

MX610H

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

User's Manual



4th Ed – 14 April 2025

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 UNDESIRE OPERATION.

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

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

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

Notice

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

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5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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1. Getting Started

1.1 Safety Precautions

Warning!



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

Caution!



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

1.2 Packing List

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

- 1 x MX610H motherboard
- 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
1 st	December 2023	Avalue	Initial Release
2 nd	January 2024	Avalue	Update User condition suggestion
3 rd	October 2024	Avalue	Update Product Overview
4 th	April 2025	Avalue	Update Jumper and Connector List

1.4 Manual Objectives

This manual describes in details Avalue Technology MX610H 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 MX610H 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

MX610H	
Processor	Intel® Alder Lake-S Processor Up to 16 Cores 24 Threads Hybrid LGA1700 Supports Core i9, Core i7, Core i5, Core i3, Pentium, Celeron
Chipset	Intel® H610E
Memory	2 x DDR5 SO-DIMM slots (262 pin)
	Dual channel Non-ECC DDR5 4800 MHz , Up to 64GB
Display	Intel® UHD Graphic
	3 x independent displays supported 1 x LVDS 18/24-Bit Dual Channel - Resolution up to 1366x768 @60Hz (18-Bit) - Resolution up to 1920x1200 @60Hz (24-Bit) 2 x DP - Resolution up to 4096x2304 @60Hz 1 x HDMI - Resolution up to 3840x2160 @30Hz
SATA	3 x SATA III connectors supports Data Transfer rates 6.0Gb/s, 3.0Gb/s and 1.5Gb/s
PCIe	1 x PCIe x16 Gen4 Slot
M.2	1 x 2230 M.2 slot E Key with PCIe x1 & USB 2.0 signal (CNVi Supported)
	1 x 2280 & 2242 M.2 Slot M Key with PCIe x4 & SATA 3.0 signal
USB	4 x USB 3.2 Gen 1 (4 x Rear I/O with USB 2.0 signal)
	2 x USB 2.0
	2 x USB 3.2 Gen 1 (2 x Internal I/O with USB 2.0 signal)
	4 x USB 2.0 (2 x Internal I/O)
TPM	Infineon® SLB 9670VQ2.0 FW7.85
Super I/O Controller	Fintek® F81966AB-I
Serial Ports	2 x RS232/422/485 COM port connector (COM1, COM2)
	2 x RS232 COM port connectors (internal COM3, COM4)
PS/2	1 x PS/2 KB/MS
Watch Dog Timer	1 ~ 255 sec timer
HW Monitor	Yes
Smart FAN	1 x PWM FAN for CPU
	1 x PWM FAN for System
Audio	Realtek® ALC897
	HD Audio Codec with Auto Jack Sensing
LAN	1 x Intel® I219-LM GbE LAN PHY
	1 x Intel® i225-V 2.5GbE LAN

BIOS	AMI BIOS with 256Mb SPI ROM
Others IO	8-Bit Digital IO (4 x GPI, 4 x GPO) SMBus I2C
Expansion Slots	
PCIe	1 x PCIe x16 Gen 4 Slot
M.2	1 x 2230 M.2 slot E Key with PCIe x1 & USB 2.0 signal (CNVi Supported)
	1 x 2280 & 2242 M.2 Slot M Key with PCIe x4 Gen 3 & SATA3.0 signal
Internal I/O Headers	
SATA	3 x Std. SATA 3.0 Connectors
USB 2.0	2 x USB Headers (2 ports on headers)
USB 3.2 Gen 1	1 x USB Headers (2 ports on headers)
COM Port	4 x 2*5-pin Headers
PS/2	1 x 1*6-pin Header
Smart FAN	2 x 1*4-pin Headers
Front Audio	1 x 2*5-pin Header (Line-in, Mic)
Amplifier	1 x 1*4-pin Header
Front Panel	1 x 2*5-pin Header
Fan Header	2 x 1*4-pin Headers
Chassis Intrusion Header	1 x 1*2-pin Header
SMBus	1 x 1*4-pin Header
I2C	1 x 1*4-pin Header
Digital IO	1 x 2*5-pin Header
LVDS	1 x 2*20-pin Header
LVDS Inverter	1 x 1*5-pin Header
ATX-Power	1 x 2*12-pin Mini-Fit Connector
12V ATX-Power	1 x 2*4-pin Mini-Fit Connector
Internal Jumpers	
COM Port Ring-In/ Power Select	2 x 2*3-Pin Headers provide selections of "Ring-In", or "12V" or "5V" on COM1&2 and COM3&COM4 ports
AT/ATX Select	1 x 1*3-Pin Header
Clear CMOS	1 x 1*3-Pin Header
ME FW Enable/Disable Select	1 x 1*3-Pin Header
LVDS Backlight Control Select	1 x 1*3-Pin Header

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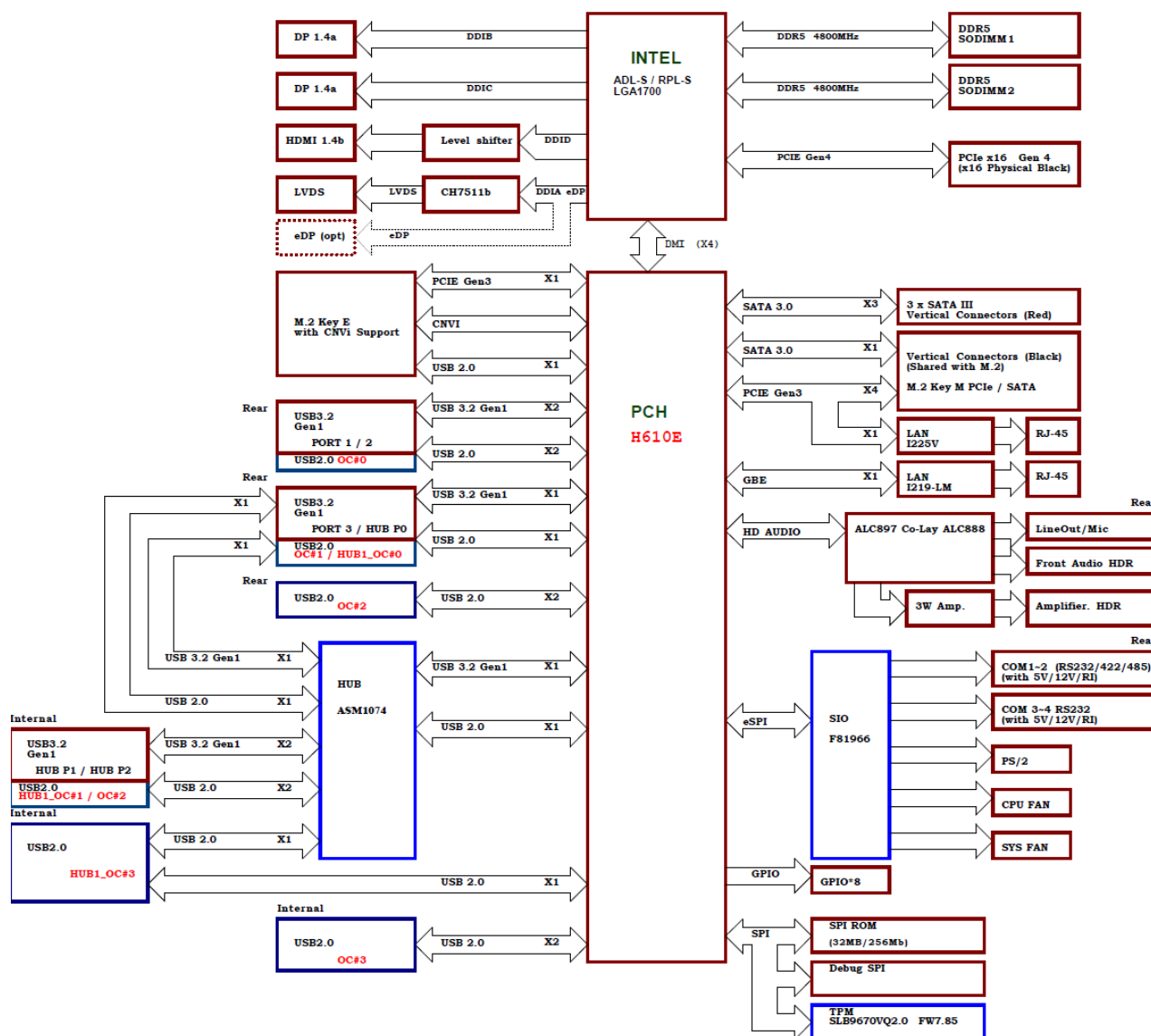
Back I/O Panel	
Audio	1 x Dual Audio Jack (Line-Out, Mic)
LAN + USB 3.2	1 x GbE RJ45 + Dual USB 3.2 Gen1 Stacked Connector
	1 x 2.5GbE RJ45+Dual USB 3.2 Gen1 Stacked Connector
USB 2.0	1 x Stack up USB 2.0 Connectors
DisplayPort	1 x Stack up dual DisplayPort Connector
HDMI	1 x HDMI Connector
COM	1 x Stack up dual COMs Connector
Power & Connector	
	1 x 2*12-pin Mini-Fit ATX-Power Connector
	1 x 2*4-pin Mini-Fit 12V ATX-Power Connector
Form Factor	
	Mini-ITX (6.7-in x 6.7-in)
Certification	
	FCC Class B, CE



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 MX610H.



User condition suggestion:

● **Before you proceed**

Take note of the following precautions before you install mainboard components or change any mainboard settings.

- Unplug the power cord from the wall socket before touching any component inside the system.
- Use a grounded wrist strap or touch a safely grounded object or to a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.
- Hold components by the edges to avoid touching the ICs on them.
- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
- Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the mainboard, peripherals, and/or component.

● **Before you proceed**

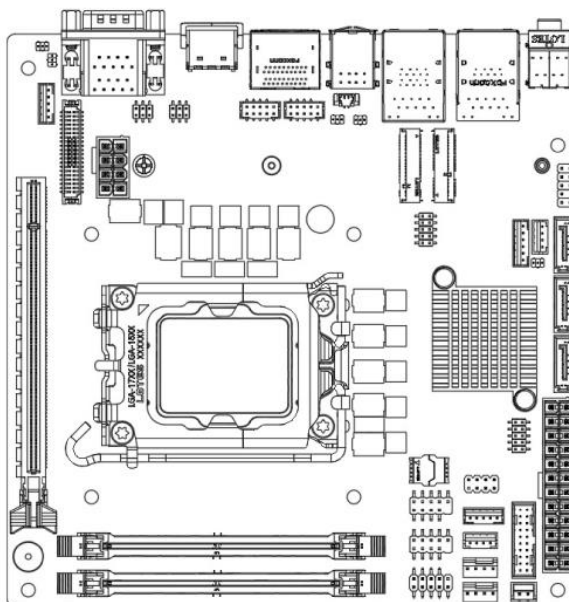
Before you install the mainboard, study the configuration of your chassis to ensure that the mainboard fits into it.



Make sure to unplug the power cord before installing or removing the mainboard. Failure to do so can cause you physical injury and damage mainboard components.

- **Placement Direction**

When installing the mainboard, make sure that you place it into the chassis in the correct orientation. The edge with external port goes to the rear part of the chassis as indicated in the image below.

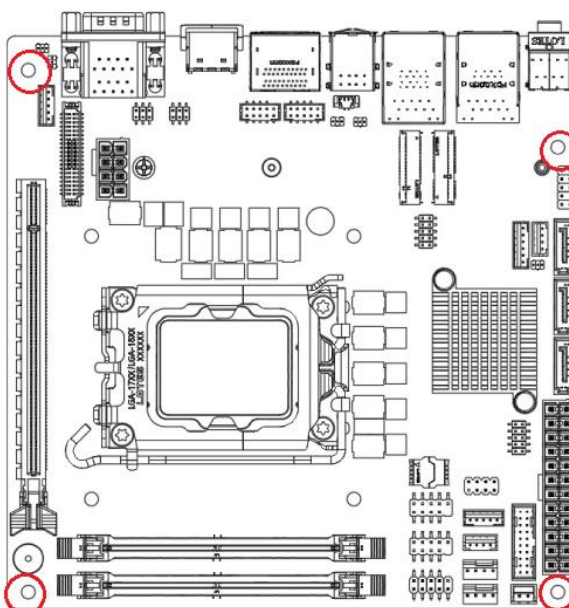


- **Mounting Holes**

Place the screws into the mounting holes indicated by the red circles to secure the mainboard to the chassis.

