EMX-H610P

Intel® 12th/13th Gen Core™ i9/i7/i5/i3/Pentium®/Celeron® Processor, supports LGA 1700 CPU Mini ITX motherboard

User's Manual

1st Ed – 23 May 2023

Part No. E2047EM6100R

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

A Message to the Customer

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To receive the latest version of the user's manual; please visit our Web site at:
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Product Warranty

Avalue warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Avalue, or which have been subject to misuse, abuse, accident or improper installation. Avalue assumes no liability under the terms of this warranty as a consequence of such events. Because of Avalue's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of Avalue's products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

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 EMX-H610P motherboard
- 2 x SATA cables
- 1 x Backplane
- 1 x I/O Shield

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

1.3 Document Amendment History

Revision	Date	By	Comment
1st	May 2023	Avalue	Initial Release

1.4 Manual Objectives

This manual describes in details Avalue Technology EMX-H610P 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 EMX-H610P 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

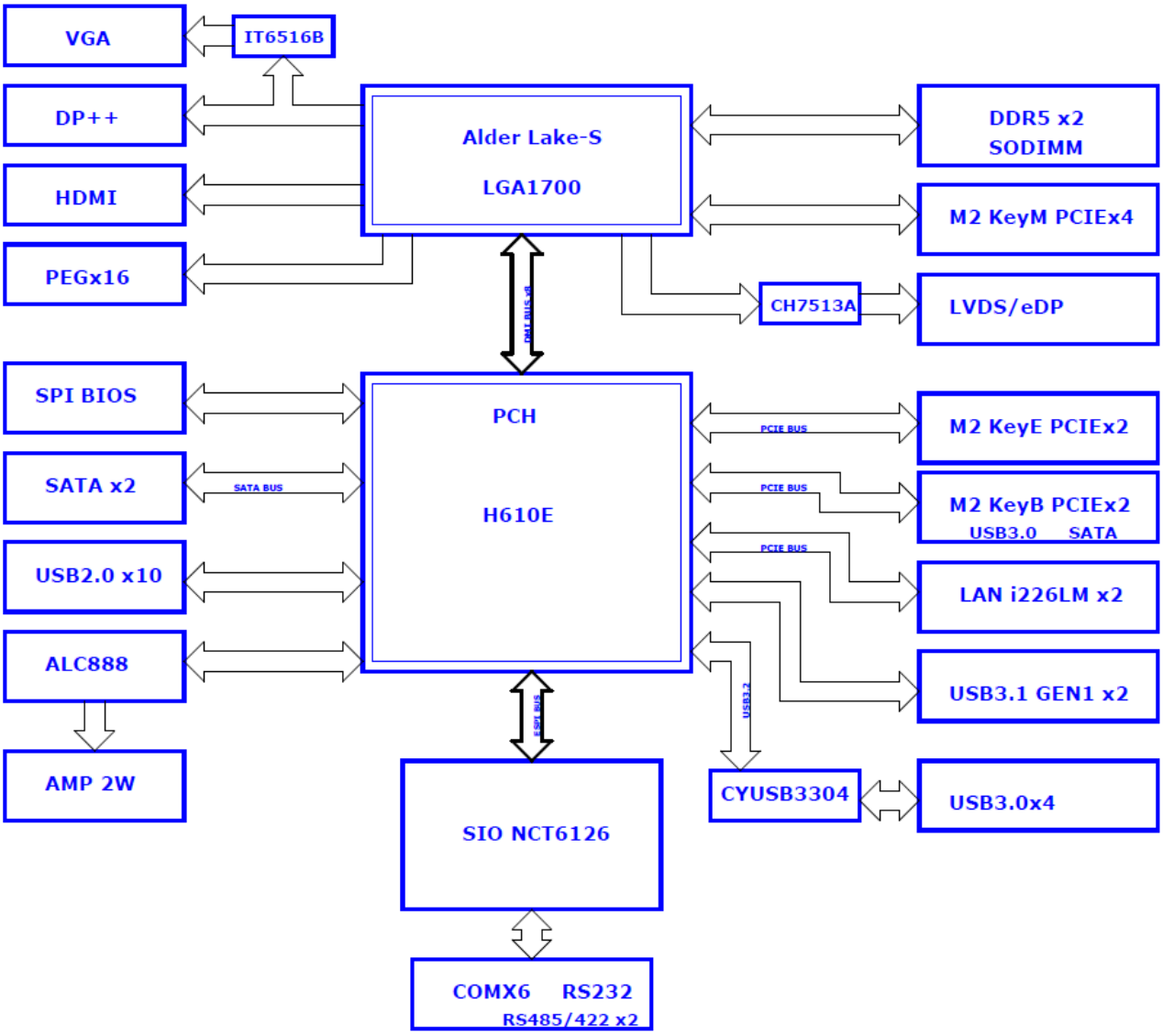
System	
CPU	Intel® 12th/13th Gen Core™ i9/i7/i5/i3/Pentium®/Celeron® Processor, supports LGA 1700 CPU Up to 125W Max
BIOS	AMI uEFI BIOS, 256Mbit SPI Flash ROM
System Chipset	Intel® H610E
I/O Chip	NuvoTon NCT6126D Ver.B (eSPI super IO)
System Memory	2 x SODIMM Up to 64GB Dual Channel DDR5 4800MHz (Non-ECC)
Watchdog Timer	H/W Reset, 5~255 seconds/5~255 minutes
H/W Status Monitor	CPU temperature monitoring Voltage monitoring CPU fan speed control
iAMT	Yes
Expansion Slot	
M.2	1 x M.2 (2230) E-Key, support WiFi module with PCIe x 2 Gen 3 & USB 2.0 1 x M.2 (3042_4G/3052_5G/2242/2280) B-Key, with USB 3.0 & PCI-e x 2 Gen 3 & SATA signals, support WWAN+GNSS (support 5G) with Nano SIM card slot & SSD (default SATA) 1 x Nano SIM Card slot + 1 x FPC connector (to use either one)
PCIe	1 x PCI-e x 16 Gen 5 (from CPU)
Storage	
M.2	1 x M.2 (3042_4G/3052_5G/2242/2280) B-Key, with USB 3.0 & PCI-e x 2 Gen 3 & SATA signals, support WWAN+GNSS (support 4G/5G) with Nano SIM card slot & SSD (default SATA)
SATA	2 x SATA III
Edge I/O	
COM	1 x COM connector support RS232/RS422/RS485 by BIOS Selection at I/O(COM1)
LAN	2 x 2.5 Gigabit Ethernet
USB 2.0	4 x USB 2.0
USB 3.1	2 x USB 3.2 Gen 2 + 2 x USB 3.2 Gen 1
DP	1 x DP++
HDMI	1 x HDMI 2.0b
VGA	1 x VGA
Onboard I/O	
COM	COM 2: Support RS232/422/485 selected by BIOS selection 1 x 2 x 5 pin, pitch 2.00mm connector for COM 2 support RS232/RS422/485 connector

	COM 3-6: Support RS232 1 x 2 x 20 pin, pitch 2.00mm connector for COM 3~6 support RS-232 connector without DB9 (pin9 without Power)
USB 3.1	1 x 2 x 10 pin, pitch 2.0mm connector for 2 x USB 3.2 Gen 1
GPIO	1 x 2 x 10 pin, pitch 2.00mm connector for GPIO: 16 bits & +5VS Level SMBus
CPU/System FAN	1 x 1 x 4 pin, pitch 2.54mm CPU fan connector with smart fan function supported 1 x 1 x 4 pin, pitch 2.54mm System fan connector with smart fan function supported
Buzzer	Onboard
Front Panel	1 x 2 x 5 pin, pitch 2.54mm connector for front panel
RTC Battery	1 x 2 Pin Pitch 1.25mm Vertical type battery connector (SMD Type)
AT/ATX Selector	1 x 1 x 3 pin pitch 2.00mm connector for AT/ATX jumper 1 x 2 x 10 pin ATX power connector 1 x 2 x 4 pin ATX 12V power connector
Clear CMOS	1 x 1 x 3 pin, pitch 2.54mm connector for COMS Clear
LVDS	1 x 2 x 20 pin, pitch 1.25mm connector for LVDS or eDP
LCD Backlight Brightness	1 x 1 x 5 pin, pitch 2.00mm Wafer connector for LCD inverter backlight connector (5V/12V)
BIOS SPI	1 x 2 x 4 pin, pitch 2.00mm connector for BIOS SPI
eSPI	Yes
Audio	1 x 2 x 5 pin, pitch 2.54mm connector for front Audio
Amp Connector	1 x 1 x 4 pin, pitch 2.00mm connector for Amplifier
Other	1 x 2 x 4 pin, pitch 2.00mm connector for LAN1~LAN2 Activity Indicator LED Onboard power on LED
Display	
Graphic Chipset	Intel® 12th Generation CPU Integrated
Spec. & Resolution	1 x VGA: 2048 x 1536@60 Hz 1 x DP: 4096 x 2304@60Hz / 5120 x 3200@60Hz 1 x HDMI 2.0b: 4096 x 2304 @60Hz 1 x LVDS: 1920 x 1080@60Hz Dual channel 18/24-bits LVDS (Chrontel CH7513A-BF eDP to LVDS) Or 1 x eDP 1920 x 1080@60Hz (2 Lanes)
Multiple Display	H610E only support 3 independent displays.
Audio	
Audio Codec	Realtek ALC888S (co-lay ALC897) HD Audio Decoding Controller
Amplifier	RealTek ALC105 Stereo Class-D 2W4Ω
Other	Line-in, Mic-in, Line-out
Ethernet	
LAN Chipset	2 x Intel® i226-LM 2.5 Gigabit Controller
LAN Spec.	2 x 2.5 Gigabit Ethernet
Mechanical & Environmental Specification	

Power Requirement	+12V / +5V / 5VSB / +3.3V / -12V
ACPI	Single power ATX Support S0, S3, S4, S5
Power Mode	AT / ATX mode Switchable Through Jumper
Operating Temp.	0 ~ 55°C (32~131°F) with 0.5m/s air flow (using CPU TDP 65W) 0 ~ 60°C (32~140°F) with 0.5m/s air flow (using CPU TDP 125W)
Storage Temp.	-40~ +75°C
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Size (L x W) (Please consult product engineers for the production feasibility if the size is larger than 410x360mm or smaller than 80x70mm)	6.7" x 6.7" (170mm x 170mm)
Weight	0.46 kg
OS Information	BIOS Support: 1. Win11 64bit UEFI Note: Windows 11 is not a LTSC release and will be supported on the Intel CCG Client roadmap. NEX Network & Edge customers may install non-LTSC releases(e.g. Win11) on NEX Network & Edge processors. 2. Win10 64bit UEFI 3. Linux

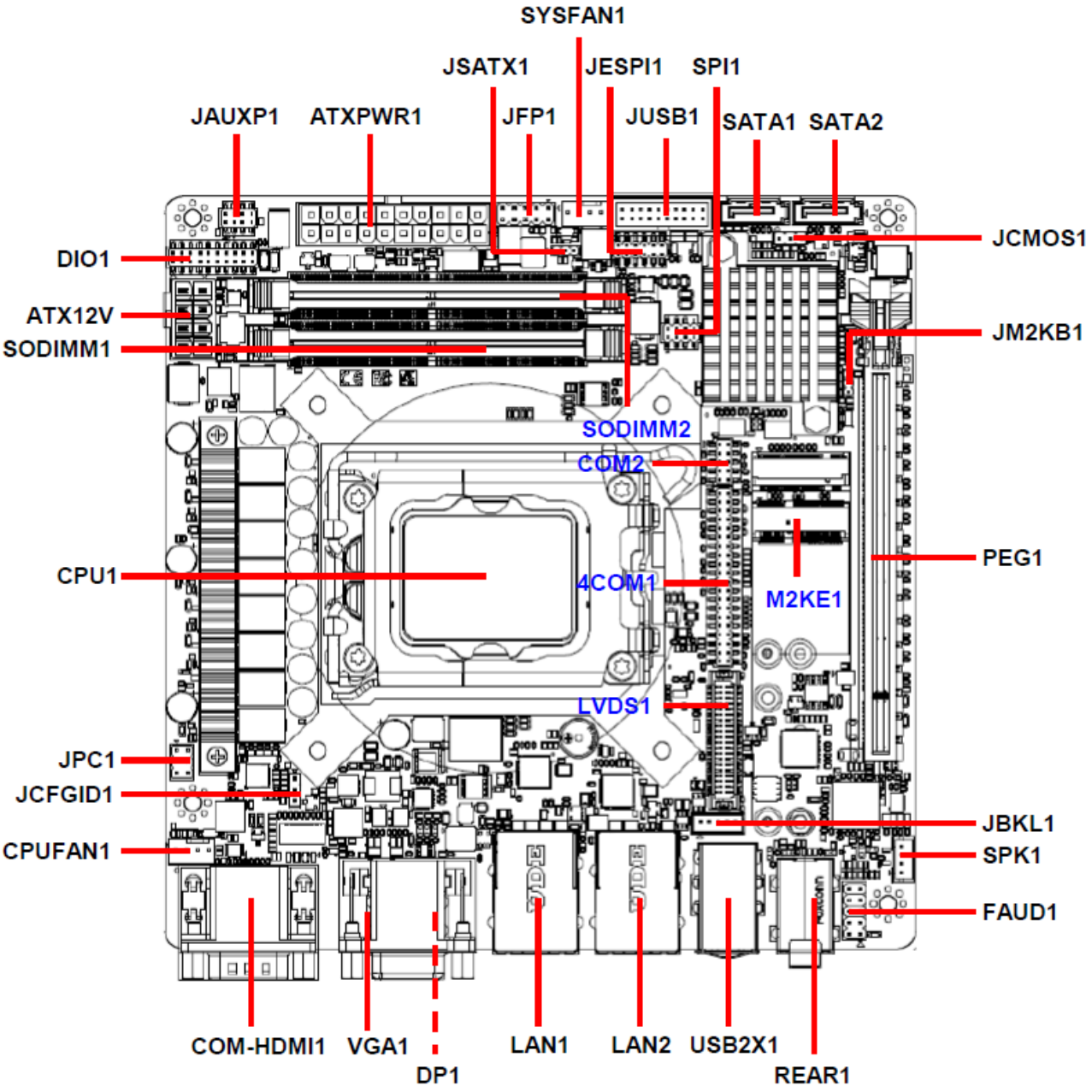
Note: Specifications are subject to change without notice.

The following block diagram shows the architecture and main components of EMX-H610P.



2. Hardware Configuration

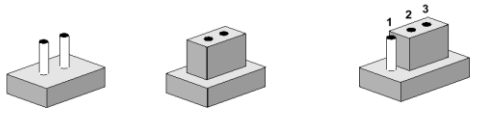
2.1 Product Overview



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.

Jumpers

Label	Function	Note
JCMOS1	Clear CMOS	3 x 1 header, pitch 2.54mm
JCFGID1	CPU TDP (Watts)	3 x 1 header, pitch 2.54mm
JSATX1	AT/ATX Power Mode Select	3 x 1 header, pitch 2.00mm
JM2KB1	M2KB1 Voltage setting	3 x 1 header, pitch 2.00mm

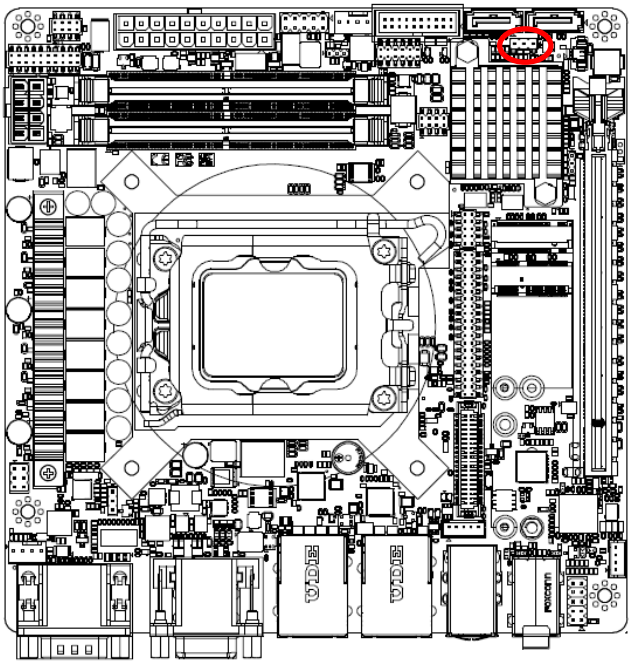
Connectors

Label	Function	Note
SYSFAN1	System fan connector 1 (with smart fan function supported)	4 x 1 wafer, pitch 2.54mm
CPUFAN1	CPU fan connector	4 x 1 wafer, pitch 2.54mm
JAUXP1	Auxiliary Panel connector	4 x 2 header, pitch 2.00mm
SPI1	Miscellaneous setting connector	4 x 2 header, pitch 2.00mm

COM2	Serial Port1/2 connector	5 x 2 header, pitch 2.00 mm
FAUD1	Front Audio connector	5 x 2 header, pitch 2.54mm
DIO1	General purpose I/O connector	10 x 2 header, pitch 2.00mm
SPK1	Speaker connector	4 x 1 wafer, pitch 2.00 mm
JFP1	Front Panel connector	5 x 2 header, pitch 2.54mm
LAN1/2	2 x RJ-45 with Dual deck USB 3.0 connector	
PEG1	PCIe slot 1	
JBKL1	LCD Inverter connector	5 x 1 wafer, pitch 2.00 mm
JESPI1	JESPI1 connector	6 x 2 header, pitch 1.27mm
4COM1	Serial Port connector	20 x 2 header, pitch 2.00mm
JHUSB1	USB 3.0 connector	10 x 2 wafer, pitch 2.00mm
LVDS1	LVDS connector	20 x 2 wafer, pitch 1.25mm
JPC1	JPC connector	3 x 2 header, pitch 2.54mm
ATXPWR1	ATX Power connector	10 x 2 wafer, pitch 4.20mm
ATX12V	Power connector	4 x 2 header, pitch 4.20mm
COM-HDMI1	COM-HDMI connector	
SATA1/2	Serial ATA connector	
SODIMM1/2	260-pin DIMM slot 1/2	
M2KE1	M.2 Key E	
CPU	CPU connector	
VGA1	VGA connector	
DP1	DP connector	
USB2X1	USB connector	
REAR1	PS2+USB connector	

