
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



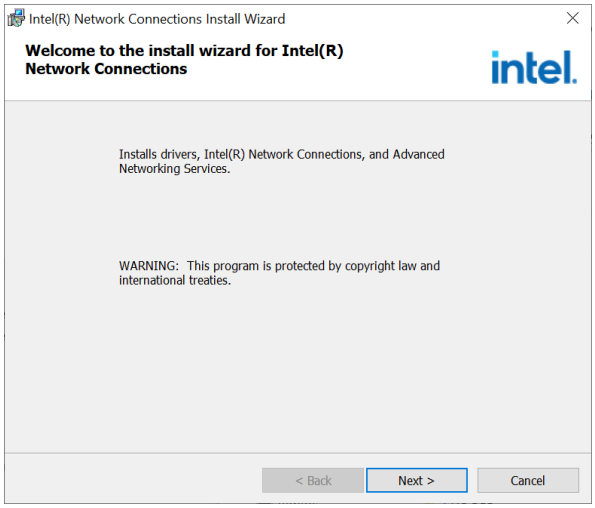
Step 3. Click **Next**.



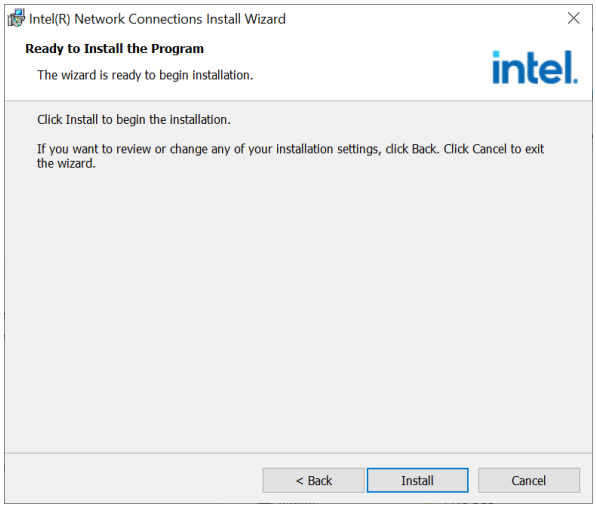
Step 1. Click **Next**



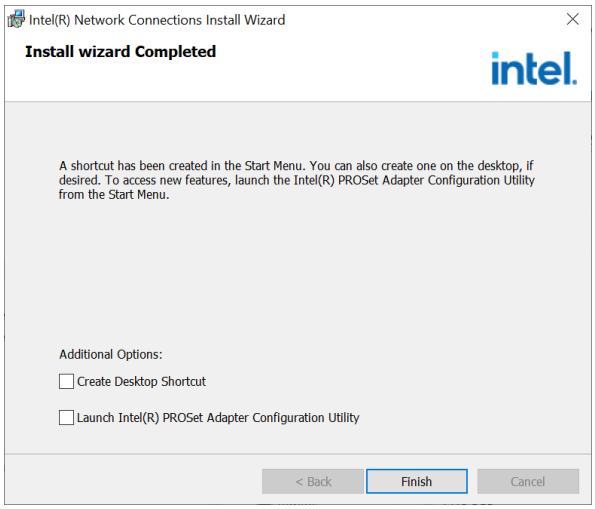
Step 4. Click **Next**.



Step 2. Click **Next** to proceed.



Step 5. Click **Install**.

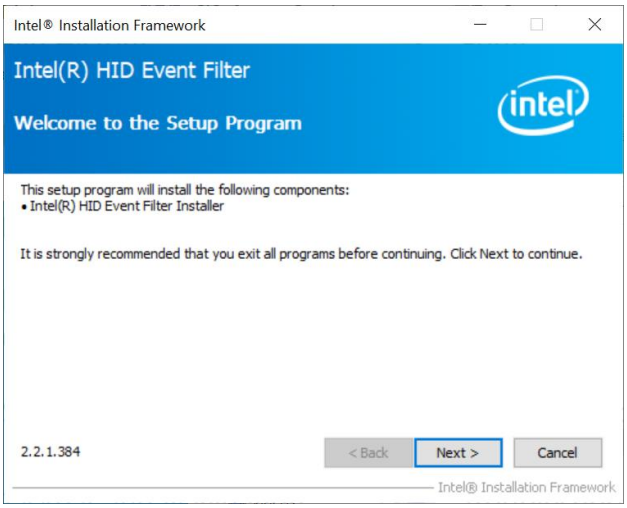


Step 6. Click **Finish** to complete the setup.