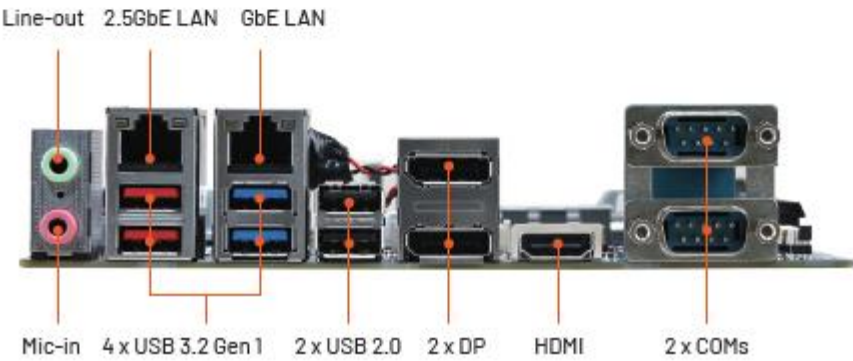
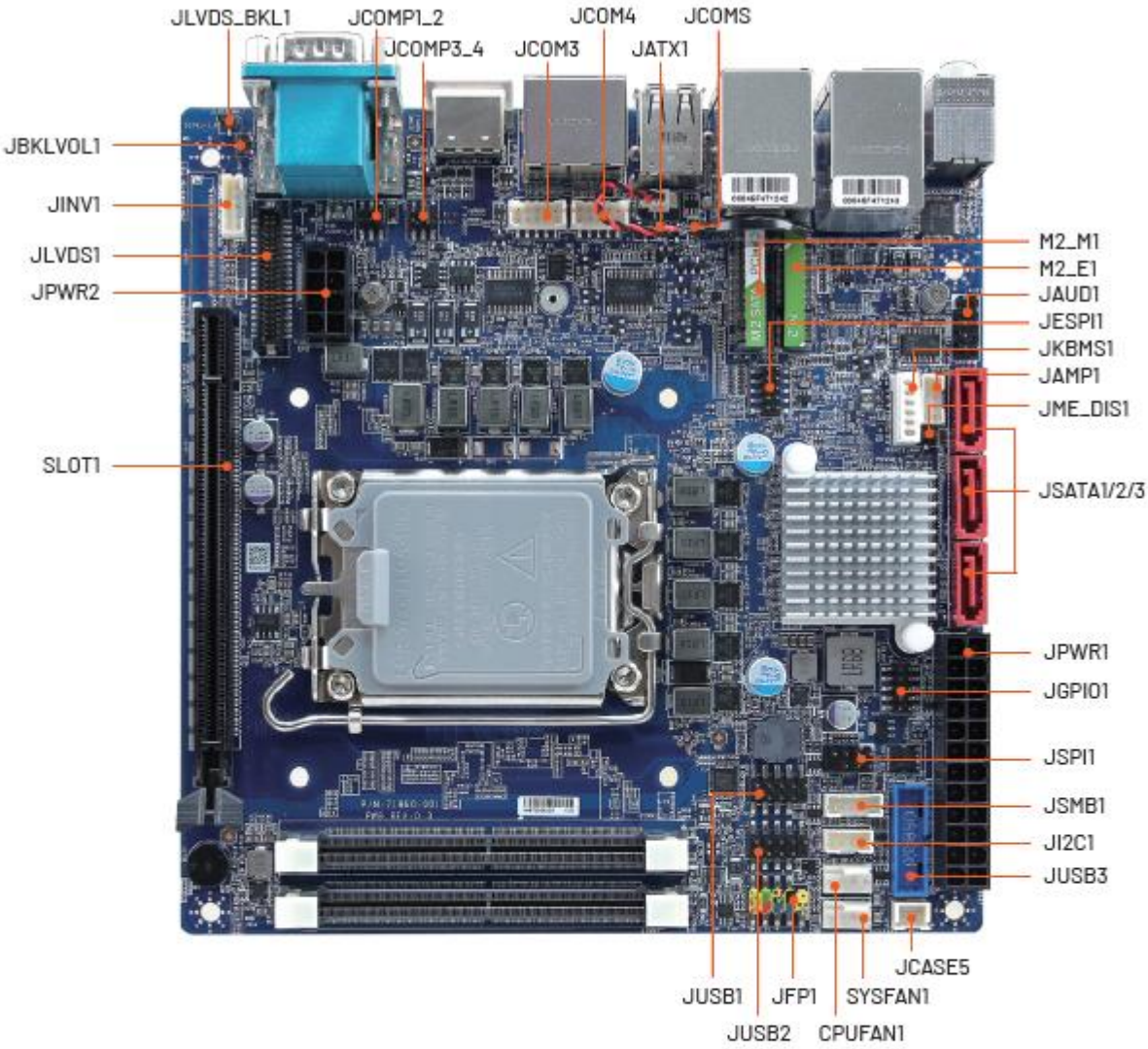


Do not over-tighten the screws! Doing so may damage the mainboard.



2. Hardware Configuration

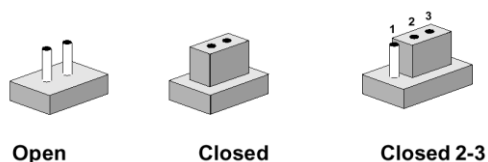
2.1 Product Overview



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.



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



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

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

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

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

Jumpers

Label	Function	Note
JCMOS1	Clear CMOS	3 x 1 header, pitch 1.25mm
JME_DIS1	Enable/disable the Intel ME F/W	3 x 1 header, pitch 1.25mm
JATX1	AT/ATX Power Select	3 x 1 header, pitch 1.25mm
JLVDS_BKL1	LVDS Backlight Control Select	3 x 1 header, pitch 1.25mm
JBKLVOL1	LVDS Backlight Power 3V/5V Select	3 x 1 header, pitch 1.25mm
JCOMP1_2	COM1 & COM2 RI/+5V/+12V Select	3 x 2 header, pitch 2.00mm
JCOMP3_4	COM3 & COM4 RI/+5V/+12V Select	3 x 2 header, pitch 2.00mm

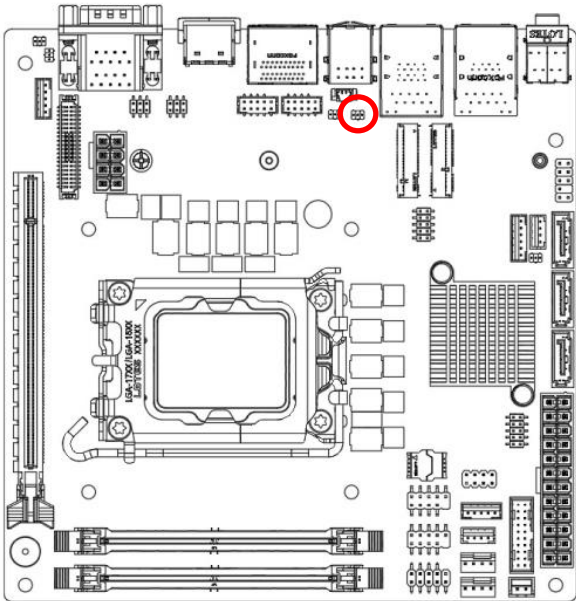
Connectors		
Label	Function	Note
JPWR1	ATX-Power Connector	12 x 2 header, pitch 4.20mm
JPWR2	12V ATX-Power Connector	4 x 2 header, pitch 4.20mm
JSATA1/2/3	Serial ATA Connectors	
CPUFAN1	CPU Fan Connector	4 x 1 wafer, pitch 2.54mm
SYSFAN1	System Fan Connector	4 x 1 wafer, pitch 2.54mm
JI2C1	I2C Connector	4 x 1 wafer, pitch 2.0mm
JSMB1	SMBus Connector	4 x 1 wafer, pitch 2.0mm
JFP1	System Panel Connector	5 x 2 header, pitch 2.54mm
JCOM3/4	Serial Port Connector 3/4	5 x 2 wafer, pitch 2.00mm
JGPIO1	Digital I/O header	5 x 2 header, pitch 2.54mm
JCASE5	Chassis Intrusion Connector	2 x 1 wafer, pitch 2.54mm
JBMS1	PS/2 KB&MS Connector	6 x 1 wafer, pitch 2.00mm
JUSB1/2	USB 2.0 Connector	5 x 2 header, pitch 2.54mm
JAMP1	Amplifier Connector	4 x 1 wafer, pitch 2.00mm
JUSB3	USB 3.2 Gen 1 Connector	10 x 2 Box header, pitch 2.00mm
JAUD1	Front Panel Audio Connector	5 x 2 header, pitch 2.54mm
JINV1	LVDS Inverter Connector	5 x 1 wafer, pitch 2.00mm Matching connector : JST PHR-5
JLVDS1	LVDS Connector	20 x 2 header, pitch 1.25mm Matching connector : DF13-40DS-1.25C
DIMM1	262-pin DIMM slot 1	If there is only one memory module being installed in the system, install it on this slot first.
DIMM2	262-pin DIMM slot 2	
SLOT1	PCI express x16 slot	
M2_E1	2230 M.2 slot E Key	
M2_M1	2280 & 2242 M.2 Slot M Key	
AUDIO1	1 x Audio Dual Jack (Line-Out, Mic)	
Conn2	1 x 2.5GbE RJ45 + Dual USB 3.2 Gen1 Stacked Connector	
Conn1	1 x GbE RJ45 + Dual USB 3.2 Gen1 Stacked Connector	
USB1	1 x Stack up USB 2.0 Connectors	

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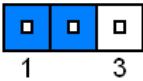
JSPI1	JSPI1 Connector	4 x 2 header, pitch 2.00mm
JESPI1	JESPI Connector	5 x 2 header, pitch 2.00mm
HDMI1	1 x HDMI Connector	
DP1	1 x Stack up dual DisplayPort Connector	
JCOM1	1 x Stack up dual COMs Connector	

2.3 Setting Jumpers & Connectors

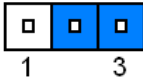
2.3.1 Clear CMOS (JCMOS1)



Normal *

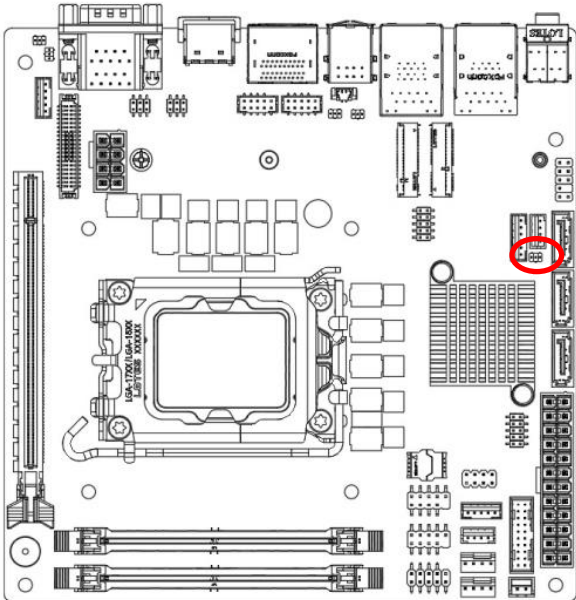


Clear CMOS

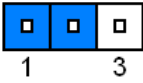


* Default

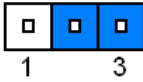
2.3.2 Enable/disable the Intel ME F/W (JME_DIS1)



Enable*

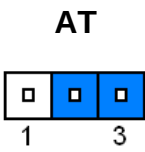
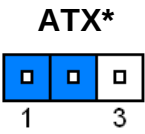
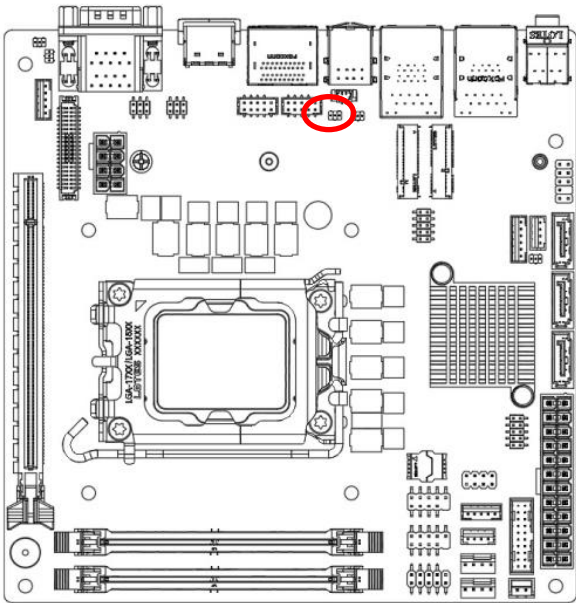


Disable



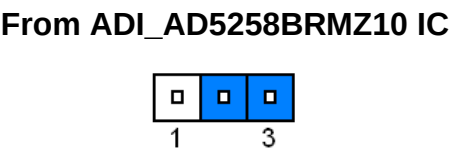
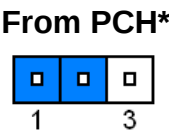
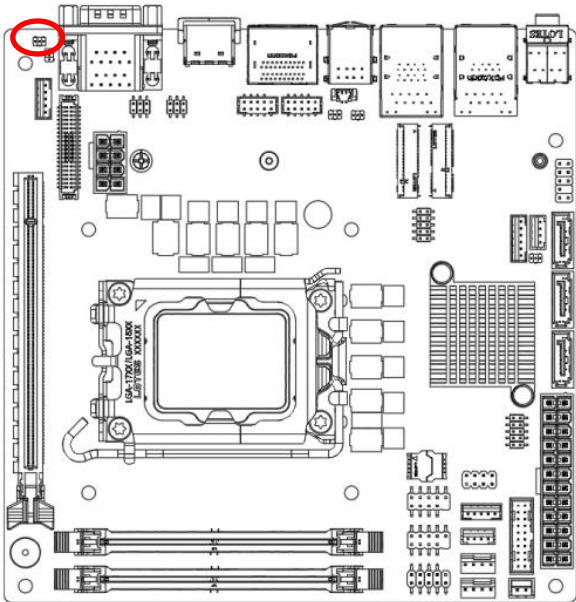
* Default

2.3.3 AT/ATX Power Select (JATX1)



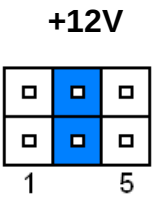
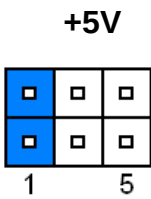
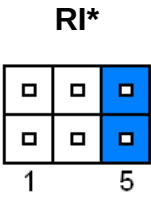
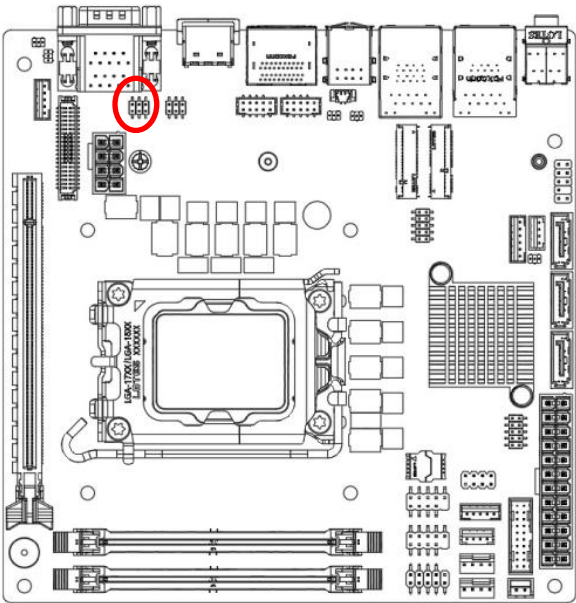
* Default