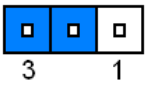
2.3 Setting Jumpers & Connectors

2.3.1 Clear CMOS (JCMOS1)



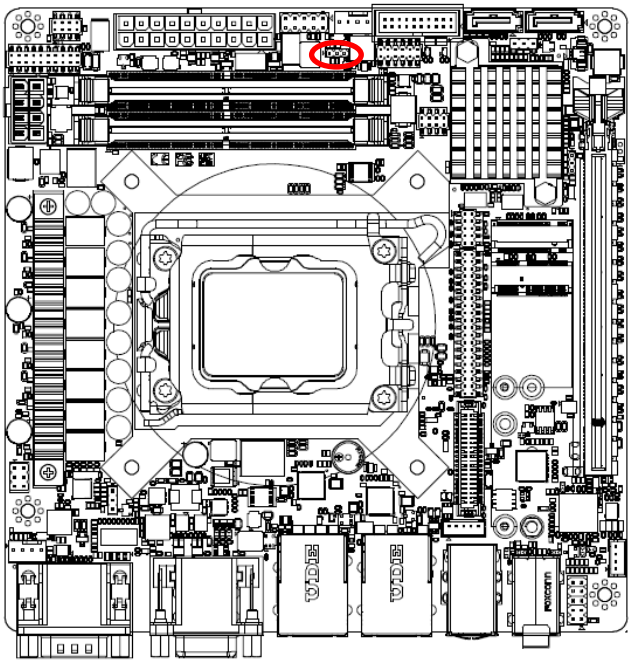
Protect*

Clear CMOS

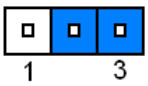


*** Default**

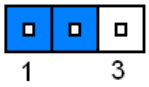
2.3.2 AT/ATX Power Mode Select (JSATX1)



AT

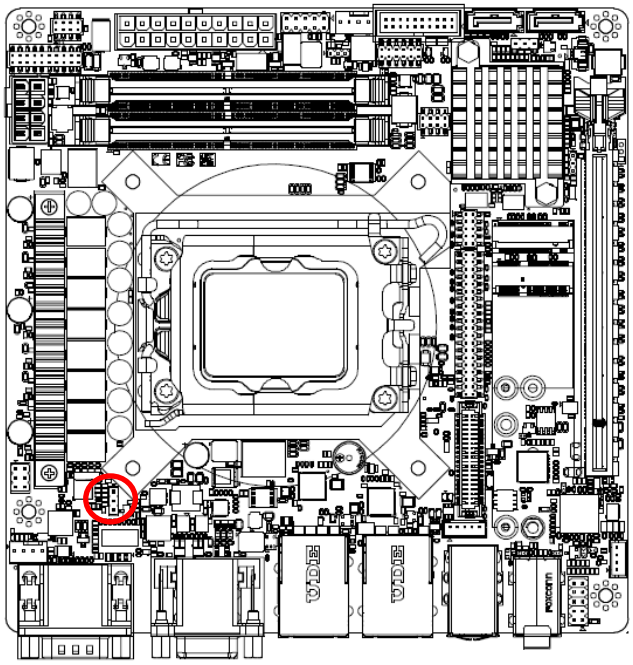


ATX*

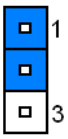


*** Default**

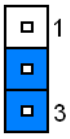
2.3.3 CPU TDP (Watts) (JCFGID1)



Config ID1 *

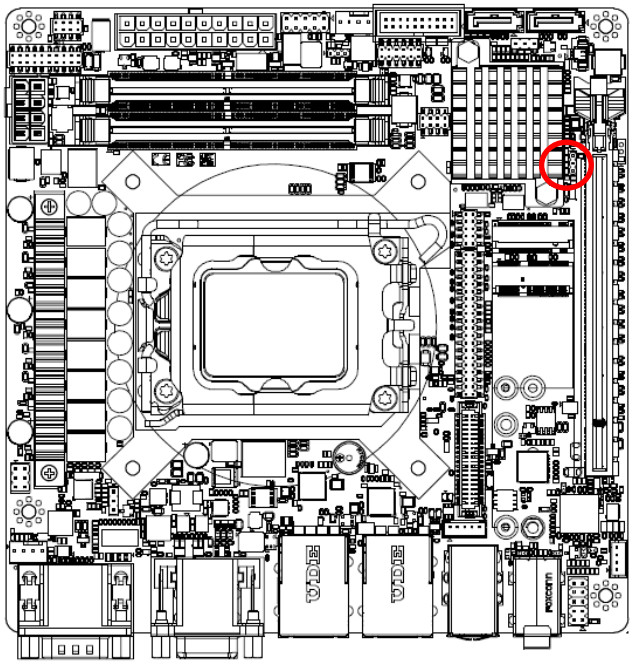


Config ID0

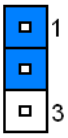


*** Default**

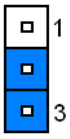
2.3.4 M2KB1 Voltage setting (JM2KB1)



+3.8V*

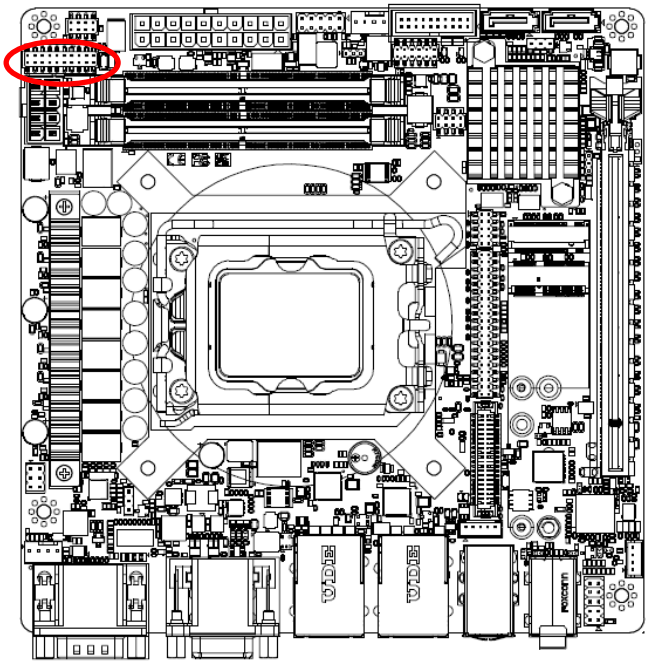


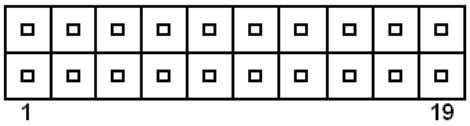
+3.38V



*** Default**

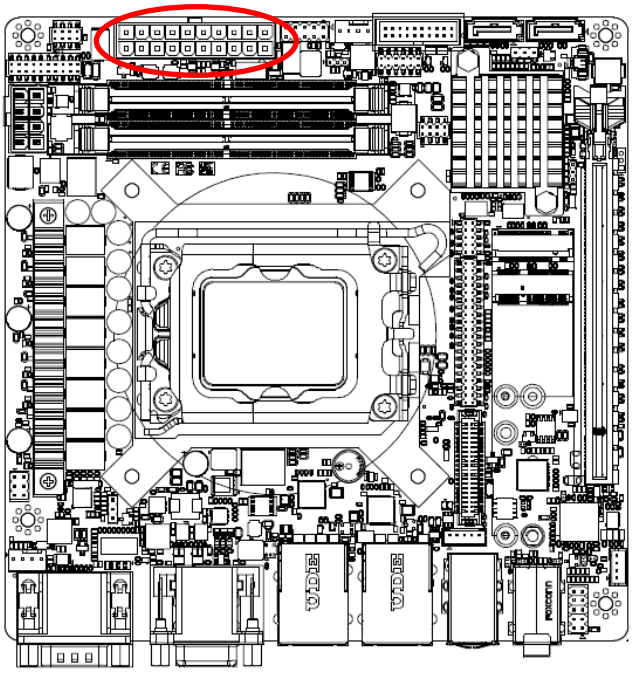
2.3.5 General purpose I/O connector (DIO1)

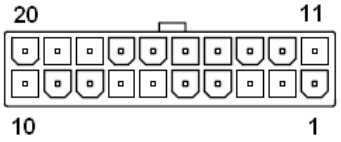




Signal	PIN	PIN	Signal
DI0	1	2	DO0
DI1	3	4	DO1
DI2	5	6	DO2
DI3	7	8	DO3
DI4	9	10	DO4
DI5	11	12	DO5
DI6	13	14	DO6
DI7	15	16	DO7
5V_SMB_CLK	17	18	5V_SMB_DATA
GND	19	20	+5V

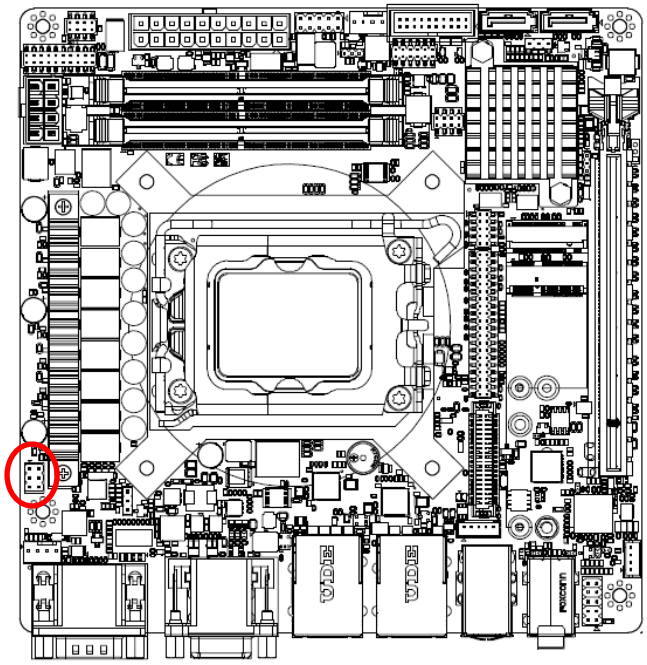
2.3.6 ATX Power connector (ATXPWR1)

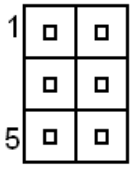




Signal	PIN	PIN	Signal
+3.3V	11	1	+3.3V
NC	12	2	+3.3V
GND	13	3	GND
ATX_PSON#	14	4	+5V
GND	15	5	GND
GND	16	6	+5V
GND	17	7	GND
NC	18	8	ATX20_PWROK
+5V	19	9	+V5A_SB
GND	20	10	+12V

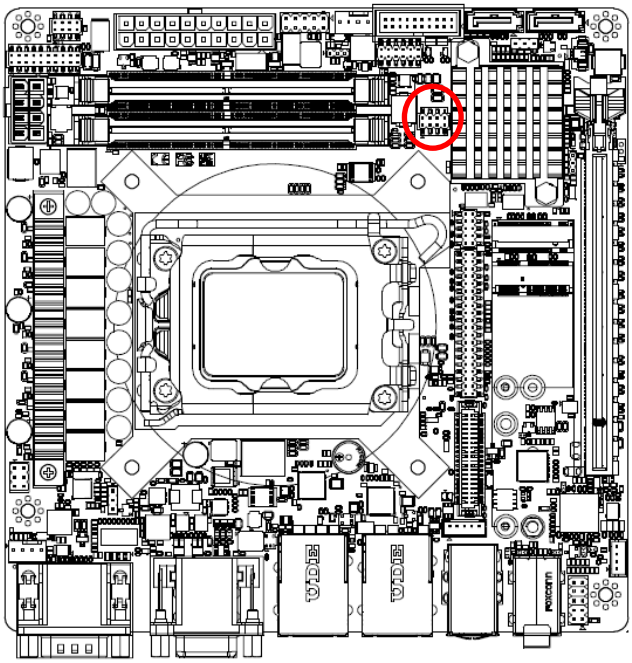
2.3.7 JPC connector (JPC1)

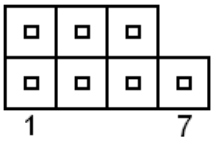




Signal	PIN	PIN	Signal
VCCCORE_nPMALERT	1	2	VCCCORE_PMSDA
GND	3	4	VCCCORE_PMSCL
NC	5	6	+V3P3_EXT

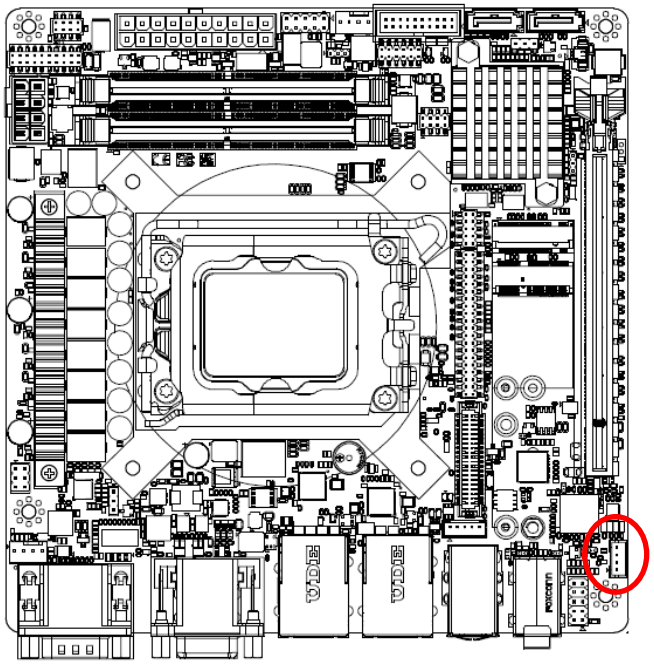
2.3.8 Miscellaneous setting connector (SPI1)

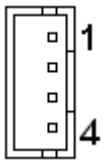




Signal	PIN	PIN	Signal
+ V3.3A_SPI	1	2	GND
SPI_CS0#	3	4	SPI_CLK
SPI_MISO	5	6	SPI_MOSI
SPI_HOLD#	7		

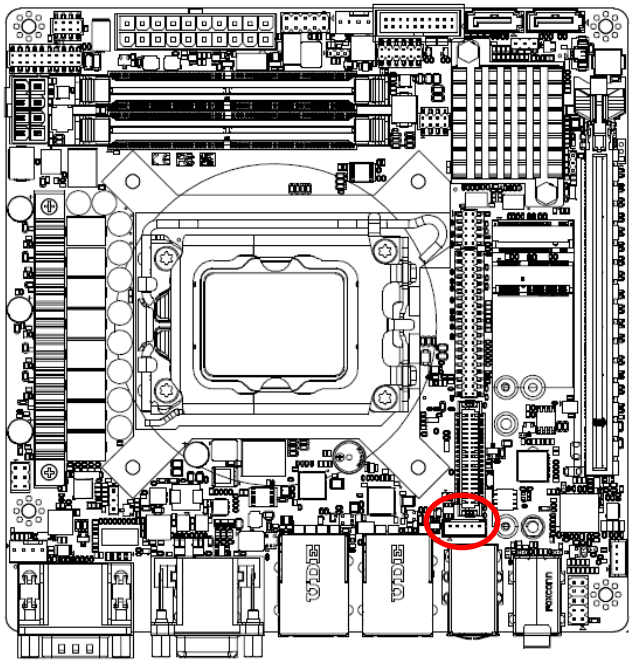
2.3.9 Speaker connector (SPK1)

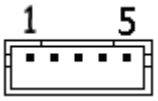




Signal	PIN
LSPK+	1
LSPK-	2
RSPK+	3
RSPK-	4

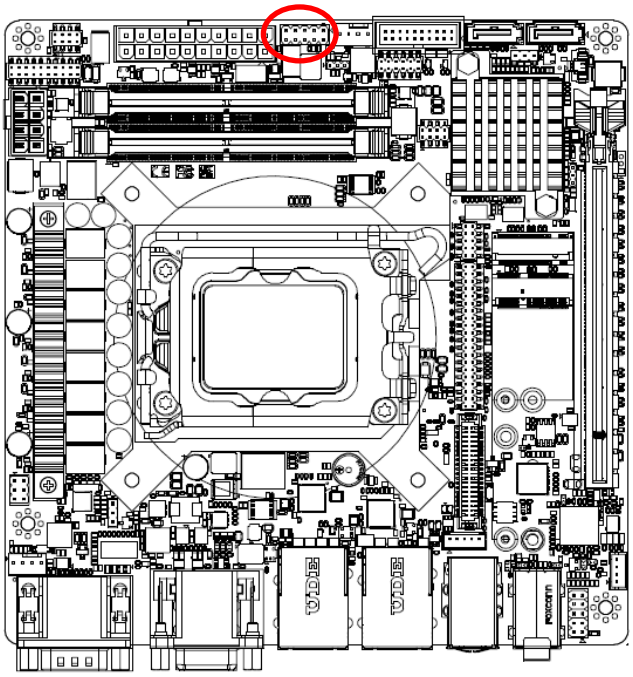
2.3.10 LCD Inverter connector (JBKL1)

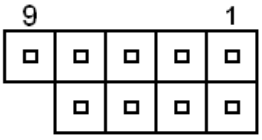




Signal	PIN
+12V	1
GND	2
LVDS_BKLTEN	3
LVDS_BKLADJ	4
+5V	5

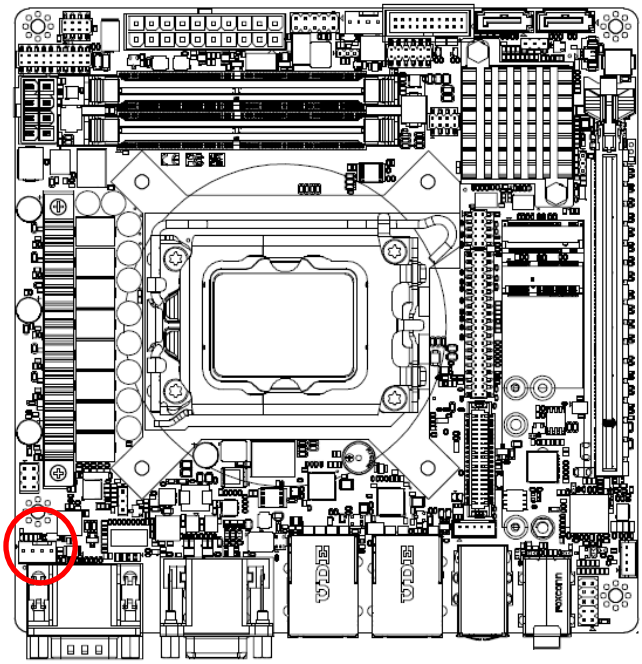
2.3.11 Front Panel connector (JFP1)

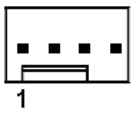




Signal	PIN	PIN	Signal
HDD_LED+	1	2	PWR_LED+
HDD_LED-	3	4	PWR_LED-
SYS_RST#	5	6	PWRBTN#
GND	7	8	GND
NC	9		

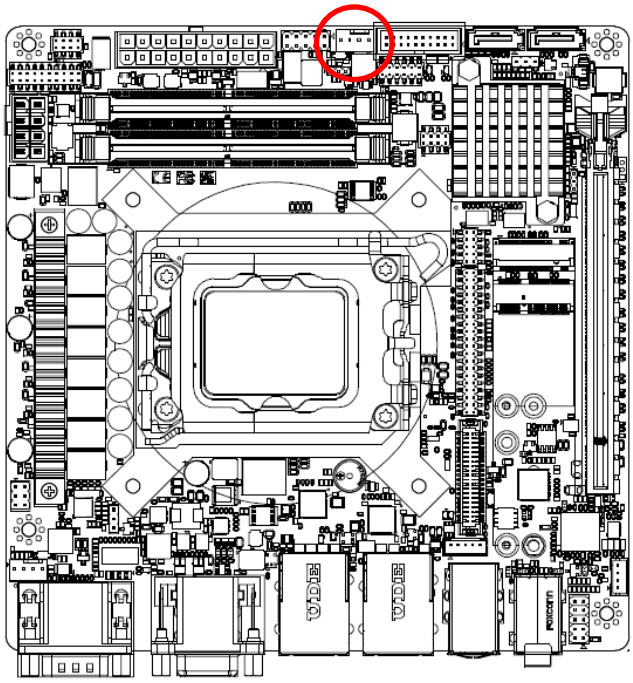
2.3.12 CPU fan connector (CPUFAN1)