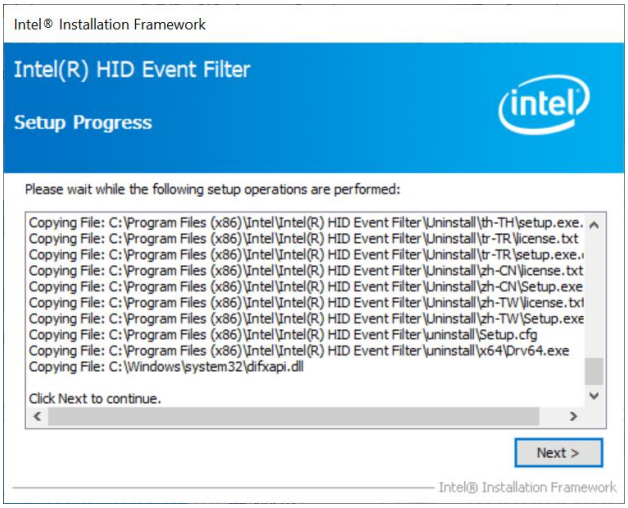
4.4 Install HID Driver

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

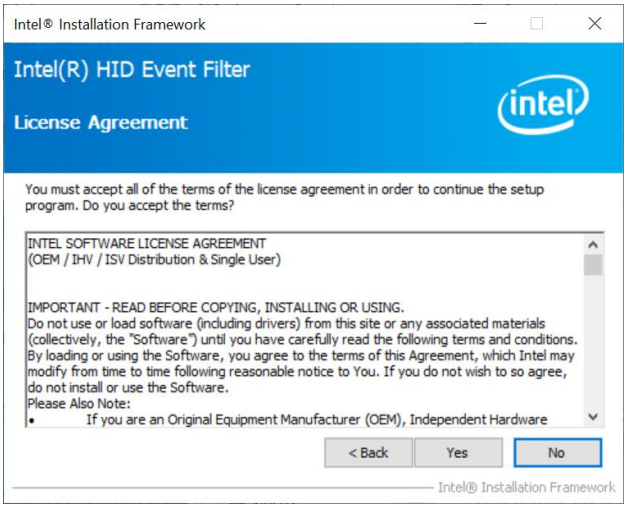
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



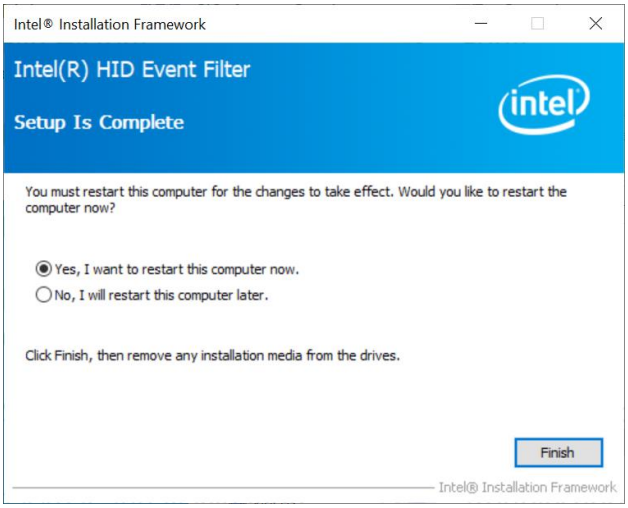
Step 1. Click **Next** to continue setup.



Step 3. Click **Next**.



Step 2. Click **Yes**.

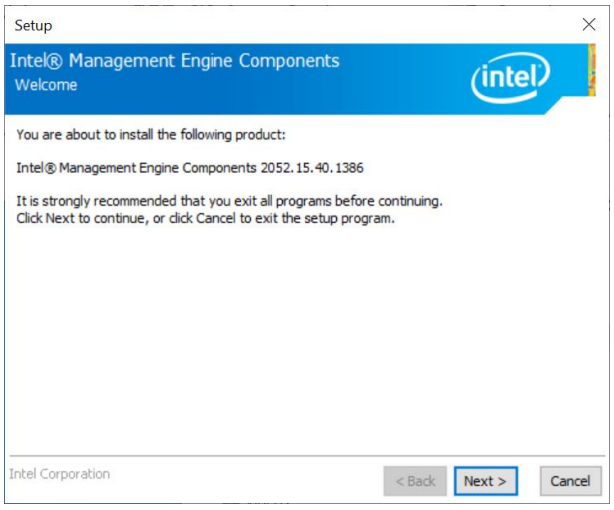


Step 4. Click **Finish** to complete the setup.