2.3.4 LVDS Backlight Control Select (JLVDS_BKL1)

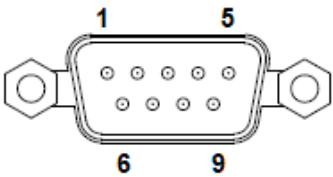


* Default

2.3.5 COM1/2 RI/+5V/+12V Select (JCOMP1_2)

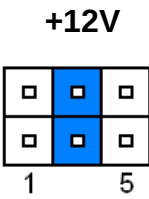
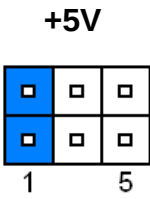
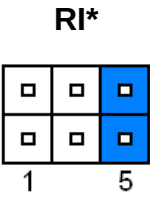
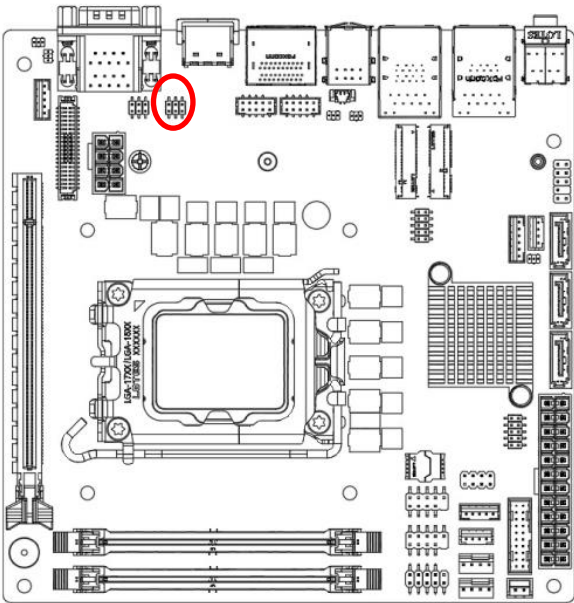


* Default



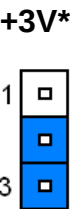
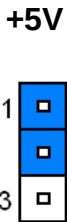
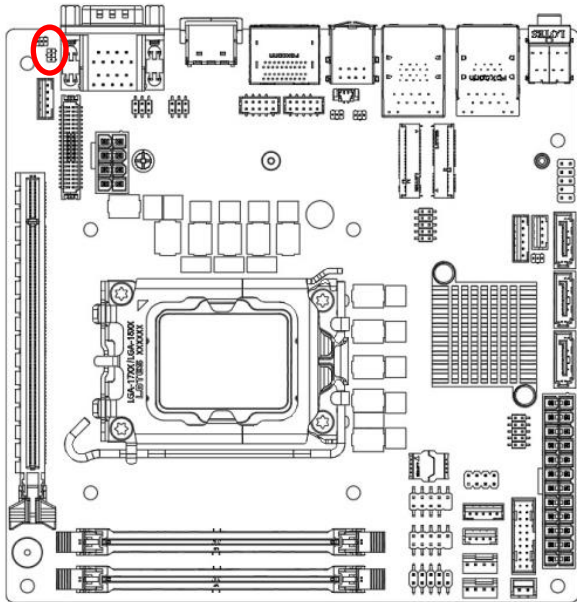
PIN	RS232	RS422	RS485
1	DCD	TXD -	DATA-
2	RXD	RXD +	
3	TXD	TXD +	DATA+
4	DTR	RXD -	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	Ring in or 5V/12V out	5V/12V out	5V/12V out

2.3.6 COM3/4 RI/+5V/+12V Select (JCOMP3_4)



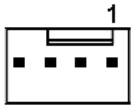
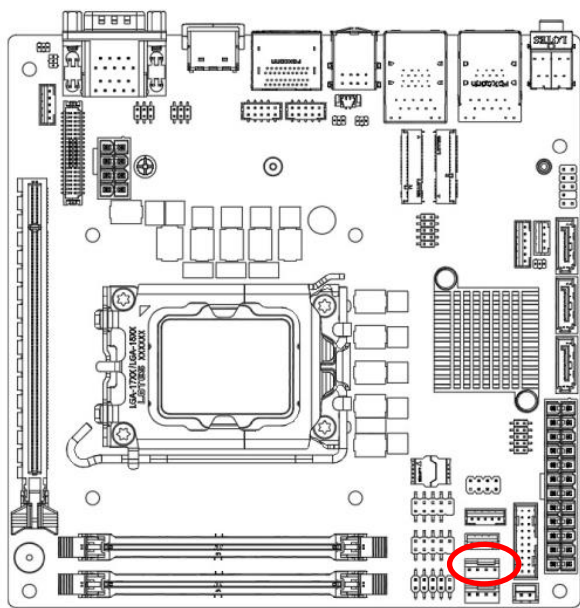
* Default

2.3.7 LVDS Backlight Power 3V/5V Select (JBKLVOL1)



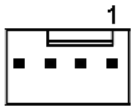
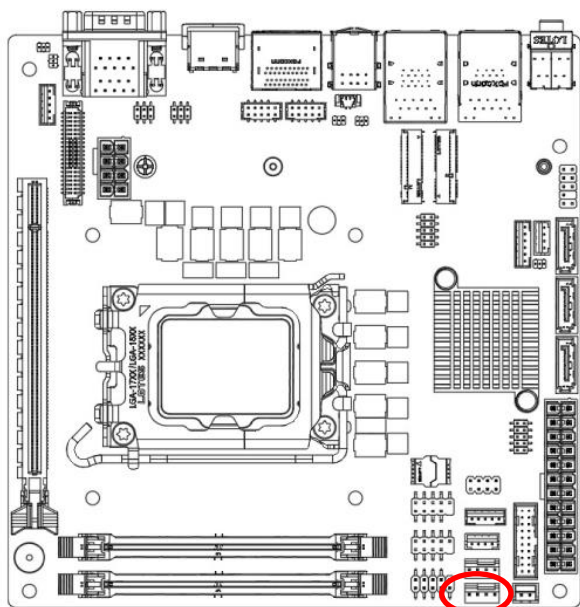
* Default

2.3.8 CPU fan connector (CPUFAN1)



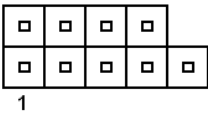
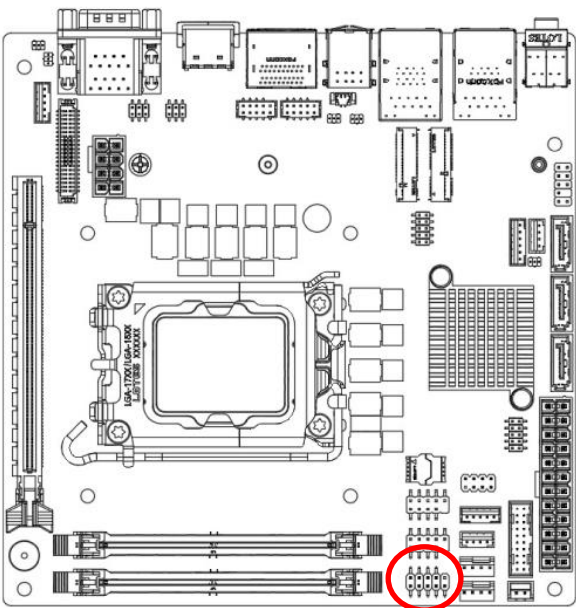
PIN	Signal
1	GND
2	+12V
3	FAN_SENSE
4	FAN_PWN

2.3.9 System fan connector (SYSFAN1)



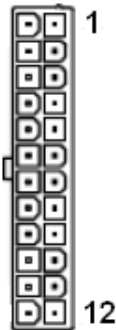
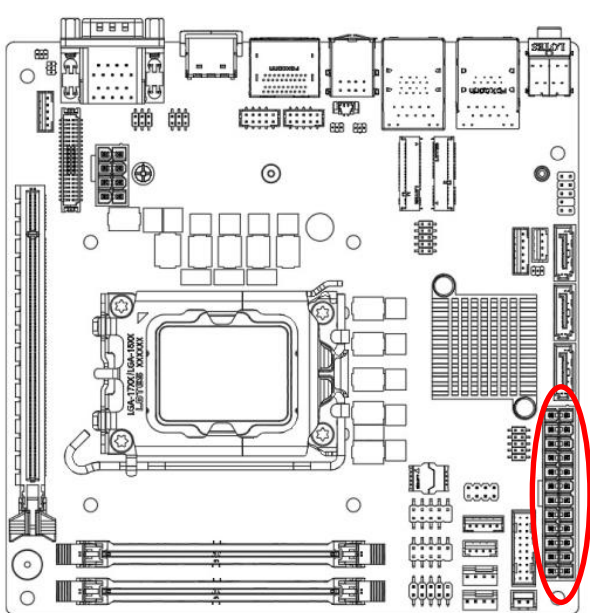
PIN	Signal
1	GND
2	+12V
3	FAN_SENSE
4	FAN_PWN

2.3.10 System Panel Connector (JFP1)



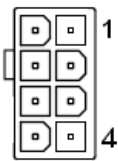
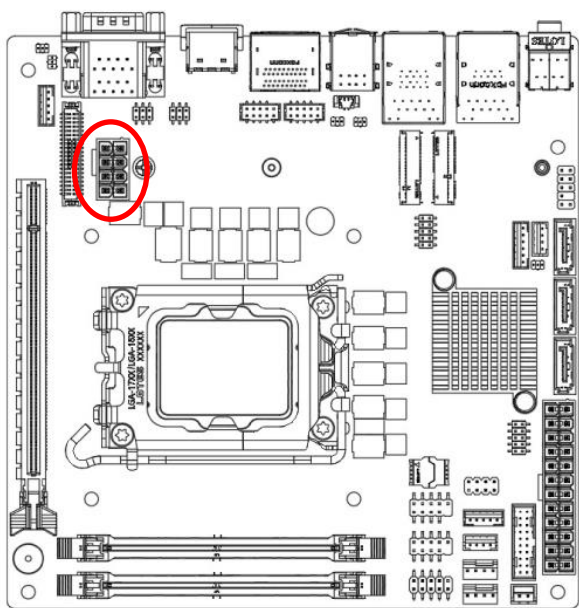
Function	Signal	PIN	PIN	Signal	Function
			9	NC	
Power button	GND	8	7	Reset Switch+	Reset button
	Power Button+	6	5	GND	
Power LED	Power LED-	4	3	HDD LED-	HDD LED
	Power LED+	2	1	HDD LED+	

2.3.11 ATX-Power Connector (JPWR1)



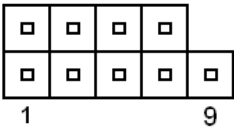
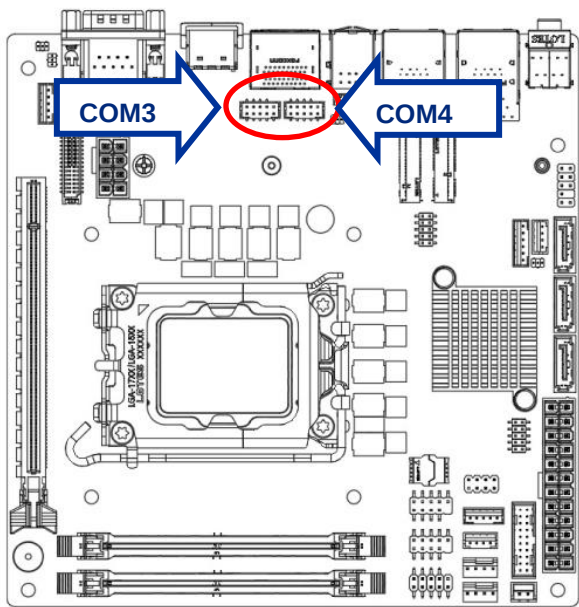
Signal	PIN	PIN	Signal
+3.3V	13	1	+3.3V
-12V	14	2	+3.3V
GND	15	3	GND
PS-ON#	16	4	+5V
GND	17	5	GND
GND	18	6	+5V
GND	19	7	GND
NC	20	8	PWR OK
+5V	21	9	5VSB
+5V	22	10	+12V
+5V	23	11	+12V
GND	24	12	+3.3V

2.3.12 12V ATX-Power Connector (JPWR2)



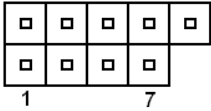
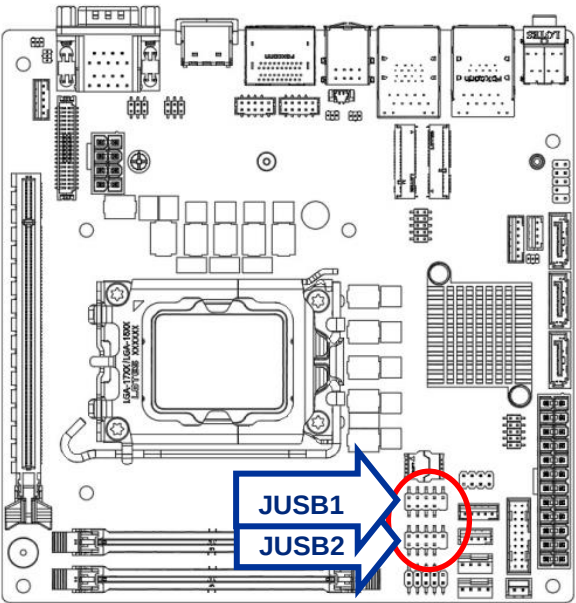
Signal	PIN	PIN	Signal
+12V	5	1	GND
+12V	6	2	GND
+12V	7	3	GND
+12V	8	4	GND