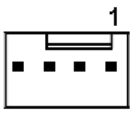




PIN	Signal
1	GND
2	+12V
3	CPU_R_FANIN
4	CPU_FANOUT

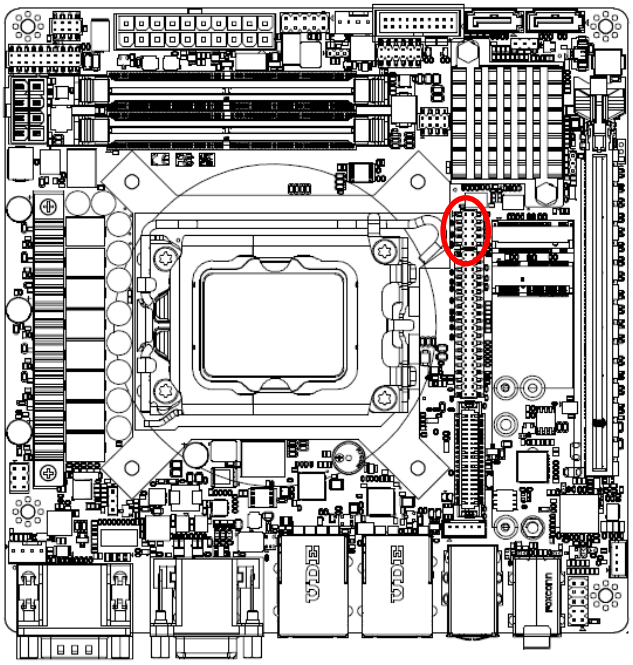
2.3.13 System fan connector (SYSFAN1)

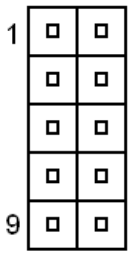




PIN	Signal
4	SYS_FANOUT
3	SYS_R_FANIN
2	+12V
1	GND

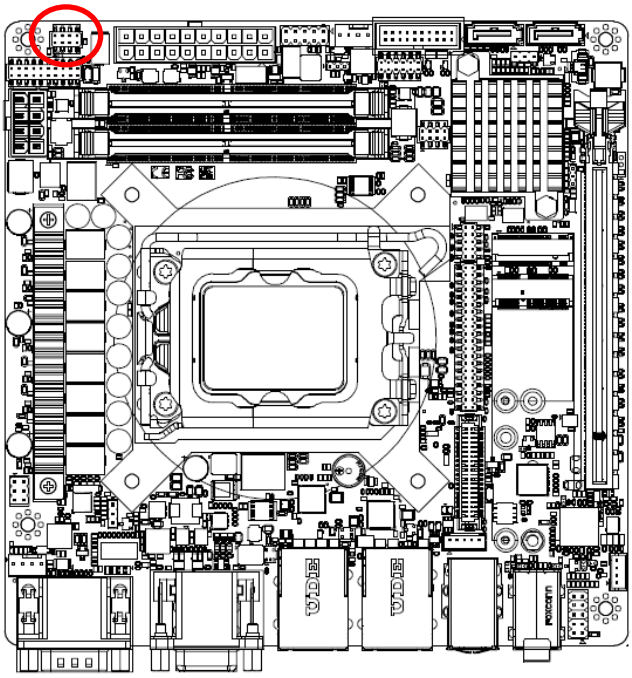
2.3.14 Serial port connector (COM2)

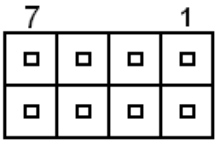




Signal	PIN	PIN	Signal
NDCDB#	1	2	NRXDB
NTXDB	3	4	NDTRB#
GND	5	6	NDSRB#
NRTSB#	7	8	NCTSB#
NRIB#	9	10	NC

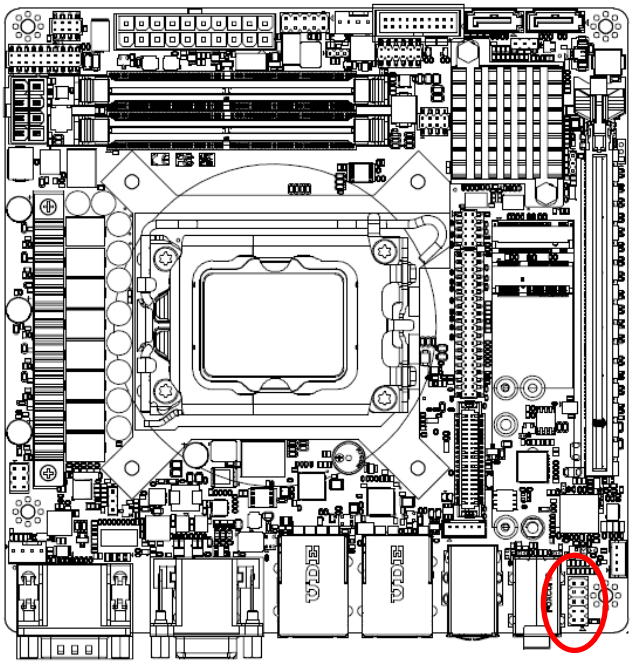
2.3.15 Auxiliary Panel connector (JAUXP1)

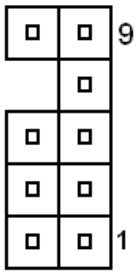




Signal	PIN	PIN	Signal
FRONT_LAN1_ACT	1	2	FRONT_LAN1 _LINK100_1000#
GND	3	4	FRONT_LAN1 _LINK2500#
FRONT_LAN2_ACT	5	6	FRONT_LAN1 _LINK100_1000#
GND	7	8	FRONT_LAN1 _LINK2500#

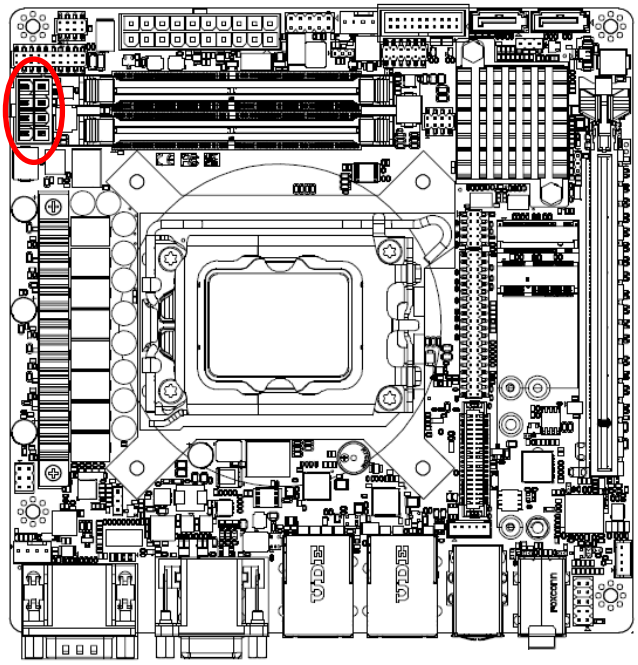
2.3.16 Audio connector (FAUD1)

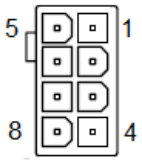




Signal	PIN	PIN	Signal
LINE2_JD	10	9	LINE2_L
		7	SENSE_B_JD3
MIC2_JD	6	5	LINE2_R
AUD_FRONT_DET	4	3	MIC2_R
GND	2	1	MIC2_L

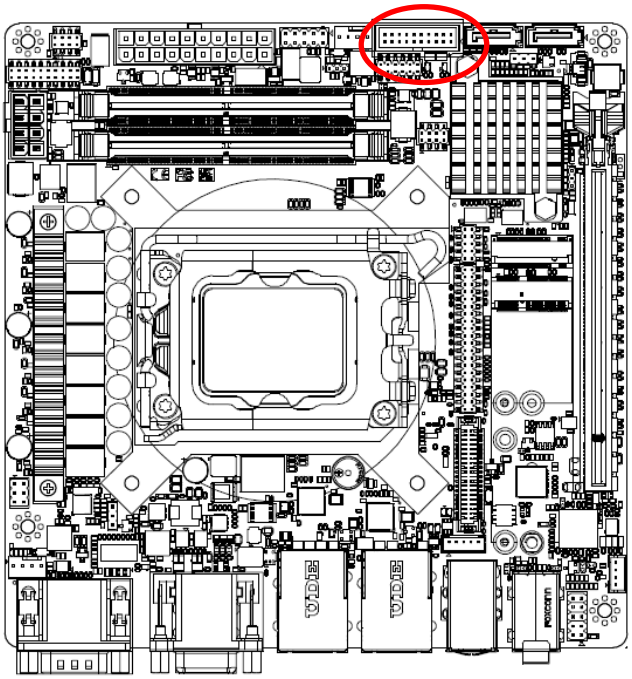
2.3.17 Power connector (ATX12V1)

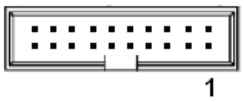




Signal	PIN	PIN	Signal
+V12S_CPU	2	1	GND
+V12S_CPU	4	3	GND
+V12S_CPU	6	5	GND
+V12S_CPU	8	7	ATX_2X4+DET

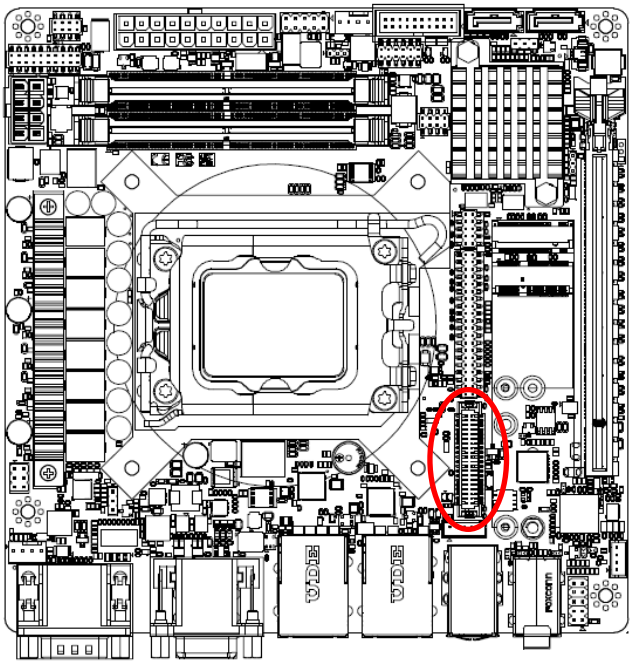
2.3.18 USB 3.0 connector (JHUSB1)

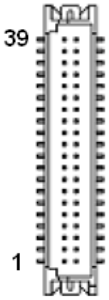




Signal	PIN	PIN	Signal
		1	+V5A_CY_USB
GND	19	2	CYUSB3_RXN4
CYUSB3_RXN3	18	3	CYUSB3_RXP4
CYUSB3_RXP3	17	4	GND
CY_USB3_TXN3	16	5	CY_USB3_TXN4
CY_USB3_TXP3	15	6	CY_USB3_TXP4
GND	14	7	GND
CY_USB3_DN3	13	8	CY_USB3_DN4
CY_USB3_DP3	12	9	CY_USB3_DP4
GND	11	10	GND

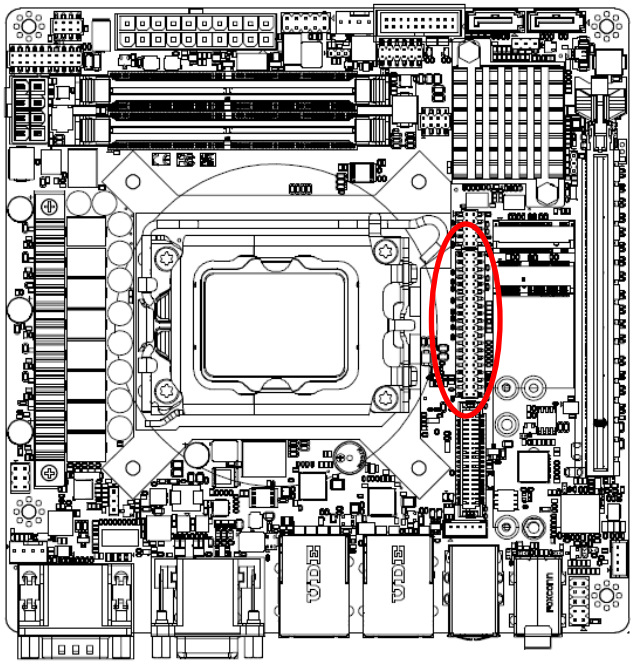
2.3.19 LVDS connector (LVDS1)

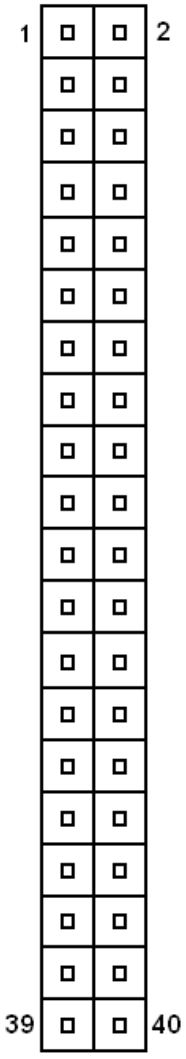




Signal	PIN	PIN	Signal
LVDS_VDD12V	39	40	LVDS_VDD12V
GND	37	38	GND
LVDS_CLK2N	35	36	LVDS_CLK1N/EPAUXN
LVDS_CLK2P	33	34	LVDS_CLK1P/EPAUXP
GND	31	32	GND
LVDS_DATAN7	29	30	LVDS_DATAN6
LVDS_DATAP7	27	28	LVDS_DATAP6
GND	25	26	GND
LVDS_DATAN5	23	24	LVDS_DATAN4
LVDS_DATAP5	21	22	LVDS_DATAP4
GND	19	20	GND
LVDS_DATAN3	17	18	LVDS_DATAN2/eDPN0
LVDS_DATAP3	15	16	LVDS_DATAP2/eDPP0
GND	13	14	GND
LVDS_DATAN1/eDPN1	11	12	LVDS_DATAN0
LVDS_DATAP1/eDPP1	9	10	LVDS_DATAP0/eDP_HPD
GND	7	8	GND
LVDS_VDD33V	5	6	LVDS_VDD5V
LVDS_VDD33V	3	4	LVDS_VDD5V
LVDS_VDD33V	1	2	LVDS_VDD5V

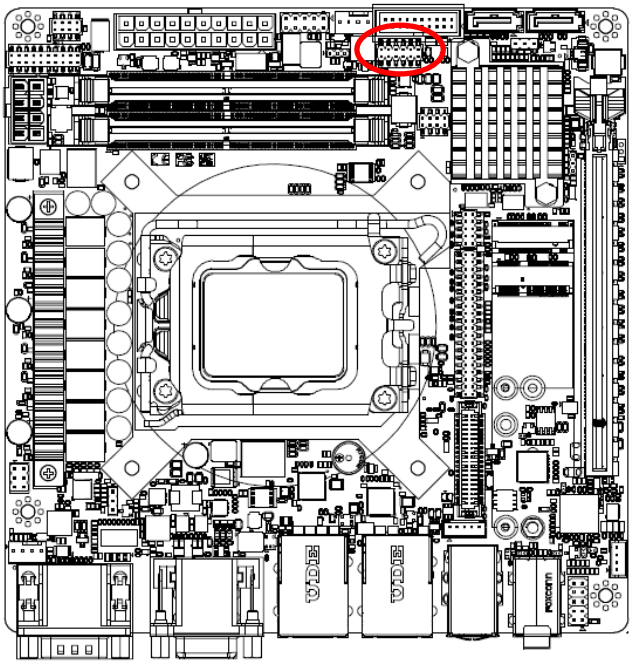
2.3.20 Serial port connector (4COM1)

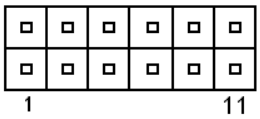




Signal	PIN	PIN	Signal
NDCDC#	1	2	NRXDC
NTXDC	3	4	NDTRC#
GND	5	6	NDSRC#
NRTSC#	7	8	NCTSC#
NRIC#	9	10	NC
NDCDD#	11	12	NRXDD
NTXDD	13	14	NDTRD#
GND	15	16	NDSRD#
NRTSD#	17	18	NCTSD#
NRID#	19	20	NC
NDCDE#	21	22	NRXDE
NTXDE	23	24	NDTRE#
GND	25	26	NDSRE#
NRTSE#	27	28	NCTSE#
NRIE#	29	30	NC
NDCDF#	31	32	NRXDF
NTXDF	33	34	NDTRF#
GND	35	36	NDSRF#
NRTSF#	37	38	NCTSF#
NRIF#	39	40	NC

2.3.21 JESPI1 connector (JESPI1)





Signal	PIN	PIN	Signal
ESPI_ IO0	1	2	+V3P3A
ESPI_ IO1	3	4	PLT_RST#_BUF
ESPI_ IO2	5	6	ESPI_CS#
ESPI_ IO3	7	8	ESPI_DEG_CLK
ESPI_CS1#	9	10	GND
ESPI_RST#	11	12	ESPI_ALERT#

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

The 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 <F2> immediately after switching the system on, or
By pressing the <Del> or <F2> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <Del> or <F2> 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. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to.