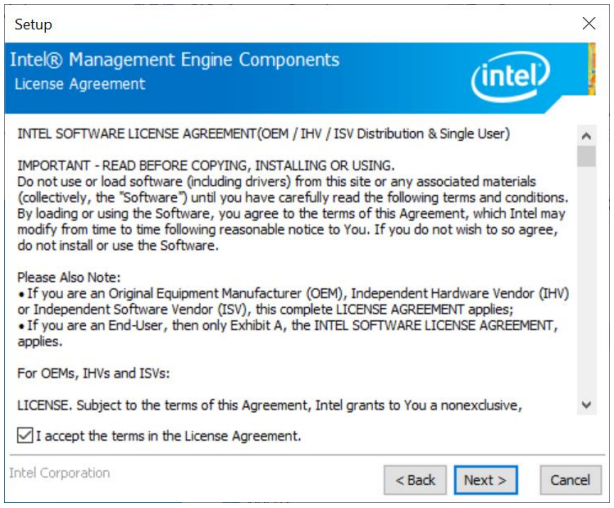
4.5 Install ME Driver

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

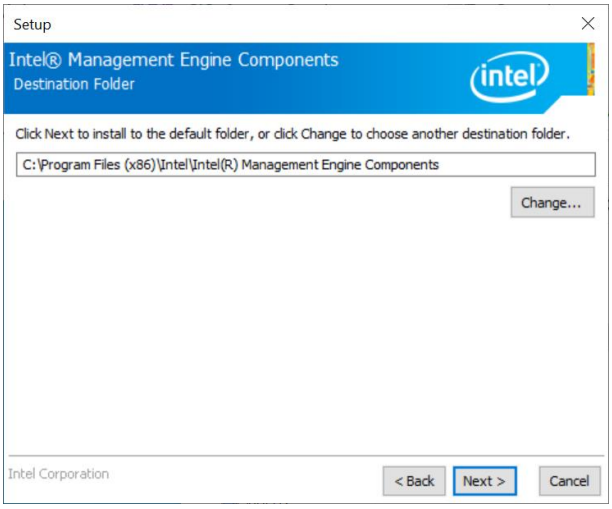
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



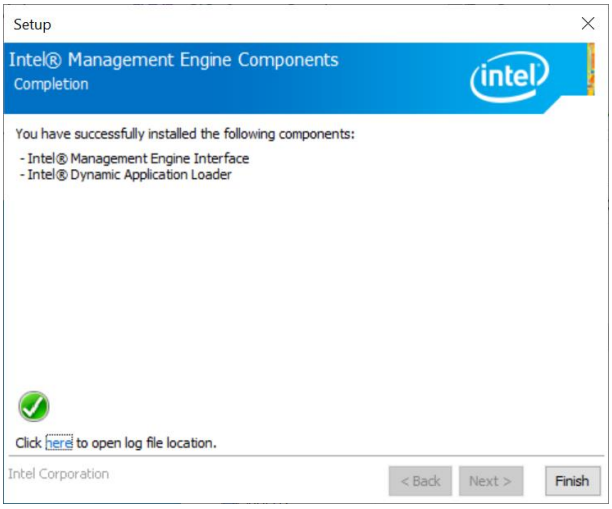
Step 1. Click **Next** to continue setup.



Step 2. Click **Next**.

