MX610HD

12th/13th Gen Intel® Core™ Processors Thin Mini-ITX Motherboard with Intel® H610E Chipset

User's Manual

1st Ed – 13 January 2024

Part No. E2047MX6D00R

FCC Statement

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.
THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.
THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.
OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

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

Copyright Notice

Trademark Acknowledgement

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

Disclaimer

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

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

Life Support Policy

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

As used herein:

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

A Message to the Customer

Avalue Customer Services

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

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

Technical Support

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

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

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 mini-ITX MX610HD motherboard
- 2 x I/O Shield (Full Size I/O Shield+ Half Size I/O Shield)
- 1 x SATA power cable

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

1.3 Document Amendment History

Revision	Date	By	Comment
1st	November 2023	Avalue	Initial Release

1.4 Manual Objectives

This manual describes in details Avalue Technology MX610HD 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 MX610HD 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

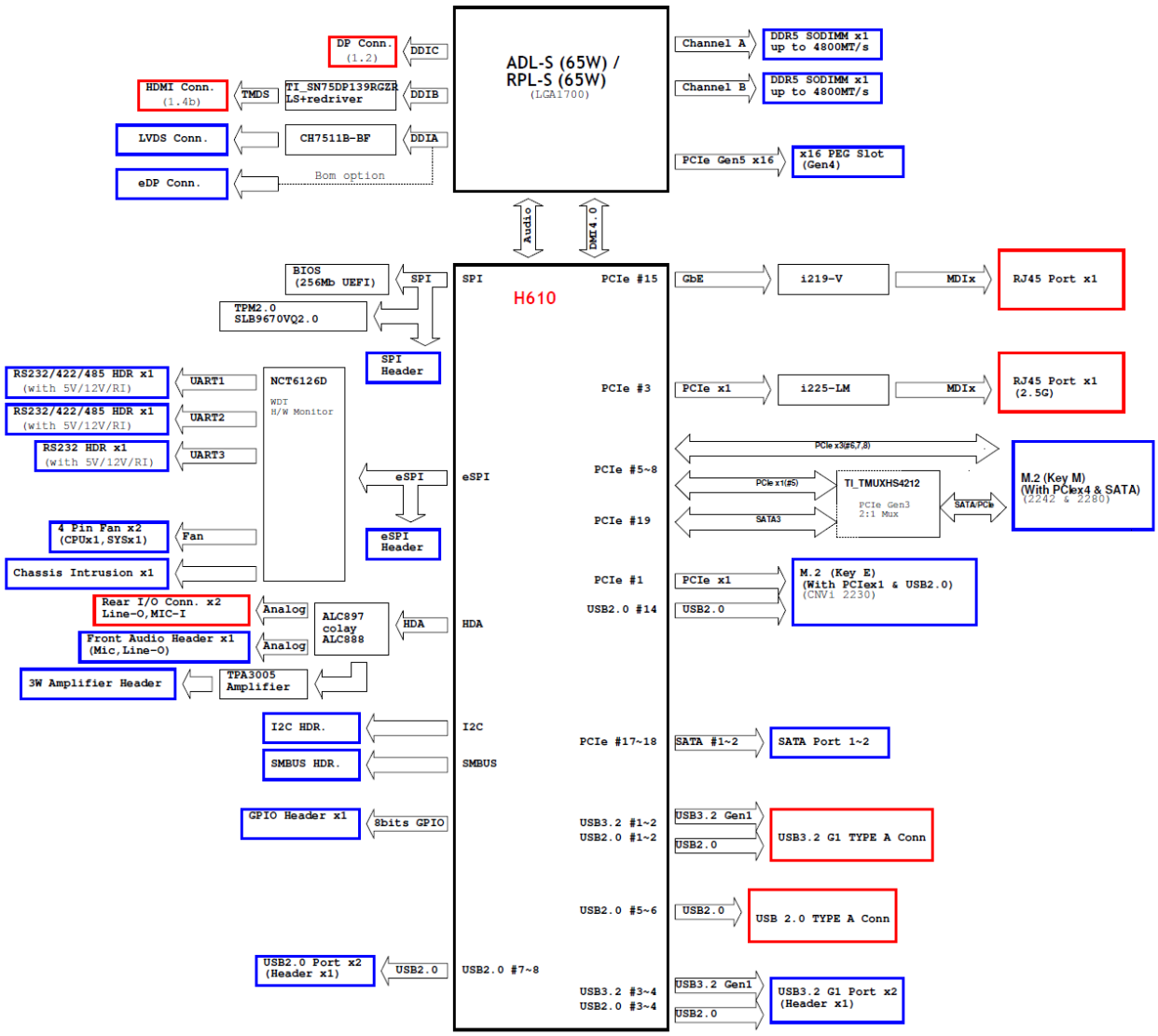
System	
CPU	LGA 1700 Socket supports Intel® Raptor/Alder Lake Core™ i7, Core™ i5, Core™ i3, Pentium, Celeron Processor up to 16 Cores 24 Threads Hybrid up to 65W
BIOS	Socket Type 256Mb SPI BIOS
System Chipset	Intel® H610E PCH
Memory	2 x Horizontal Type SoDIMM Up to 64GB Max Dual Channel DDR5 4800MHz
Watchdog Timer	1 ~ 255 sec timer
H/W Status Monitor	CPU & system temperature monitoring Voltages monitoring
Expansion Slots	1 x Gen 4 PCIe x16 (x16 Physical black) 1 x M.2 2242/2280 M Key NVMe (PCIe x4 + SATA III) 1 x M.2 2230 E Key with CNVi Support (PCIe x 1 + USB 2.0)
Smart Fan Control	Yes
Display	
Chipset	Intel® Integrated Iris Xe Graphic (CPU Dependent)
Display Memory	Shared Memory
Ethernet	
LAN1	Intel® I219-V Gigabit Ethernet PHY
LAN2	Intel® I225-LM 2.5 Gigabit Ethernet Controller
Back I/O Port	
Back Panel	1 x HDMI Connectors 1 x DisplayPort Connectors 2 x RJ45 LAN ports 2 x USB 3.2 Type-A Connectors 2 x USB 2.0 Type-A Connectors 1 x Line out (green color) 1 x Mic in (Pink color) 1 x DC-in Jack
Internal I/O Connector	
Internal I/O	2 x SATA III Vertical Connectors (Red) 1 x 15 Pins SATA Power Connector (2 Devices) 1 x RS-232 Headers with Voltage Selection (2.0mm Pitch) 2 x RS-232/422/485 Headers with Voltage Selection (2.0mm Pitch) 1 x USB 2.0 Headers with Shroud (2 Ports on Header) 1 x USB 3.2 Gen 1 Header with Shroud (2 Ports on Header)

Internal I/O	1 x LVDS Header 1 x eDP Header (Optional) 1 x Backlight Locking Type Header 1 x SPI Header (2.00mm Pitch) 1 x I2C Header 1 x SMBus Header 1 x Front Audio Header with Shroud (2.54mm Pitch) 1 x Amplifier Locking Type Header (2.0mm Pitch) Amp output: 6W with 8 Ohm. 1 x Front Panel Headers with Shroud (2.54mm Pitch) 1 x 8 bits GPIO Header with Shroud 1 x 4 Pin CPU Fan Header (4 Pin PWM) 1 x 4 Pin Chassis Fan Header (4 Pin PWM) 1 x Cable Type CMOS Battery 1 x Chassis Intrusion Locking Type Header 1 x 4 Pin Mini-Fit Jr DC-In Header
Onboard I/O	
Operating Temperature	0~60°C (32~140°F)
Operating Humidity	5%~90% relative humidity, non-condensing
Size (L x W)	6.7" (L) x 6.7" (W) (170mm x 170mm)

Note: Specifications are subject to change without notice.

1.6 Architecture Overview—Block Diagramk Diagram

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

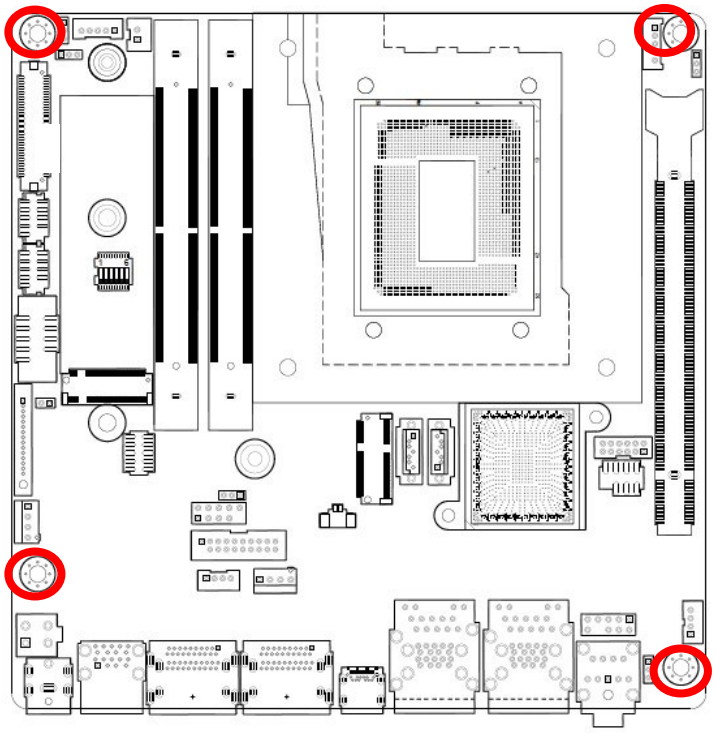


User condition suggestion:

- **Screw Holes**

Place four screws into the holes indicated by circles to secure the motherboard to the chassis.

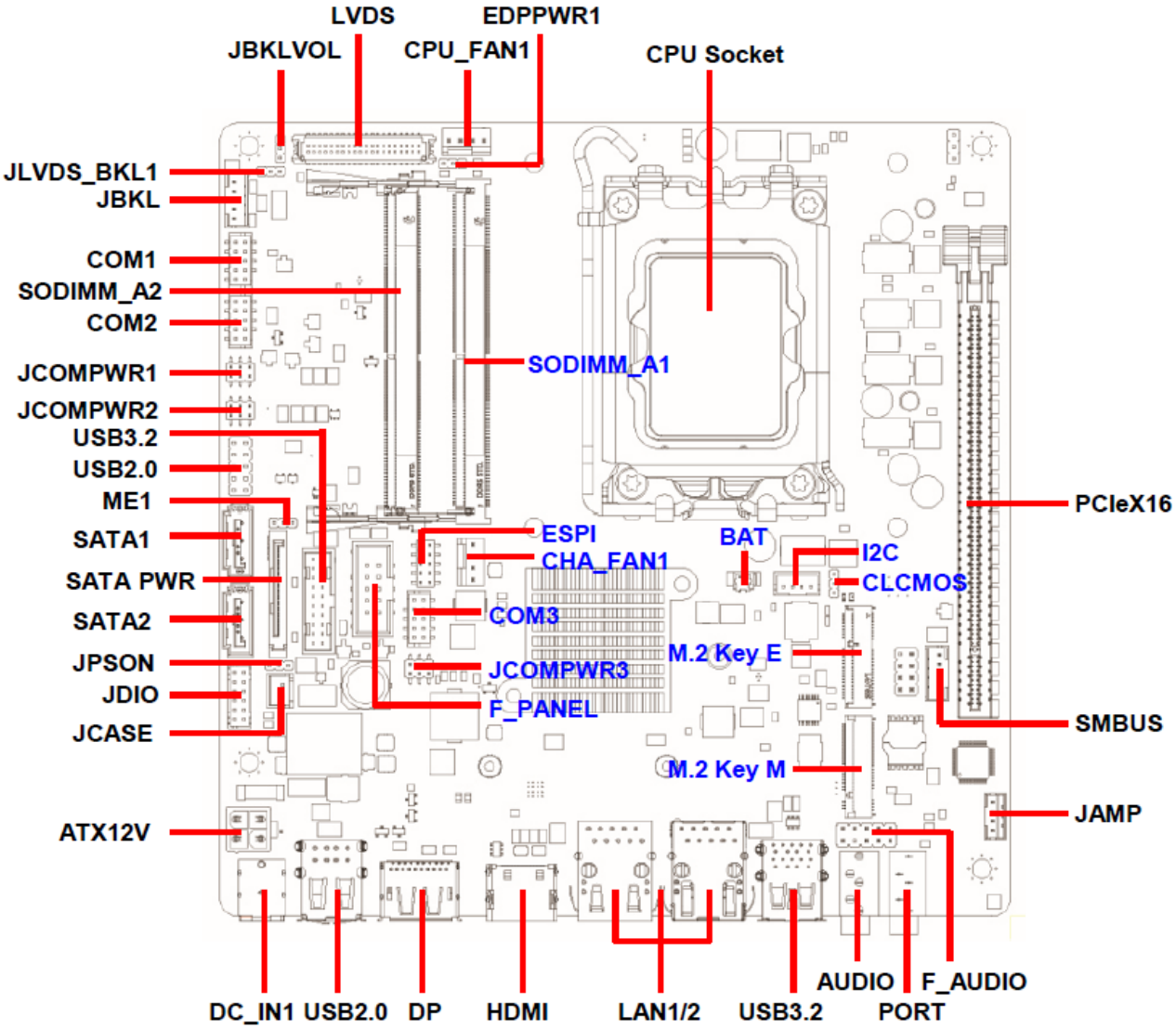
Do not over tighten the screws! Doing so can damage the motherboard.



Place this side towards the rear of the chassis.

2. Hardware Configuration

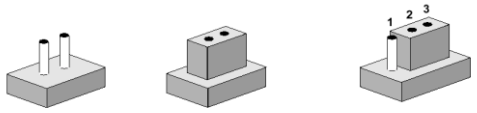
2.1 Product Overview



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
CLCMOS1	Clear CMOS	3 x 1 header, pitch 2.00mm
JCOMPWR1~3	COM1~3 power setting	3 x 2 header, pitch 2.00mm
JBKLVOL	LVDS panel power setting	3 x 1 header, pitch 2.00mm
JLVDS_BKL1	LVDS brightness mode setting	3 x 1 header, pitch 2.00mm
EDPPWR1	eDP power setting	3 x 1 header, pitch 2.00mm

Connectors

Label	Function	Note
CPU_FAN1	CPU Fan connector	4 x 1 wafer, pitch 2.54mm
CHA_FAN1	Chassis Fan connector	4 x 1 wafer, pitch 2.54mm
F_PANEL1	Front Panel connector	5 x 2 header, pitch 2.54mm
ATX12V1	12V ATX power connectors	4 x 2 wafer, pitch 2.54mm

COM1~3	Serial Port Connector	5 x 2 header, pitch 2.00mm
SATA1~2	SATA Connector	Male connector (Red)
FP_ AUDIO1	Front Panel Audio Connector	5 x 2 header, pitch 2.54mm
JDIO1	Digital I/O Connector	4 x 2 wafer, pitch 2.00mm
I2C1	I2C connector	4 x 1 wafer, pitch 2.00mm
USB56	Front USB 3.2 Header	10 x 2 header, pitch 2.00mm
USB78	Front USB 2.0 Headers	10 x 2 header, pitch 2.54mm
LVDS1	LVDS header	20 x 2 wafer, pitch 1.25mm
JBKL1	LVDS backlight connector	5 x 1 wafer, pitch 2.00mm
SMBUS1	SMBus connector	5 x 1 wafer, pitch 2.00mm
JAMP1	Amplifier Connector	4 x 1 wafer, pitch 2.00mm
JCASE1	Chassis Intrusion Header	2 x 1 wafer, pitch 2.50mm
CPU1	LGA1700 CPU socket	
SODIMMA1/B1	DDR5 SODIMM Slot	Dual channel. (1 DIMMs per channel)
PCIEX16_1	PCIe x16 Gen4	
M2E1	M.2 key E slot	PCIEx1+USB interface
M2M_1	M.2 key M slot	PCIEx4+SATA interface
DC_IN1	DC in connector	
USB34	USB 2.0 Type A connector	Support 2 ports
DP1	Display port x1	
HDMI1	HDMI port x1	
LAN1	RJ-45 Ethernet Connector x 1	1 Gigabit Ethernet
LAN2	RJ-45 Ethernet Connector x 1	2.5 Gigabit Ethernet
USB12	USB 3.2 Type A connector	Support 2 ports
LINEOUT1	Line out port x1	Color: Lime
MICIN1	Mic-in port x1	Color: Pink

User condition suggestion:

- **Central Processing Unit (CPU)**

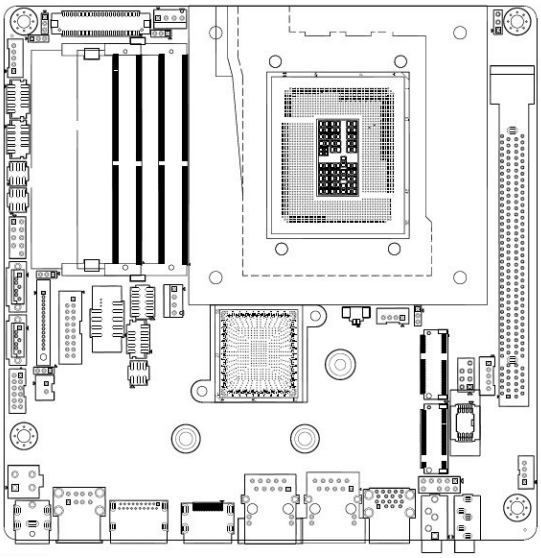
The motherboard comes with a surface mount LGA1700 socket designed for the Intel® Core™ i7/ i5/ i3 processor in the 1700-land package.

Your boxed Intel® Core™ i7/ i5/ i3 LGA1700 processor package should come with installation instructions for the CPU, fan and heatsink assembly. If the instructions in this section do not match the CPU documentation, follow the latter.
Upon purchase of the motherboard, make sure that the PnP cap is on the socket and the socket pins are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket pins/motherboard components. BCM will shoulder the cost of repair only if the damage is shipment/transit-related.
Keep the cap after installing the motherboard. BCM will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1700 socket.
The product warranty does not cover damage to the socket pins resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.
Install the CPU fan and heatsink assembly before you install motherboard to the chassis.

If you purchased a separate CPU heatsink and fan assembly, make sure that you have properly applied Thermal Interface Material to the CPU heatsink or CPU before you install the heatsink and fan assembly.

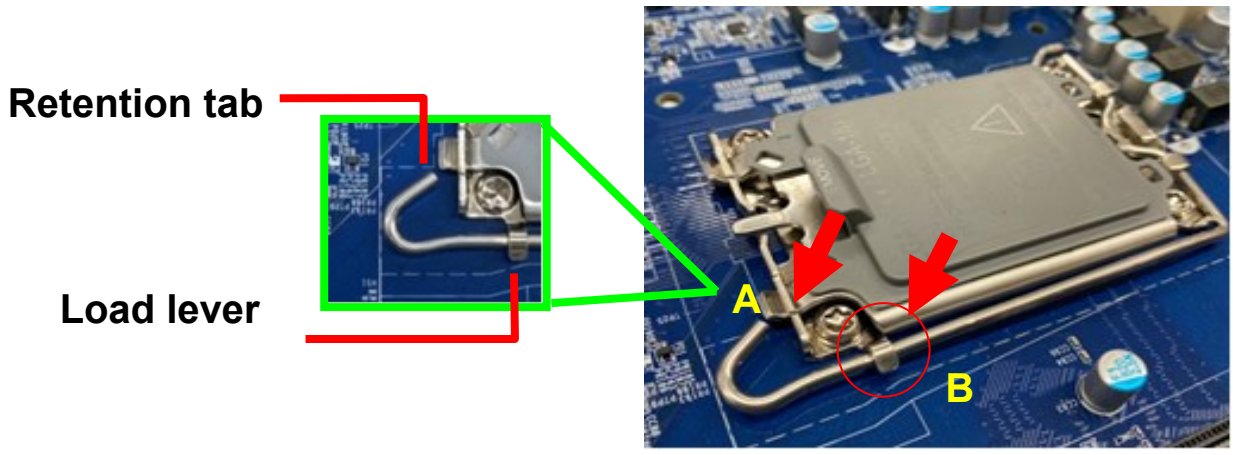
- **Installing the CPU**

Locate the CPU socket on the motherboard.