2.3.13 Serial Port connectors (JCOM3/4)



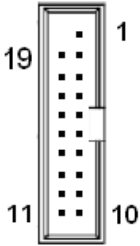
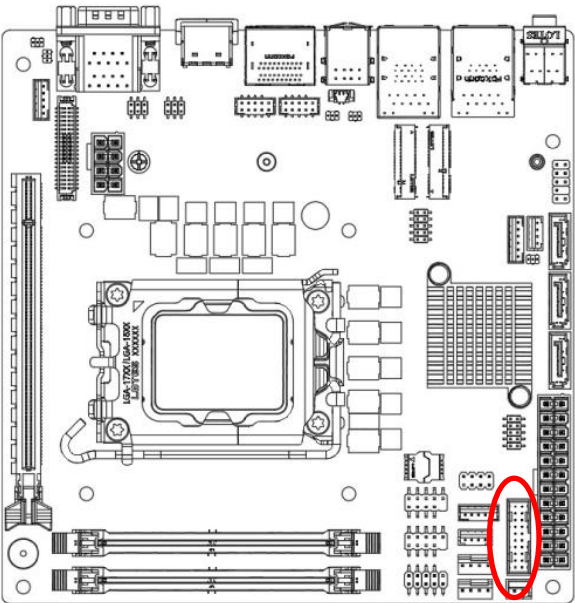
Signal	PIN	PIN	Signal
DCD	1	2	SIN
SOUT	3	4	DTR
GND	5	6	DSR
RTS	7	8	CTS
RI/+5V/+12V	9		

2.3.14 USB 2.0 Connector (JUSB1/2)



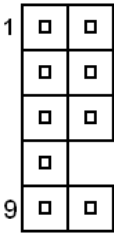
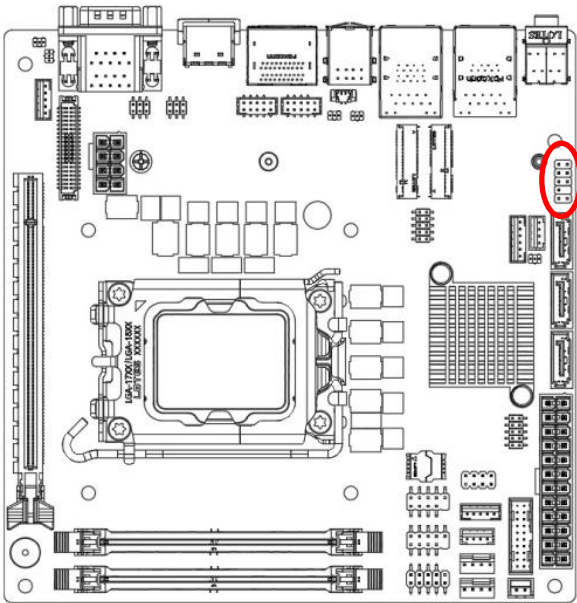
Signal	PIN	PIN	Signal
+5V	1	2	+5V
USB0-	3	4	USB1-
USB0+	5	6	USB1+
GND	7	8	GND
		10	NC

2.3.15 USB 3.2 Gen 1 Connector (USB3)



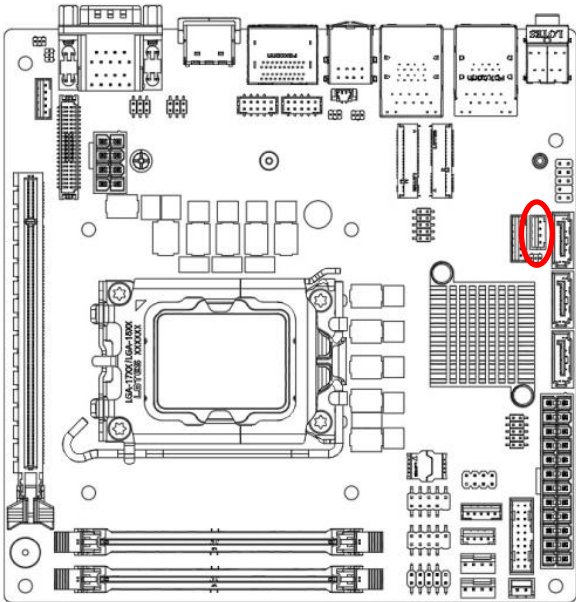
Signal	PIN	PIN	Signal
		1	+5V
+5V	19	2	USB3.0_RX-
USB3.0_RX-	18	3	USB3.0_RX+
USB3.0_RX+	17	4	GND
GND	16	5	USB3.0_TX-
USB3.0_TX-	15	6	USB3.0_TX+
USB3.0_TX+	14	7	GND
GND	13	8	USB_D-
USB_D-	12	9	USB_D+
USB_D+	11	10	NC

2.3.16 Front Panel Audio Connector (JAUD1)



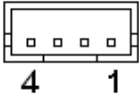
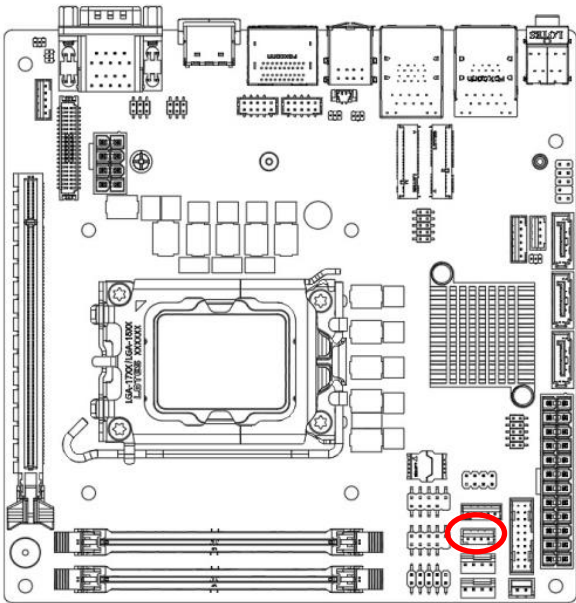
Signal	PIN	PIN	Signal
MIC_L	1	2	GND
MIC_R	3	4	Front Panel Audio Detection
Head Phone_R	5	6	MIC Detection
Sense_Send	7		
Head Phone_L	9	10	Head Phone Detection

2.3.17 Amplifier connector (JAMP1)



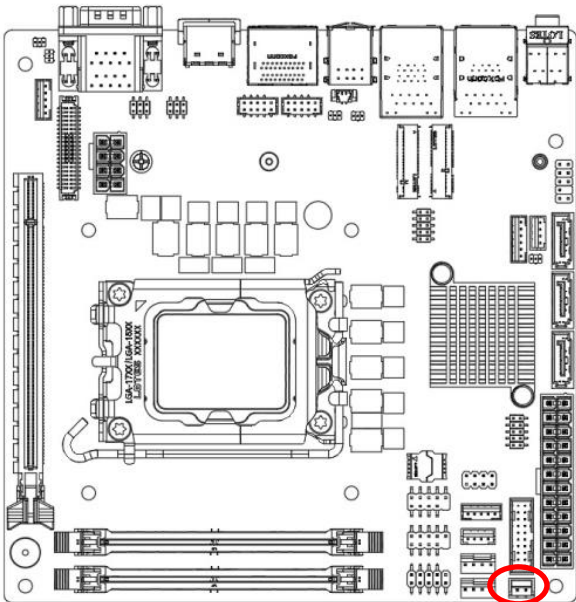
Signal	PIN
AMP_R-	1
AMP_R+	2
AMP_L-	3
AMP_L+	4

2.3.18 I2C connector (J12C1)



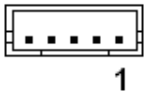
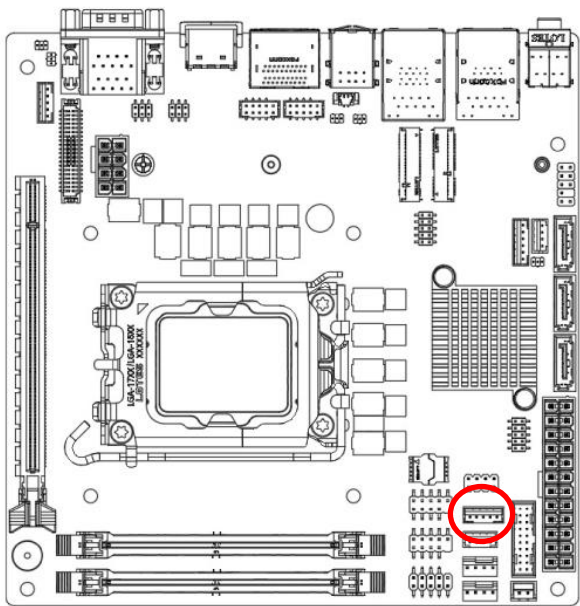
PIN	Signal
1	3.3V
2	CLK
3	DATA
4	GND

2.3.19 Chassis Intrusion Connector (JCASE5)



PIN	Signal
2	GND
1	SIO_CASEOPEN#

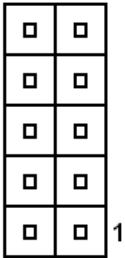
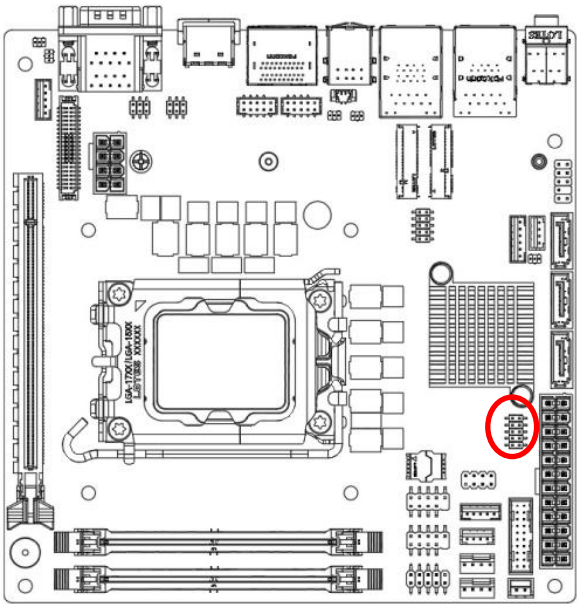
2.3.20 SMBus connector (JSMB1)



Signal	PIN
3.3V	5
GND	4
SMBALERT#	3
SMBDATA	2
SMBCLK	1

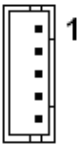
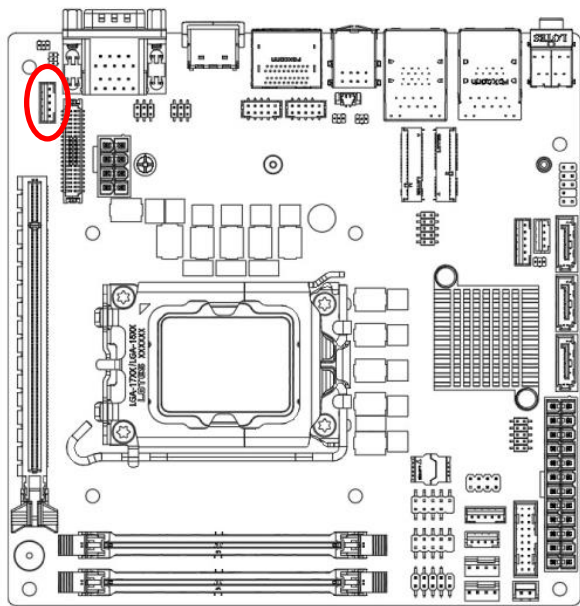
Note: The connector is for the RD to update the Power IC firmware only

2.3.21 Digital I/O header connector (JGPIO1)



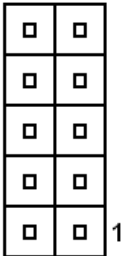
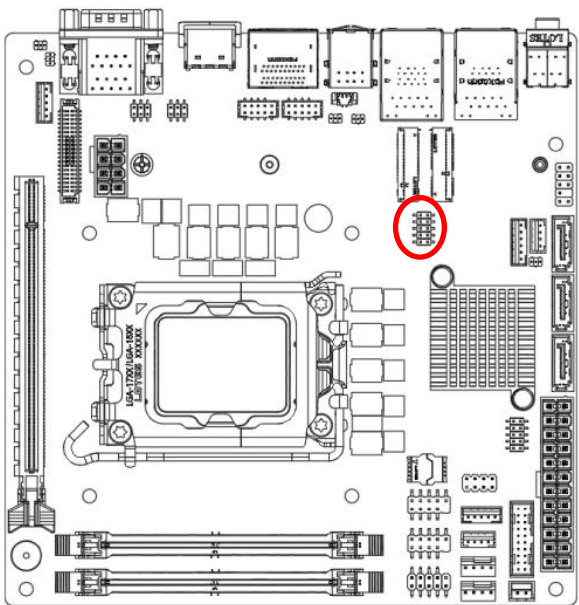
Signal	PIN	PIN	Signal
N_GPO3	10	9	N_GPI3
N_GPO2	8	7	N_GPI2
N_GPO1	6	5	N_GPI1
N_GPO0	4	3	N_GPI0
3.3V	2	1	GND