Press F1 to Continue, DEL to enter SETUP

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

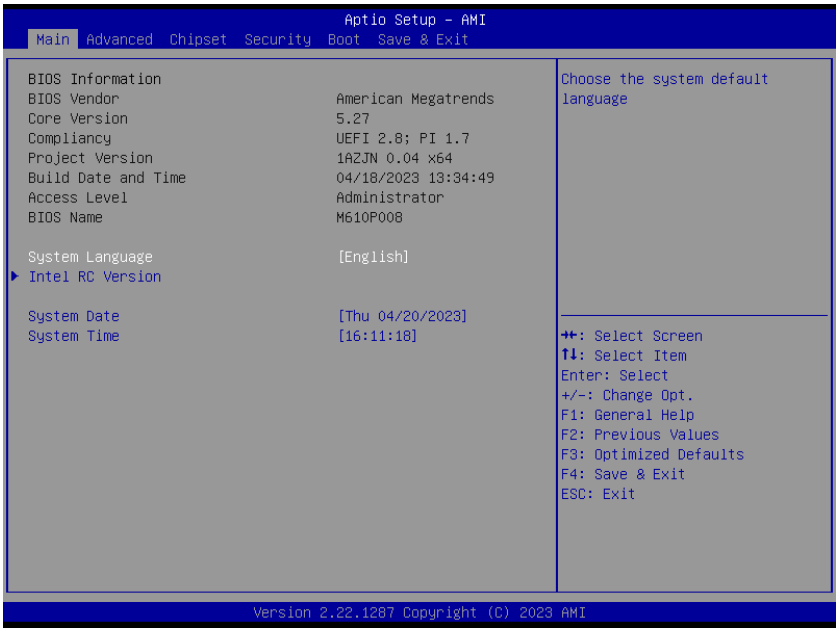
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance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

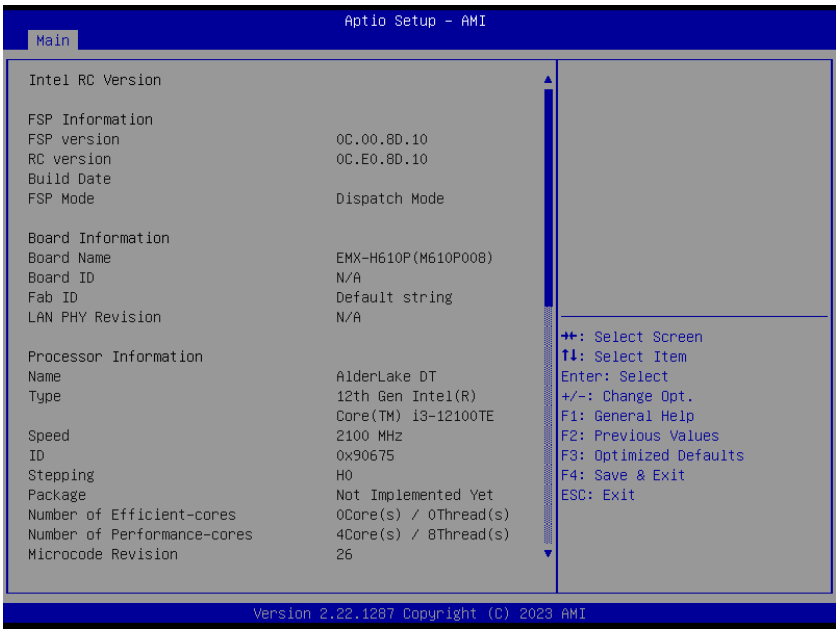
3.6 BIOS setup

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.

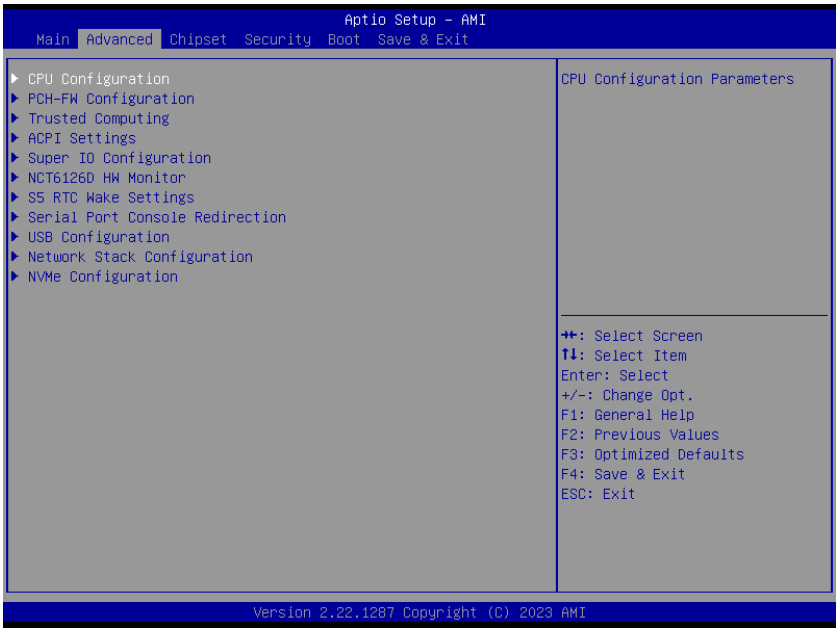
3.6.1.3 System Time

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

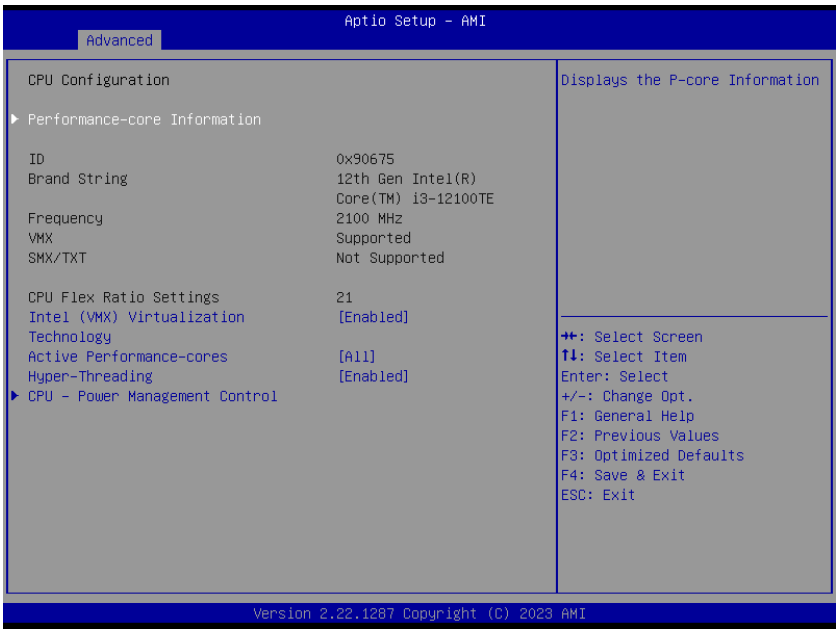
Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com.tw) to download the latest product and BIOS information.

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.

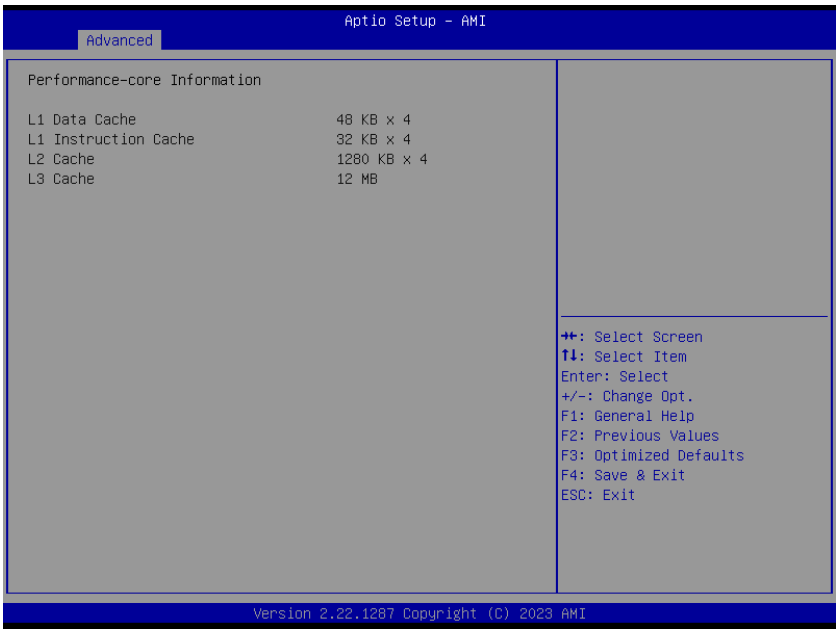


3.6.2.1 CPU Configuration

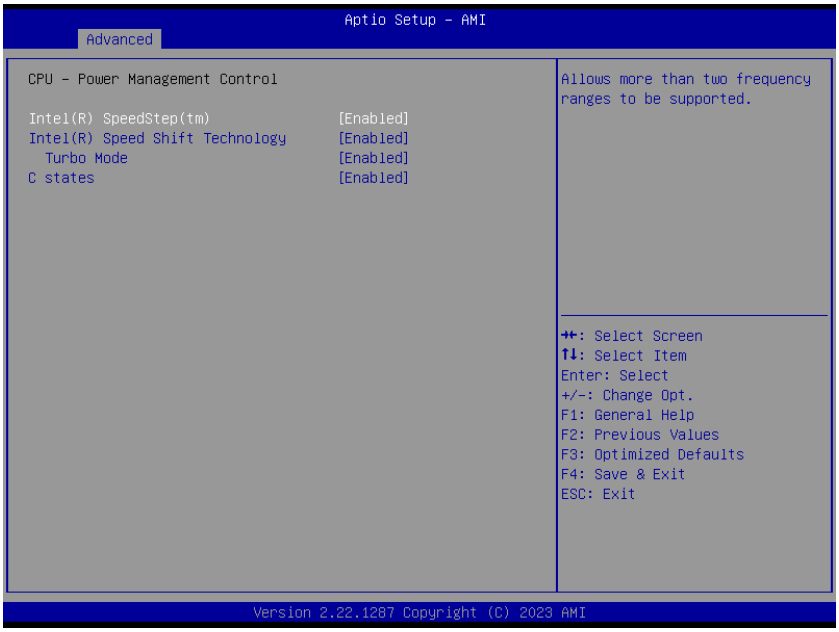


Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled Enabled**[Default]**,	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All**[Default]**, 1 2 3 4 5 6 7 8	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.
Hyper-Threading	Disabled Enabled**[Default]**,	Enable or Disable Hyper-Threading Technology.

3.6.2.1.1 Performance-core Information



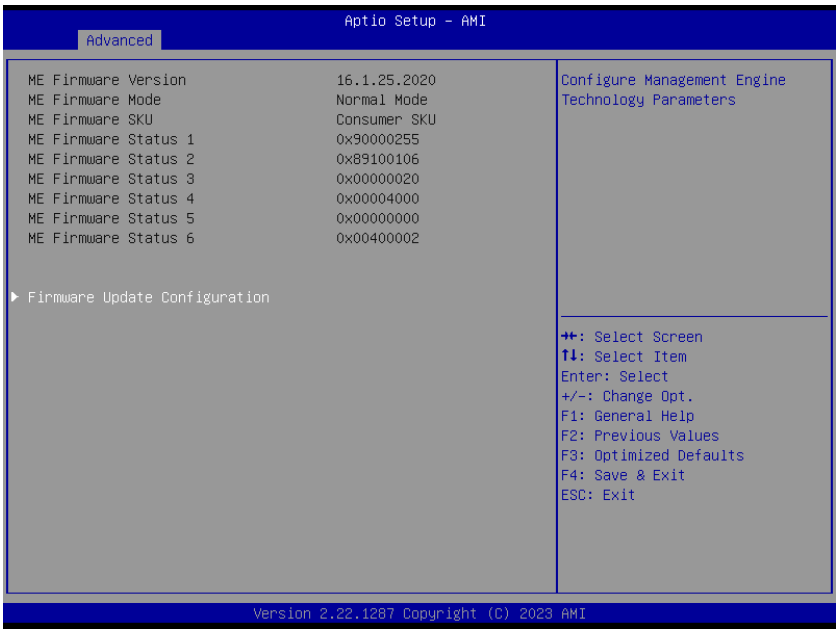
3.6.2.1.2 CPU - Power Management Control



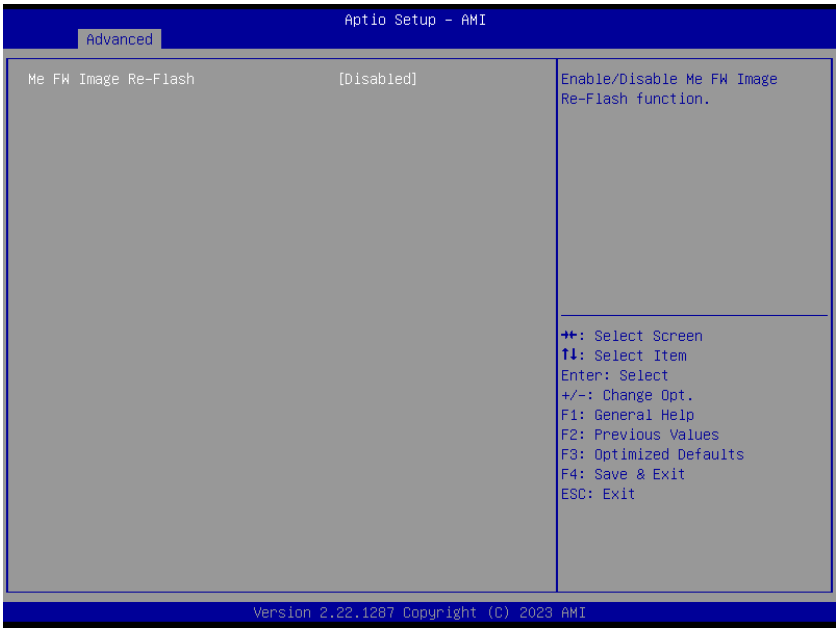
Item	Options	Description
Intel(R) SpeedStep(tm)	Disabled Enabled**[Default]**,	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Disabled Enabled**[Default]**,	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow 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 Enabled**[Default]**,	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized

3.6.2.2 PCH-FW Configuration



3.6.2.2.1 Firmware Update Configuration

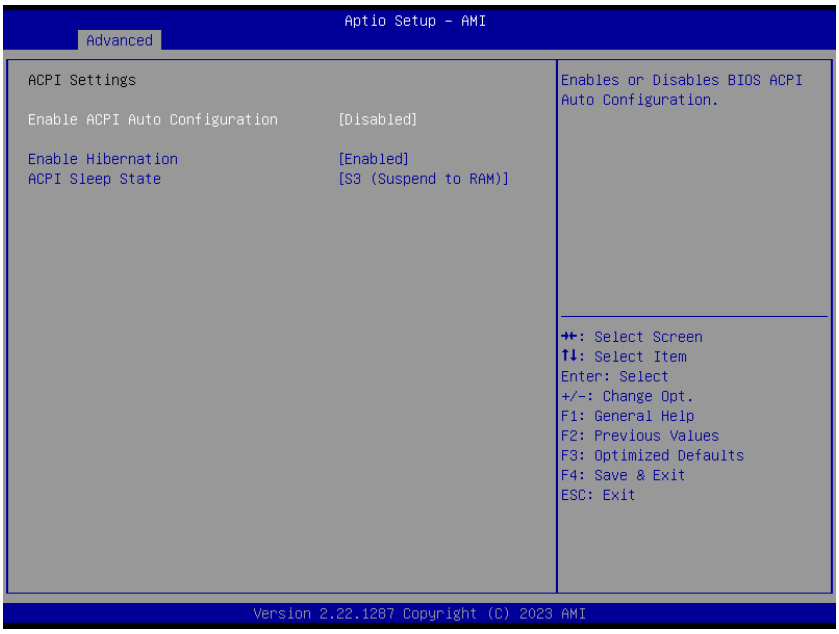


Item	Option	Description
Me FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.

3.6.2.3 Trusted Computing

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

3.6.2.4 ACPI Settings

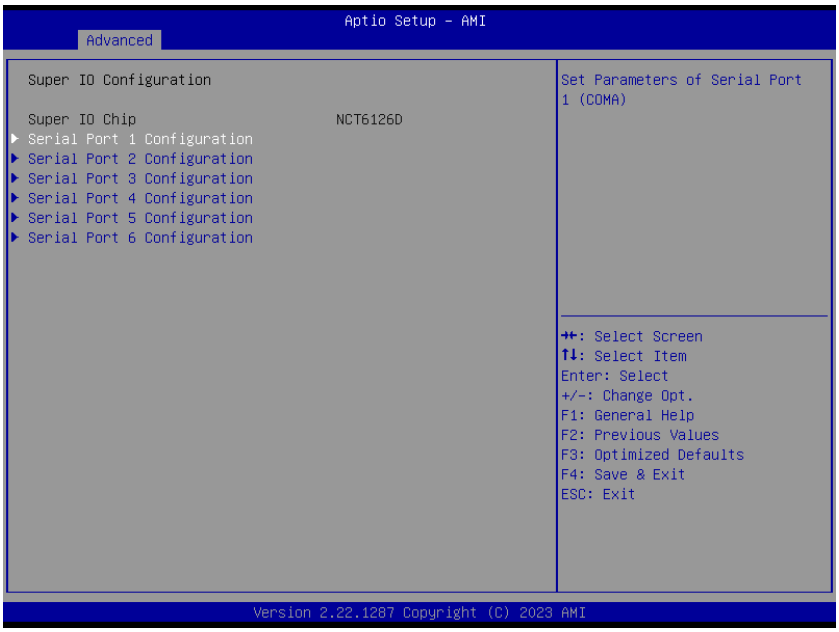


Item	Options	Description
Enable ACPI Auto Configuration	Disabled**[Default]**, Enabled	Enables or Disables BIOS ACPI Auto Configuration.

Enable Hibernation	Disabled Enabled**[Default]**,	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEDN button is pressed.

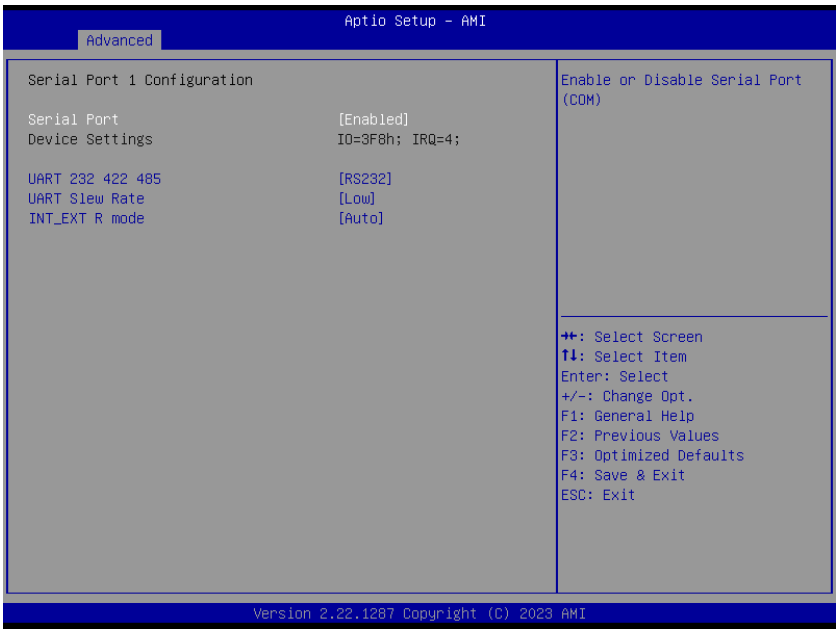
3.6.2.5 Super IO Configuration

You can use this item to set up or change the Super IO configuration for serial ports. Please refer to 3.6.2.5.1~ 3.6.2.5.6 for more information.