Before installing the CPU, make sure that the socket box is facing towards you and the load lever is on your left.

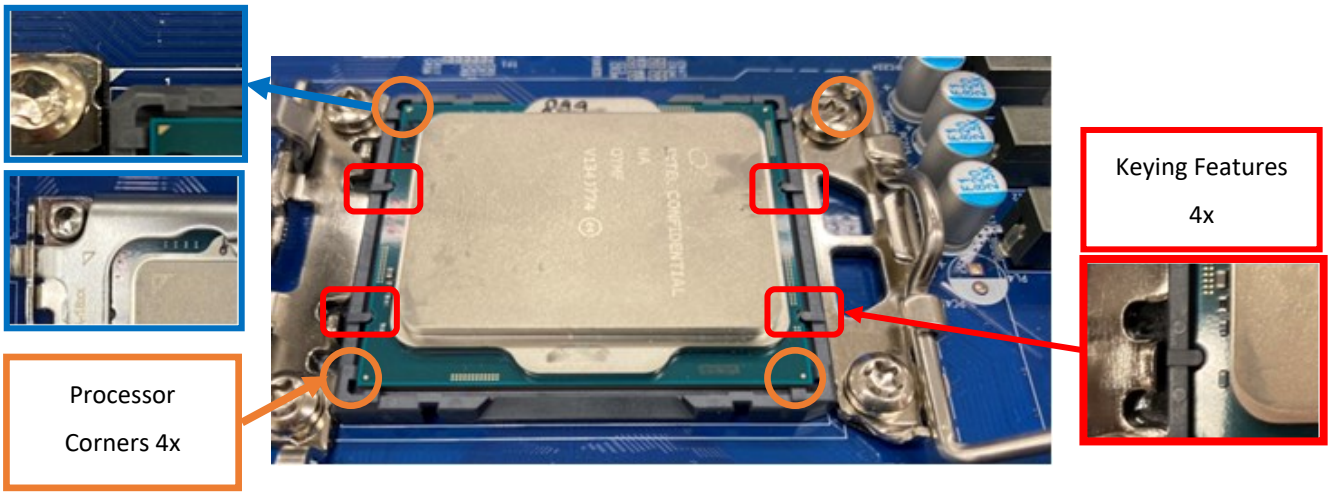
- Press the load lever with your thumb (A), then move it to the left (B) until it is released from the retention tab.



To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

- Lift the Load lever with your thumb and forefinger to around 120º angle (C), then pull the PnP cap from the CPU socket to remove (D).

- Position the CPU over the socket, making sure that the gold triangle is on the top-left corner of the socket then fit the socket alignment key into the CPU notch.



- Pull back the load lever, then push the load lever (E) until it snaps into the retention tab.

The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

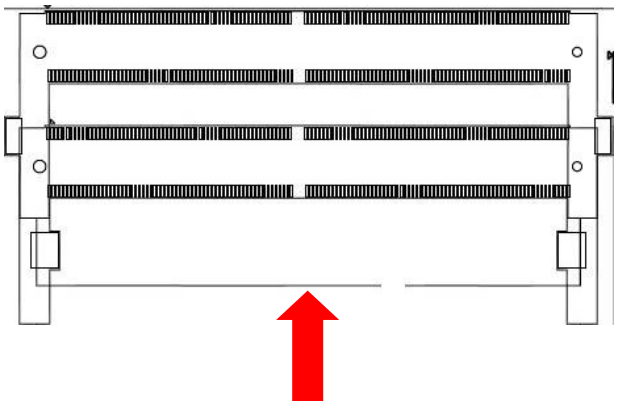
- **Installing a SODIMM**

Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Hold the SO-DIMM-module by the sides and slide it into the correct slot at the appropriate angle, golden contacts first

2. Insert the module carefully until you can no longer see the golden contacts and the module is snug in its slot.

3. Ensure that the notches on the sides line up with the rest of the locking mechanism and then gently push the module flat until the clips of locking arm lock it into place.



Alighn notch key to the rib on the slot

- A DDR5 SODIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.
- The DDR5 SODIMM sockets do not support DDR/DDR2/DDR3/DDR4 SODIMMs.
- DO NOT install DDR/DDR2/DDR3/DDR4 SODIMMs to the DDR5 SODIMM socket.

- **Installing a SODIMM**

1. Release two locking arms, and then allow the lower edge of the SODIMM to pivot slightly upwards to free it from the holder.

2. Pull the SODIMM down and away from the holder to remove it.

Support the DIMM lightly with your fingers when releasing the locking arms. The DIMM might get damaged when it flips out with extra force.

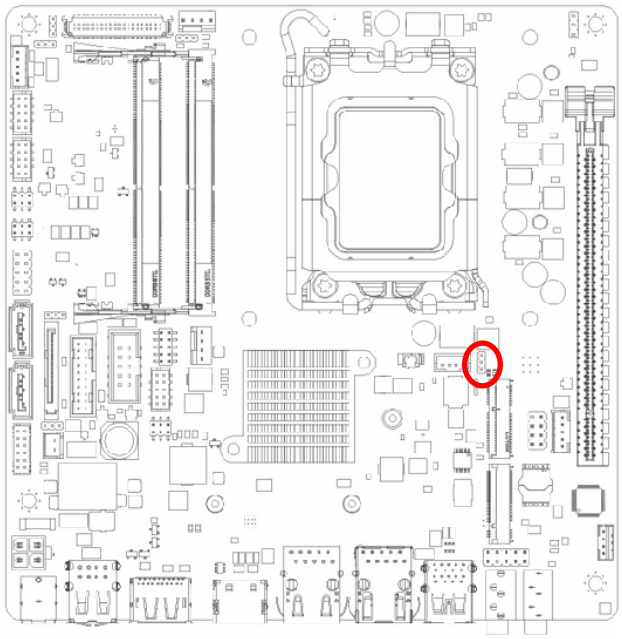
- **Expansion Card**

In the future, you may need to install expansion cards. The following sub-sections describe the slots and the expansion cards that they support.

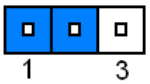
Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

2.3 Setting Jumpers & Connectors

2.3.1 Clear CMOS (JCMOS1)



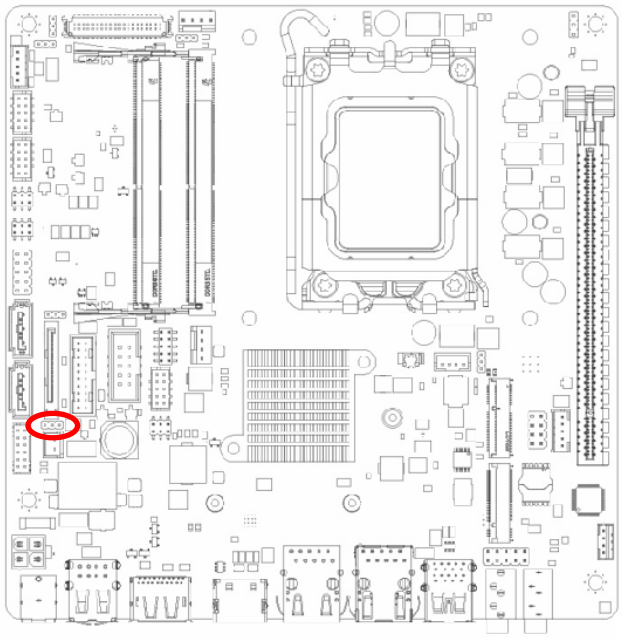
Protect*



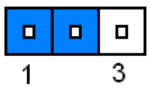
Clear CMOS

*** Default**

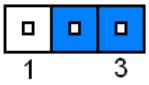
2.3.2 AT/ATX Power Mode Select (JPSON1)



AT

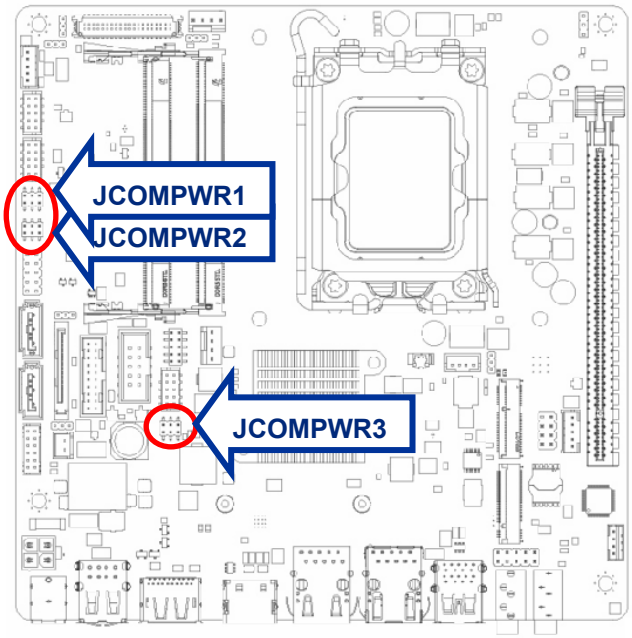


ATX*

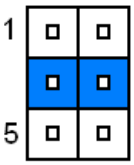


*** Default**

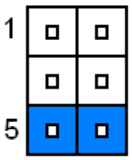
2.3.3 COM POWER SETTING (JCOMPWR1~3)



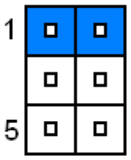
Ring*



+5V

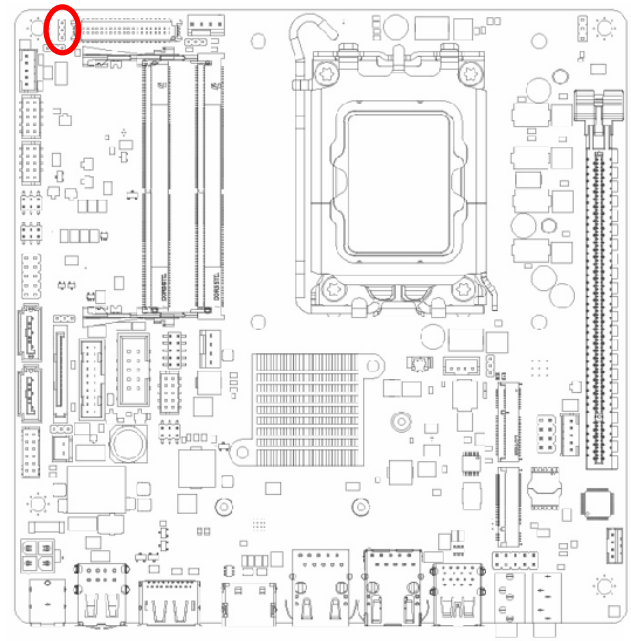


+12V

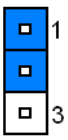


*** Default**

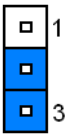
2.3.4 LVDS backlight voltage selection (JBKLVOL)



+5V*

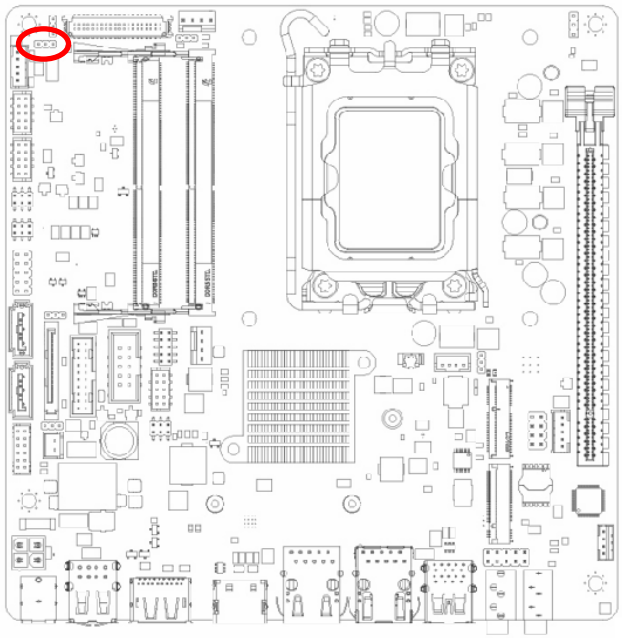


+3V

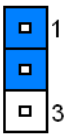


*** Default**

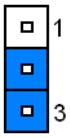
2.3.5 LVDS brightness control mode selection (JLVDS_BKL1)



PWM mode*

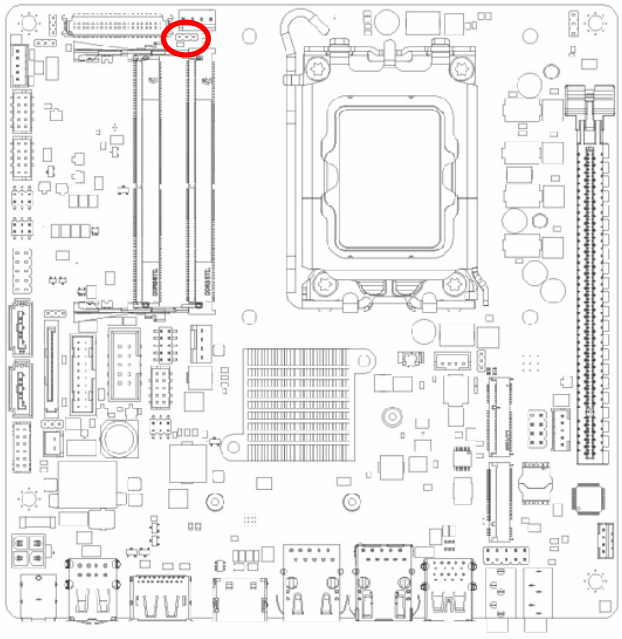


DC mode

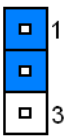


*** Default**

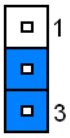
2.3.6 eDP voltage selection (EDPPWR1)



+5V

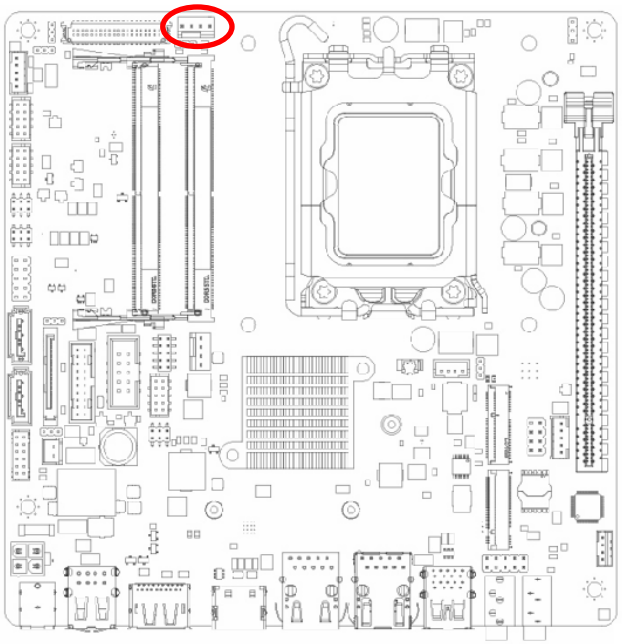


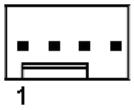
+3V*



*** Default**

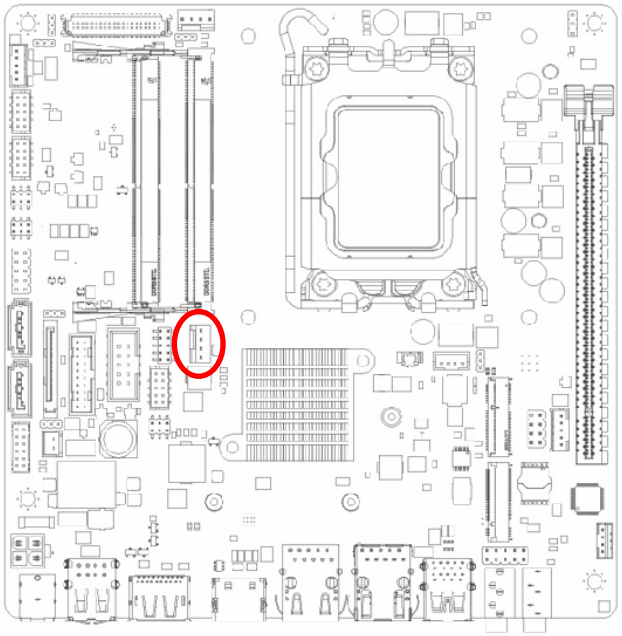
2.3.7 CPU fan connector (CPU_FAN1)

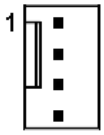




PIN	Signal
1	GND
2	+12V
3	FAN_SPEED
4	FAN_PWN

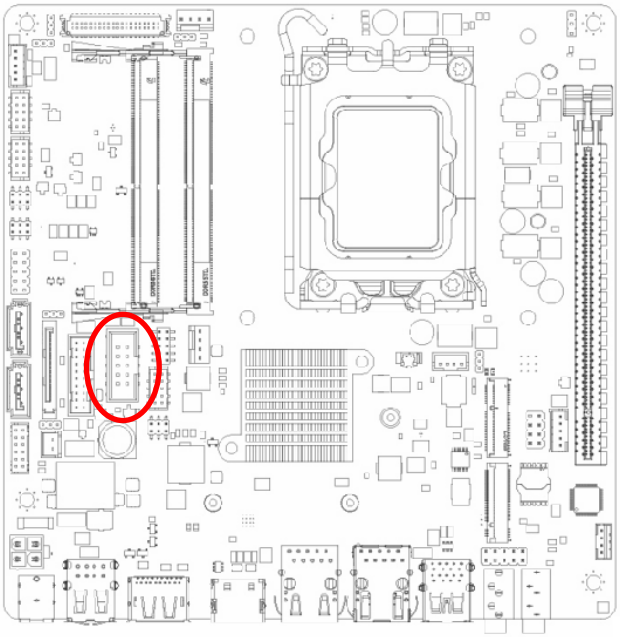
2.3.8 System fan connector (SYSFAN1)

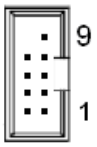




PIN	Signal
1	GND
2	+12V
3	FAN_SPEED
4	FAN_PWN

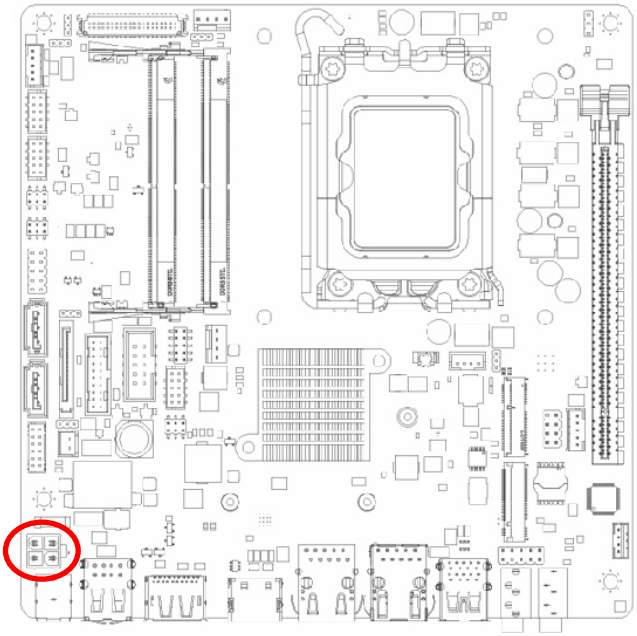
2.3.9 System Panel (F_PANEL)