2.3.22 LVDS Inverter Connector (JINV1)



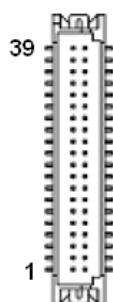
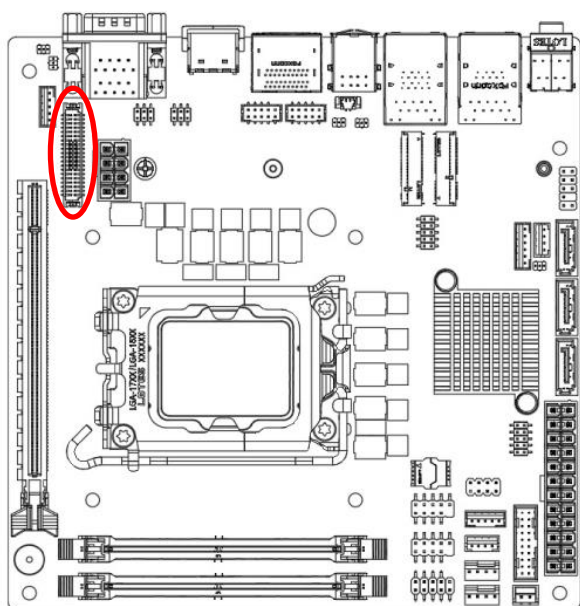
Signal	PIN
+12V	1
GND	2
Enable	3
Brightness control	4
+5V	5

2.3.23 JESPI connector (JESPI1)



Signal	PIN	PIN	Signal
GND	10	9	ESPI_HDR_ALERT0
ESPI_CLK_HDR_C	8	7	ESPI_IO3_HDR_C
ESPI_CS0_N	6	5	ESPI_IO2_HDR_C
ESPI_HDR_RESET#	4	3	ESPI_IO1_HDR_C
VCC3	2	1	ESPI_IO0_HDR_C

2.3.24 LVDS connector (JLVDS1)



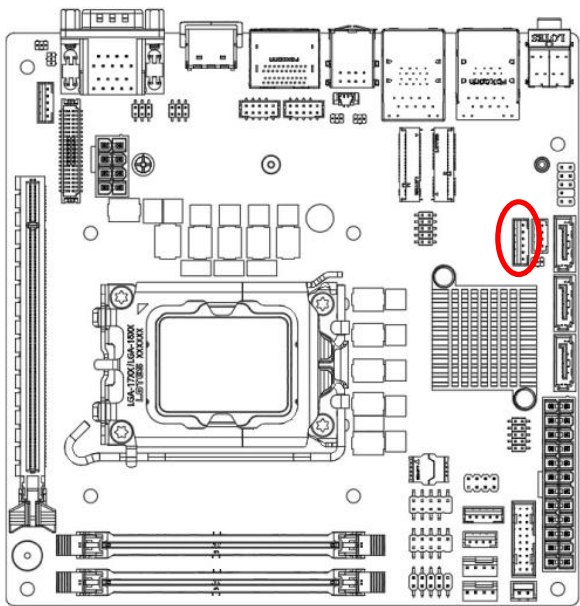
Signal	PIN	PIN	Signal
+12V	39	40	+12V
GND	37	38	GND
LVDSB_CLK#	35	36	LVDSA_CLK#
LVDSB_CLK	33	34	LVDSA_CLK
GND	31	32	GND
LVDSB_DATA#3	29	30	LVDSB_DATA#2
LVDSB_DATA3	27	28	LVDSB_DATA2
GND	25	26	GND
LVDSB_DATA#1	23	24	LVDSB_DATA#0
LVDSB_DATA1	21	22	LVDSB_DATA0
GND	19	20	GND
LVDSA_DATA#3	17	18	LVDSA_DATA#2
LVDSA_DATA3	15	16	LVDSA_DATA2
GND	13	14	GND
LVDSA_DATA#1	11	12	LVDSA_DATA#0
LVDSA_DATA1	9	10	LVDSA_DATA0
GND	7	8	GND
DDC_CLK	5	6	DDC_DATA
+3.3V_LVDS	3	4	+5V_LVDS
+3.3V_LVDS	1	2	+5V_LVDS



Some notes on LVDS:

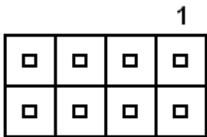
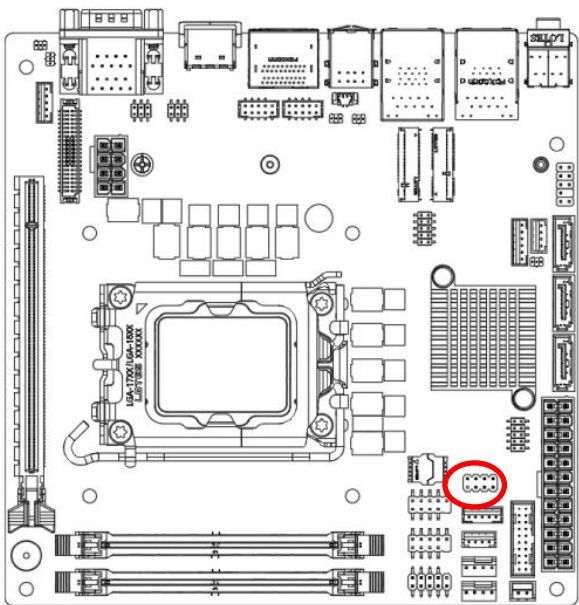
- LVDS was disabled by default
- Default resolution: 1024x768 18/1
- Default PWM Voltage: 3V (5V By jumper selection)
- JLVDS_BK1:
 - *short 1-2 Brightness bar is workable under Win10 OS
 - *short 2-3 Backlight is controlled by ADI_AD5258BRMZ10 IC via API

2.3.25 PS/2 KB&MS Connector (JKBMS1)



Signal	PIN
KB_CLK	1
KB_DAT	2
MS_CLK	3
GND	4
+5V	5
MS_DAT	6

2.3.26 JSPI header connector (JSPI1)



Signal	PIN	PIN	Signal
+VCCSPI	1	2	GND
SPI_CS0_HDR	3	4	SPI_CLK_HDR
SPI_MISO_HDR	5	6	SPI_MOSI_HDR
SPI_HOLD#_HDR	7		

User condition suggestion:**● CPU (Central Processing Unit)**

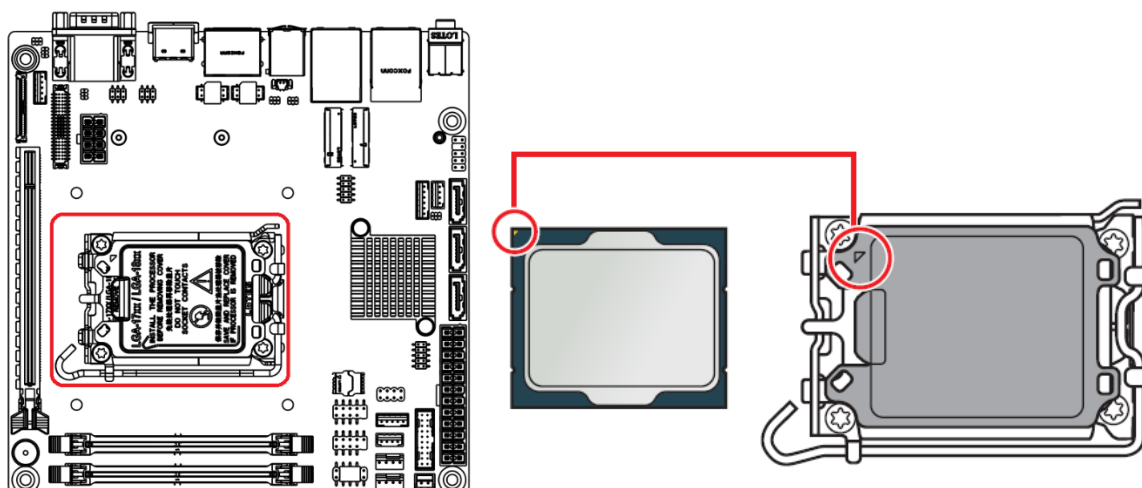
When installing the CPU, make sure that you install a cooler to prevent overheating. If you do not have a CPU cooler, consult your vendor before turning on the computer.

**Overheating**

Overheating may seriously damage the CPU and system. Always make sure the cooling fan can work properly to protect the CPU from overheating. Make sure that you apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.

Replacing the CPU

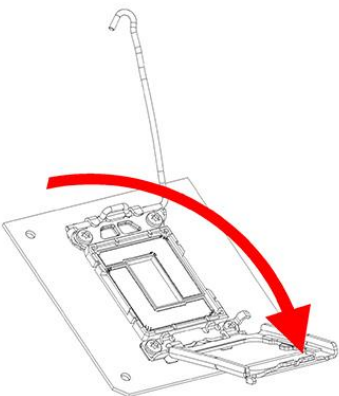
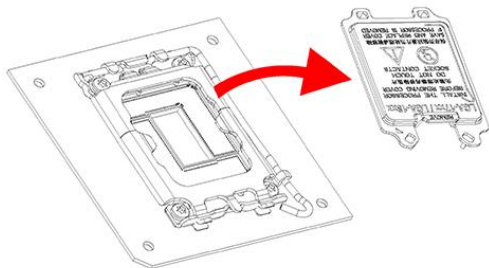
While replacing the CPU, always turn off the power supply or unplug the power supply's power cord from the grounded outlet first, to ensure the safety of CPU.



● CPU Installation

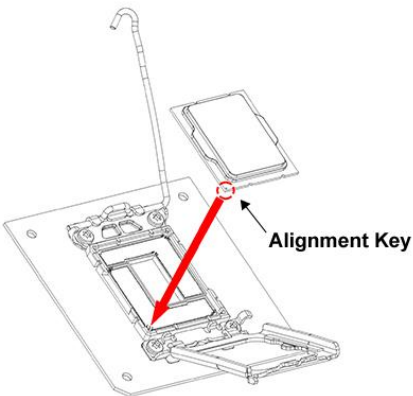
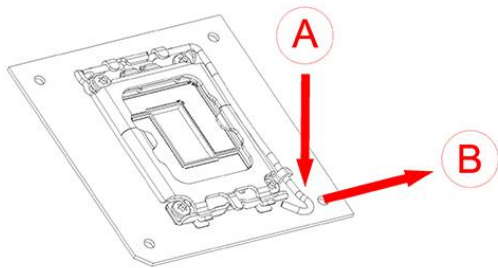
01

04



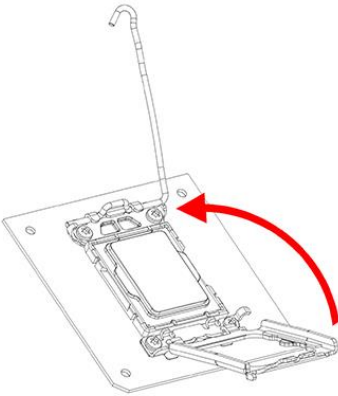
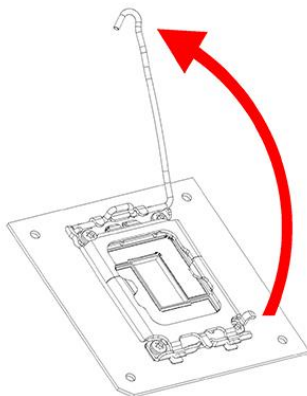
02

05

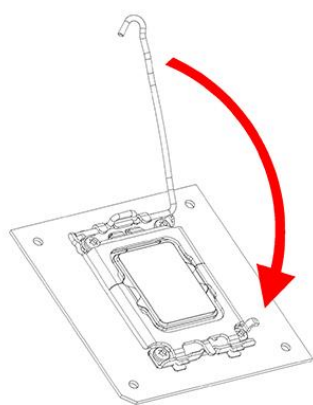


03

06

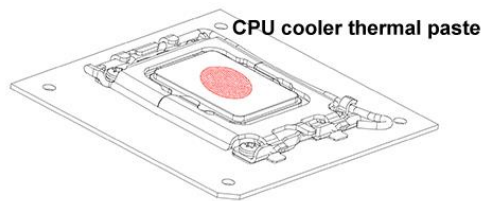


07

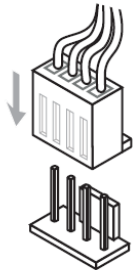


● CPU cooler Installation

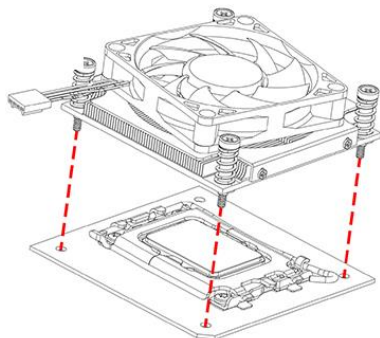
01



03



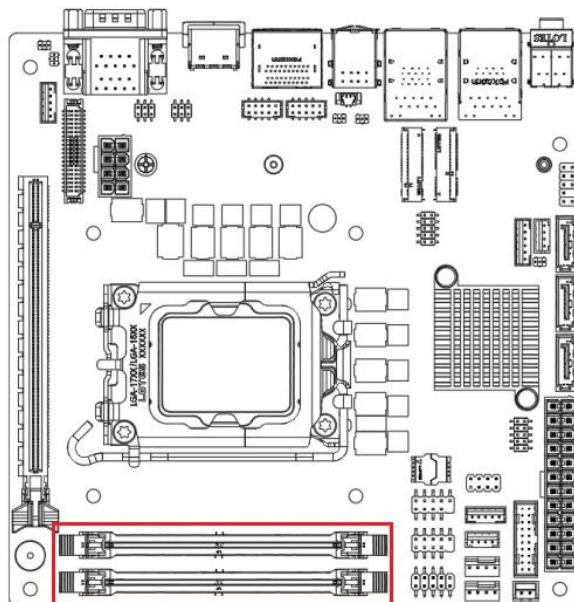
02



● Installing DIMM

When installing the CPU, make sure that you install a cooler to prevent overheating. If you do not have a CPU cooler, consult your vendor before turning on the computer.