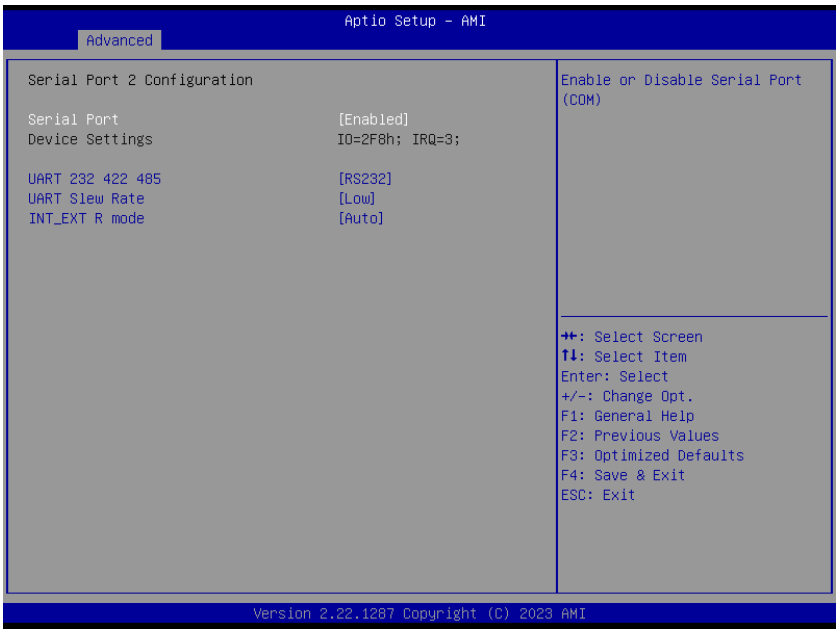
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Set Parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Set Parameters of Serial Port 6 (COMF).

3.6.2.5.1 Serial Port 1 Configuration



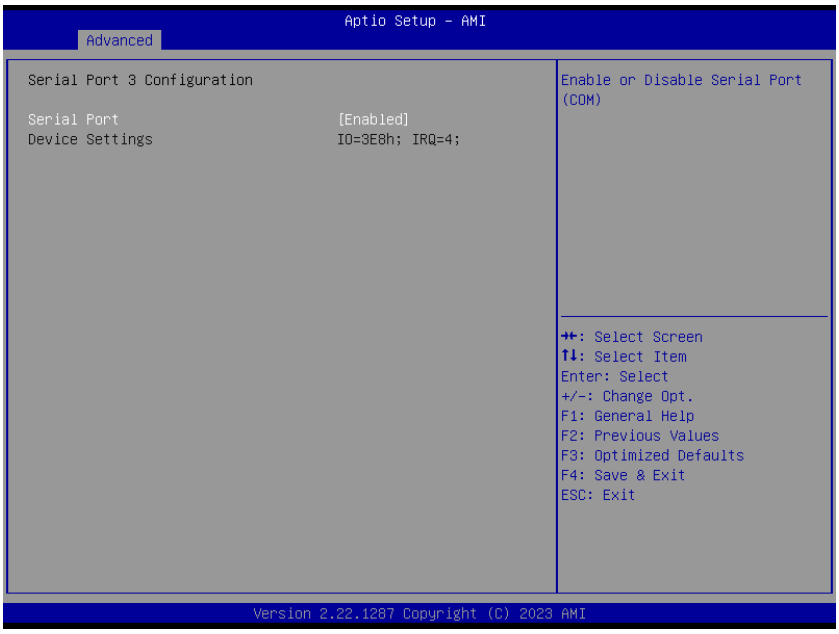
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	RS232**[Default]**, RS422 RS485	Set COM Port as RS232, RS422 or RS485 mode.
UART Slew Rate	Low**[Default]**, High	Low: RS232/422/485 = 250Kbps High: RS232 = 3 Mbps, RS422/485 = 20Mbps
INT_EXT R mode	Auto**[Default]**, Non INT+EXT R INT R EXT R INT+EXT R	Adjust the Serial Port with internal or external termination resistors

3.6.2.5.2 Serial Port 2 Configuration



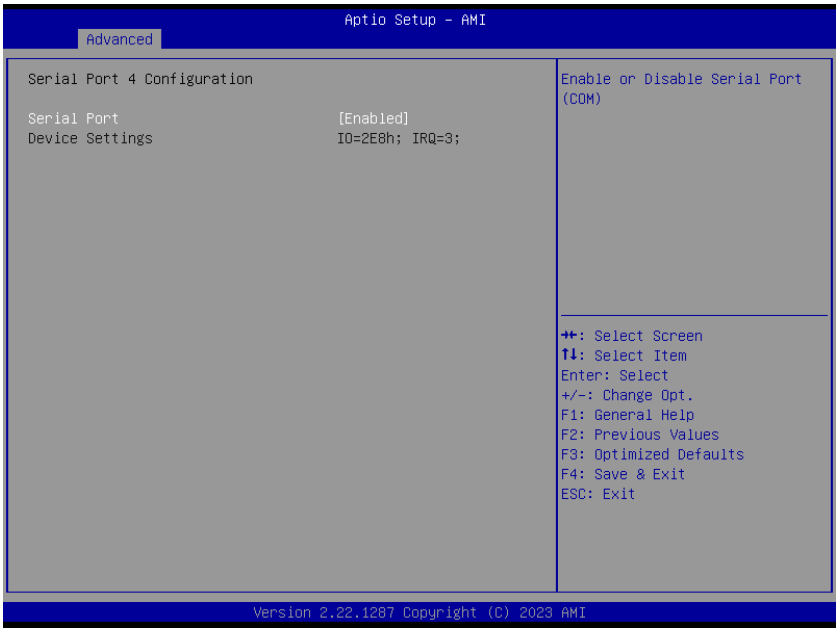
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	RS232**[Default]**, RS422 RS485	Set COM Port as RS232, RS422 or RS485 mode.
UART Slew Rate	Low**[Default]**, High	Low: RS232/422/485 = 250Kbps High: RS232 = 3 Mbps, RS422/485 = 20Mbps
INT_EXT R mode	Auto**[Default]**, Non INT+EXT R INT R EXT R INT+EXT R	Adjust the Serial Port with internal or external termination resistors

3.6.2.5.3 Serial Port 3 Configuration



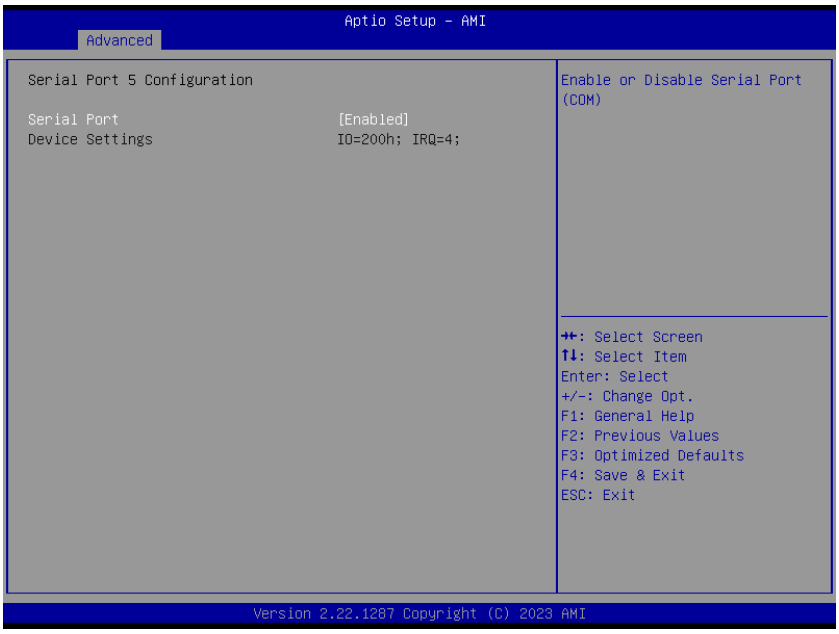
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.5.4 Serial Port 4 Configuration



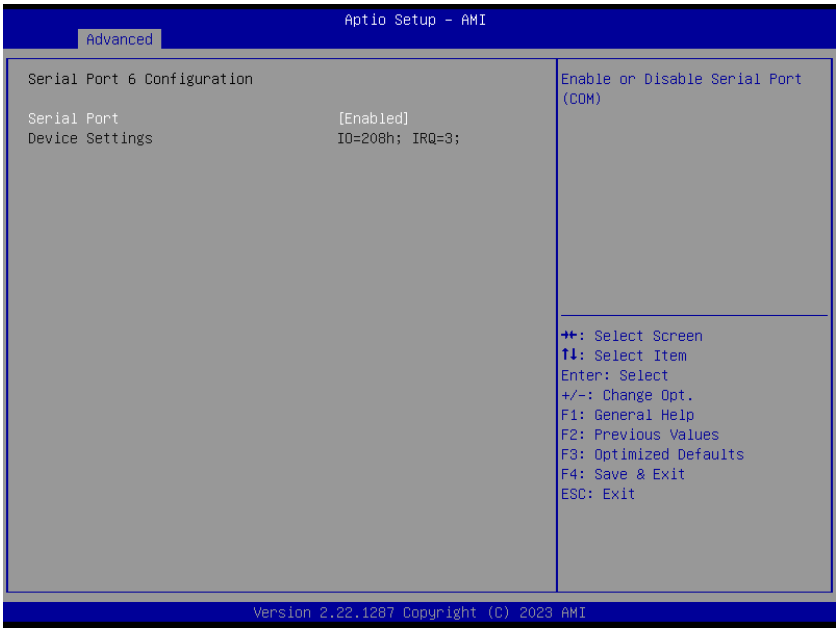
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.5.5 Serial Port 5 Configuration



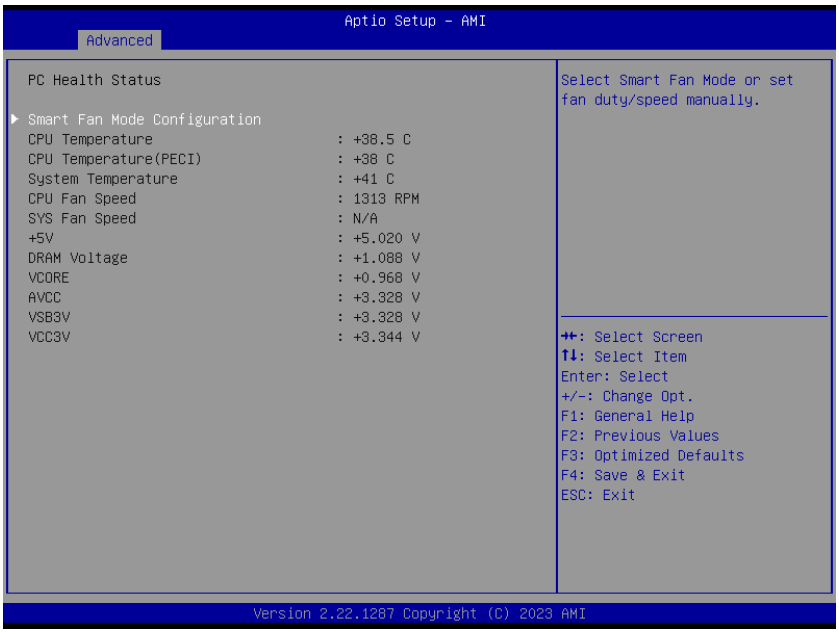
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.5.6 Serial Port 6 Configuration

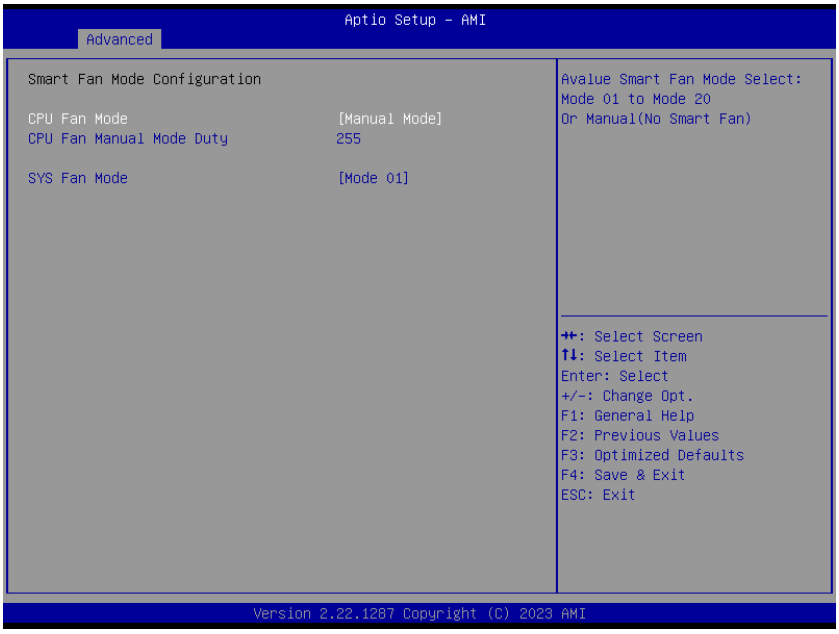


Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).

3.6.2.6 NCT6126D H/W Monitor



3.6.2.6.1 Smart Fan Mode Configuration



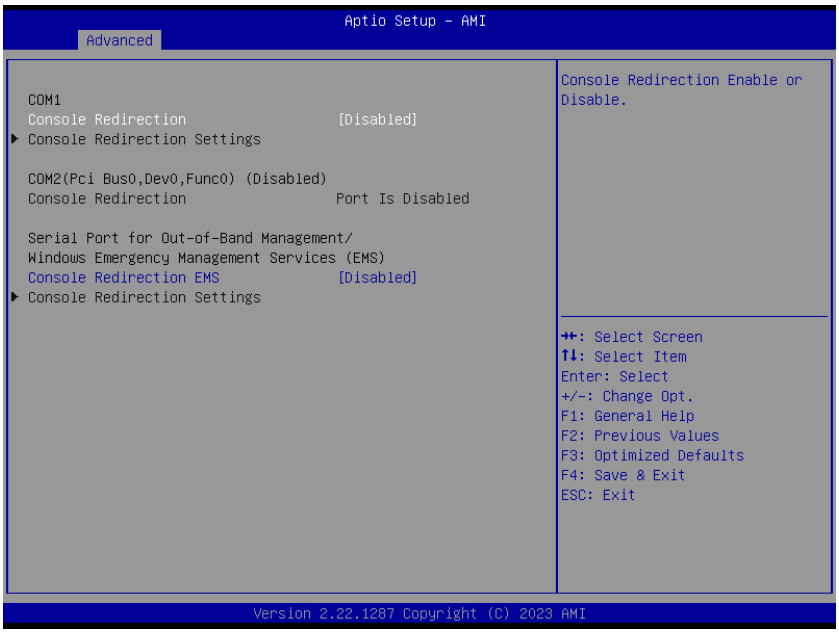
Item	Option	Description
CPU Fan Mode	Manual Mode**[Default]**, /Mode 01/Mode 02 /Mode 03/Mode 04 /Mode 05/Mode 06 /Mode 07/Mode 08 /Mode 09/Mode 10 /Mode 11/Mode 12 /Mode 13/Mode 14 /Mode 15/Mode 16 /Mode 17/Mode 18 /Mode 19/Mode 20	Avalue Smart Fan Mode Select: Mode 01 to Mode 20 Or Manual(No Smart Fan)

CPU Fan Manual Mode Duty	255	Set Fan Duty Manually(1~255).
SYS Fan Mode	Manual Mode**[Default]**, /Mode 01/Mode 02 /Mode 03/Mode 04 /Mode 05/Mode 06 /Mode 07/Mode 08 /Mode 09/Mode 10 /Mode 11/Mode 12 /Mode 13/Mode 14 /Mode 15/Mode 16 /Mode 17/Mode 18 /Mode 19/Mode 20	Avalue Smart Fan Mode Select: Mode 01 to Mode 20 Or Manual(No Smart Fan)

3.6.2.7 S5 RTC Wake Settings

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

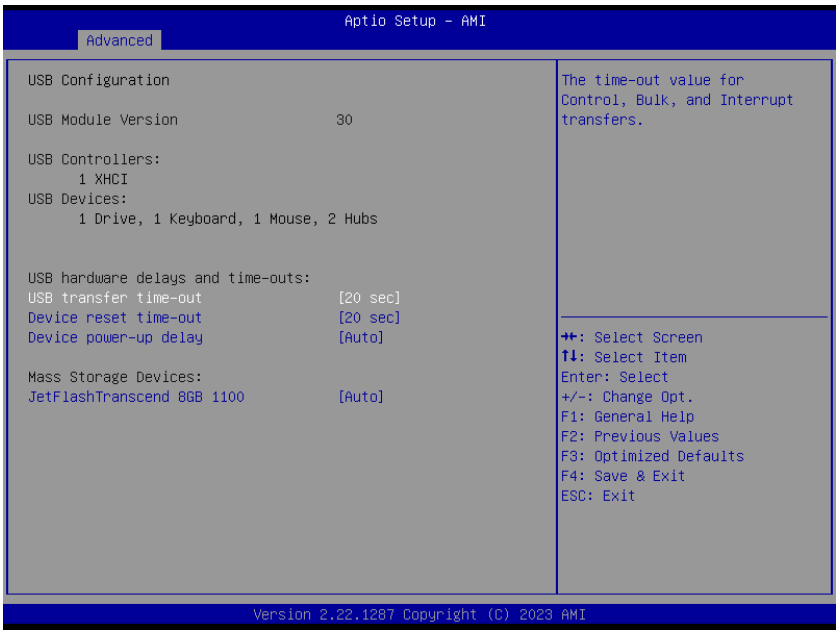
3.6.2.8 Serial Port Console Redirection



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

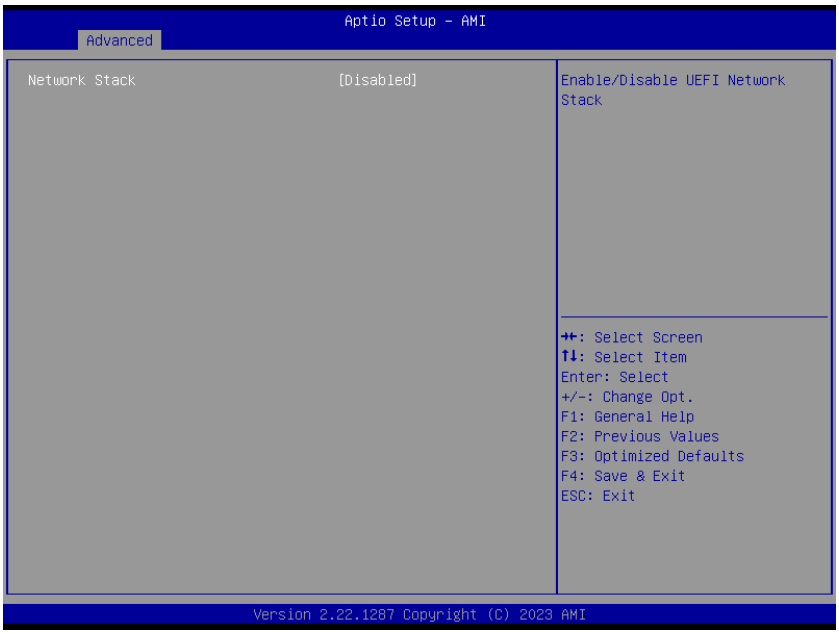
3.6.2.9 USB Configuration

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



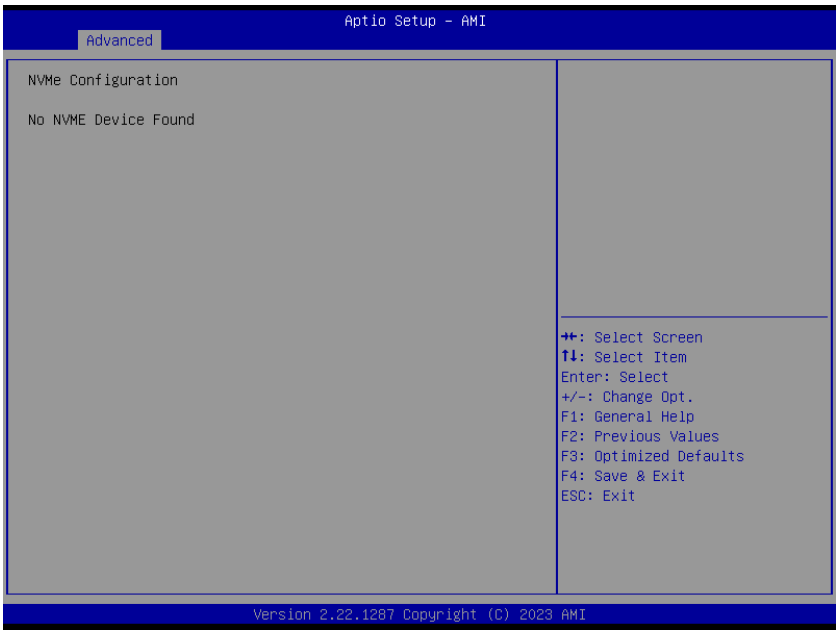
Item	Options	Description
USB transfer time-out	1 sec 5 sec 10 sec 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec**[Default]** 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken form Hub descriptor.
JetF lashTranscend 8GB 1100	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.