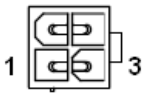




Signal	PIN	PIN	Signal
		9	NC
GND	8	7	RST
PANSWIN#	6	5	GND
PWR LED#	4	3	HDD LED#
+5VSB	2	1	HHD LED+

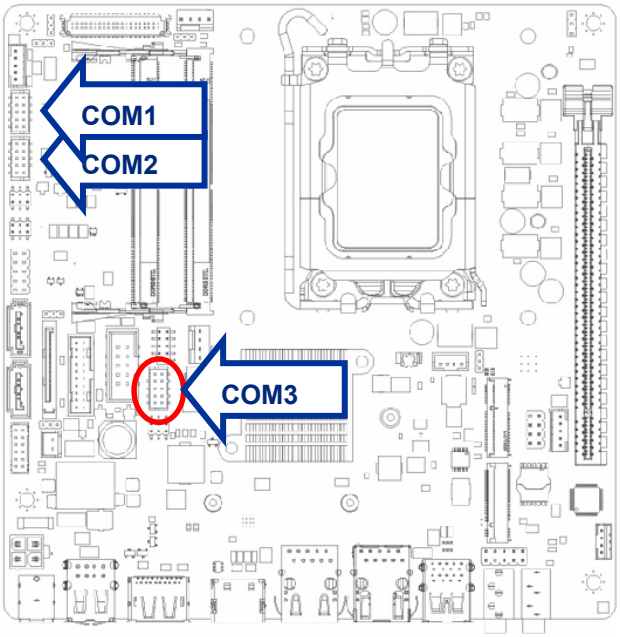
2.3.10 ATX power connectors (ATX12V1)

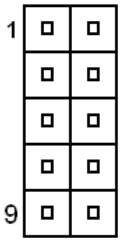




Signal	PIN	PIN	Signal
GND	2	4	+12V
GND	1	3	+12V

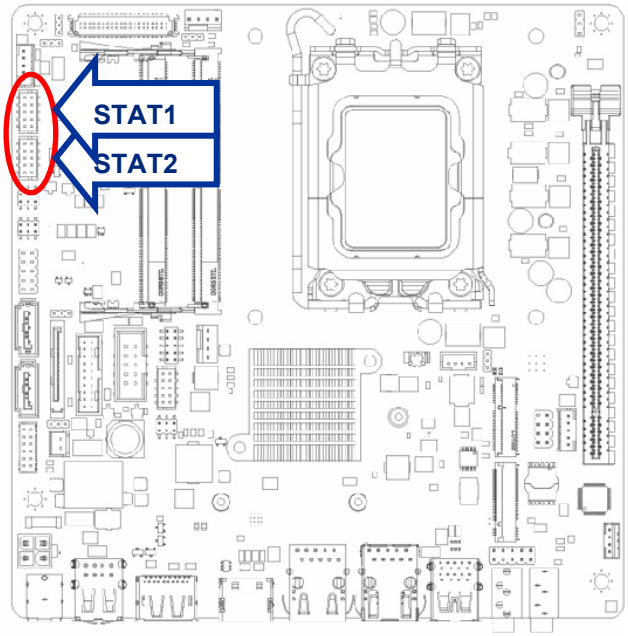
2.3.11 Serial Port connectors (COM1~3)

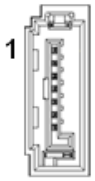




Signal	PIN	PIN	Signal
DCD#	1	2	RX
TX	3	4	DTR#
GND	5	6	DSR#
RTS#	7	8	CTS#
RI3xPOWERxJMP	9		

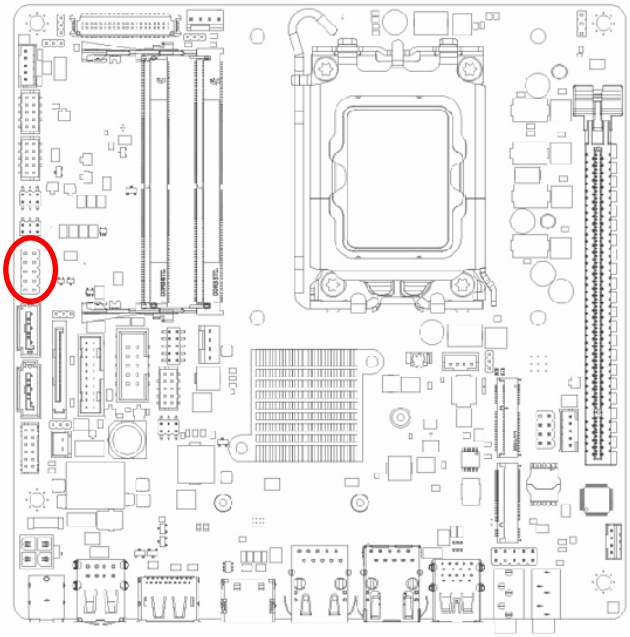
2.3.12 Serial Port connectors (COM1~3)

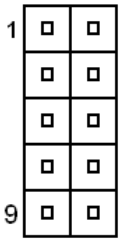




PIN	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

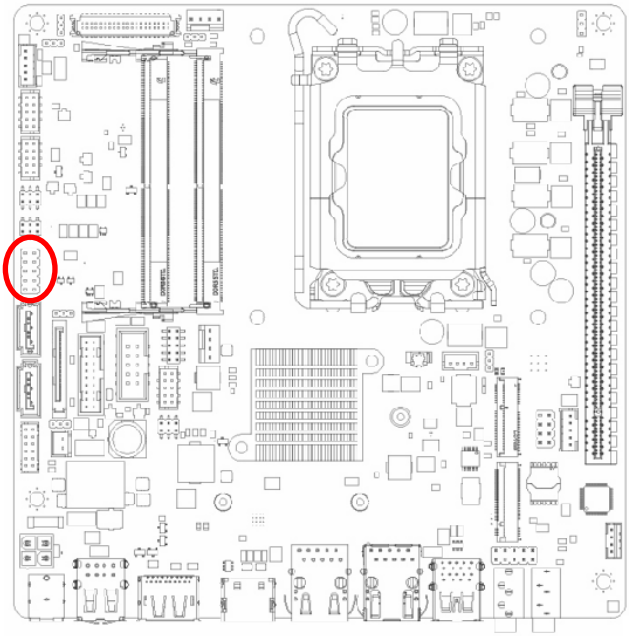
2.3.13 USB connectors (USB78)

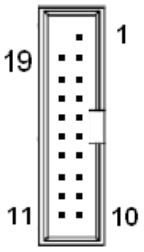




Signal	PIN	PIN	Signal
USB+5V	1	2	USB+5V
USB-	3	4	USB-
USB+	5	6	USB+
GND	7	8	GND
		10	NC

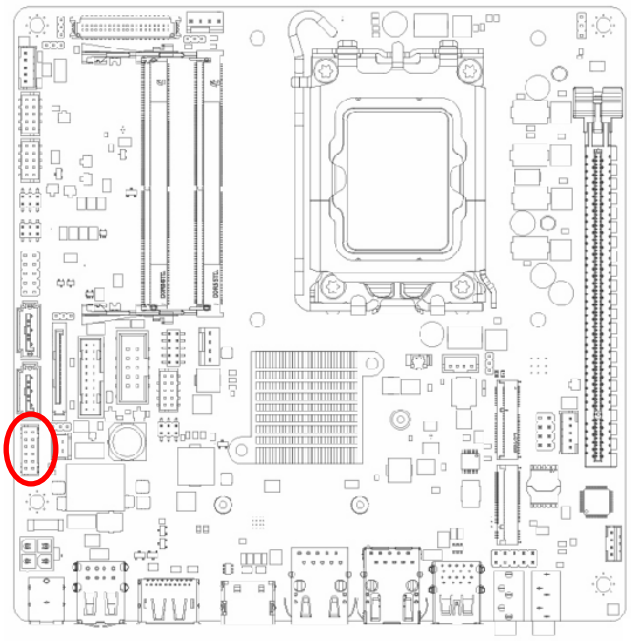
2.3.14 USB connectors (USB78)

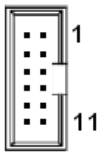




Signal	PIN	PIN	Signal
		1	+5V
+5V	19	2	USB3 RX-
USB3_RX-	18	3	USB3 RX+
USB3_RX+	17	4	GND
GND	16	5	USB3_TX-
USB3_TX-	15	6	USB3_TX+
USB3_TX+	14	7	GND
GND	13	8	USB-
USB-	12	9	USB+
USB+	11	10	NC

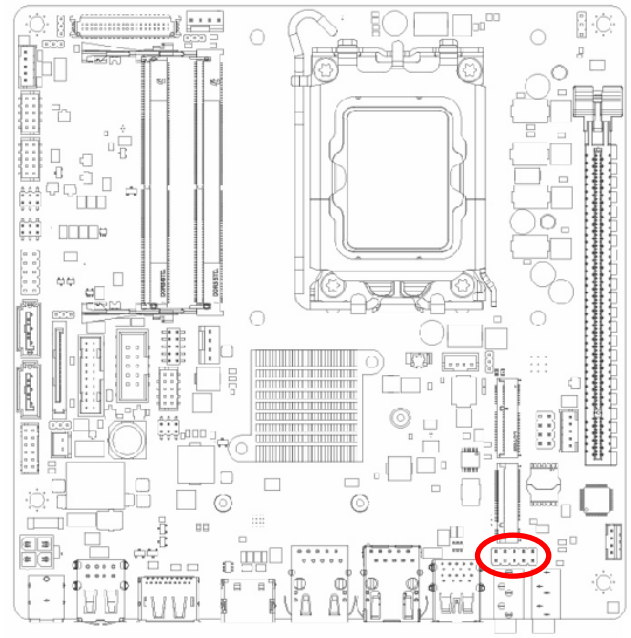
2.3.15 8 bit GPIO header (JDIO1)

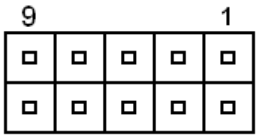




Signal	PIN	PIN	Signal
SIO_GPIO4	2	1	SIO_GPIO0
SIO_GPIO5	4	3	SIO_GPIO1
SIO_GPIO6	6	5	SIO_GPIO2
SIO_GPIO7	8	7	SIO_GPIO3
SMB_DATA_ RESUME	10	9	SMB_CLK_ RESUME
+5Vsb	12	11	GND

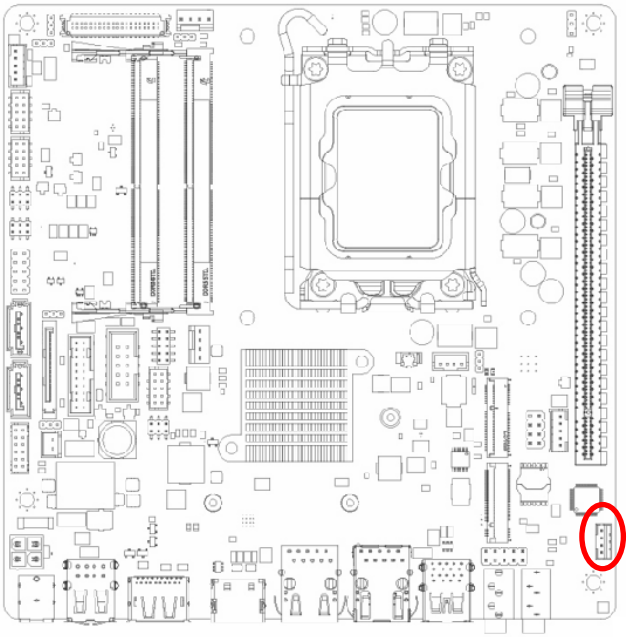
2.3.16 Front Audio connector (FP_AUDIO1)





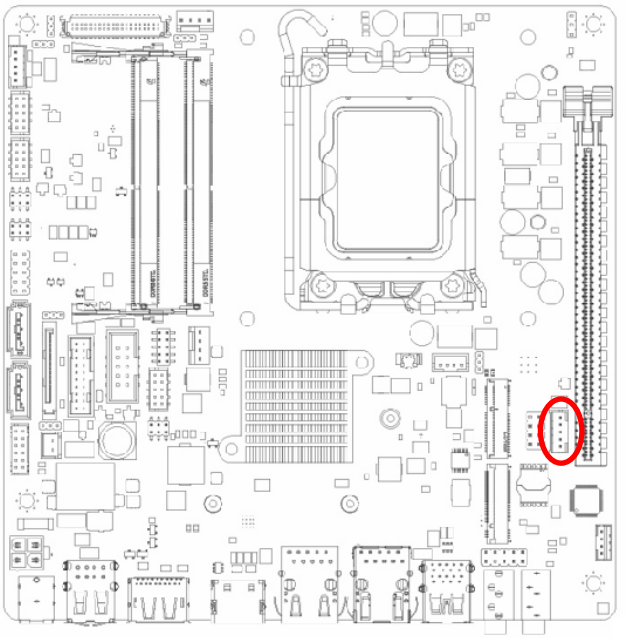
Signal	PIN	PIN	Signal
MIC2L	1	2	GND
MIC2R	3	4	+3.3V
LINE2R	5	6	MIC2_JD
SENSEB	7		
LINE2L	9	10	LINE2_JD

2.3.17 Amplifier connector (JAMP1)



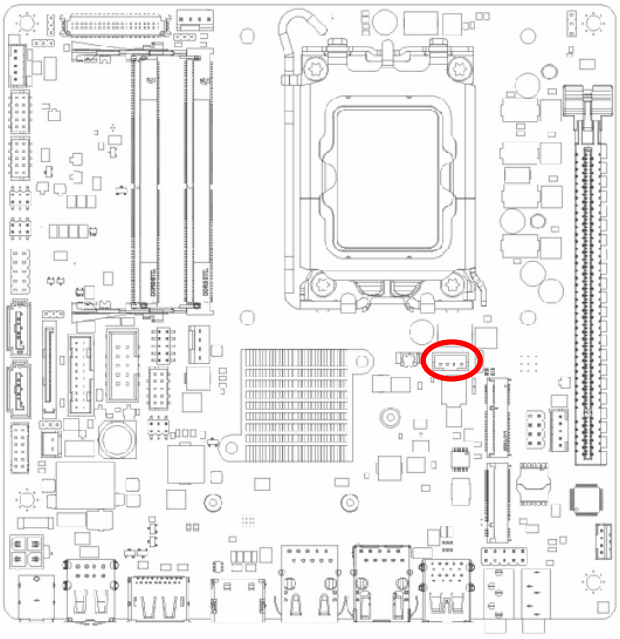
PIN	Signal
4	AMP_R+
3	AMP_R-
2	AMP_L+
1	AMP_L-

2.3.18 Amplifier connector (JAMP1)



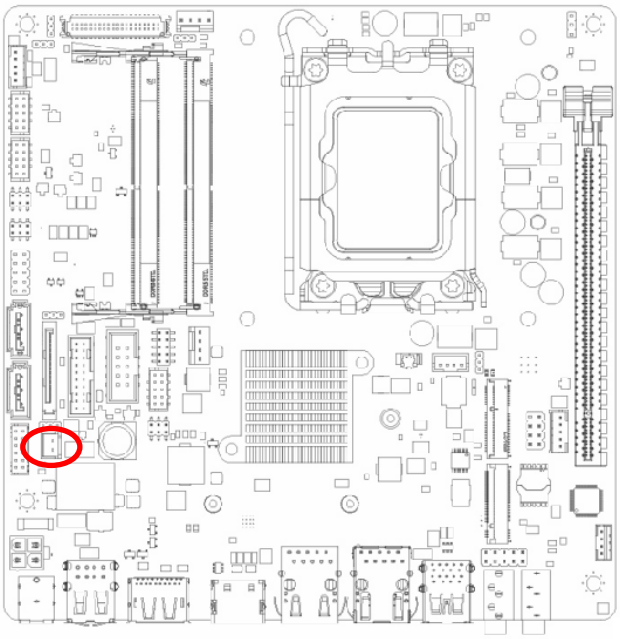
PIN	Signal
1	SMB_CLK
2	SMB_DATA
3	SMB_ALT
4	GND
5	+3.3V

2.3.19 I2C connector (I2C1)



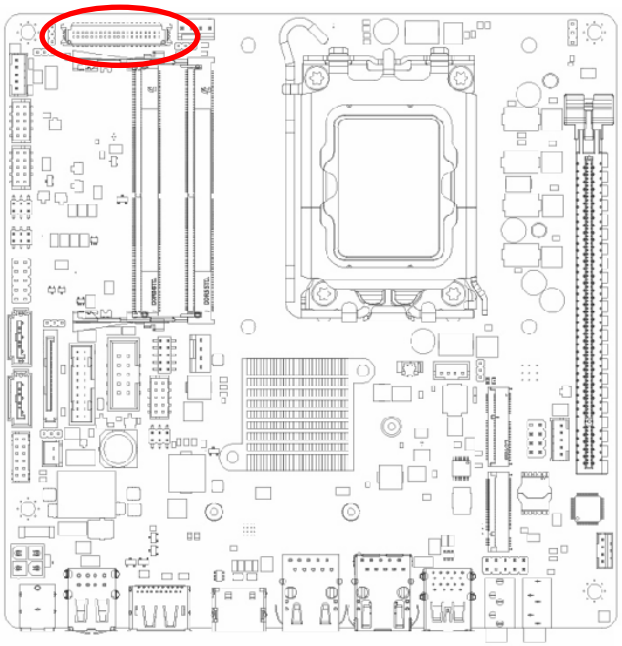
PIN	Signal
1	+3.3V
2	I2C_SCL
3	I2C_SDA
4	GND

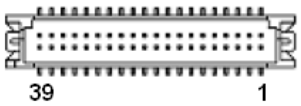
2.3.20 Chassis intrusion connector (JCASE1)



PIN	Signal
1	SIO_CASEOPEN#
2	GND

2.3.21 LVDS connector (LVDS1)





Signal	PIN	PIN	Signal
VDD_+5V	2	1	VDD_+3.3V
VDD_+5V	4	3	VDD_+3.3V
DDC_DATA	6	5	DCC_CLK
GND	8	7	GND
LVDS_A0+	10	9	LVDS_A1+
LVDS_A0-	12	11	LVDS_A1-
GND	14	13	GND
LVDS_A2+	16	15	LVDS_A3+
LVDS_A2-	18	17	LVDS_A3-
GND	20	19	GND
LVDS_B0+	22	21	LVDS_B1+
LVDS_B0-	24	23	LVDS_B1-
GND	26	25	GND
LVDS_B2+	28	27	LVDS_B3+
LVDS_B2-	30	29	LVDS_B3-
GND	32	31	GND
LVDS_A_CLK+	34	33	LVDS_B_CLK+
LVDS_A_CLK-	36	35	LVDS_B_CLK-
GND	38	37	GND
VDD_+12V	40	39	VDD_+12V

Some notes on VBIOS:

- LVDS Default: Disabled.
- Defaults resolution: 1280x768 18/1.
- Defaults PWM Voltage: 5V (By jumper).
- Under BIOS: Manually brightness adjustment. Only with BIOS Mode can be adjusted. Defaults brightness value is 128, for range 1~255.
- Defaults is LVDS Interface. eDP Interface need H/W Operation. (eDP Connector by BOM option)

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.