- The SO-DIMM slot is intended for memory modules.



• Installing a DDR5 SODIMM



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

1. Locate the SODIMM socket on the board.
2. Hold two edges of the SODIMM module carefully, and keep away of touching its connectors.
3. Align the notch key on the module with the rib on the slot.
4. Firmly press the modules into the socket which will automatically snap into the mounting notch. Do not force the SODIMM module in with extra force as the SODIMM module only fits in one direction.





-
- 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.
-

- **Removing a DDR5 SODIMM**

1. Press the two ejector tabs on the slot outward simultaneously, and then pull out the DIMM module.



Support the SODIMM lightly with your fingers when pressing the ejector tabs. The SODIMM might get damaged when it flips out with extra force.

- **The Expansion Slots**

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

- **Installation of Expansion Card**

To install an expansion Card:

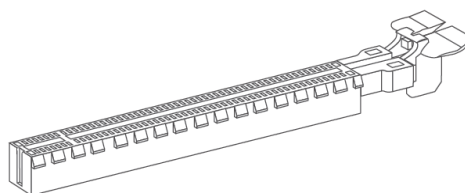
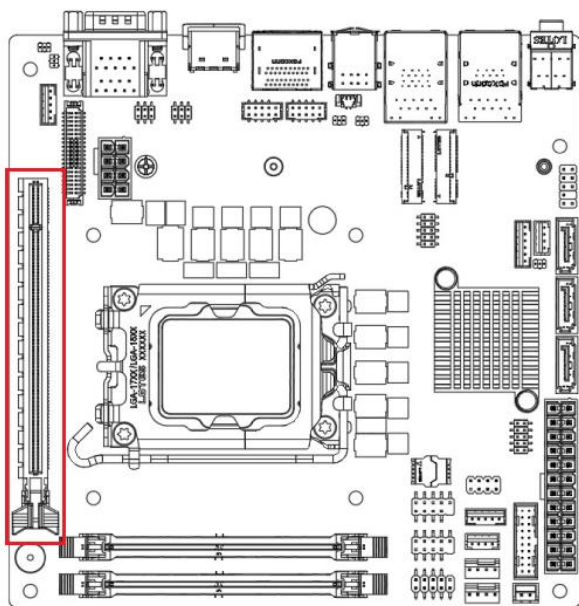
1. Before installing an expansion card, read the documentation that came with it and make the necessary hardware setting for the card.
2. Remove the chassis cover (if the mainboard is installed in a chassis).
3. Remove the expansion slot bracket from the chassis on the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press it firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw that have been removed earlier (in step 3).
6. Place the chassis cover back on.

- **PCI (Peripheral Component Interconnect) Express Slot**

The PCI Express slot supports the PCI Express interface expansion card.

- **PCIe x16 Slot: SLOT1**

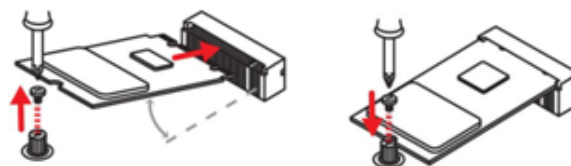
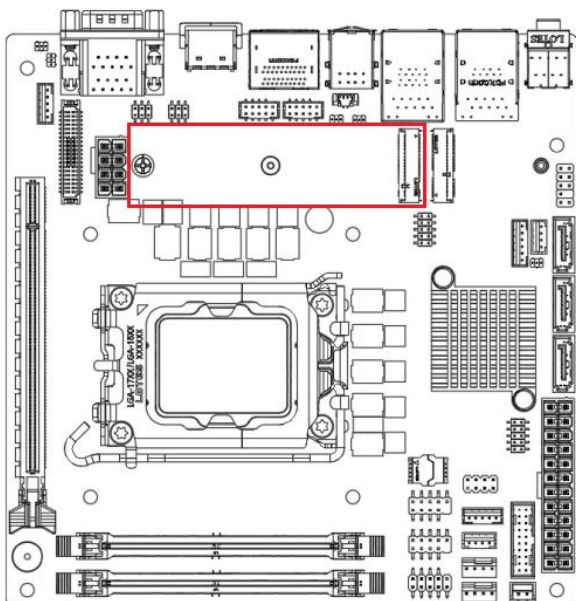
The PCI Express x16 Gen4 Bandwidth supports up to 252 GT/s.



PCIe x16 slot

- **M.2 Slot (Key M, 2280 & 2242): M2_M1**

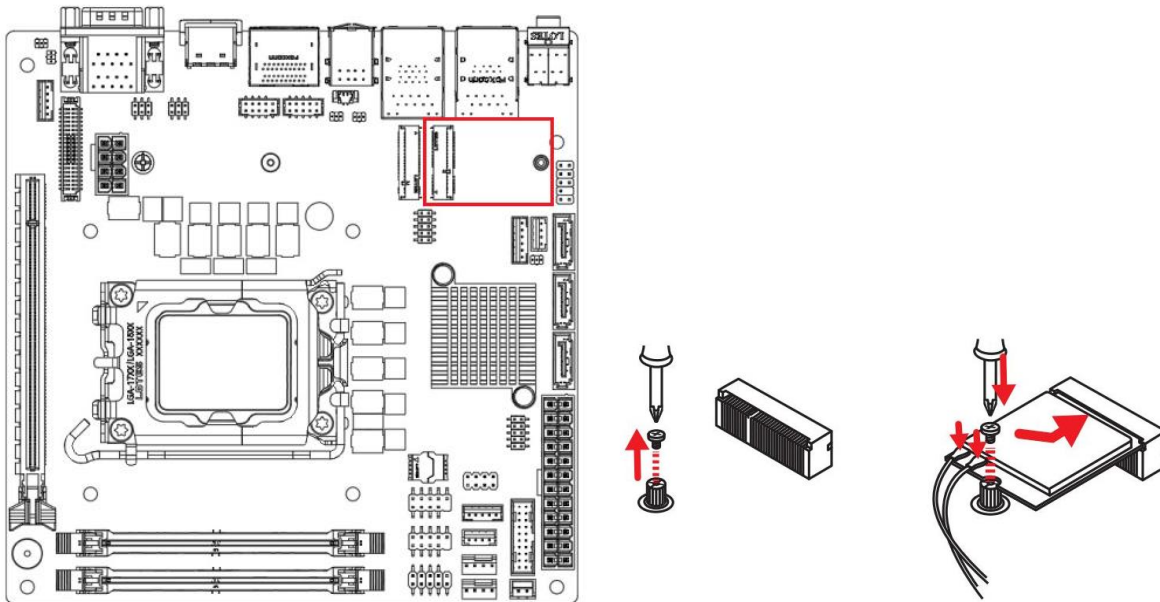
Please install the M.2 solid-state drive (SSD) into the M.2 slot as shown below.



When adding or removing expansion cards, make sure the system power is OFF.

- **M.2 Slot (Key E, 2230): M2_E1**

Please install the Wi-Fi/ Bluetooth card into the M.2 slot as shown below.



When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

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 or <F2> immediately after switching the system on, or

By pressing the or <F2> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press 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.

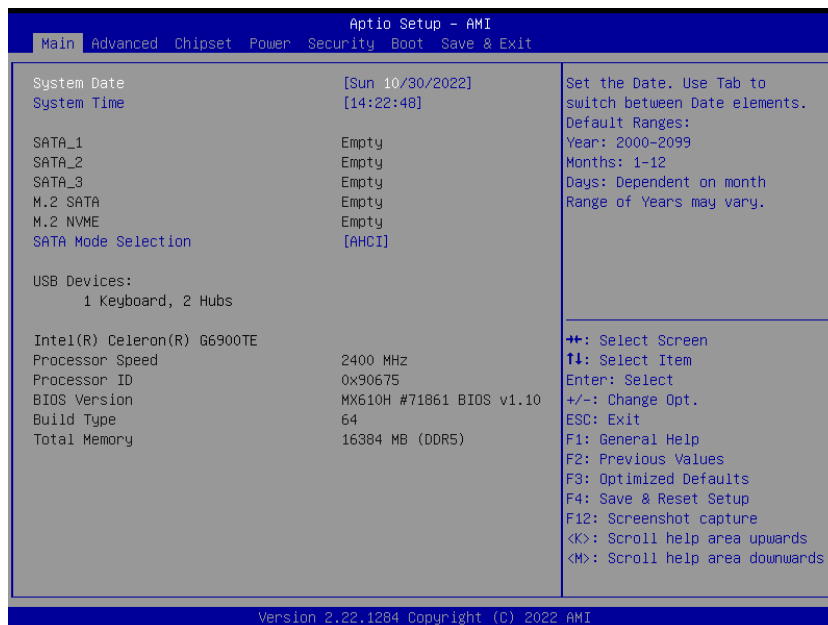
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance 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

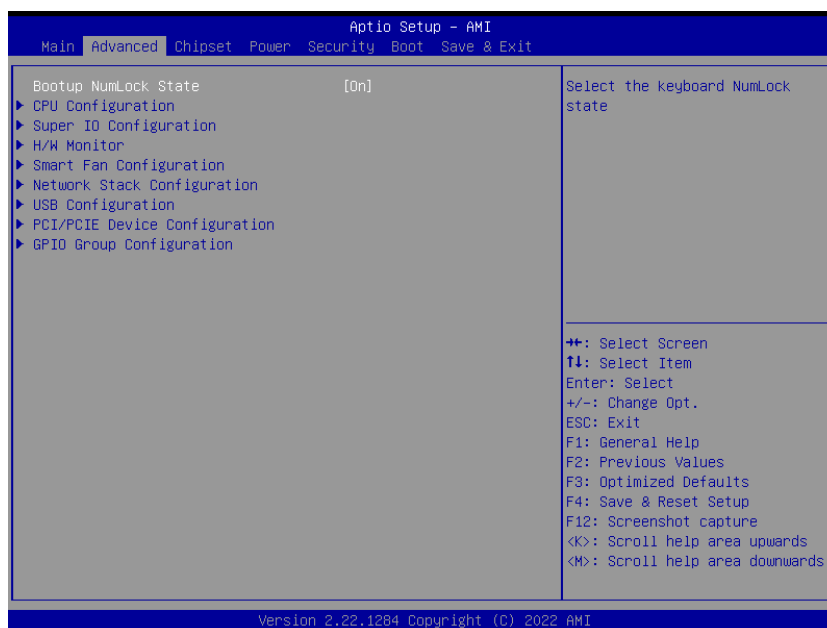
Use the system time option to set the system time. Manually enter the hours, minutes and seconds.



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.



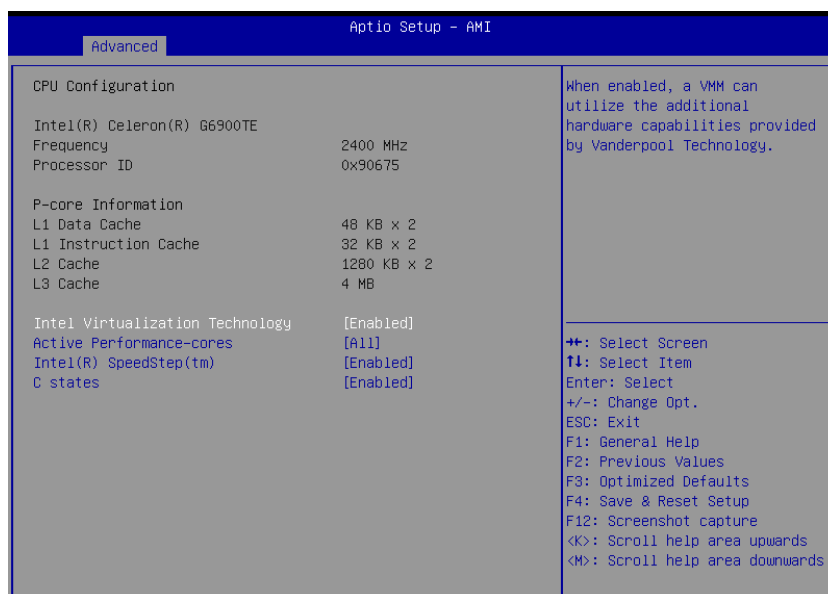
- **Bootup NumLock State**

This setting is to set the Num Lock status when the system is powered on.

[On] Turn on the Num Lock key when the system is powered on.

[Off] Allow users to use the arrow keys on the numeric keypad.

3.6.2.1 CPU Configuration



- **Intel(VMX)Virtualization[Enabled]**

Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With Virtualization, one computer system can function as multiple “virtual” systems.

- **Active Processor Cores**

This setting specifies the number of active processor cores.