3.6.2.10 Network Stack Configuration

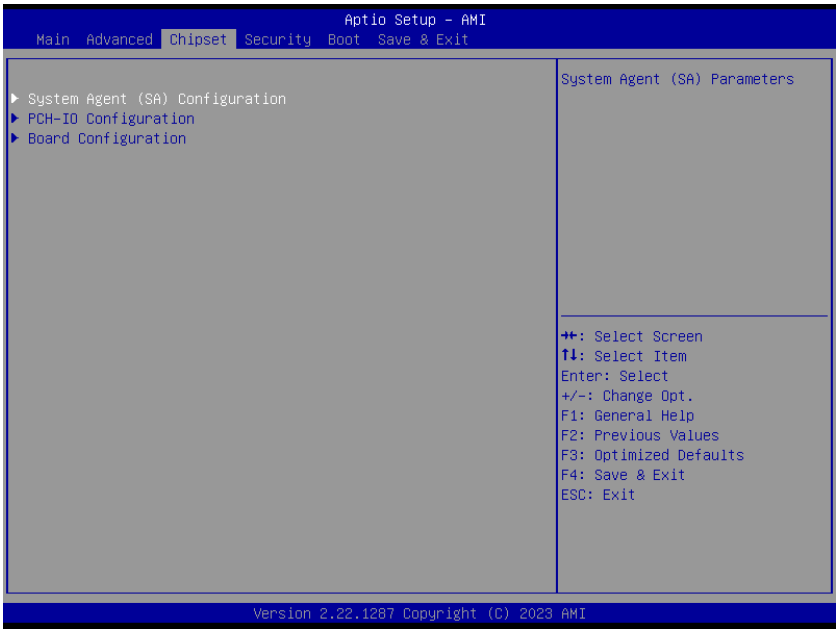


Item	Options	Description
Network Stack	Disabled**[Default]**, Enabled	Enable/Disable UEFI Network Stack.

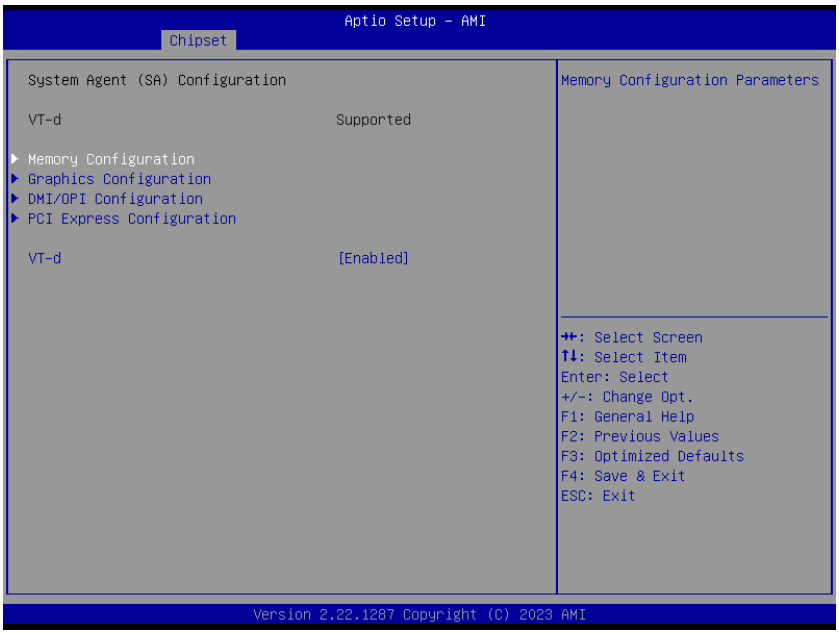
3.6.2.11 NVMe Configuration



3.6.3 Chipset

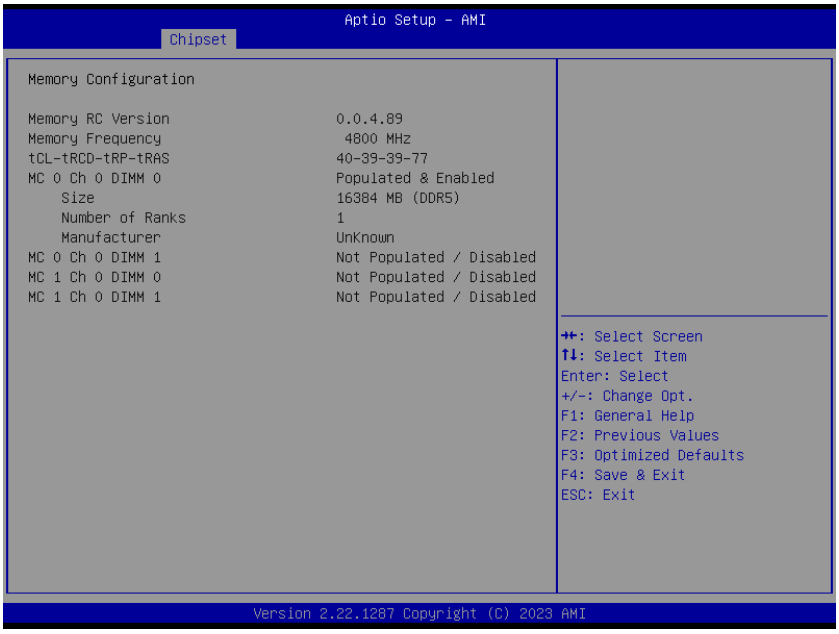


3.6.3.1 System Agent (SA) Configuration

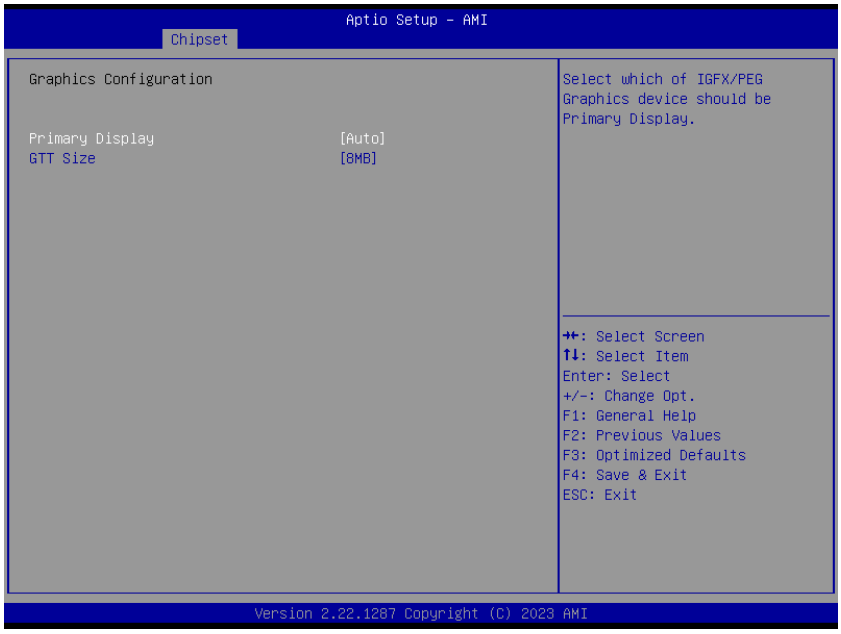


Item	Option	Description
VT-d	Disabled Enabled**[Default]**	VT-d capability.

3.6.3.1.1 Memory Configuration



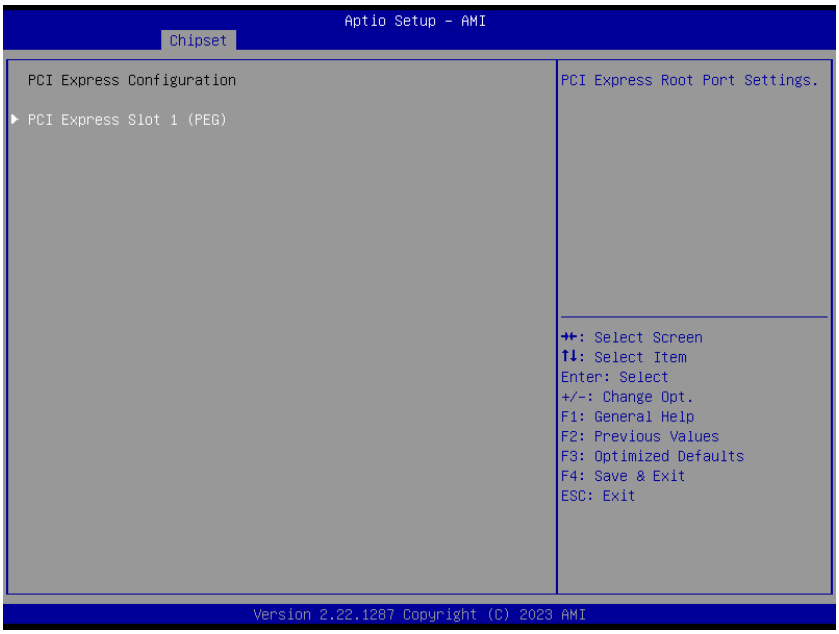
3.6.3.1.2 Graphics Configuration



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

3.6.3.1.3 DMI/OPI Configuration

3.6.3.1.4 PEG Port Configuration

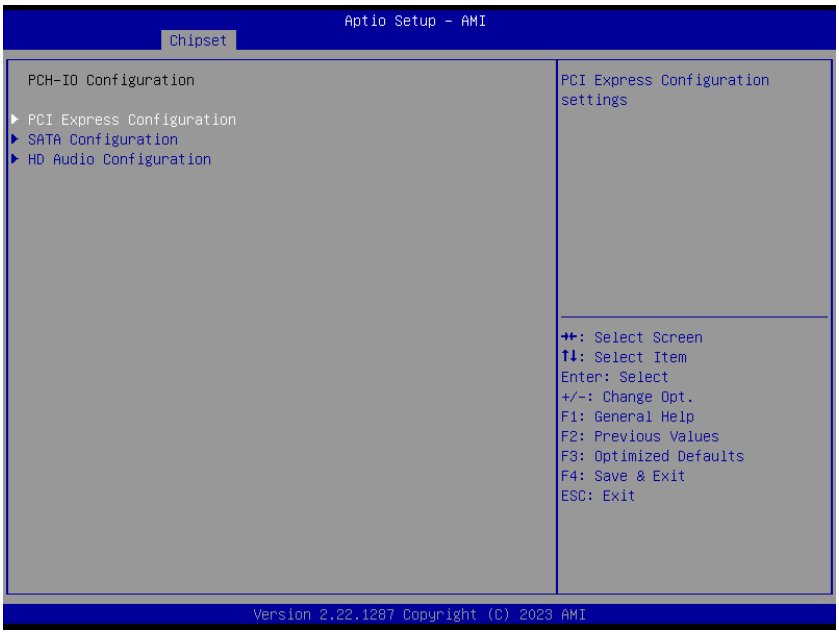


3.6.3.1.4.1 PEG Port Feature Configuration

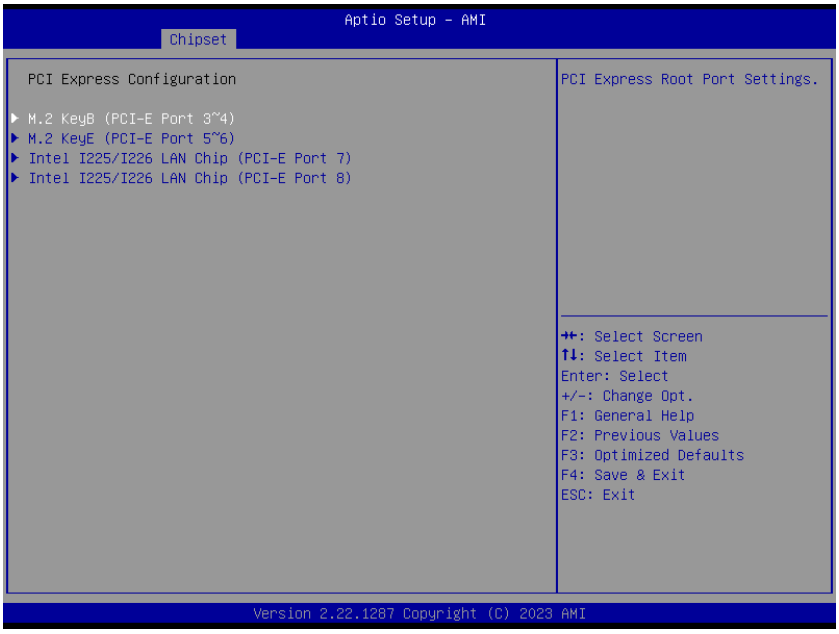
Item	Option	Description
PCI Express Slot 1 (PEG)	Disabled**[Default]** Enabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM
PCIe Speed	Auto**[Default]** Gen1/Gen2/ Gen3/Gen4/Gen5	Configure PCIe Speed

Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

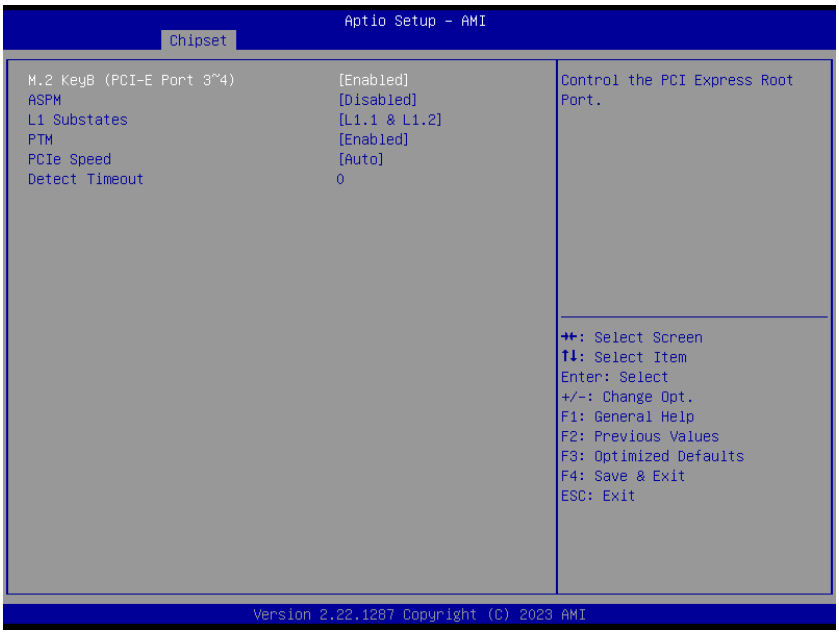
3.6.3.2 PCH-IO Configuration



3.6.3.2.1 PCI Express Configuration

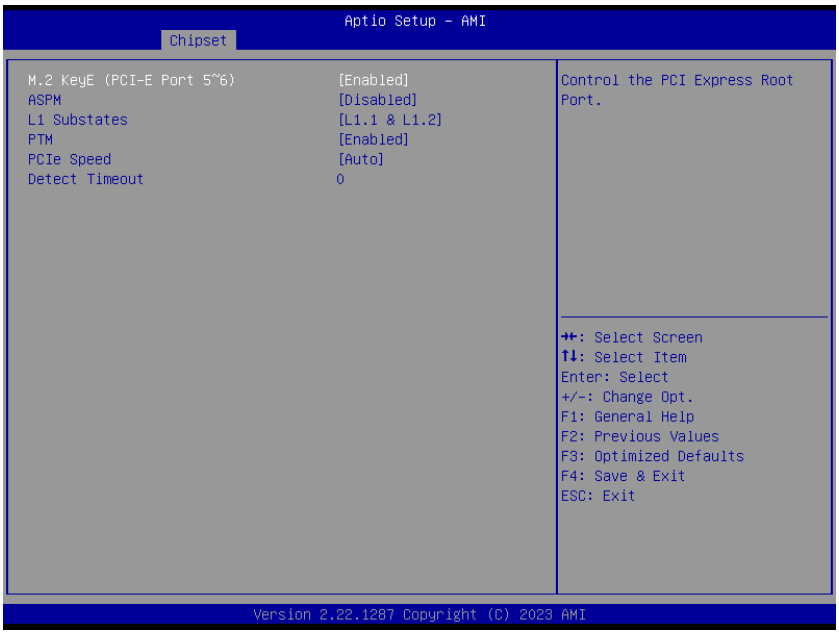


3.6.3.2.1.1 M.2 KeyB (PCI-E Port 3~4)



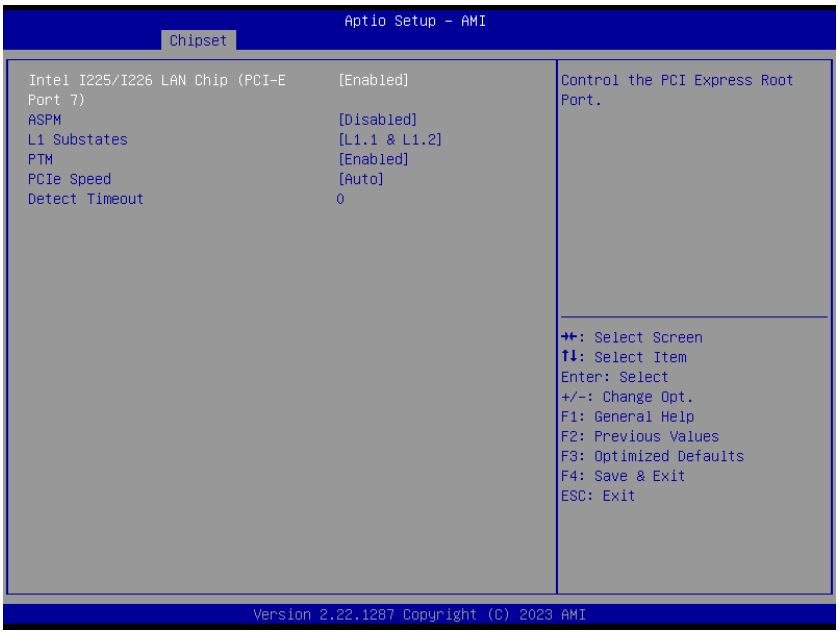
Item	Option	Description
M.2 KeyB (PCI-E Port 3~4)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L1 Auto	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