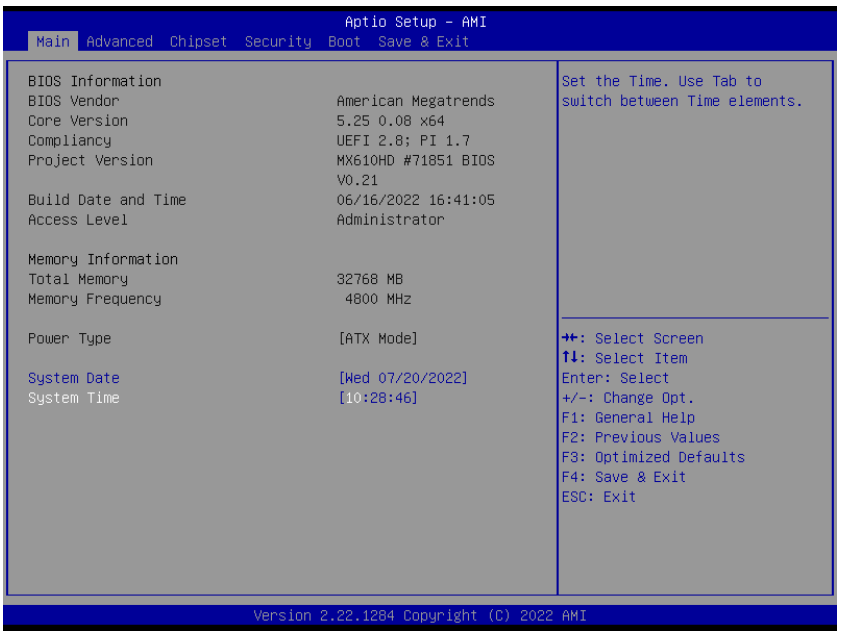
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance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

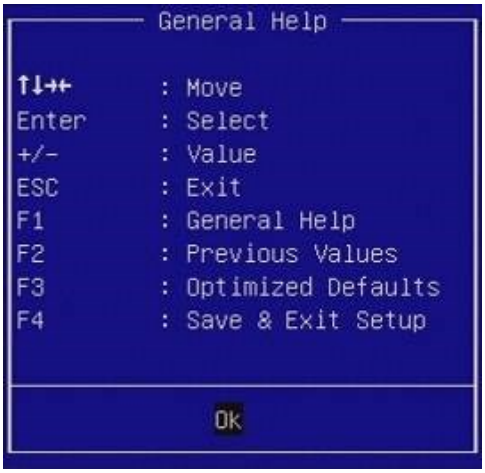
3.6 BIOS setup

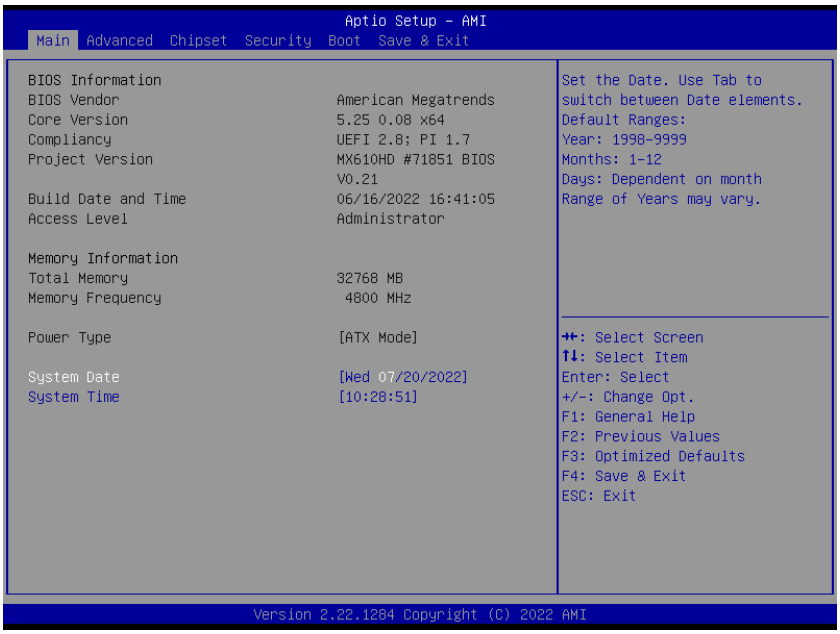
Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

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 Date

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

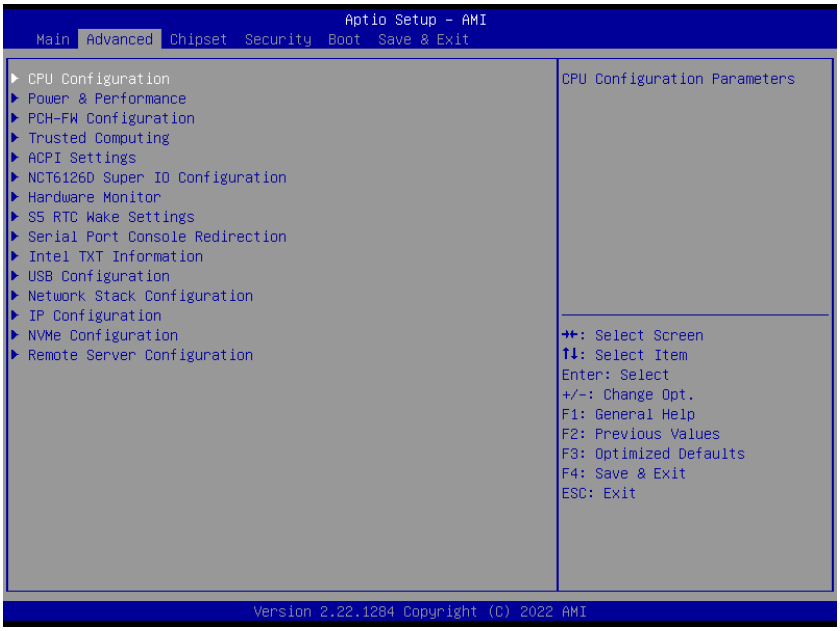
3.6.1.2 System Time

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.

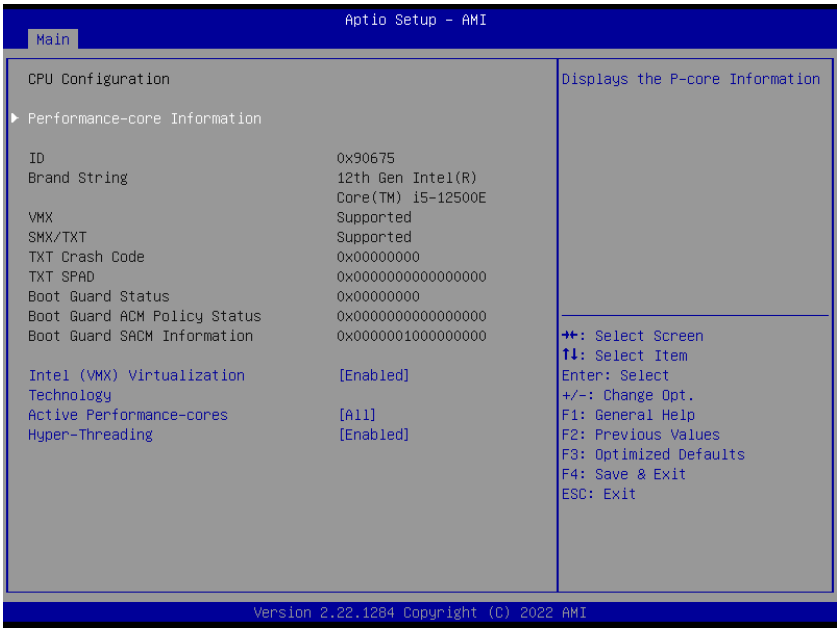
3.6.2 Advanced BIOS Setup

Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Chipset configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages.



3.6.2.1 CPU Configuration

Display CPU information and related setting



- **Intel(VMX)Virtualization[Enabled]**
  When enabled, a VMX can utilize the additional hardware compatibilities provided by Vandorpool Technology
  Configuration options: [Enable] [Disable]

- **Active Performance –Cores**
  Number of P-core to enable in each processor package

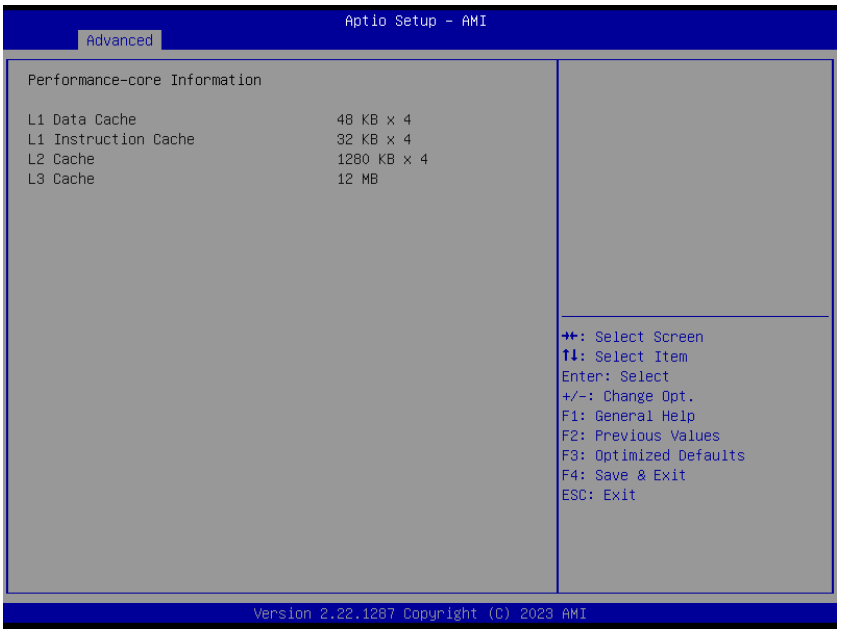
- **Hyper-Threading**

Enable or disable Hyper-Threading technology

Configuration options: [Enable] [Disable]

3.6.2.1.1 Power & Performance

Power management control for CPU



- **Intel® Speedstep™ [Enabled]**

  Allow more than two frequency range to be supported

  Configuration options: [Enable] [Disable]

- **Turbo Mode**

  Enable or Disable processor Turbo mode

  Configuration options: [Enable] [Disable]

- **C states**

  Enable/Disable CPU power management. Allows CPU to go to C states when it's not 100% utilized

  Configuration options: [Enable] [Disable]

- **Enhance C states**

  When enabled, CPU will switch to minimum speed when all cores enter C state

  Configuration options: [Enable] [Disable]

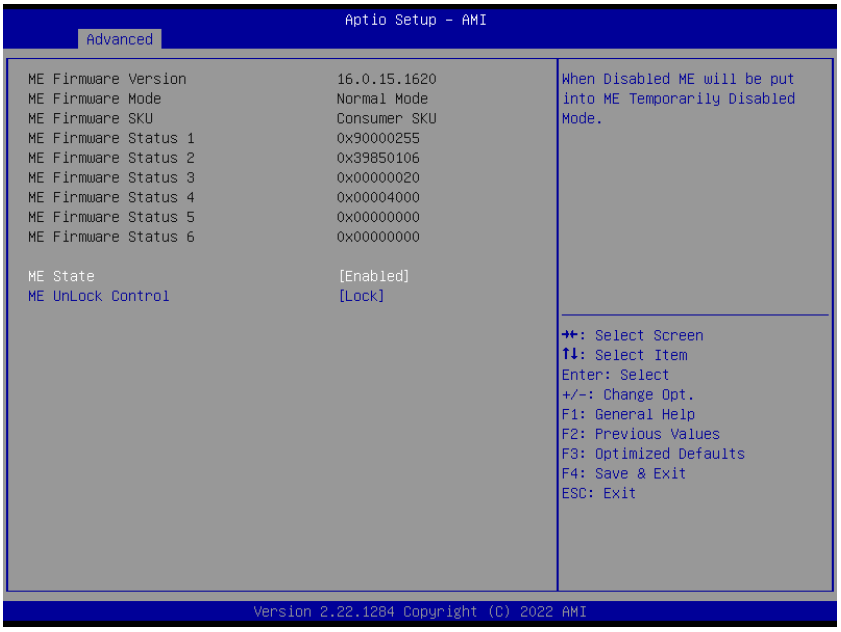
- **Package C state limit**

  Maximum package C state limit setting. CPU default : Leaves to factory default value

  Configuration options: [C0/C1] [C2] [C3]

3.6.2.2 PCH-FW Configuration

Configure Management Engine Technology Parameters

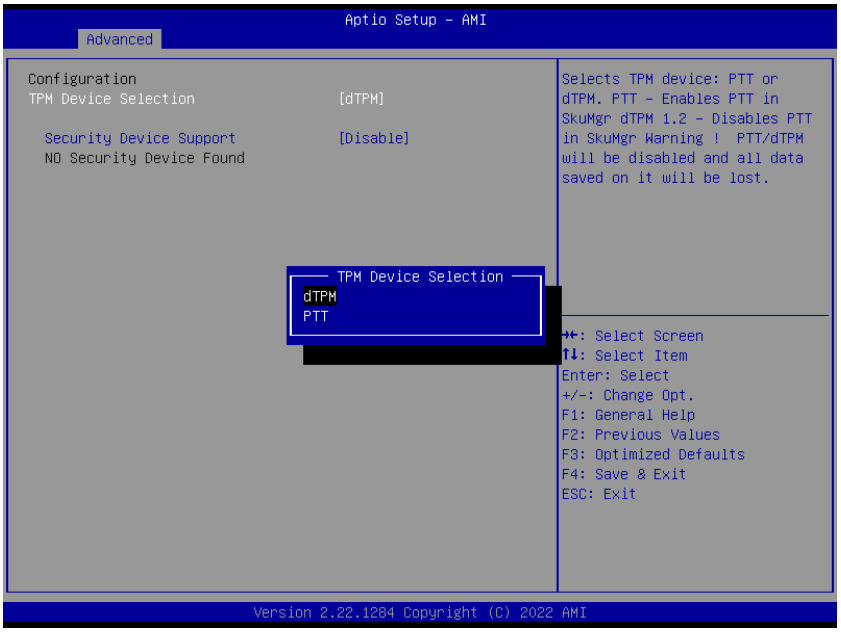


- **ME State [Enabled]**
  When disabled ME will be put into ME temporarily disabled mode
  Configuration options: [Enable] [Disable]

- **ME unlock control [Lock]**
  When Set unlock, system will shut down for active function
  Configuration options: [Lock] [Unlock]

3.6.2.3 Trusted Computing

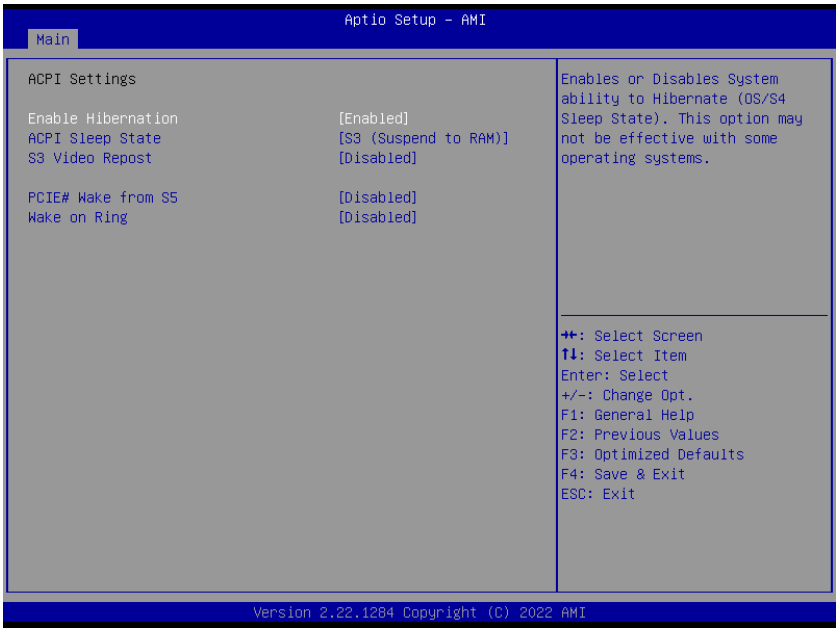
Security device settings



- **TPM Device Selection [dTPM]**
  Select TPM device
  Configuration options: [dTPM] [PTT]

- **Security Device support [Disabled]**
  Enable or Disable BIOS support security device
  Configuration options: [Enable] [Disable]

3.6.2.4 ACPI Settings



- **Enable Hibernation [Enable]**
  Enable or Disable system ability to Hibernation.
  Configuration options: [Enable] [Disable]

- **ACPI Sleep State [S3 only (Suspend to RAM)]**
  Select the highest ACPI sleep state the system will enter the SUSPEND button is press. Configuration options: [Suspend Disable] [S3 (suspend to RAM)]

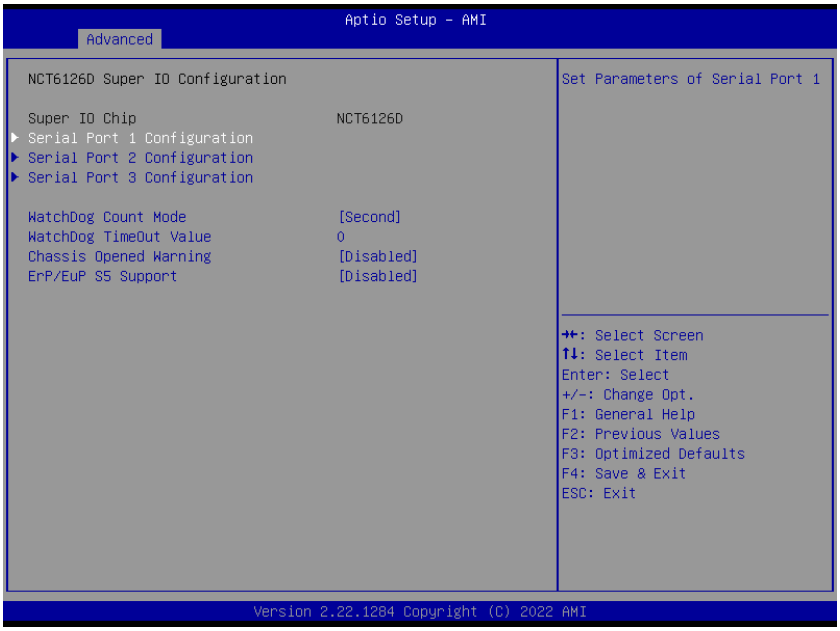
- **S3 Video Repost [Disabled]**
  Enable or disable S3 video repost
  Configuration options: [Disabled] [Enabled]

- **PCIE# wake from S5 [Disabled]**
  Enable or disable PCIE wake the system from S5.
  Configuration options: [Disabled] [Enabled]

- **Wake on Ring [Disabled]**
  Enable or disable wake on ring function under ACPI S3/S4/S5.
  Configuration options: [Disabled] [Enabled]

3.6.2.5 NCT6126D Super IO configuration

Provide NCT6126D super IO configuration settings



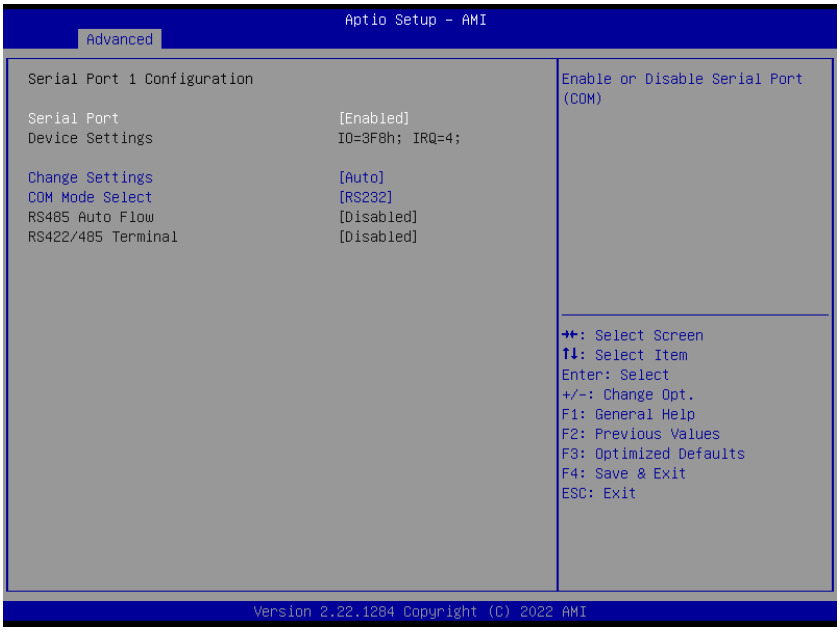
- **WatchDog count mode [Second]**
  WatchDog count mode Selection
  Configuration options: [Second] [Minute]