- **Intel(R) SpeedStep(TM)**

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

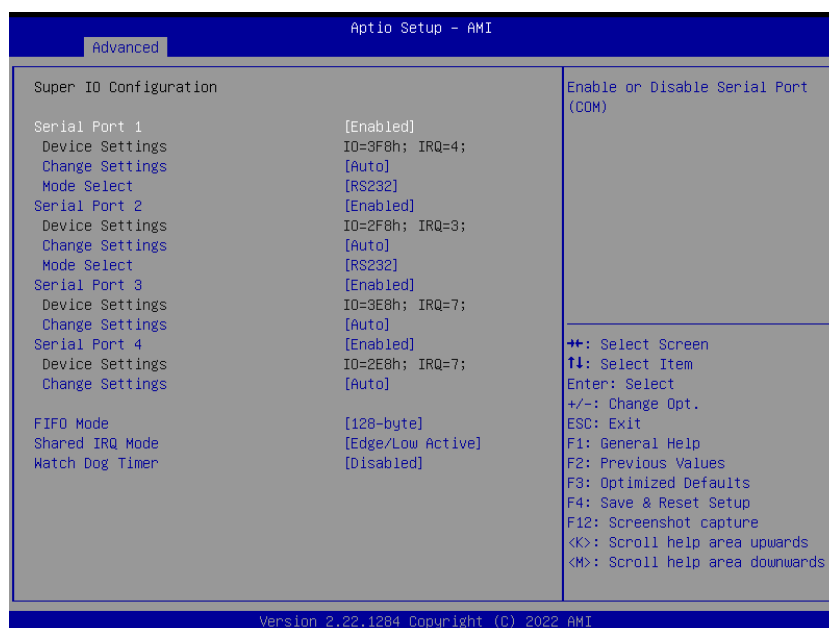
- **C States**

This setting controls the C-States (CPU Power states).

[Enabled] Detects the idle state of system and reduce CPU power consumption accordingly.

[Disabled] Disables this function.

3.6.2.2 Supoer IO Configuration



- **Serial Port 1/ 2/ 3/ 4**

This setting enables/disables the specified serial port.

- **Change Settings**

This setting is used to change the address & IRQ settings of the specified serial port.

- **FIFO Mode**

This setting controls the FIFO (First In First Out) data transfer mode.

- **Shared IRQ Mode**

This setting provides the system with the ability to share interrupts among its serial ports.

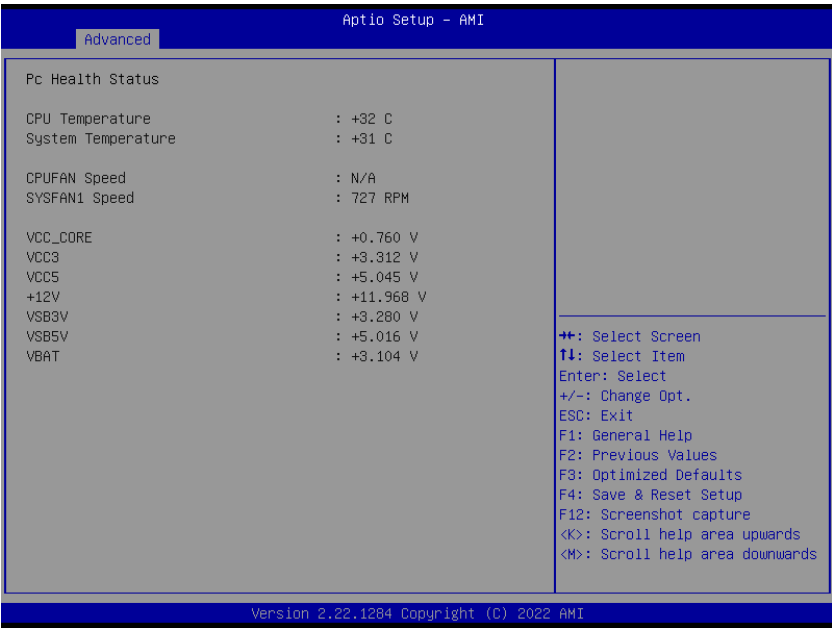
- **Watch Dog Timer**

You can enable the system watchdog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watchdog polls it.

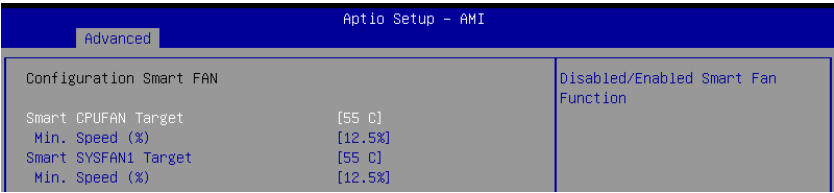
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3.6.2.3 H/W Monitor (PC Health Status)

These items display the current status of all monitored hardware devices/components such as voltages, temperatures and all fans’ speeds.



3.6.2.4 Smart Fan Configuration

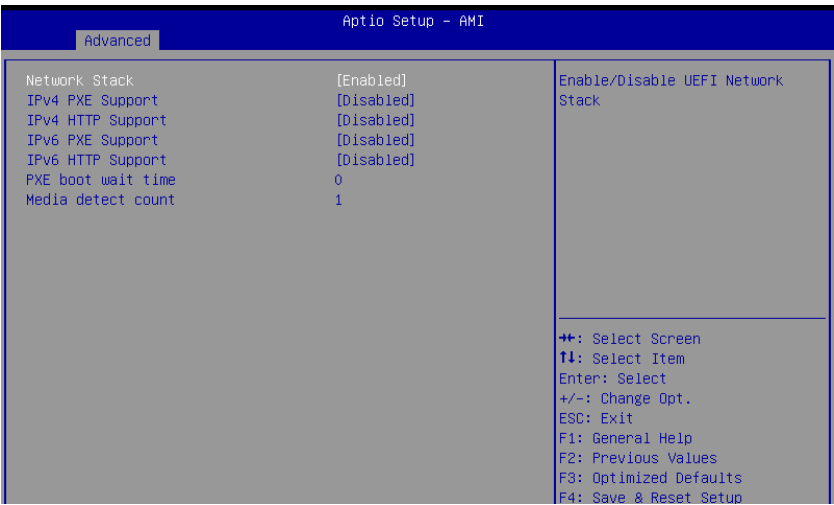


● Smart CPUFAN/ SYSFAN Target

This setting enables/ disables the Smart Fan function. Smart Fan is an excellent feature which will adjust the system fan speed automatically depending on the current system temperature, avoiding the situation of the system overheating.

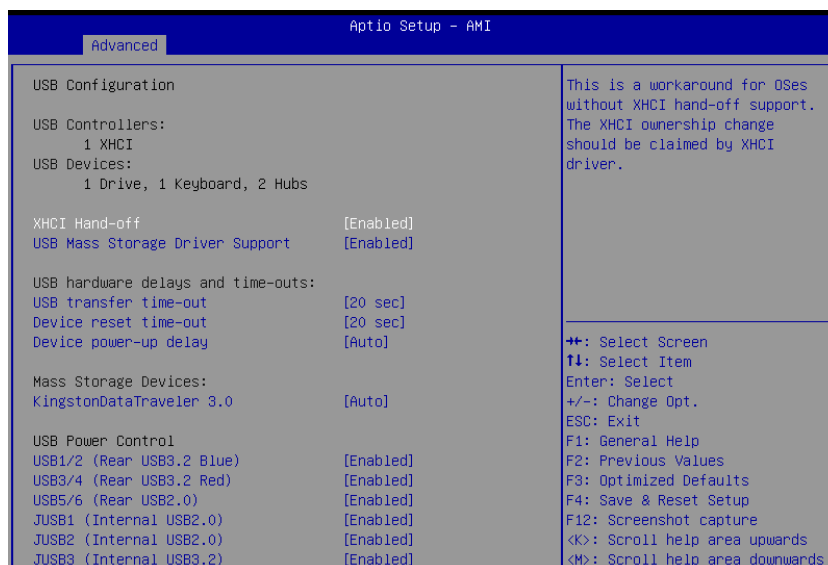
3.6.2.5 Network Stack Configuration

This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS.



- **Network Stack**
This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS. The following items will display when **Network Stack** is enabled.
- **IPv4 PXE Support**
Enables or disables IPv4 HTTP support.
- **IPv6 PXE Support**
Enables or disables IPv6 PXE boot support
- **IPv6 HTTP Support**
Enables or disables IPv6 HTTP support
- **PXE boot wait time**
This option specifies the wait time to press the ESC key for aborting the PXE boot. Press “+” or “-” on your keyboard to change the value. The default setting is 0.
- **Media detect count**
This option specifies the number of times media will be checked. Press “+” or “-” on your keyboard to change the value. The default setting is 1.

3.6.2.6 USB Configuration



- **XHCI Hand-off**

This setting controls the XHCI (eXtensible Host Controller Interface) Hand-off.

[Enabled] On-board USB 3.2 ports functions like a regular 3.2 port.

[Disabled] On-board USB 3.2 ports functions like a 2.0 port.

- **USB Mass Storage Driver Support**

A USB mass storage driver setting enables/disables the ability to communicate with external drives and other removable devices connected through the USB port, such as external HDDs/SSDs and flash drives.

- **USB transfer time-out**

Set the USB core's wait time for Control, Bulk, and Interrupt transfers.

- **Device reset time-out**

Set the amount of time that the POST (Power On Self Test) will wait for the USB mass storage device to be detected.

- **Device power-up delay**

Set the maximum time that a USB device will wait before reporting itself to the host controller.

- **USB Power Control**

This setting enables/disables USB Ports.

3.6.2.7 PCI/ PCIE Device Configuration

Aptio Setup - AMI		
Advanced		
Audio Controller	[Enabled]	Control Detection of the Audio Controller. Disabled = Audio Controller will be unconditionally
Lan1/2 Controller	[Enabled]	

- **Audio Controller**
This setting enables/disables the onboard audio controller
- **Lan1/ 2 Controller**
This setting enables/disables the onboard LAN 1/2 controllers.

3.6.2.8 GPIO Group Configuration

Aptio Setup - AMI		
Advanced		
GPIO0	[Low]	Set GPIO0 to output High/Low
GPIO1	[Low]	
GPIO2	[Low]	
GPIO3	[Low]	

- **GPO0 ~ GPO3**
These settings control the operation mode of the specified GPIO.

3.6.3 Chipset

Aptio Setup - AMI		
Main Advanced Chipset Power Security Boot Save & Exit		
DVMT Pre-Allocated	[64M]	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	[256M]	
LVDS	[Disabled]	
		++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Reset Setup F12: Screenshot capture <K>: Scroll help area upwards <M>: Scroll help area downwards
Version 2.22.1284 Copyright (C) 2022 AMI		

- **DVMT Pre-Allocated**
This setting specifies the pre-allocated graphics memory size for DVMT (Dynamic

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Video Memory Technology).

- **DVMT Total Gfx Mem**

This setting specifies the total graphics memory size for DVMT.

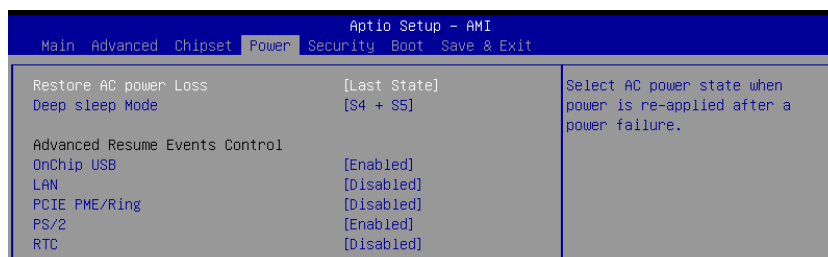
- **LVDS**

This setting enables/disables LVDS.

- **LCD Panel Type**

This setting specifies the LCD Panel's resolution and distribution formats. The item will display when **LVDS is enabled**.

3.6.4 Power



- **Restore AC Power Loss**

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off] Leaves the computer in the power off state.

[Power On] Leaves the computer in the power on state.

[Last State] Restores the system to the previous status before power failure or interrupt occurred.

- **Deep Sleep Mode**

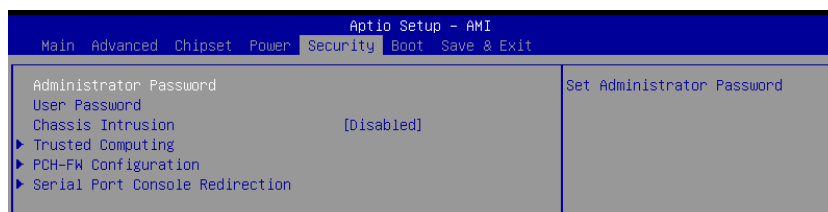
The setting enables/disables the Deep S5 power saving mode. S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies minimum power to the power button to allow returning to S0. A full reboot is required. No previous memory content is retained. Other components may remain powered so the computer can “wake” on input from the keyboard, clock, modem, LAN, or USB device.

- **OnChip USB**

The item allows the activity of the OnChip USB device to wake up the system from S4/ S5 sleep state.

- **LAN**
Enables or disables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device is detected.
- **PCIE PME/Ring**
Enables or disables the system to be awakened from power saving modes when activity or input signal of onboard PCIE PME/Ring is detected.
- **PS/2**
Enables or disables the system wake up by PS/2 devices, such as keyboard or mouse.
- **RTC**
When [Enabled], you can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

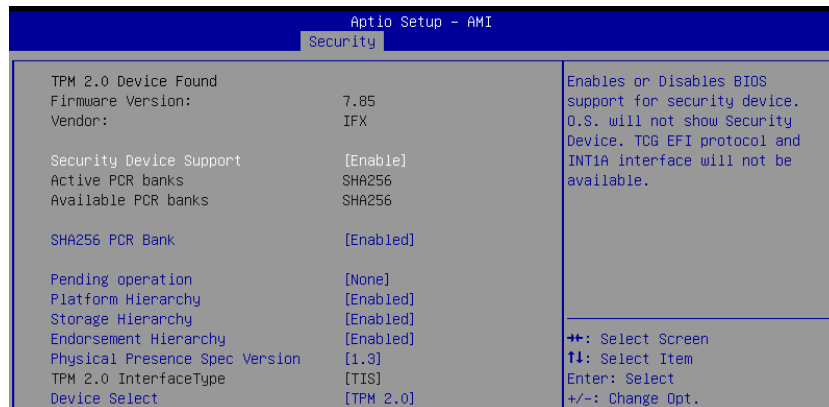
3.6.5 Security



- **Administrator Password**
Administrator Password controls access to the BIOS Setup utility.
- **User Password**
User Password controls access to the system at boot and to the BIOS Setup utility.
- **Chassis Intrusion**
Detects whether the chassis has been opened when used with the Chassis Intrusion header.