3.6.3.2.1.2 M.2 KeyE (PCI-E Port 5~6)



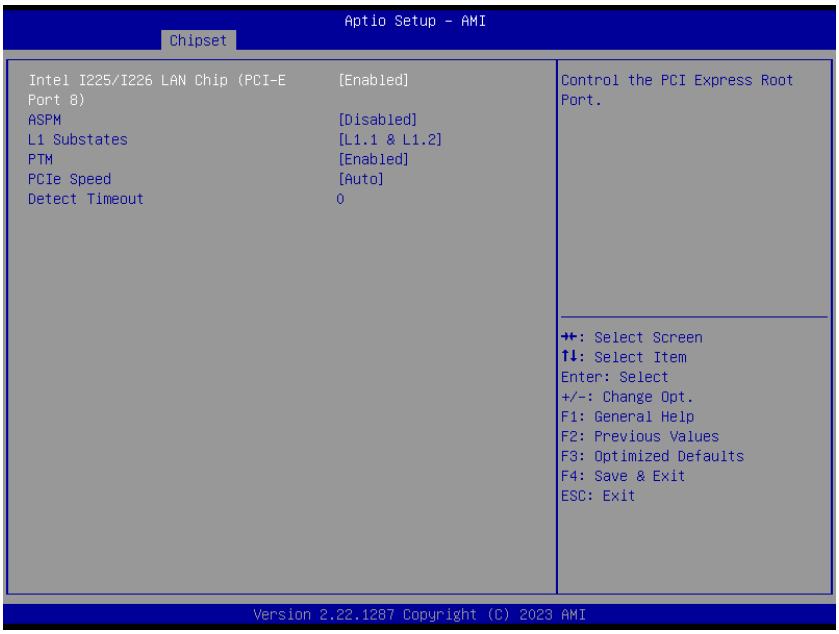
Item	Option	Description
M.2 KeyE (PCI-E Port 5~6)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L1 Auto	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

3.6.3.2.1.3 Intel I225/I226 LAN Chip (PCI-E Port 7)



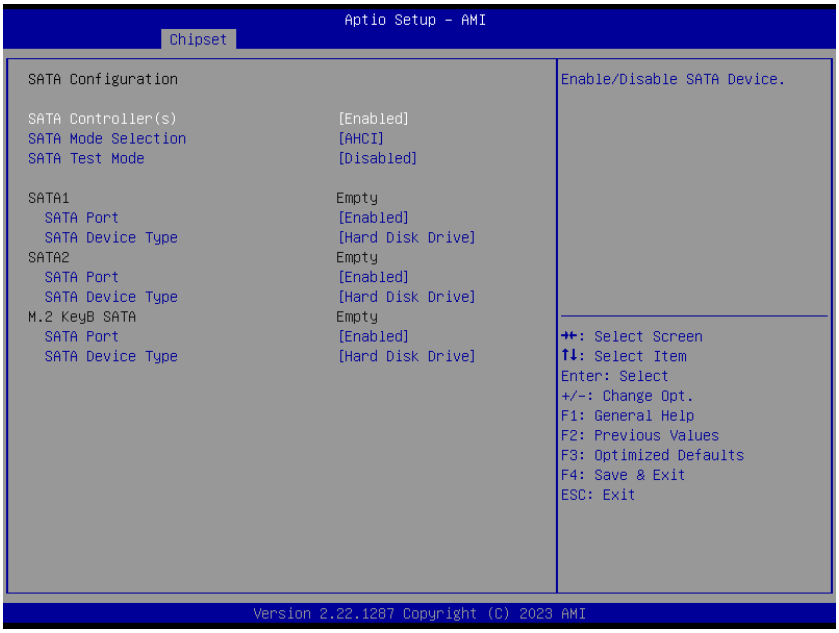
Item	Option	Description
Intel I225/I226 LAN Chip (PCI-E Port 7)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L1 Auto	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

3.6.3.2.1.4 Intel I225/I226 LAN Chip (PCI-E Port 8)



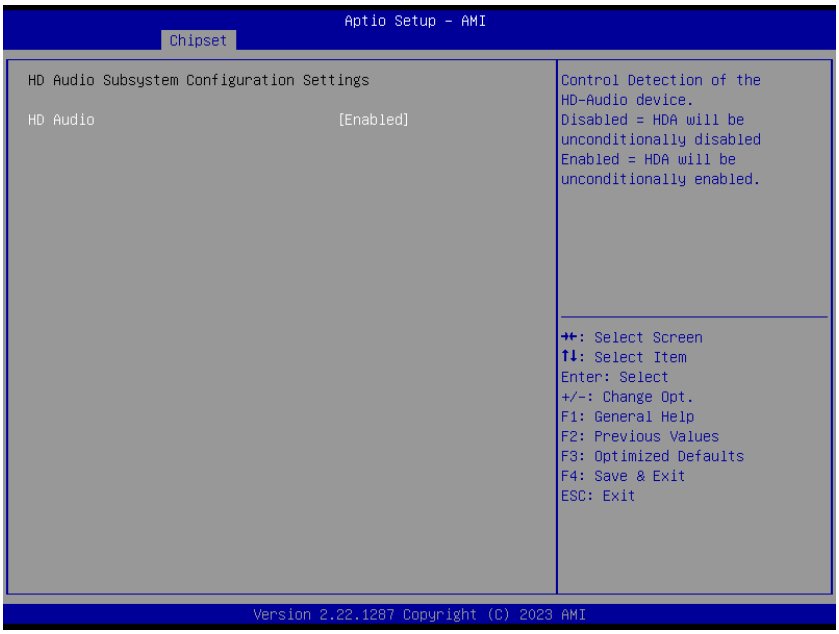
Item	Option	Description
Intel I225/I226 LAN Chip (PCI-E Port 8)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L1 Auto	Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3 Gen4	Configure PCIe Speed
Detect Timeout	0	The number of milliseconds reference code will wait for link to exit Detect state for enabled ports before assuming there is no device and potentially disabling the port.

3.6.3.2.2 SATA Configuration



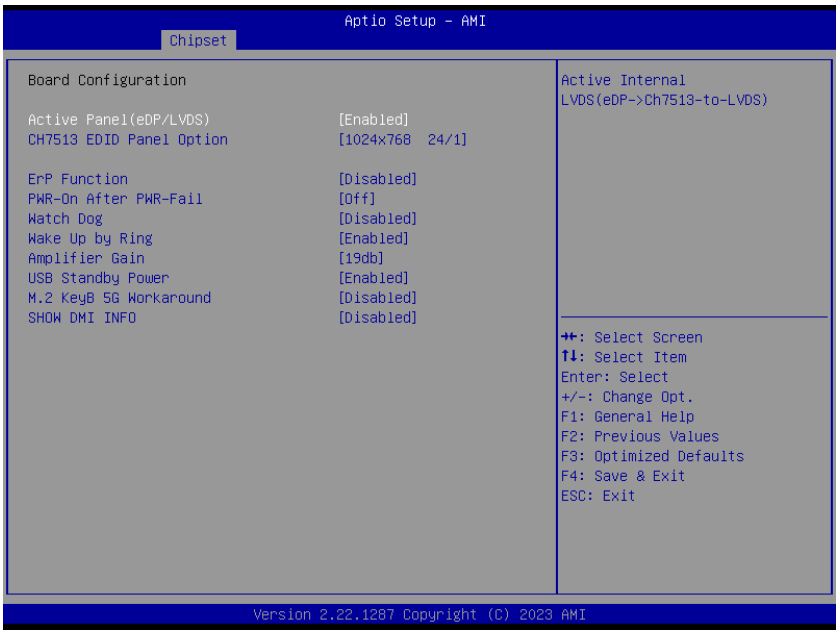
Item	Options	Description
SATA Configuration(S)	Enabled**[Default]**, Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI	Determines how SATA controller(s) operate.
SATA Test Mode	Enabled Disabled**[Default]**,	Test Mode Enable/Disable (Loop Back).
SATA Port	Disabled Enabled**[Default]**,	Enable or Disable SATA Port
SATA Device Type	Hard Disk Drive**[Default]**, Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

3.6.3.2.4 HD Audio Configuration



Item	Option	Description
HD Audio	Disabled Enabled**[Default]**,	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



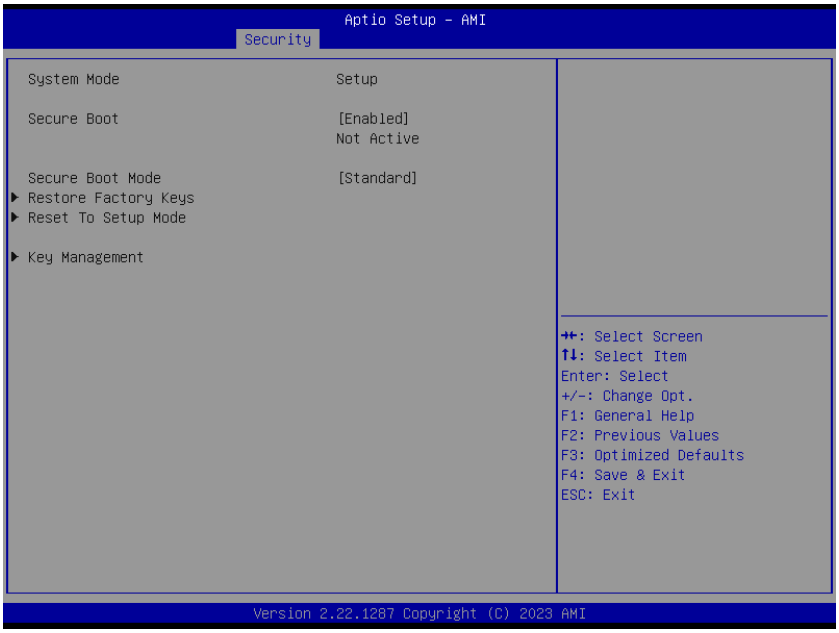
Item	Option	Description
Active Panel (eDP/LVDS)	Disabled Enabled**[Default]**,	Active Internal LVDS(eDP->Ch7513-to-LVDS)
CH7513 EDID Panel Option	1024x768 24/1**[Default]**, 800x600 18/1	Port1-EDP to LVDS(Chrotel 7513) Panel EDID Option

	1024x768 18/1 1366x768 18/1 1024x600 18/1 1280x800 18/1 1920x1200 24/2 1920x1080 18/2 1280x1024 24/2 1440x900 18/2 1600x1200 24/2 1366x768 24/1 1920x1080 24/2 7513-eDP	
ErP Function	Disabled**[Default]**, Enabled	ErP Function (Deep S5).
PWR-On After PWR-Fail	Off**[Default]**, On Last state	AC loss resume.
Watch Dog	Disabled**[Default]**, 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
Wake Up by Ring	Disabled Enabled**[Default]**,	Wake Up by Ring from S3/S4/S5
Amplifier Gain	11db 14db 19db**[Default]**, 25db	Amplifier Gain
M.2 KeyB 5G Workaround	Disabled Enabled**[Default]**,	Enabled/Disabled M.2 KeyB 5G Card Workaround
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

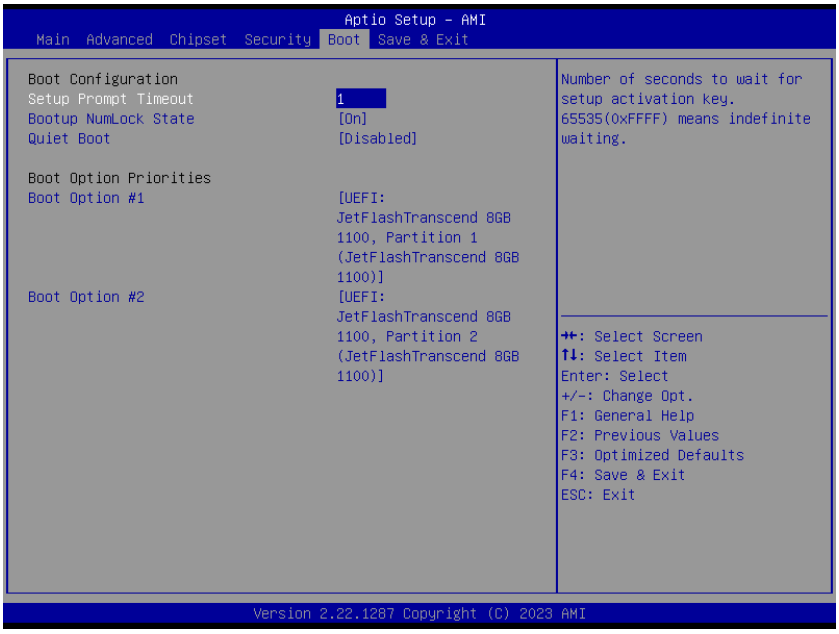
3.6.4.1 Secure Boot



Item	Option	Description
Secure Boot	Disabled**[Default]**, 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

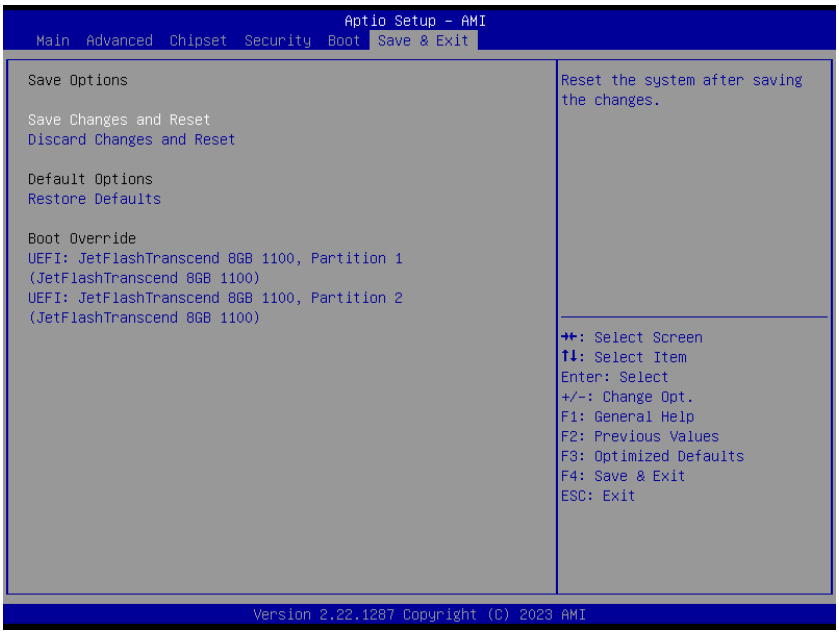
Secure Boot Mode	Standard Custom**[Default]**,	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication

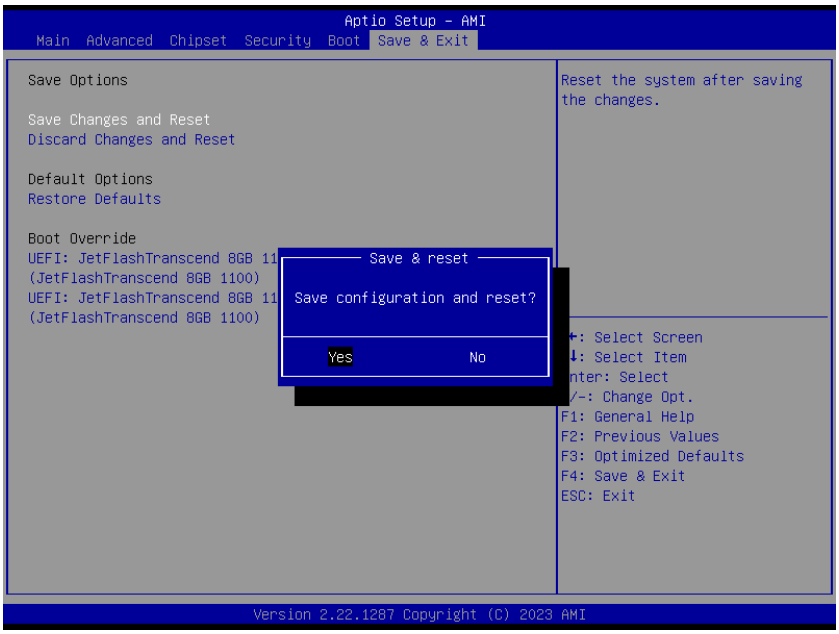
3.6.5 Boot



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	

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.

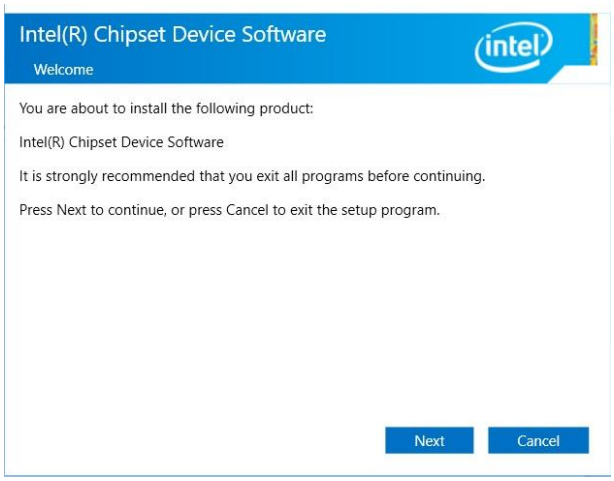
4. Drivers Installation

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

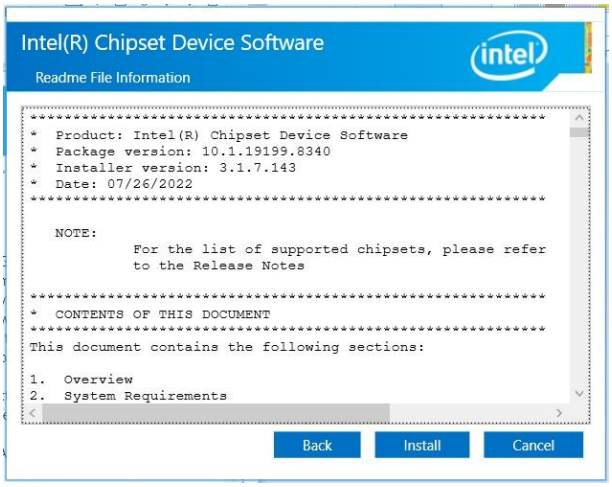
All drivers can be found on the Avalue Official Website: **http://www.avalue.com.tw**.

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 Continue to go on.



Step1. Click **Next**.

Step 2. Click **Accept**.



Step 3. Click **Install**.