- **WatchDog Timeout value**
  Fill watchdog timeout value, 0 means disables

- **Chassis opened warning [Disabled]**
  Select chassis intrusion enabled to Disabled
  Configuration options: [Disabled] [Enabled]

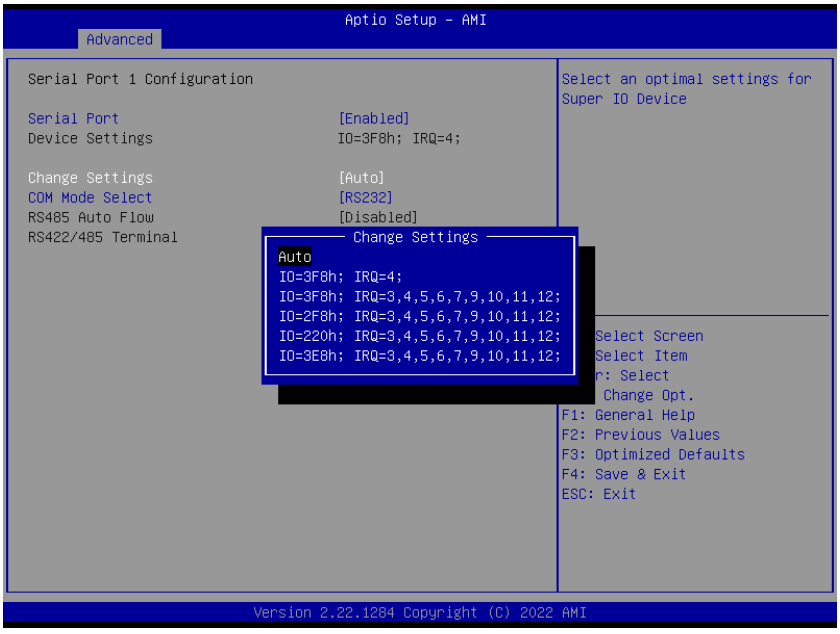
- **ErP/EuP S5 Support [Disabled]**
  Configuration options: [Disabled] [Enabled]

3.6.2.5.1 Serial Port 1 Configuration



- **Serial Port [Enabled]**
  Enable or Disable serial Port (COM)
  Configuration options: [Disabled] [Enabled]

- **Change Setting [Auto]**
  Select an optimal settings for super IO device
  Configuration options: as below



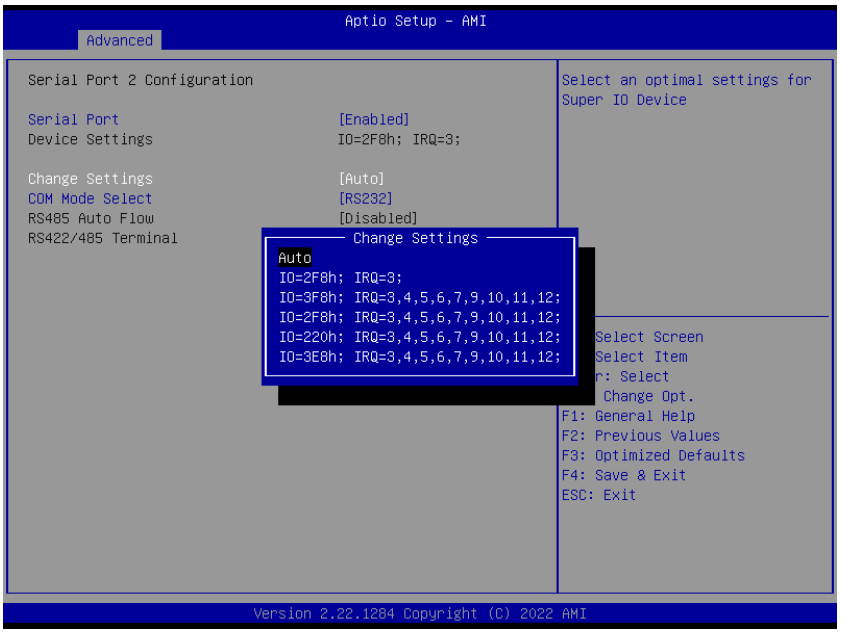
- **COM mode Select [RS232]**
  Configure the COM port Mode

Configuration options: [RS232] [RS485 Half Duplex][RS422 Ful Duplex]

3.6.2.5.2 Serial Port 2 Configuration

- **Serial Port [Enabled]**
  Enable or Disable serial Port (COM)
  Configuration options: [Disabled] [Enabled]

- **Change Settings [Auto]**
  Select an optimal settings for super IO device
  Configuration options: as below

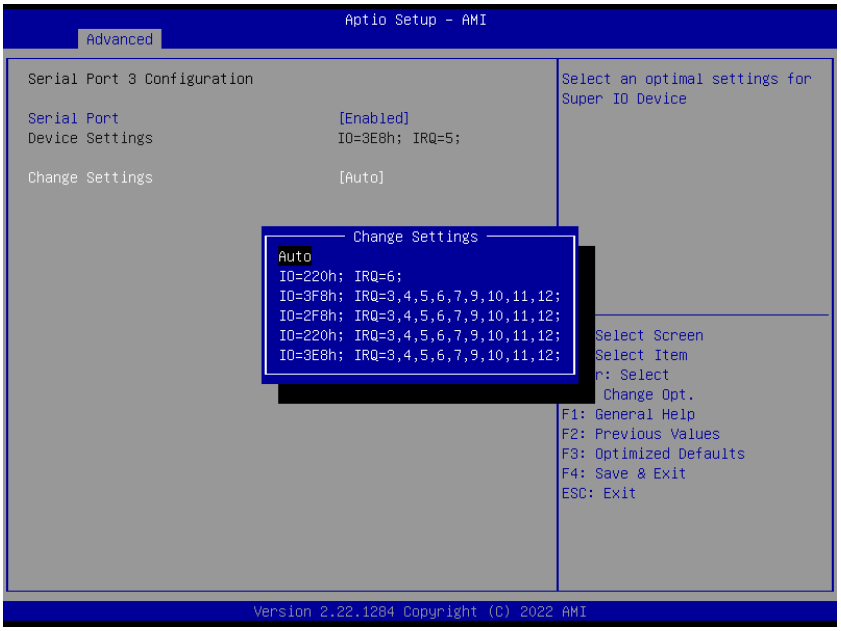


- **COM mode Select [RS232]**
  Configure the COM port Mode
  Configuration options: [RS232] [RS485 Half Duplex][RS422 Ful Duplex]

3.6.2.5.3 Serial Port 3 Configuration

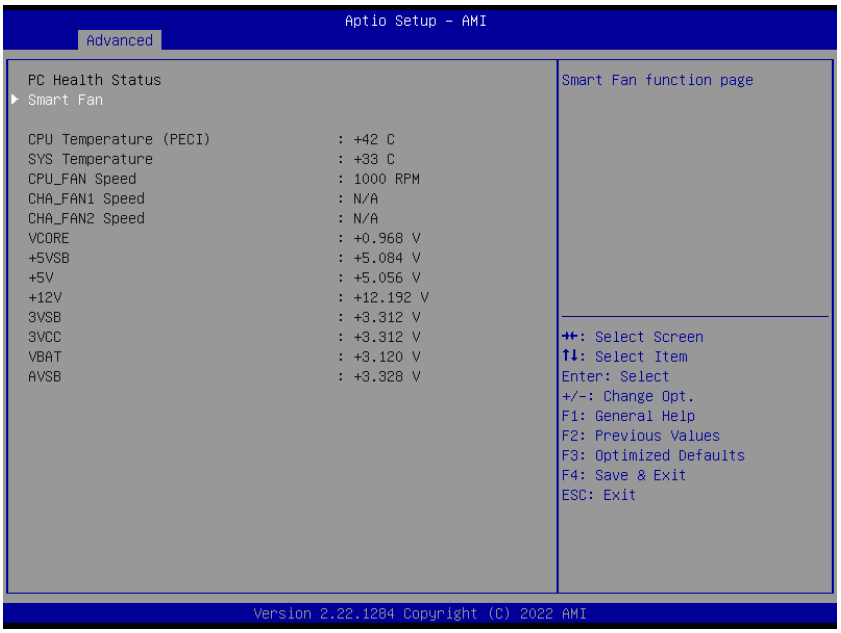
- **Serial Port [Enabled]**
  Enable or Disable serial Port (COM)
  Configuration options: [Disabled] [Enabled]

- **Change Settings [Auto]**
  Select an optimal settings for super IO device
  Configuration options: as below

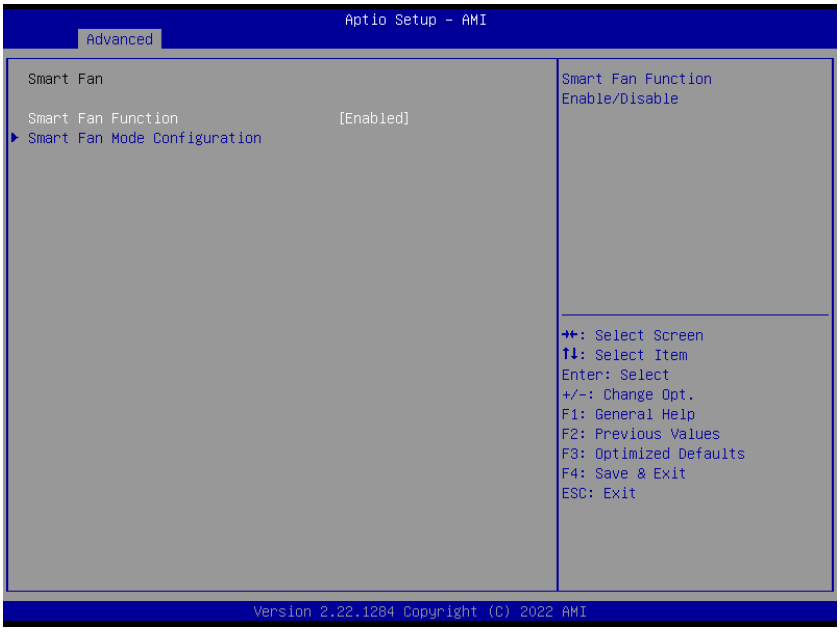


3.6.2.6 Hardware monitor

Display Hardware monitor information



3.6.2.6.1 Smart FAN



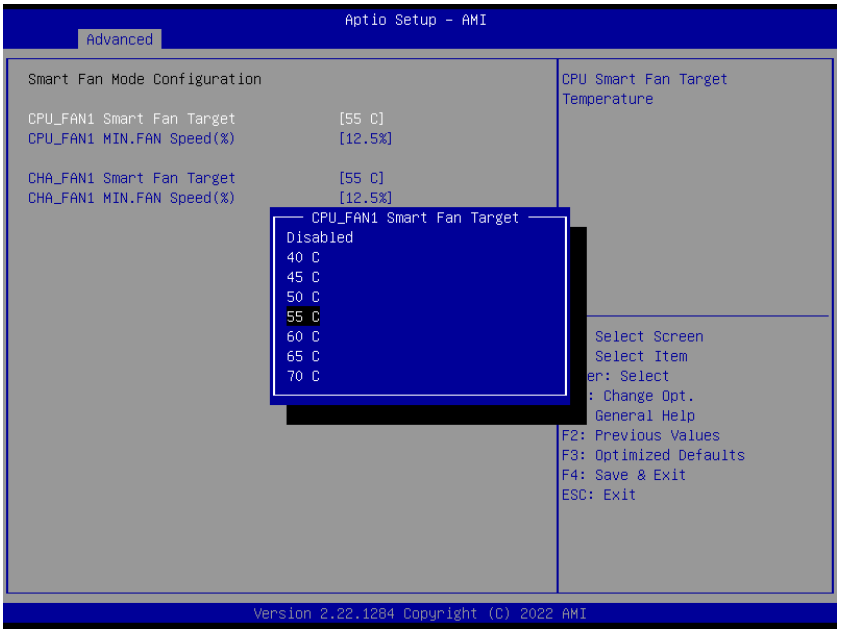
- **Smart FAN Function [Enabled]**
  Smart fan function Enable/Disabled
  Configuration options: [Enabled] [Disabled][Manual]

3.6.2.6.1.1 Smart FAN mode Configuration

Setting different FAN on this motherboard

- **CPU_FAN1/CHA_FAN1 FAN Target**
  Smart FAN target temperature

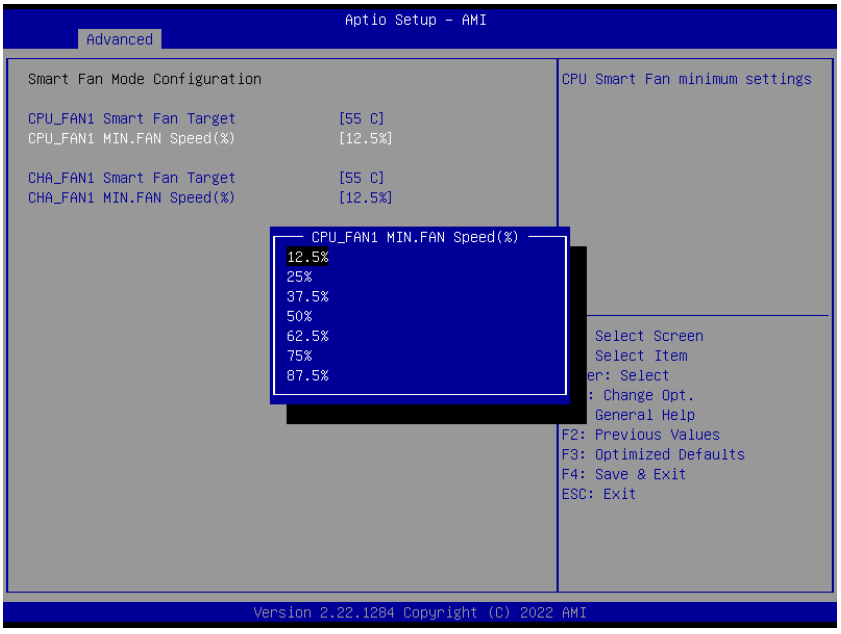
Configuration options: Please see below picture



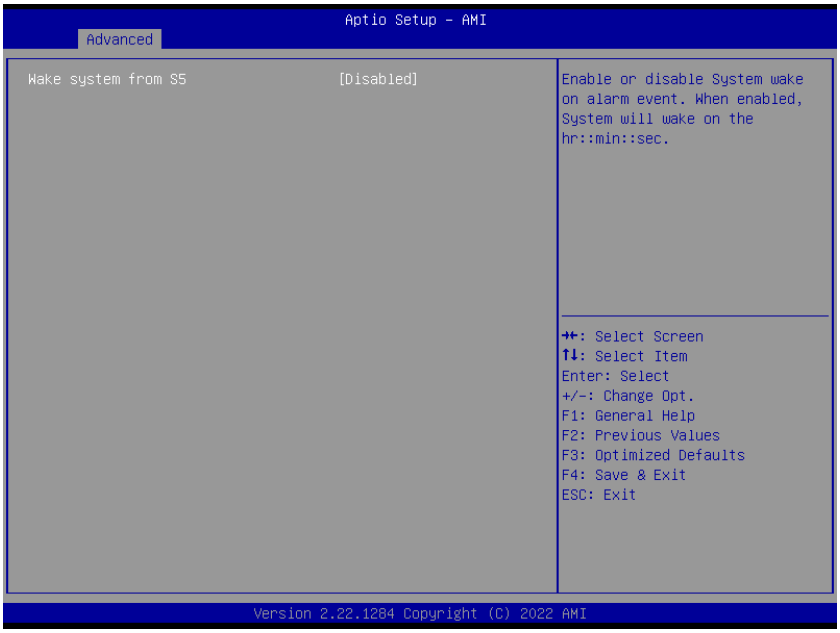
- **CPU_FAN1/CHA_FAN1 MIN.FAN Speed (%)**

  CPU or Chassis Smart FAN minimum settings

  Configuration options: Please see below picture

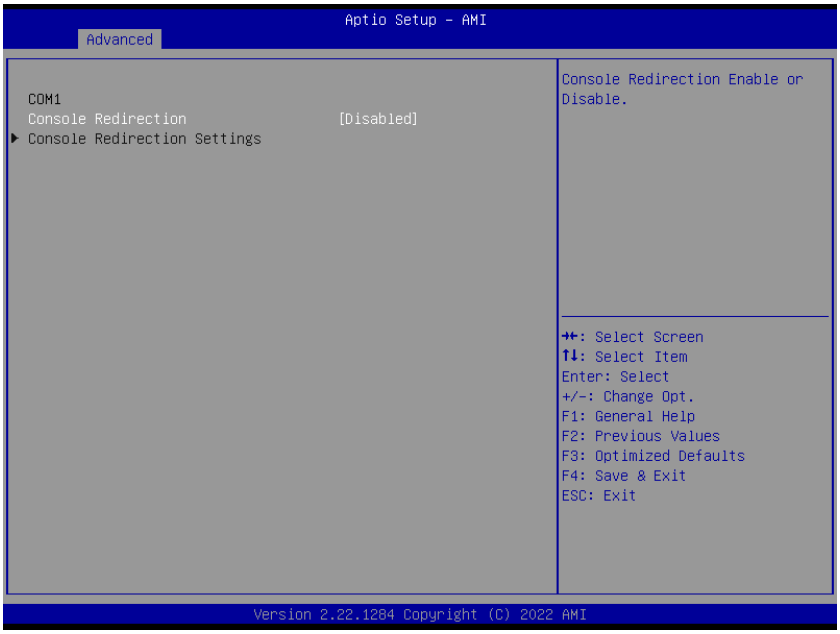


3.6.2.7 S5 RTC Wake Settings



- **Wake system from S5 [Disabled]**
  Enabled or Disabled system wake on alarm event
  Configuration options: [Enabled] [Disabled]

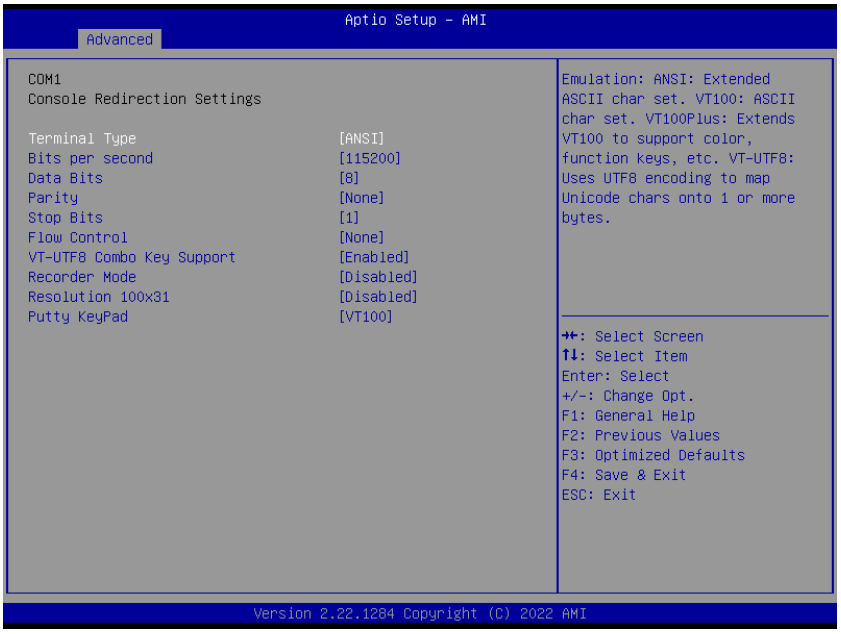
3.6.2.8 Serial Port Console Redirection



- **Console Redirection [Disabled]**

Enabled or Disabled COM1 Console redirection
Configuration options: [Disabled][Enabled]