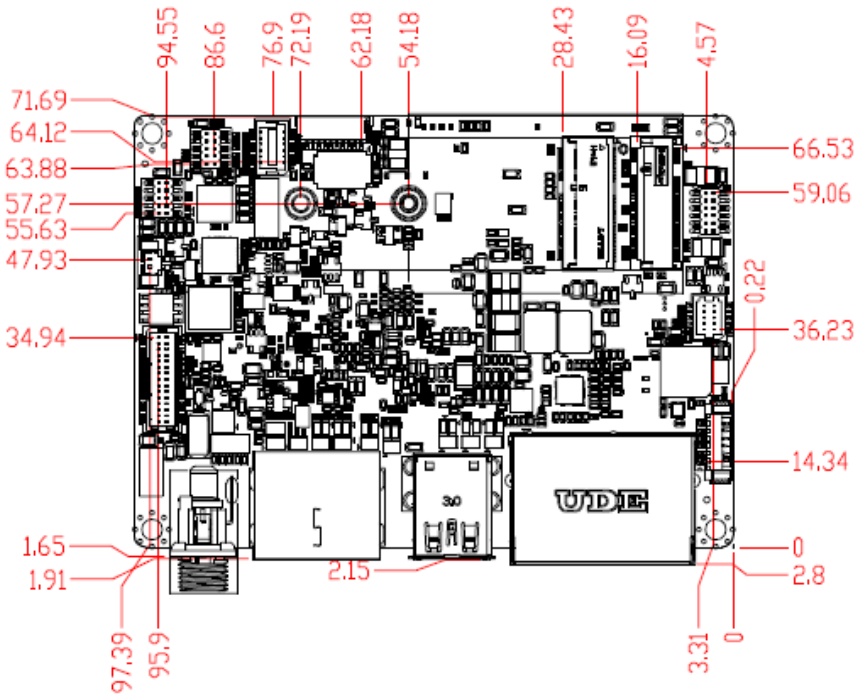


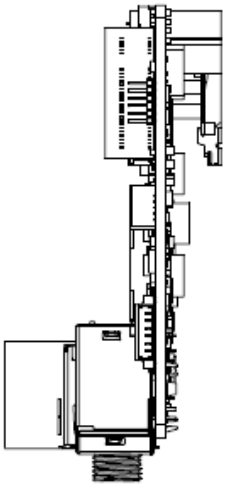
Step 3. Click **Next**.

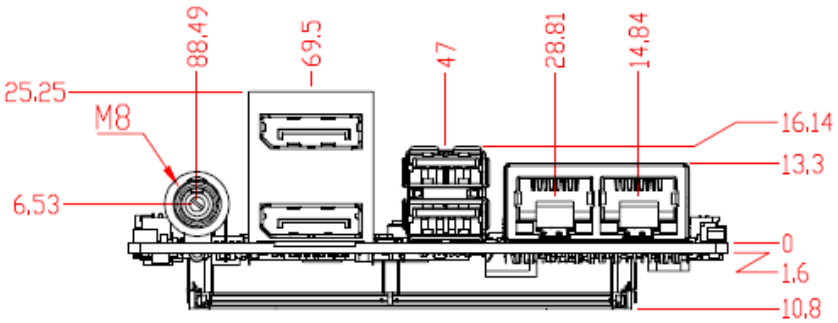


Step 4. Click **Finish** to complete the setup.

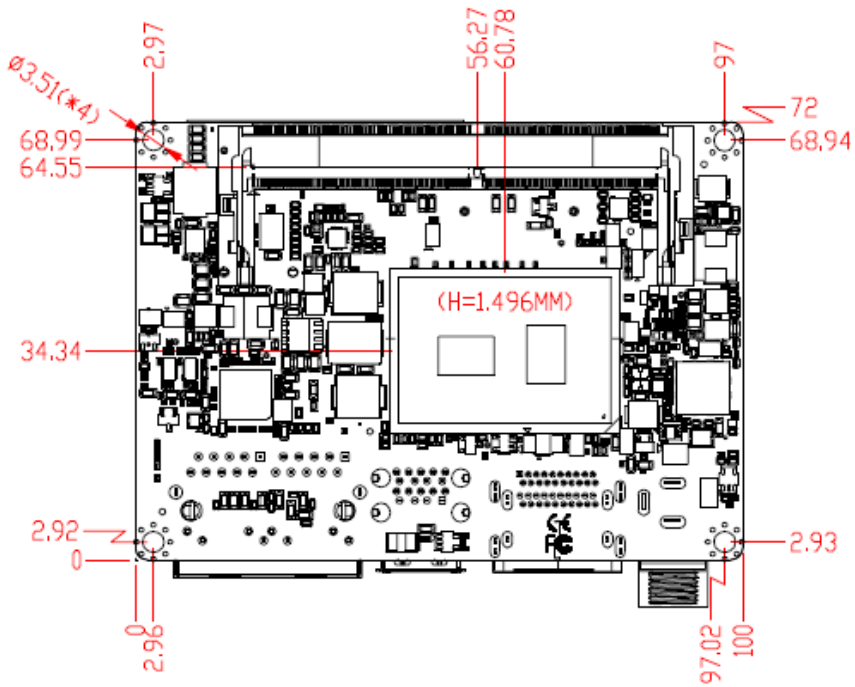
5. Mechanical Drawing







Unit: mm



Unit: mm