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3.6.5.1 Trusted Computing



- **Security Device Support**

This setting enables/disables BIOS support for security device. When set to [Disable], the OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

- **SHA256 PCR Bank**

These settings enable/disable the SHA-1 PCR Bank and SHA256 PCR Bank.

- **Pending Operation**

When **Security Device Support** is set to [Enable], **Pending Operation** will appear. Set this item to [TPM Clear] to clear all data secured by TPM or [None] to discard the selection. It is advised that users should routinely back up their TPM secured data.

- **Platform Hierarchy, Storage Hierarchy, Endorsement Hierarchy**

These settings enable/disable the Platform Hierarchy, Storage Hierarchy and Endorsement Hierarchy.

- **Physical Presence Spec Version**

This settings show the Physical Presence Spec Version.

- **TPM 2.0 Interface Type**

This setting shows the TPM 2.0 Interface Type.

- **Device Select**

Select your TPM device through this setting.

3.6.5.2 PCH-FW Configuration

Security

ME Firmware Version	16.0.15.1735
ME Firmware Mode	Normal Mode
ME Firmware SKU	Consumer SKU
ME Firmware Status 1	0x90000255
ME Firmware Status 2	0x3B650106
ME Firmware Status 3	0x00000020
ME Firmware Status 4	0x00004000
ME Firmware Status 5	0x00021F03
ME Firmware Status 6	0x044003CB

Configure PTT

PTT Configuration

++: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
ESC: Exit

Firmware Information

ME Firmware Version	System Integrity Value	These settings show the firmware information of the Intel ME (Management Engine).
ME Firmware Mode	ME Firmware Status 1-6	
ME Firmware SKU		

3.6.5.2.1 PTT Configuration

Intel Platform Trust Technology (PTT) is a platform functionality for credential storage and key management used by Microsoft Windows.

Aptio Setup - AMI

Security

PTT Capability / State	1 / 0	Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data
TPM Device Selection	[dTPM]	
TPM 1.2 Deactivate	[Disabled]	

- TPM Device Selection**
Select TPM (Trusted Platform Module) devices from PTT or dTPM (Discrete TPM).
[PTT] Enables PTT in SkuMgr.
[dTPM] Disables PTT in SkuMgr. **Warning! PTT/ dTPM will be disabled and all data saved on it will be lost.**

3.6.5.3 Serial Port Console Redirection

Aptio Setup - AMI

Security

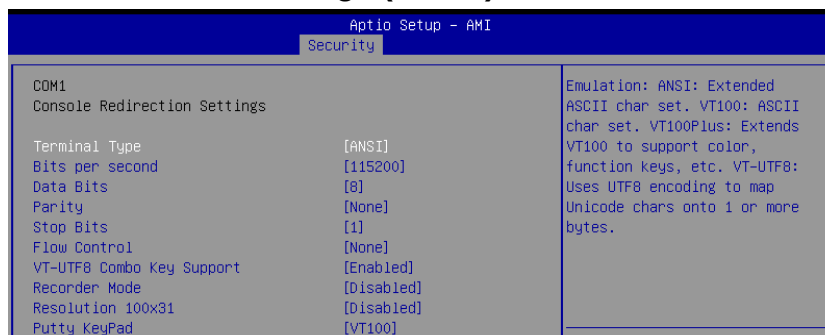
COM1		Console Redirection Enable or Disable.
Console Redirection	[Disabled]	
▶ Console Redirection Settings		

- Console Redirection**
Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that should be displayed

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on the screen to the serial COM port for display on the terminal screen. All data received from the serial port is interpreted as keystrokes from a local keyboard.

3.6.5.3.1 Console Redirection Settings (COM1)



- **Terminal Type**

To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal. You can select emulation for the terminal from this setting.

[ANSI] Extended ASCII character set.

[VT100] ASCII character set.

[VT100Plus] Extends VT100 to support color, function keys, etc.

[VT-UTF8] Uses UTF8 encoding to map Unicode characters onto one or more bytes.

- **Bits per second, Data Bits, Parity, Stop Bits**

These setting specifies the transfer rate (bits per second, data bits, parity, stop bits) of Console Redirection.

- **Flow Control**

Flow control is the process of managing the rate of data transmission between two nodes. It's the process of adjusting the flow of data from one device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it.

- **VT-UTF8 Combo Key Support**

This setting enables/disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

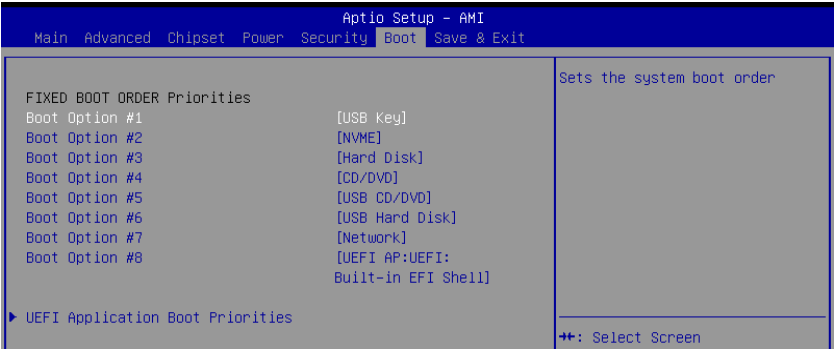
- **Recorder Mode, Resolution 100x31**

These settings enable/disable the recorder mode and the resolution 100x31.

- **Putty KeyPad**

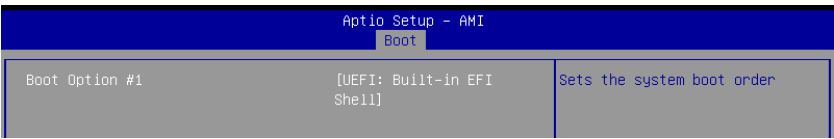
PuTTY is a terminal emulator for Windows. This controls the numeric keypad for use in PuTTY.

3.6.6 Boot



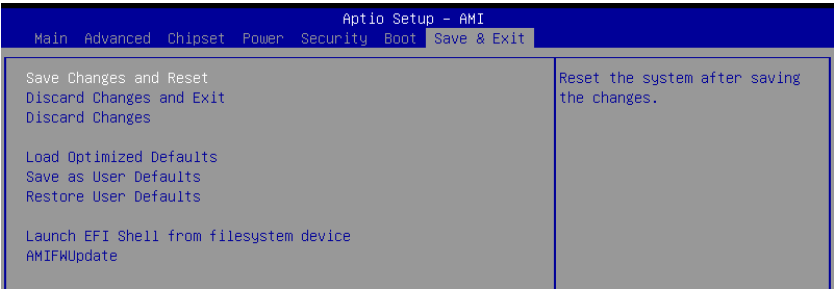
- **Boot Option #1-8**
This setting allows users to set the boot device sequence.

3.6.6.1 UEFI Application Boot Priorities



- **Boot Option #1**
This setting allows users to set the system boot order.

3.6.7 Save & Exit



- **Save Changes and Reset**
Save changes to CMOS and reset the system.
- **Discard Changes and Exit**
Abandon all changes and exit the BIOS menu.

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- **Discard Changes**

Abandon all changes from current session.

- **Load Optimized Defaults**

Use this menu to load the default values set by the motherboard manufacturer specifically for optimal performance of the motherboard.

- **Save as User Defaults**

Save changes as the user's default profile.

- **Restore User Defaults**

Restore the user's default profile.

- **Launch EFI Shell from filesystem device**

This setting helps to launch the EFI Shell application from one of the available file system devices.

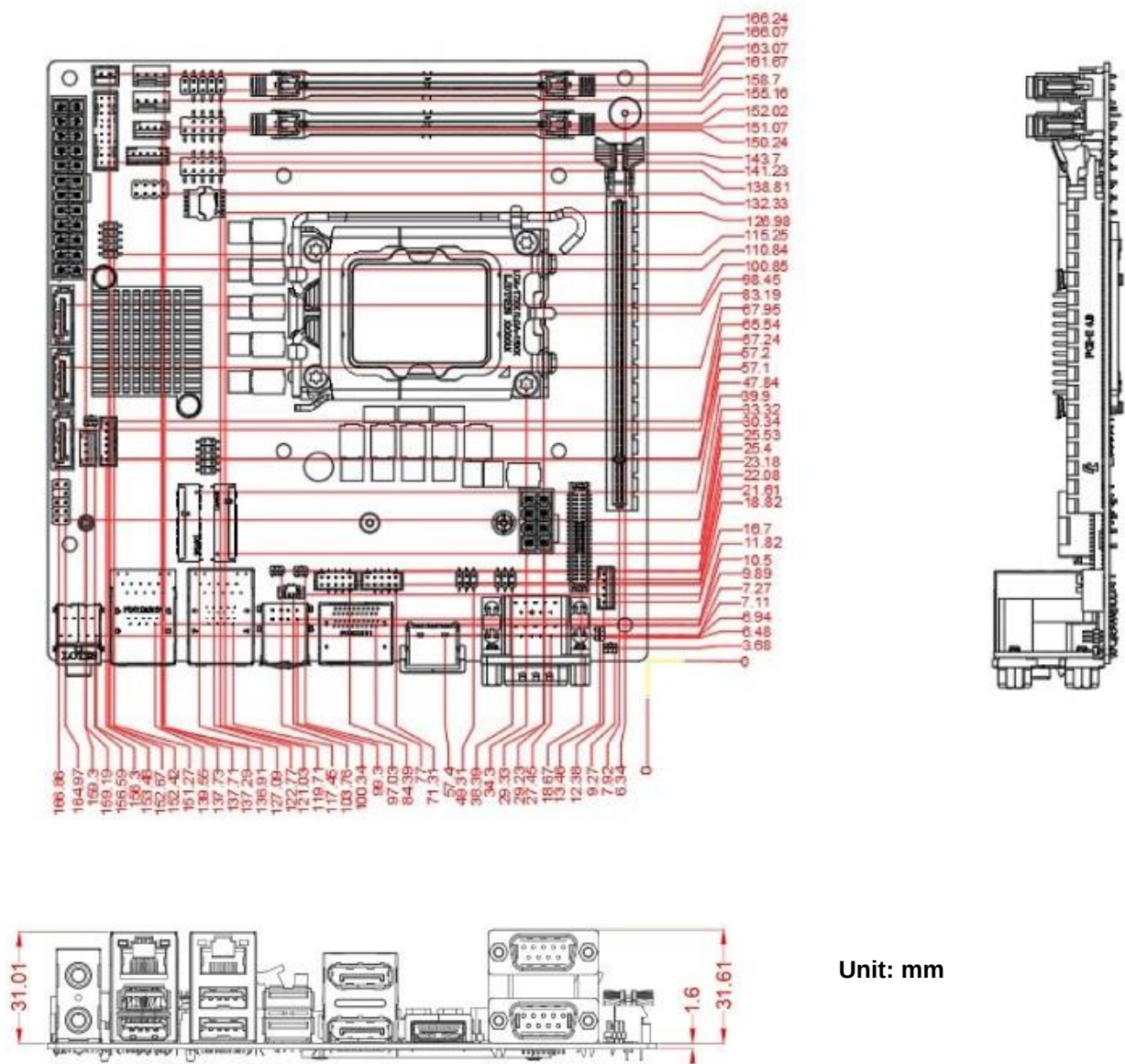
- **AMIFWUpdate**

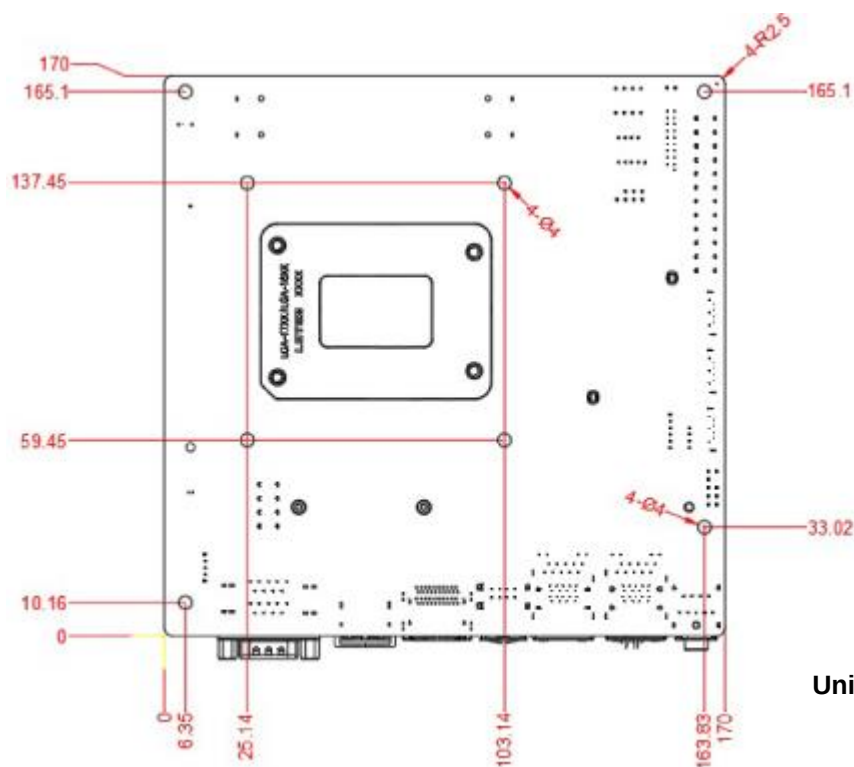
Launch AMIFWUpdate for updating the BIOS.

4. Mechanical Drawing

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4.1 Mechanical Drawing





Unit: mm