3.6.2.8.1 Console Redirection settings



- **Terminal Type[ANSI]**
  Select terminal type
  Configuration options: [VT100][VT100Plus][VT-UTF8][ANSI]

- **Bits per second[115200]**
  Select serial port transmission speed
  Configuration options: [9600][19200][38400][57600][115200]

- **Bits per second[115200]**
  Select data bits
  Configuration options: [7][8]

- **Parity[None]**
  A parity bit can be sent with the data bits to detect some transmission errors
  Configuration options: [None][Even][Odd][Mark][Space]

- **Stop Bits[1]**
  Stop bits indicate the end of a serial data package
  Configuration options: [1][2]

- **Flow Control[None]**
  Flow control can prevent data loss from buffer overflow.
  Configuration options: [None][Hardware RTS/CTS]

- **VT-UTF8 Combo key Support [Enabled]**
  Enable VT-UTF8 combination key support for ANSI/VT100 terminals
  Configuration options: [Enabled] [Disabled]

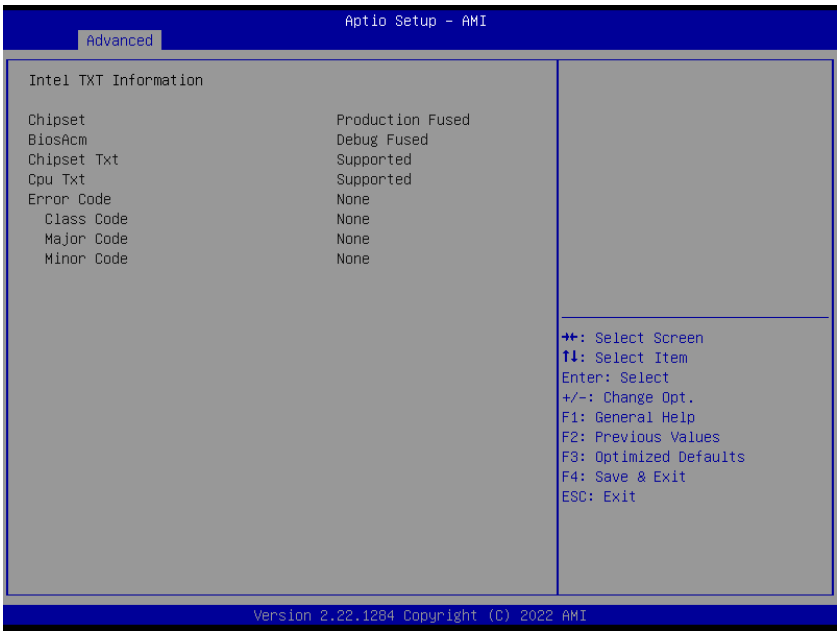
- **Recorder Mode [Disabled]**
  With this mode enabled only text will be sent.
  Configuration options: [Enabled] [Disabled]

- **Resolution 100x31 [Disabled]**
  Enables or disables extended terminal resolution
  Configuration options: [Enabled] [Disabled]

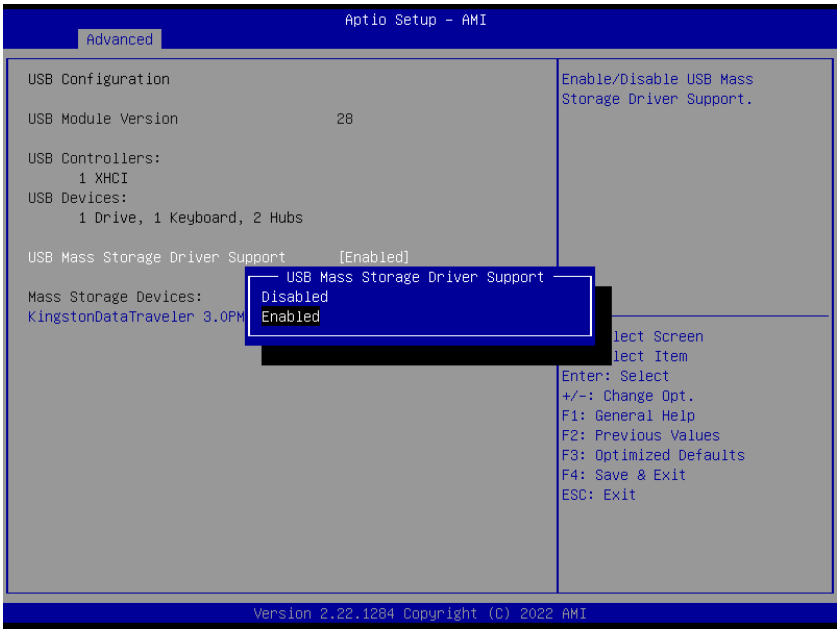
- **Putty Keypad [VT100]**
  Selects function key and keypad on putty
  Configuration options: [VT1000] [LINUX][XTERMR6][SCO][ESCN][VT400]

3.6.2.9 intel TXT information

Display Intel TXT information. This depends on CPU sku.

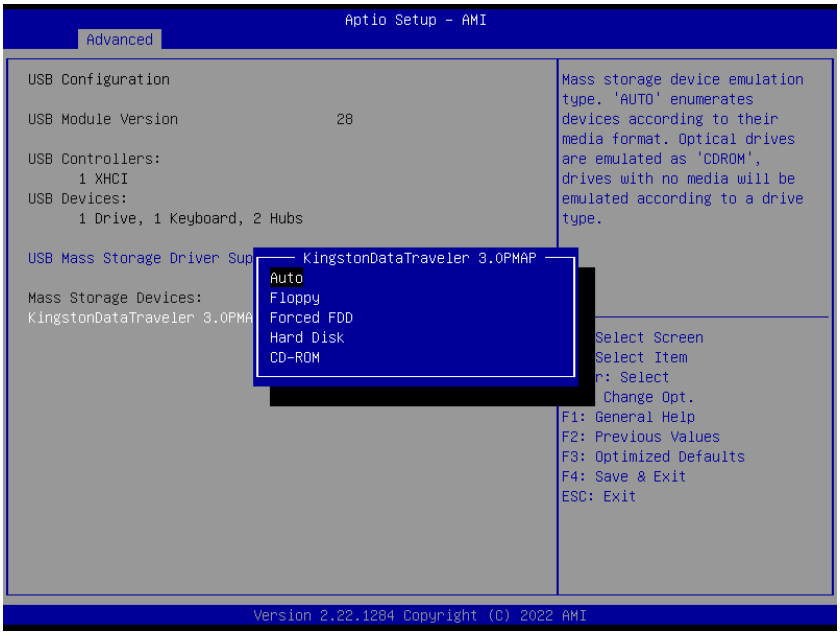


3.6.2.10 USB Configuration



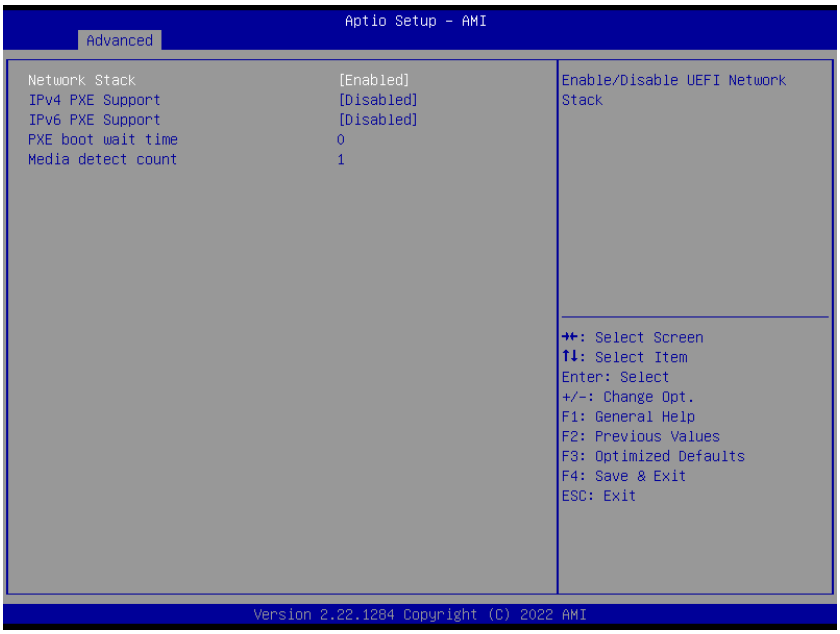
- **USB Mass Storage Driver Support [Enabled]**
  Enable or Disable USB Mass Storage Driver Support
  Configuration options: [Enabled][Disabled]

- **Mass Storage Devices [Auto]**
  Mass Storage device emulation Type. "Auto" enumerates device according to its media format.



3.6.2.11 Network Stack Configuration

Network Stack setting



- **Network Stack [Disabled]**
  Enabled/Disabled UEFI Network Stack
  Configuration options: [Enabled][Disabled]

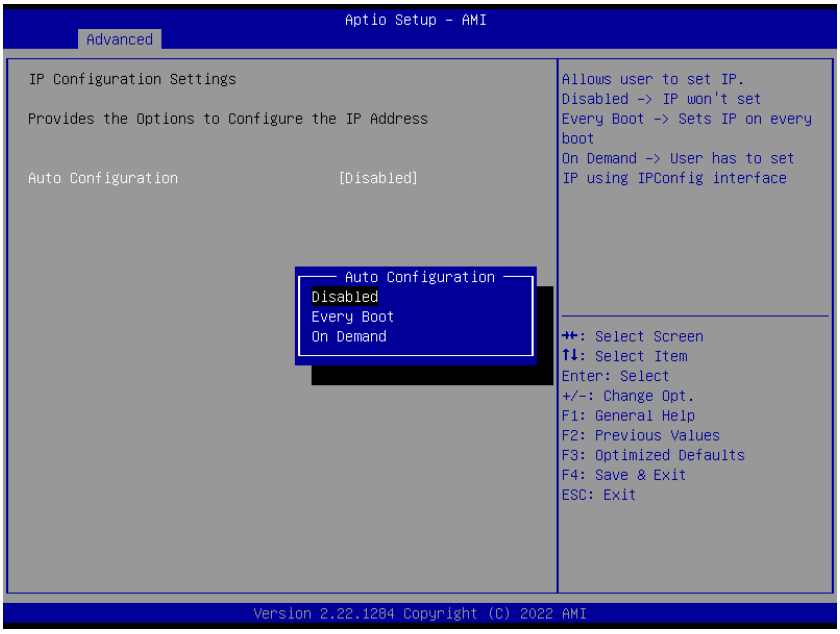
- **IPv4 PXE Support [Disabled]**
  Enabled or disabled IPv4 PXE boot Support
  Configuration options: [Enabled][Disabled]

- **IPv6 PXE Support [Disabled]**
  Enabled or disabled IPv6 PXE boot Support
  Configuration options: [Enabled][Disabled]

- **PXE boot wait time**
  Wait time in seconds to press ESC key to abort the PXE boot.

- **Media detect count**
  Number of time the presence of media will be checked

3.6.2.12 IP configuration



- **Auto Configuration[Disabled]**

Allow user to set IP.

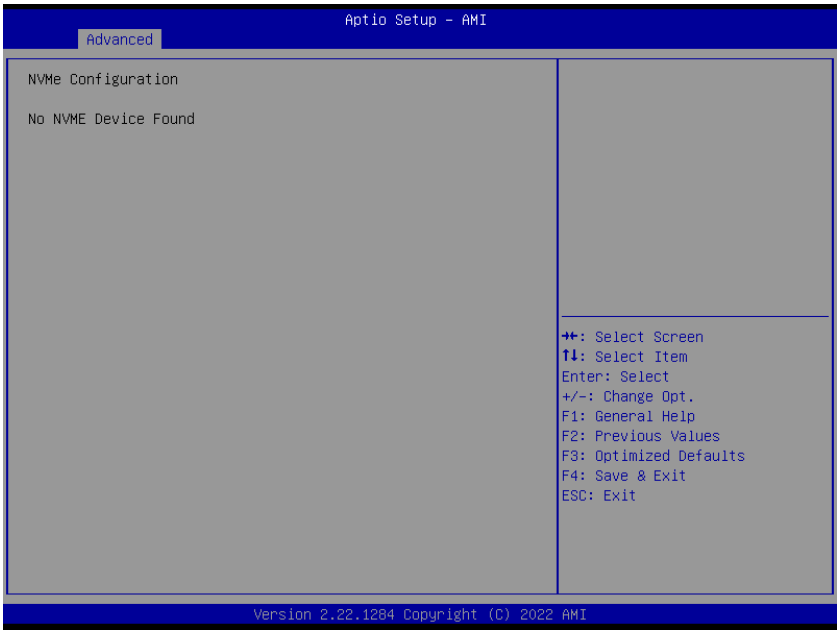
Disabled→IP won't set

Every Boot→Sets IP on every boot

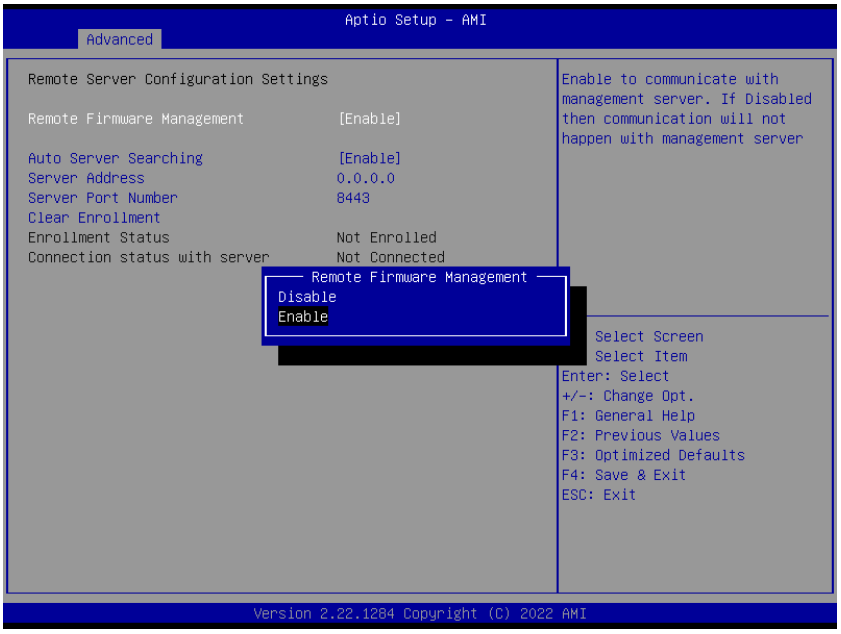
On demand→User has to set IP using IPConfig interface.

3.6.2.13 NVMe Configuration

Display NVMe controller or Drive information



3.6.2.14 Remote Server Configuration



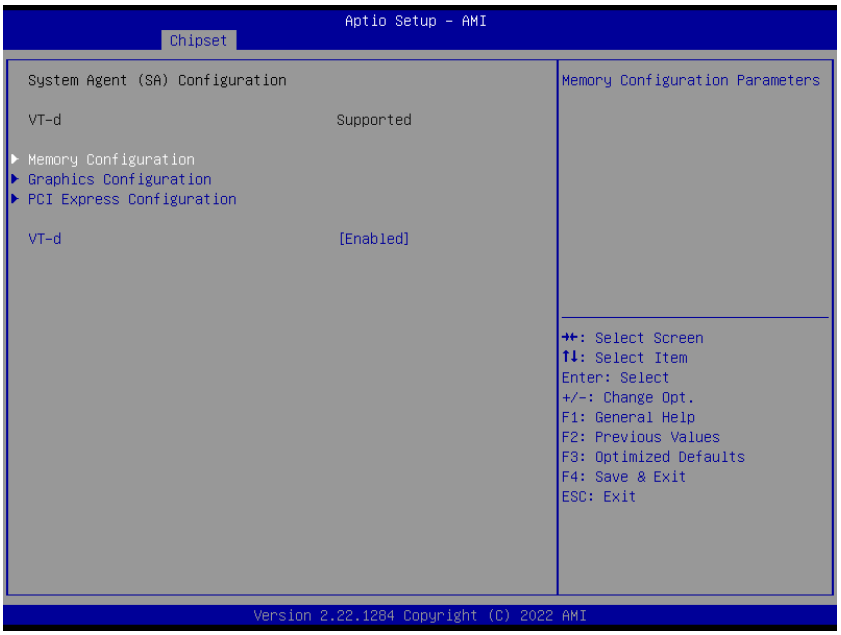
- **Remote Firmware Management [Enabled]**
  Enable to communicate with management server.
  Configuration options: [Disabled][Enabled]

- **Auto Server searching [Enabled]**
  Enabled to obtain DHCP server IP automatically. Disabled to provide Server IP manually. Need to do clear Enrollment, if server is changed to DHCP.
  Configuration options: [Enabled][Disabled]

- **Server Address [Enabled]**
  Management server address to be used if Auto server searching is either disabled or failed. If changed, need to do clear Enrollment if already enrolled with previous IP.

3.6.3 Chipset

3.6.3.1 System Agent (SA) Configuration



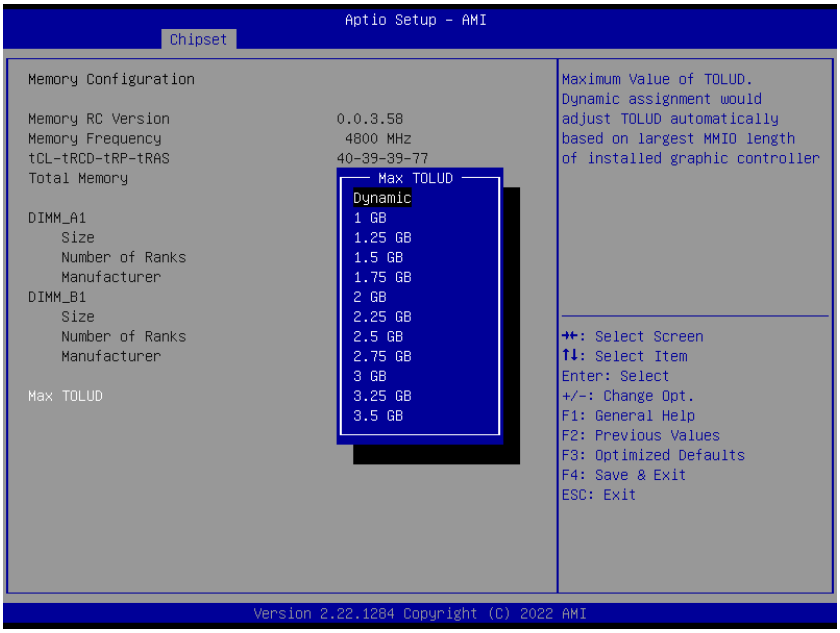
- **VT-d [Enabled]**

VT-d capability

Configuration options: [Disabled] [Enabled]

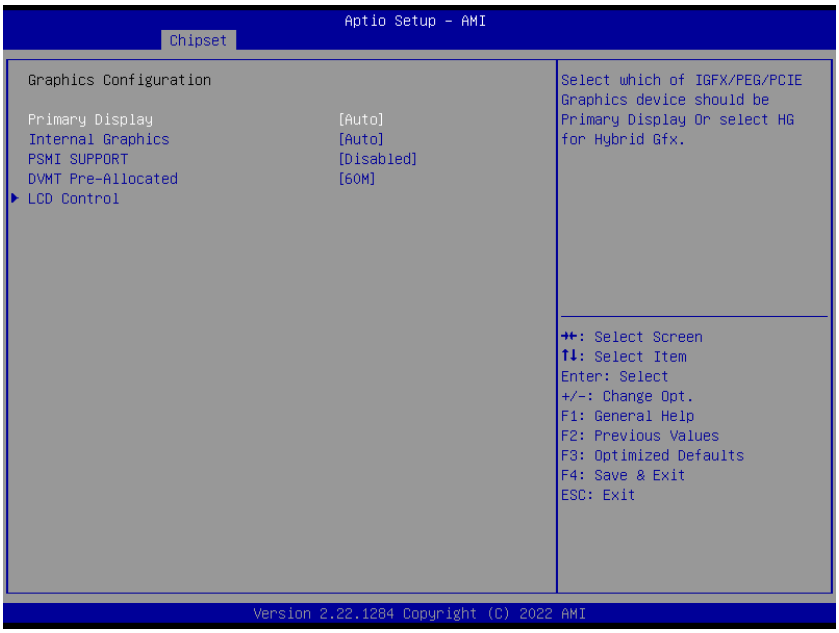
3.6.3.1.1 Memory Configuration

Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.