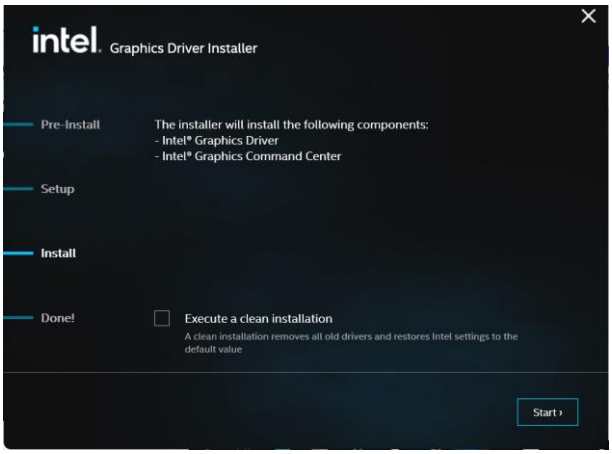
Step 4. Complete setup.

4.2 Install VGA Driver

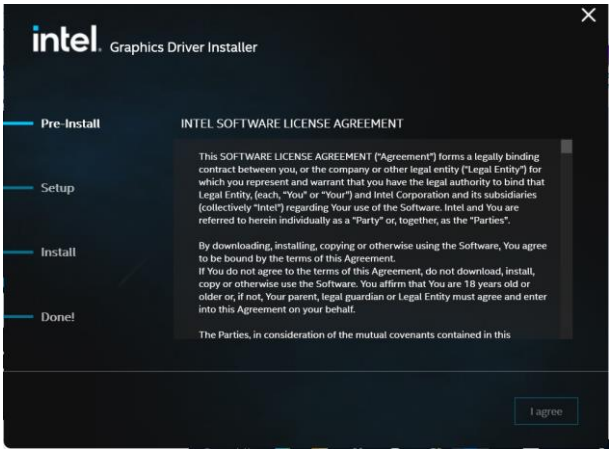
All drivers can be found on the Avalue Official Website: **http://www.avalue.com.tw**.

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 Continue to go on.

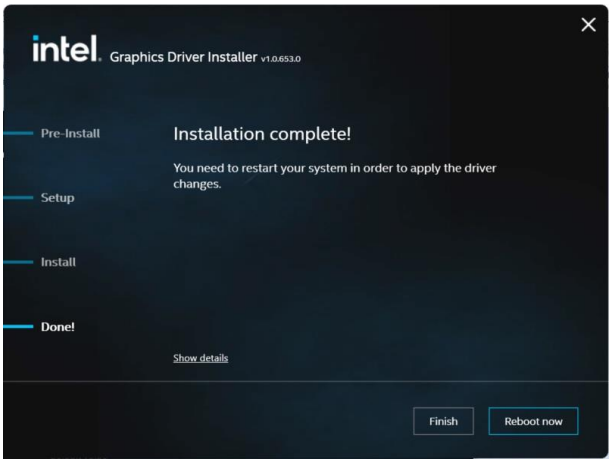
Step 1. Click **Next** to continue installation.



Step 3. Click **Next.**



Step 2. Click **Yes**.

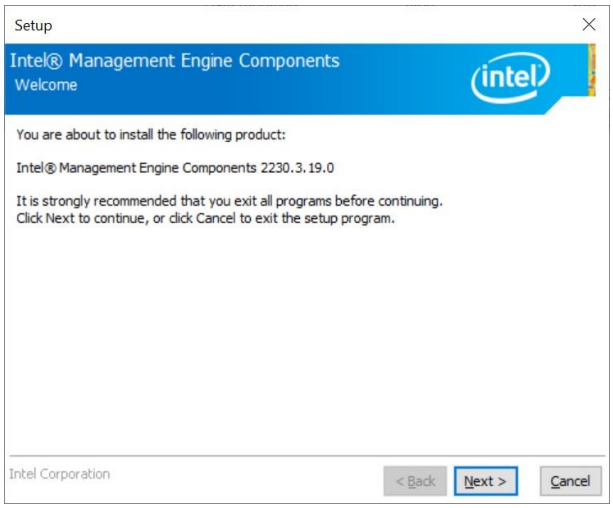


Step 4. Click **Finish** to complete setup.

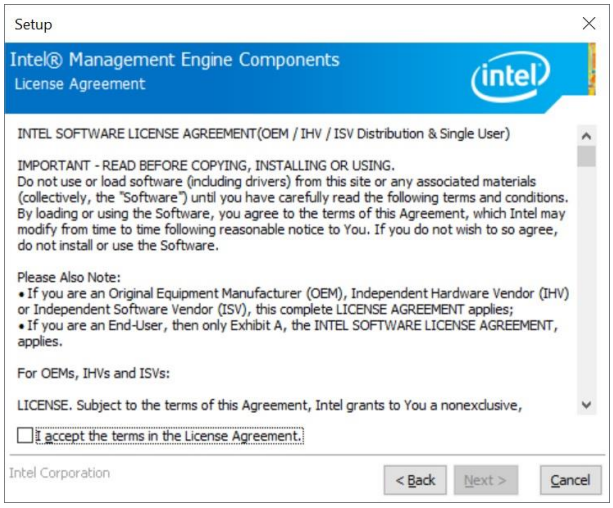
4.3 Install ME Driver

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

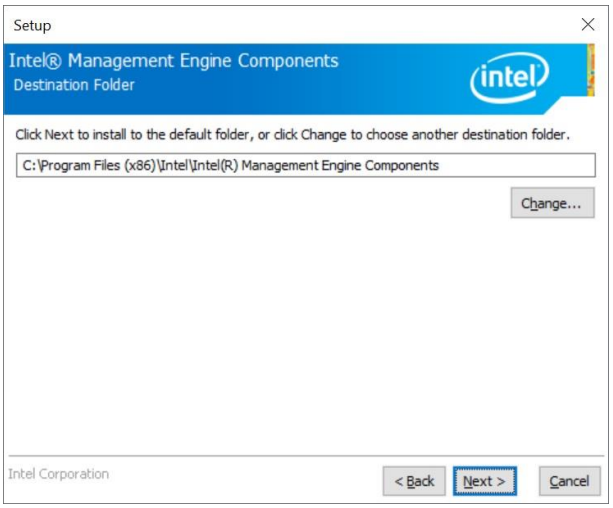
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



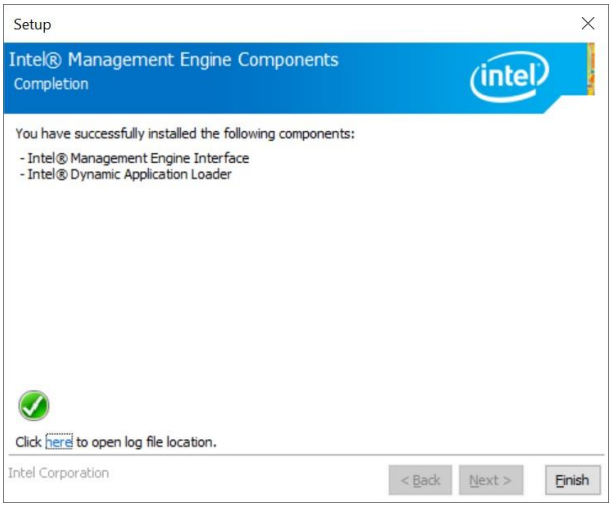
Step 1. Click **Next** to continue setup.



Step 2. Click **Next**.



Step 3. Click **Next**

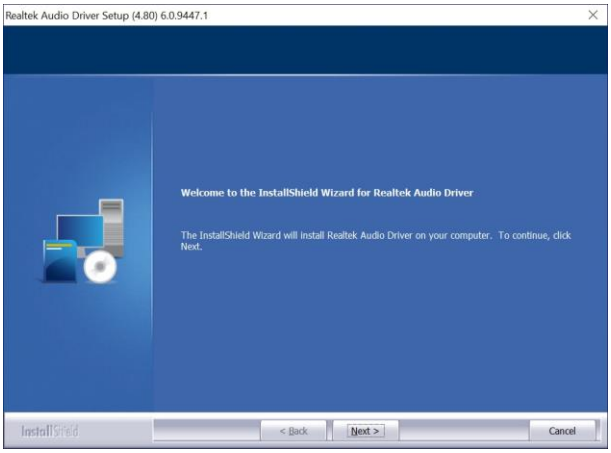


Step 5. Click **Finish** to complete the setup

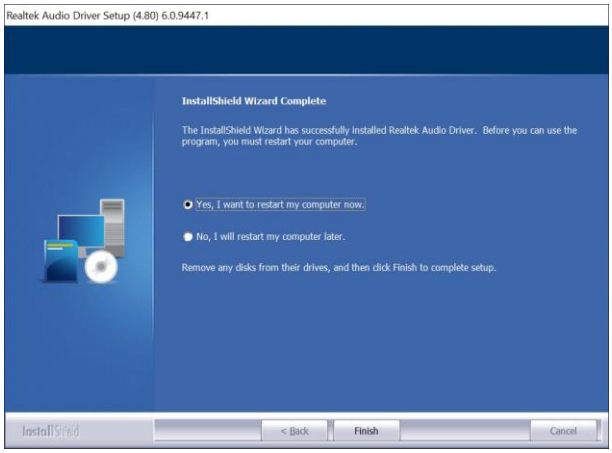
4.4 Install Audio Driver

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.



Step1. Click **Next** to Install.

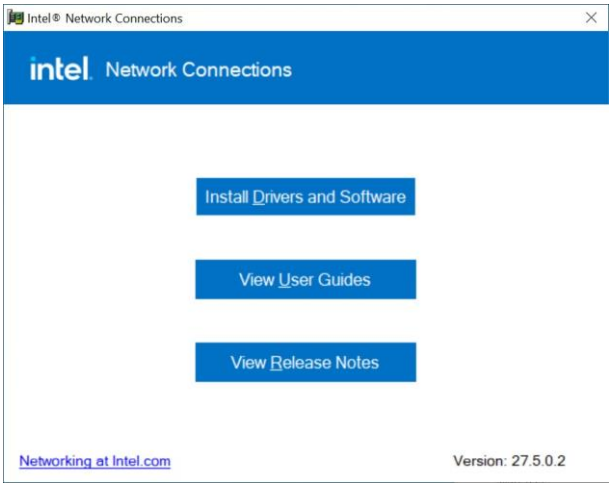


Step 2. Select **Finish** to complete Installation.

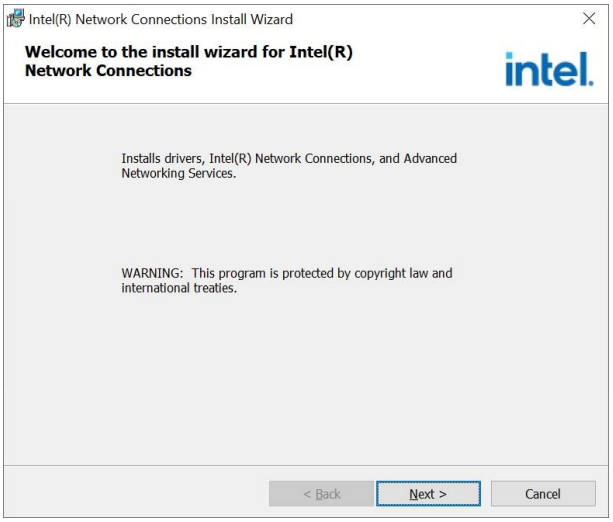
4.5 Install LAN Driver

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

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

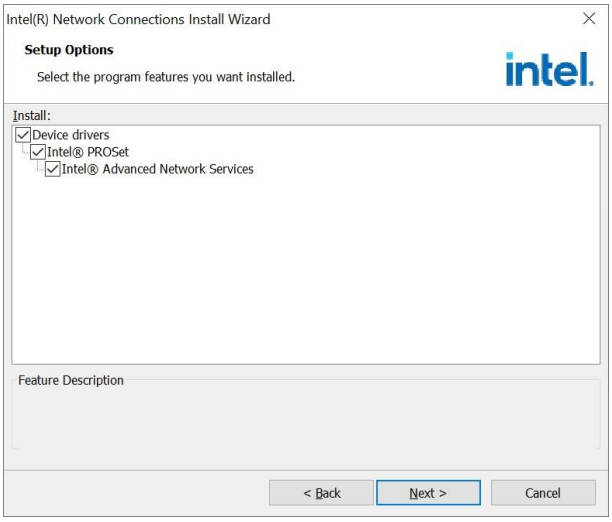


Step 1. Click **Install Drivers and Software**

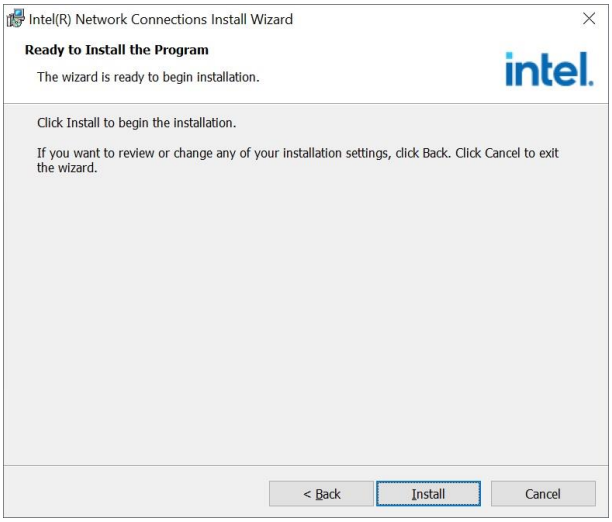


Step 2. Click **Next** to continue installation.

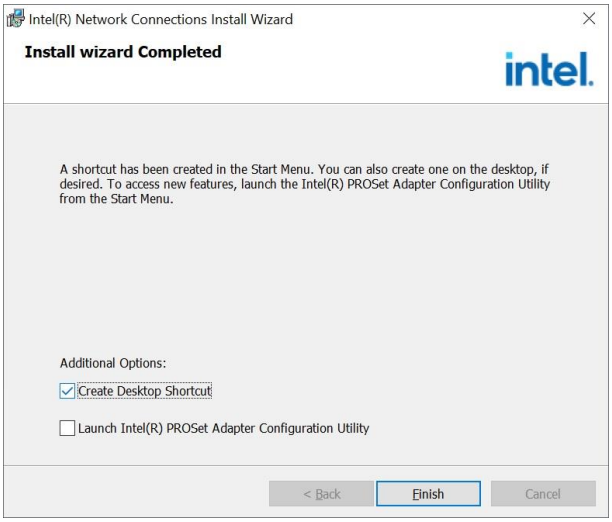
Step 3. Click **Next**.



Step 4. Click **Next**.

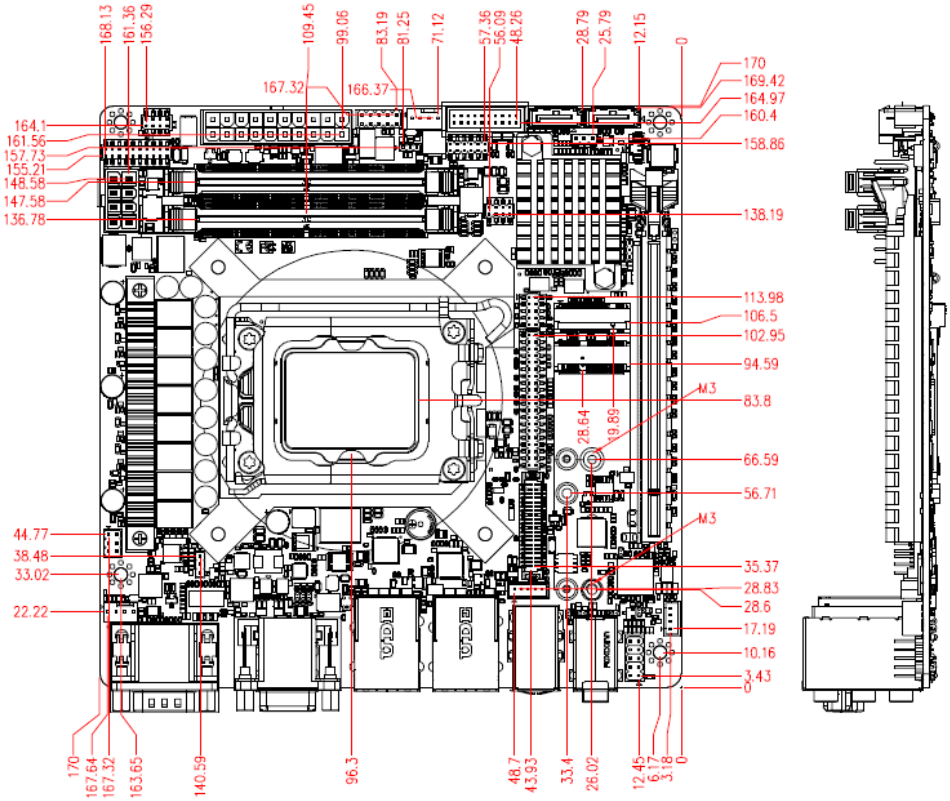


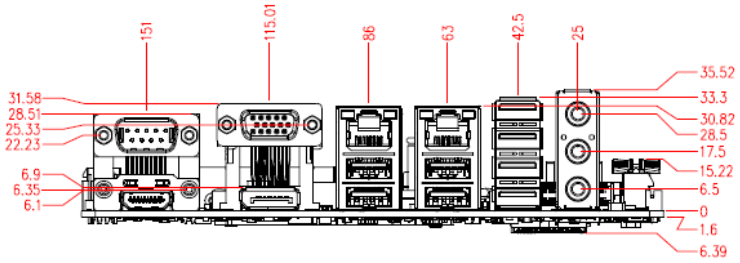
Step 5. Click **Install**.



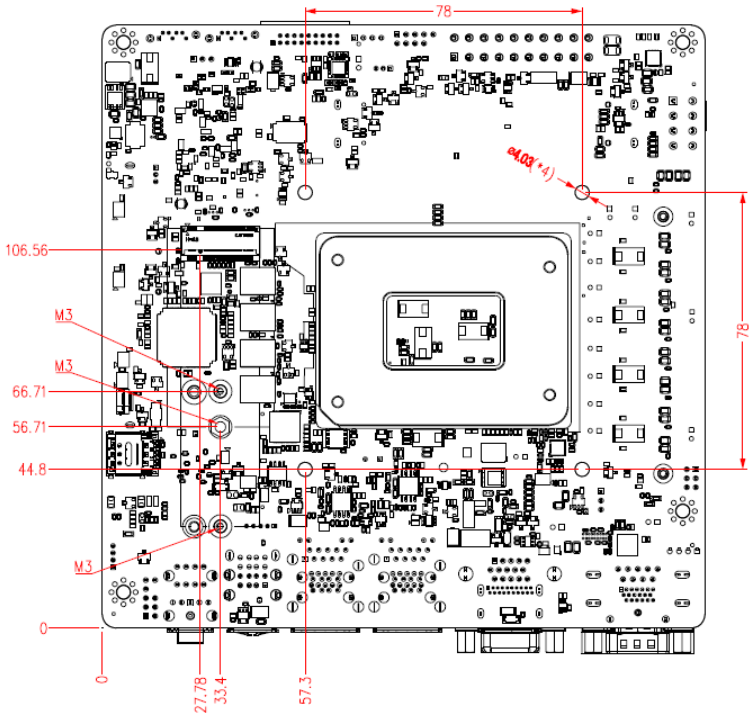
Step 6. Click **Finish** to complete setup.

5. Mechanical Drawing





Unit: mm



Unit: mm