3.6.3.1.2 Graphics Configuration

Graphic configuration settings



- **Primary Display[Auto]**

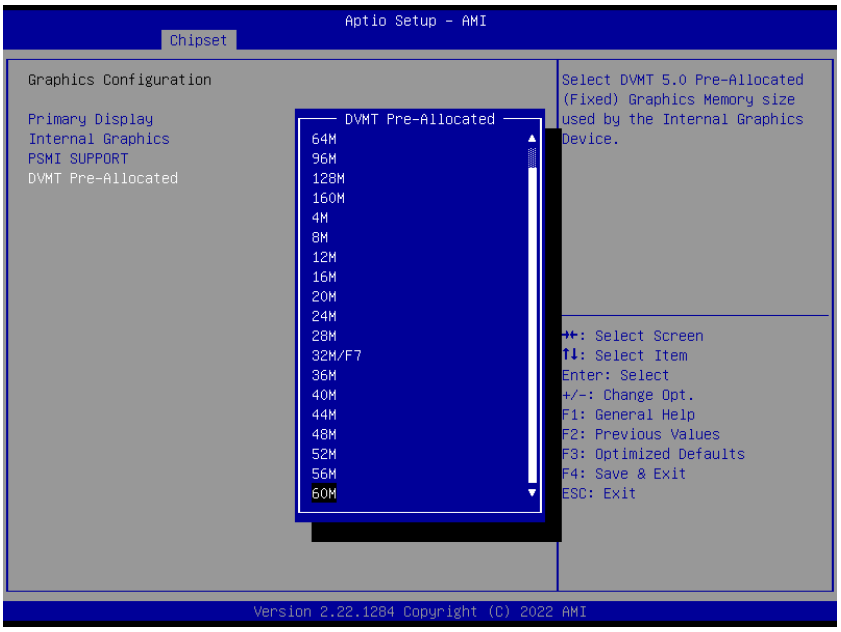
  Select which of IGFX/PEG/PCIE graphic device should be primary display or select HG for Hybrid Gfx.

  Configuration options: [Auto] [IGFX][PEG slot][PCIE]

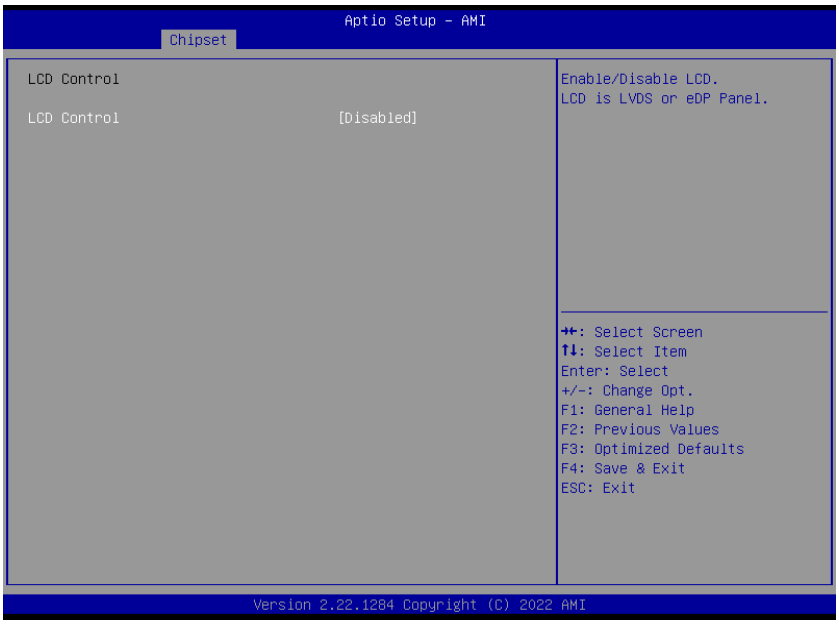
- **Internal Graphics [Auto]**
  Keep IGFX enabled based on the setup options
  Configuration options: [Auto] [disabled][enabled]

- **PSMI Support [Disabled]**
  PSMI enabled/Disabled
  Configuration options: [Disabled][Enabled]

- **DVMT Pre-allocated [60M]**
  Select DVMT 5.0 Pre-allocated (Fixed) Graphics memory size used by the internal graphics device.
  Configuration options: As below picture



3.6.3.1.2.1 LCD Control

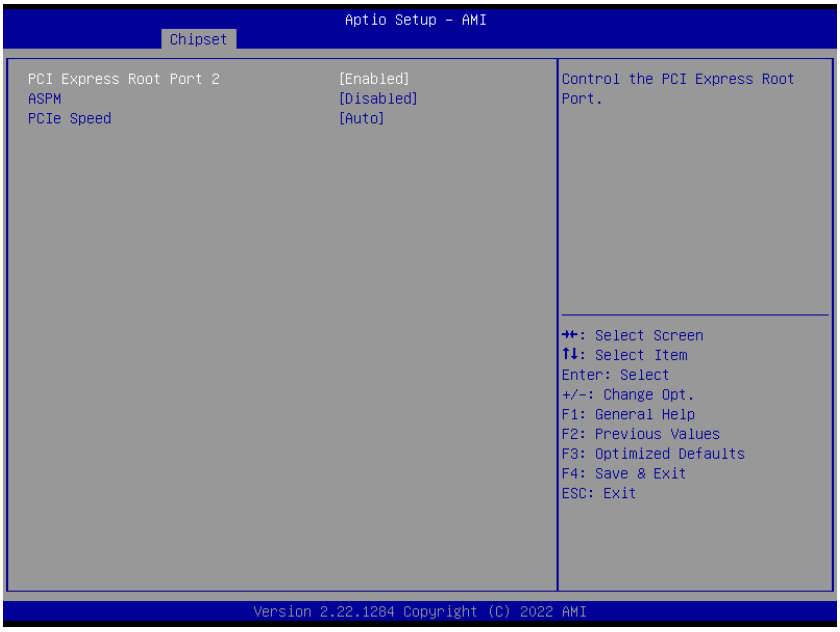


- **LCD Control [Disabled]**
  Enable/Disable LCD. LCD is LVDS or eDP panel
  Configuration options: [Disabled][Enabled]

3.6.3.1.3 PCI Express Configuration

- **Detect Non-compliance Device [Disabled]**
  Detect Non-compliance Device in PEG
  Configuration options: [Disabled][Enabled]

3.6.3.1.3.1 PCI Express Root Port 2 (x16 PEG slot)

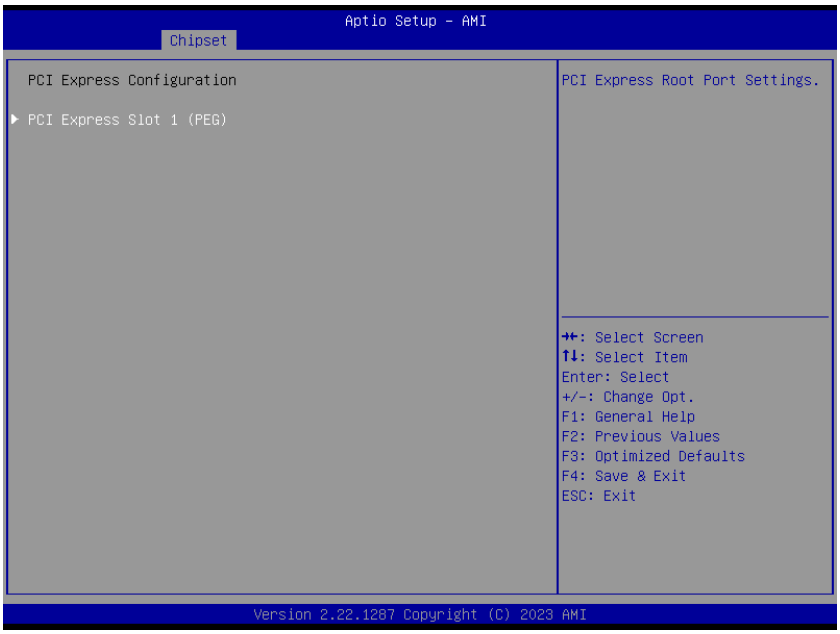


- **PCI Express Root Port 2[Enabled]**
  Control the PCI express Root Port
  Configuration options: [Enabled] [Disabled]

- **ASPM [Disabled]**
  Set the ASPM level
  Configuration options: [Disaled] [L0s][L1][L0sL1]

- **PCIe Speed [Auto]**
  Configure PCIe Speed
  Configuration options: [Auto][Gen1][Gen2][Gen3][Gen4][Gen5]

3.6.3.1.4 PEG Port Configuration

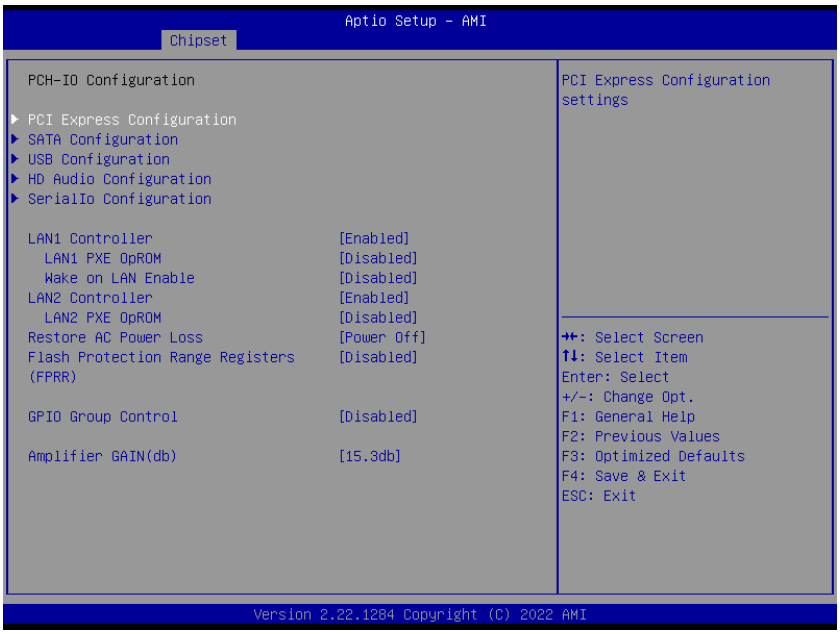


3.6.3.1.4.1 PEG Port Feature Configuration

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



- **Lan1 Controller [Enabled]**
  Enable or Disable onboard LAN1
  Configuration options: [Disabled][Enabled]

- **Lan1 PXE OpROM [Disabled]**
  Enabled or Disabled boot option for LAN1 controller
  Configuration options: [Disabled][Enabled]

- **Wake on LAN Enabled[Disabled]**
  Enable or Disable integrated LAN to wake the system
  Configuration options: [Disabled][Enabled]

- **Lan2 Controller [Enabled]**
  Enable or Disable onboard LAN2
  Configuration options: [Disabled][Enabled]

- **Lan2 PXE OpROM [Disabled]**
  Enabled or Disabled boot option for LAN2 controller
  Configuration options: [Disabled][Enabled]

- **Restore AC Power Loss[Power off]**
  Specify what state to go to when power is re-applied after a power failure
  Configuration options: [Power on][Power off][Last State]

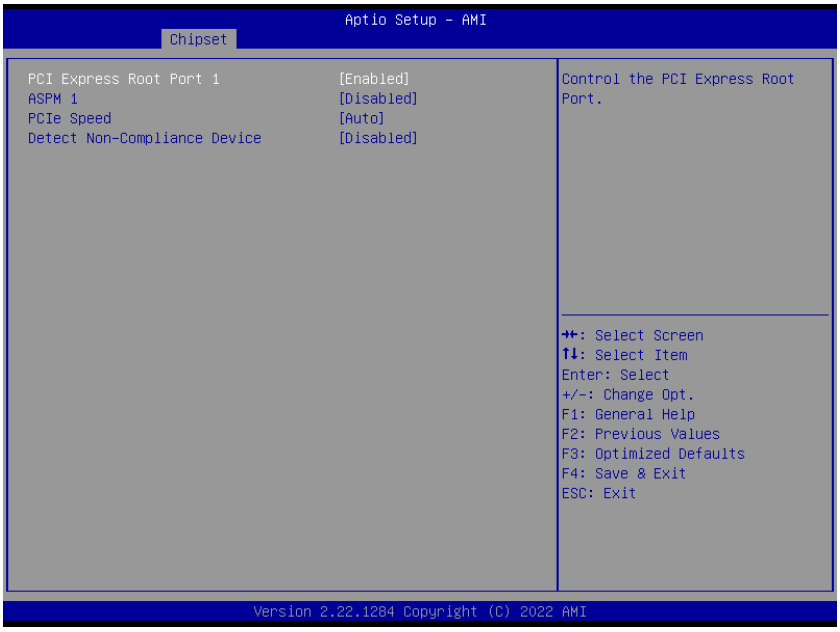
- **Flash Protection Range Registers(FPRR) [Disabled]**
  Enabled Flash Protection Range Registers
  Configuration options: [Disabled][Enabled]

- **GPIO Group Control [Disabled]**
  Configure the digital GPIO pins
  Configuration options: [Disabled][Enabled]

- **Amplifier GAIN(db) [15.3db]**
  Select Amplifier GAIN value
  Configuration options: [15.3db][21.2db][27.2db][31.8db]

3.6.3.2.1 PCI Express Configuration

3.6.3.2.1.1 PCI Express Root Port 1(x1 KeyE)



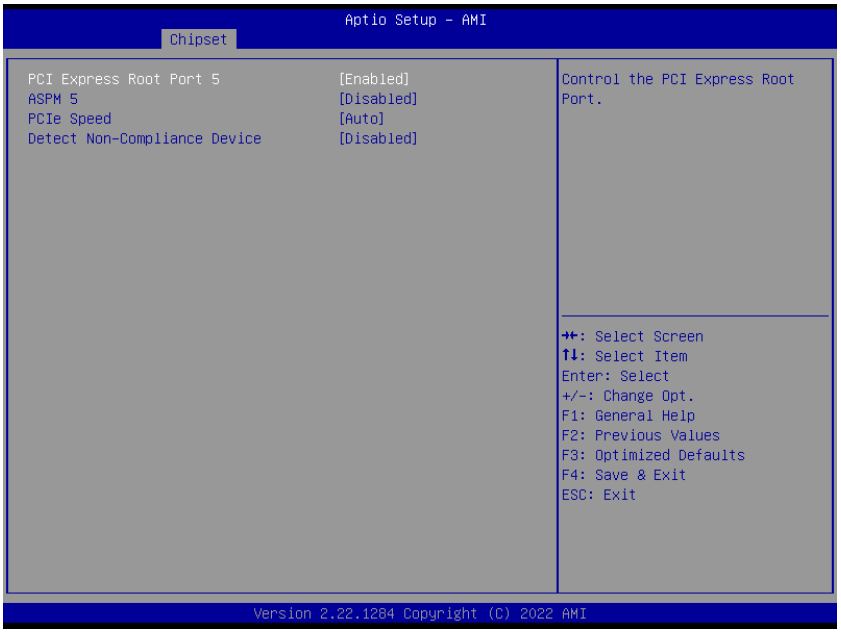
- **PCI Express Root Port 1 [Enabled]**
  Control the PCI Express Port
  Configuration options: [Disabled][Enabled]

- **ASPM Support [Disabled]**
  Set the ASPM level: Force L0s- Force all links to L0s State; Auto- BIOS auto configure; Disabled- Disables ASPM
  Configuration options: [Disabled][L1][Auto]

- **PCIe Speed [Auto]**
  Select PCI Express Port speed
  Configuration options: [Auto][Gen1][Gen2][Gen3] [Gen4]

- **Detect Non-compliance device [Disabled]**
  Detect non-compliance PCI express Device, If enabled, it will take more time at Post time.
  Configuration options: [Disabled][Enabled]

3.6.3.2.1.2 PCI Express Root Port 5(x4 Key M)



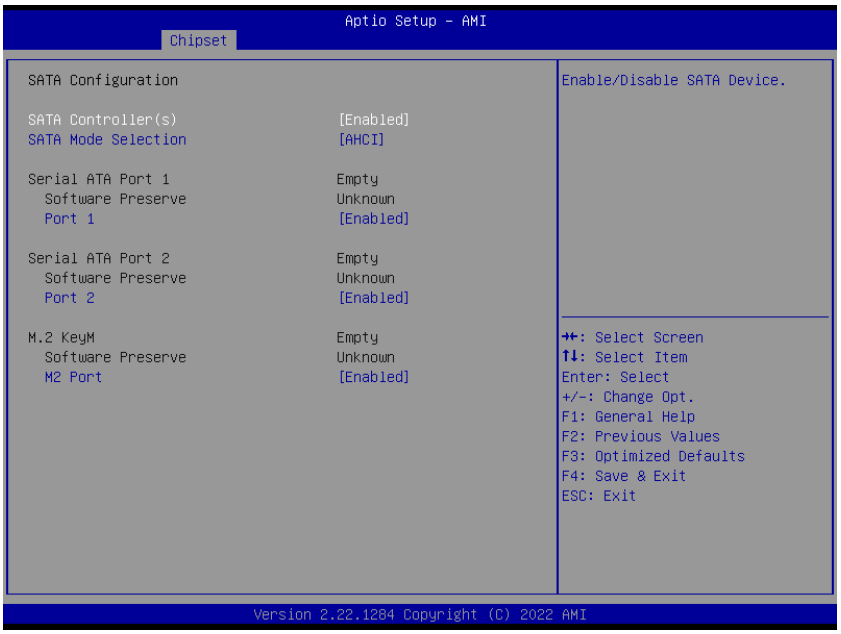
- **PCI Express Root Port 5 [Enabled]**
  Control the PCI Express Port
  Configuration options: [Disabled][Enabled]

- **ASPM 5 [Disabled]**
  Set the ASPM level: Force L0s- Force all links to L0s State; Auto- BIOS auto configure; Disabled- Disables ASPM
  Configuration options: [Disabled][L1][Auto]

- **PCIe Speed [Auto]**
  Select PCI Express Port speed
  Configuration options: [Auto][Gen1][Gen2][Gen3] [Gen4]

- **Detect Non-compliance device [Disabled]**
  Detect non-compliance PCI express Device, If enabled, it will take more time at Post time.
  Configuration options: [Disabled][Enabled]

3.6.3.2.2 SATA Configuration



- **SATA Controller(s) [Enabled]**
  Enable or Disable SATA device
  Configuration options: [Enabled][Disabled]

- **SATA Mode Selection [AHCI]**
  Determines how SATA controller operate
  Configuration options: [AHCI]

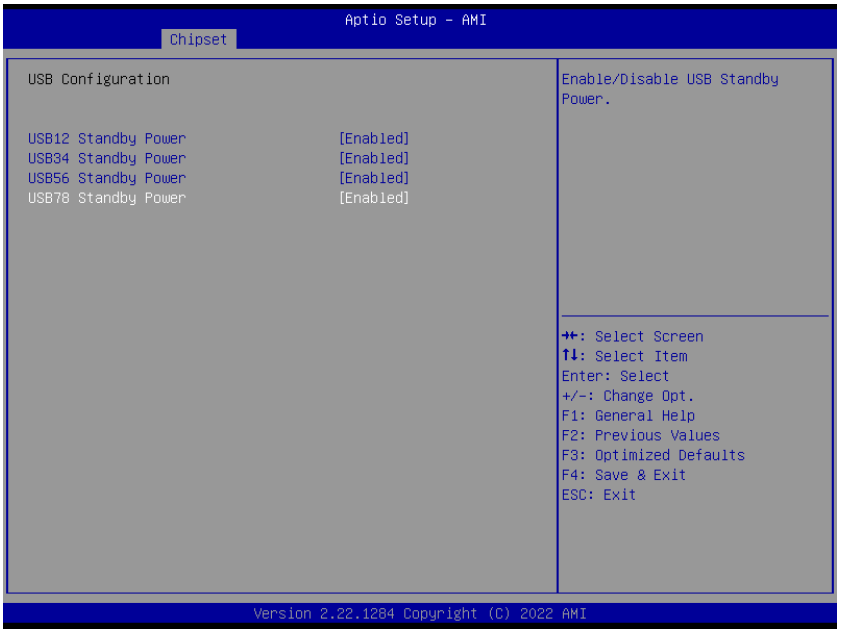
- **Port 1(M2 Port) [Enabled]**
  Enable or Disable SATA port 1
  Configuration options: [Enabled][Disabled]

- **Port 2 [Enabled]**
  Enable or Disable SATA port 2
  Configuration options: [Enable][Disabled]

- **Port 3 [Enabled]**
  Enable or Disable SATA port 3
  Configuration options: [Enabled][Disabled]

- **M2 port [Enabled]**
  Enable or Disable SATA on M.2 Key M slot
  Configuration options: [Enabled][Disabled]

3.6.3.2.3 USB Configuration



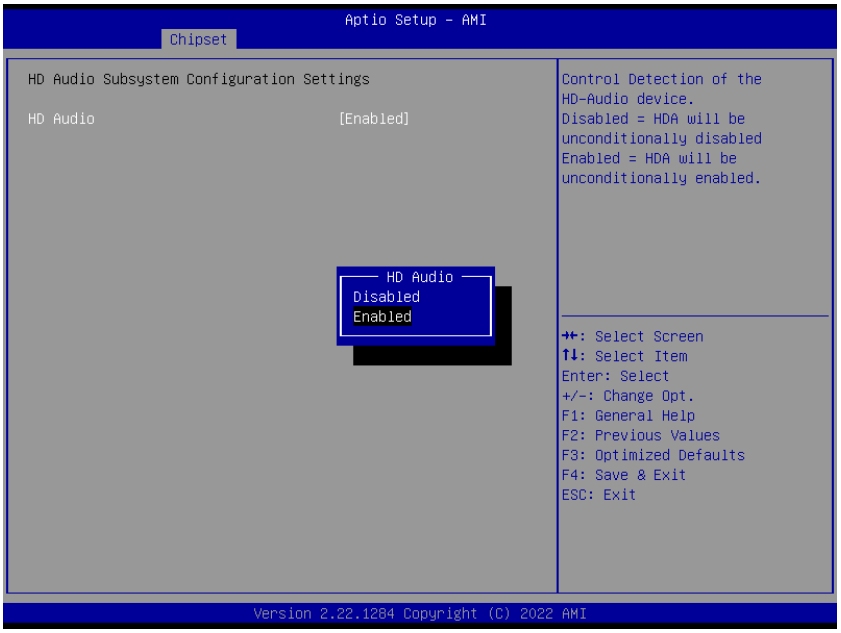
- **USB12 Standby Power[Enabled]**
  Enable or Disable USB standby power
  Configuration options: [Disabled] [Enabled]

- **USB34 Standby Power[Enabled]**
  Enable or Disable USB standby power
  Configuration options: [Disabled] [Enabled]

- **USB56 Standby Power[Enabled]**
  Enable or Disable USB standby power
  Configuration options: [Disabled] [Enabled]

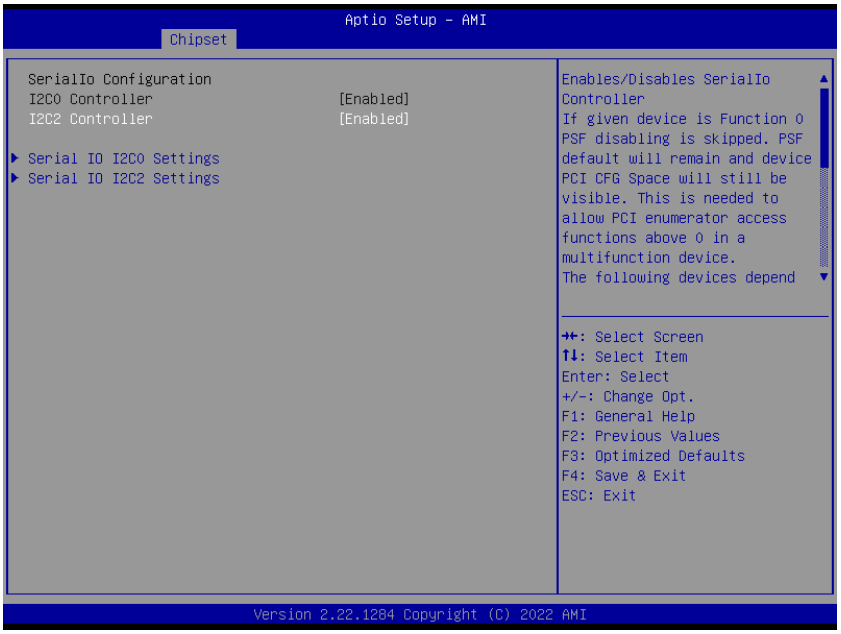
- **USB78 Standby Power[Enabled]**
  Enable or Disable USB standby power
  Configuration options: [Disabled] [Enabled]

3.6.3.2.4 HD audio Configuration



- **HD audio[Enabled]**
  Control Detection of the HD-Audio device.
  Configuration options: [Disabled] [Enabled]

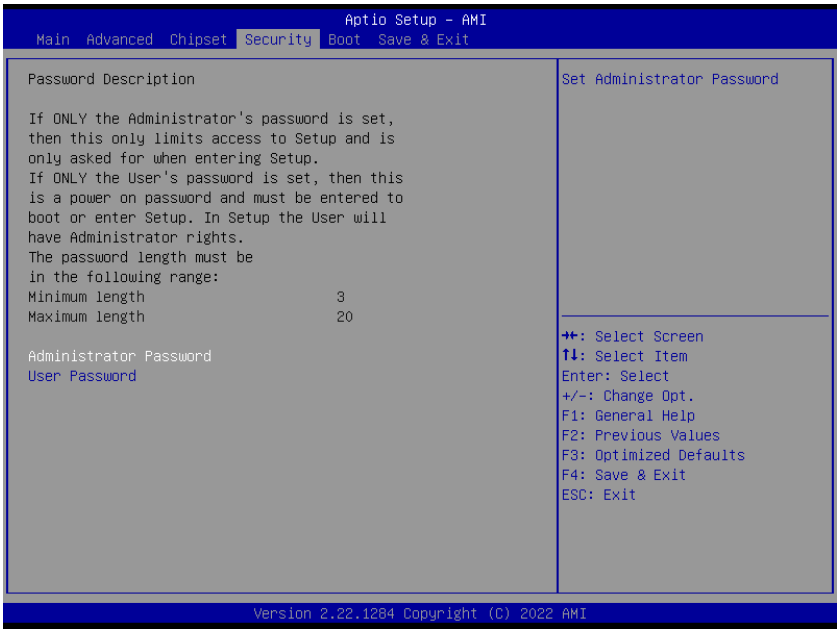
3.6.3.2.5 Serial IO Configuration



- **I2C0 Controller[Enabled]**
  Enabled/Disabled Serial IO Controller
  Configuration options: [Disabled] [Enabled]

- **I2C2 Controller[Enabled]**
  Enabled/Disabled Serial IO Controller
  Configuration options: [Disabled] [Enabled]

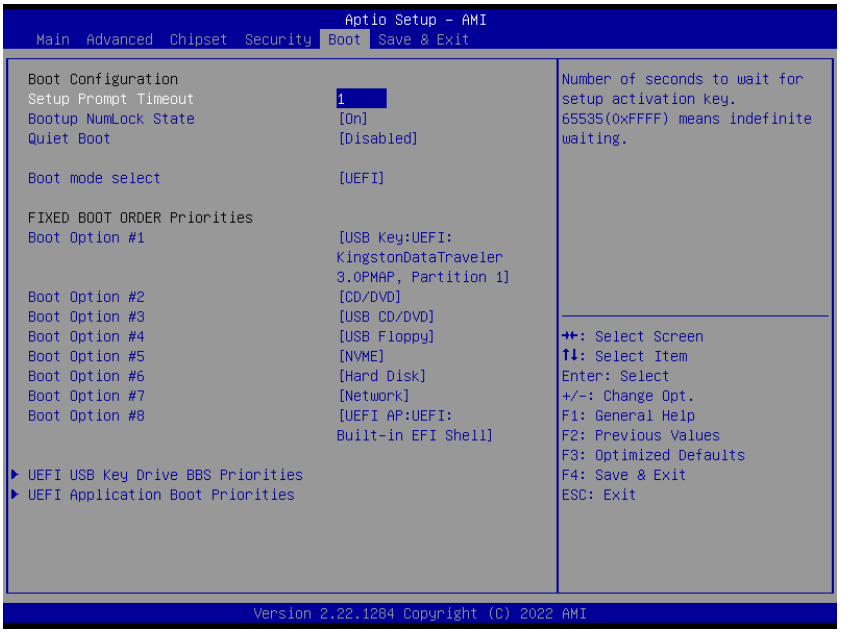
3.6.4 Security



- **Administrator Password**
  Set Administrator Password

- **User Password**
  Set User Password

3.6.5 Boot



- **Setup Prompt Timeout [1]**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

- **Bootup NumLock State [On]**
  Select the keyboard NumLock state
  Configuration options: [On] [Off]

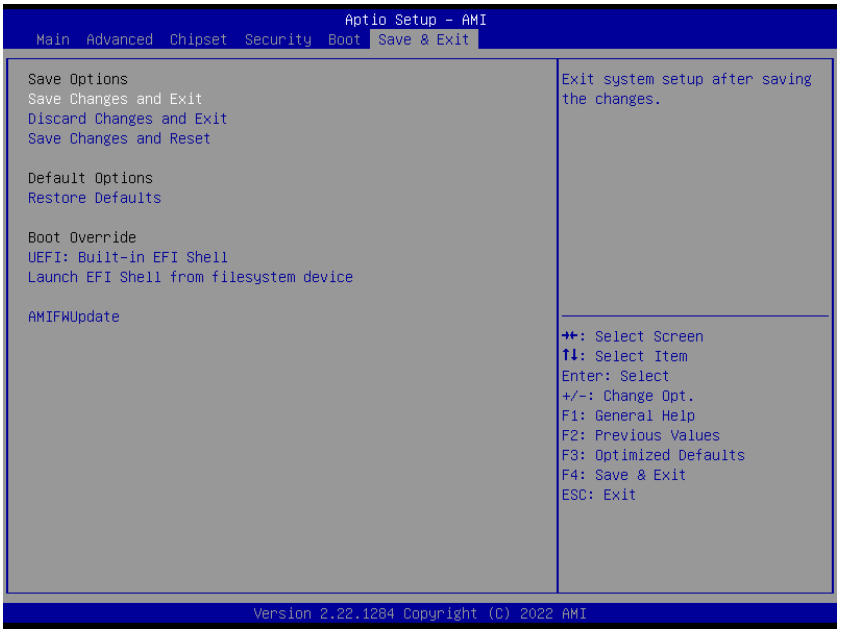
- **Quick Boot [Disable]**
  Enable or disable Quick Boot option
  Configuration options: [Disabled] [Enabled]

- **Boot mode select [UEFI]**
  Select boot mode LEGACY/UEFI
  Configuration options: [LEGACY] [UEFI]

- **UEFI USB Key Drive BBS Priorities**
  Specifies the boot device priority sequence from available UEFI USB key Drives.

- **UEFI Application Boot Priorities**
  Specifies the boot device priority sequence from available UEFI Application.

3.6.6 Save & Exit



- **Save changes and Exit**
  Exit system setup after saving the changes.

- **Discard changes and Exit**
  Exit system setup without saving the changes.

- **Save changes and Reset**
  Reset the system after saving the changes.

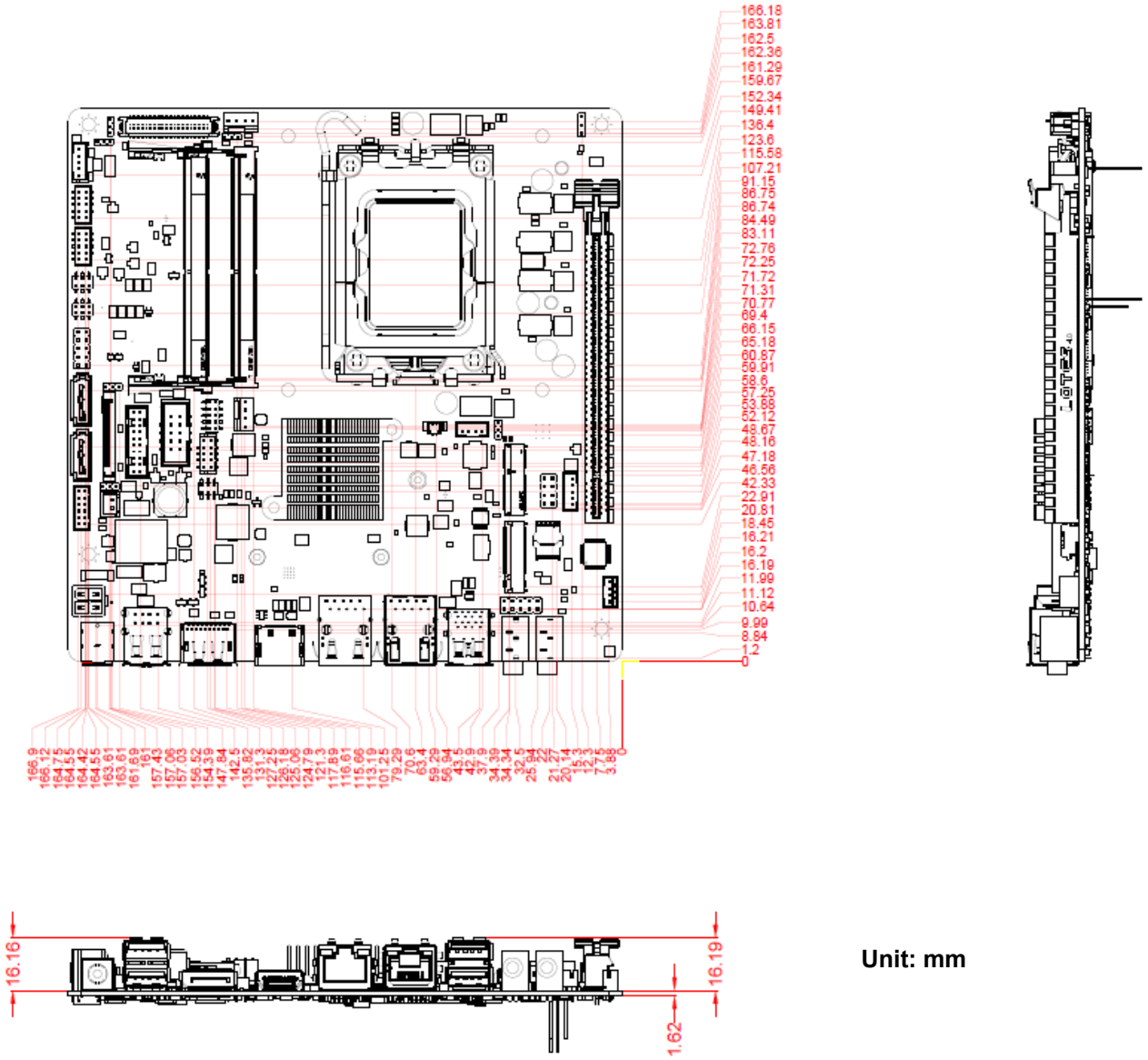
- **Restore Defaults**
  Restore/Load default values for all the setup option.

- **Launch EFI Shell from filesystem device**
  Attempts to launch EFI shell application from one of the available filesystem devices.

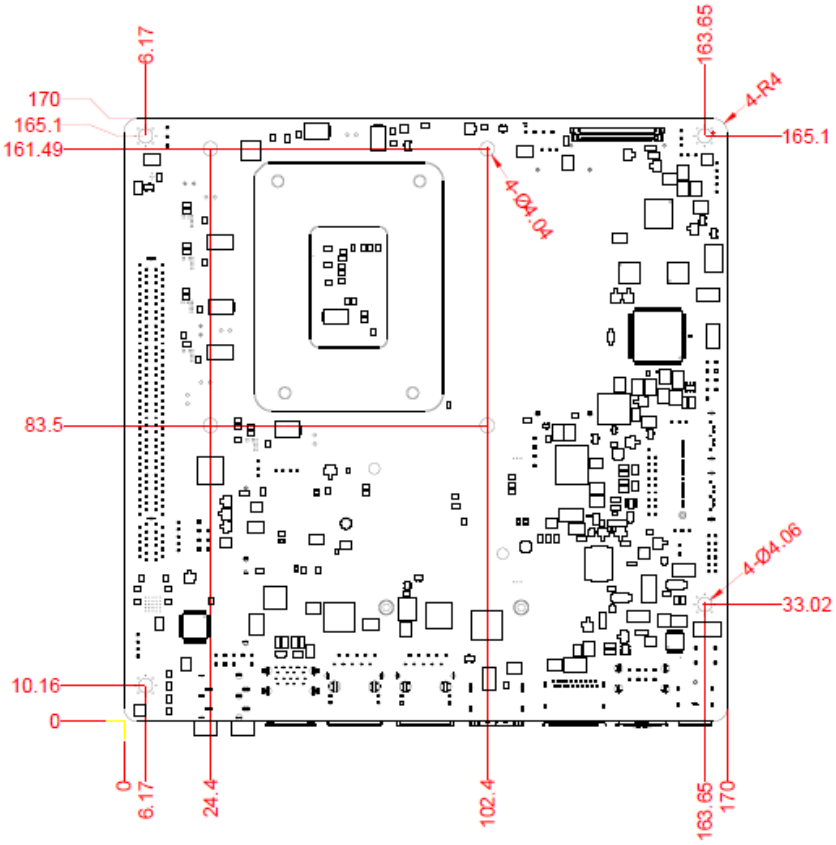
- **AMIFWUpdate**
  Launches AMIFWUpdate

4. Mechanical Drawing

4.1 Mechanical Drawing



Unit: mm


6.17
163.65
170
165.1
161.49
4-R4
165.1
4-Ø4.04
83.5
4-Ø4.06
33.02
10.16
0
0
6.17
24.4
102.4
163.65
170

Unit: mm