# MX-MTLPS

**Intel® Meteor Lake-PS LGA 1851**

**Meteor Lake-UL**
**(Series 1 ONLY) base power 15W**

**Meteor Lake-HL**
**(Series 1 ONLY) base power 45W**

**Mini-ITX Motherboard**

# User's Manual

**Edition 1.01 – May, 2025**

## FCC Statement

THIS DEVICE SUPPORTS 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 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 INSTATLLED 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 set up the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

## Copyright Notice



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# A Message to the Customer

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Each and every BCM 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 BCM 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 BCM has come to be known.

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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.

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If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your BCM products. In fact, most problems reported are minor and are able to be easily solved over the phone.
In addition, free technical support is available from BCM engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. Please do not hesitate to call or e-mail us.

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## *Product Warranty*

BCM 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 BCM, or which have been subject to misuse, abuse, accident or improper installation. BCM assumes no liability under the terms of this warranty as a consequence of such events. Because of BCM high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of BCM 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, BCM 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.

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

## Manual Objectives

This manual describes in detail the BCM MX-MTLPS mainboard.

We strongly recommend that you study this manual carefully before attempting to interface with this mainboard 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 concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

## 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 mainboard. 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.

## Document Amendment History

| Revision | Date | Comment |
|---|---|---|
| 1st (1.00) | April, 2025 | Initial Release |
| 1.01 | May, 2025 | Update connector page information |
| | | |
| | | |
| | | |

# Contents

# Mainboard Specifications

<table>
<tr><th>Model</th><th>MX-MTLPS</th></tr>
<tr><td>Processor</td><td>Supports LGA1851 Meteor Lake-PS LGA1851<br>Meteor Lake-UL (Series 1 ONLY) base power 15W<br>Meteor Lake-HL (Series 1 ONLY) base power 45W</td></tr>
<tr><td>Memory</td><td>2x 262-pins DDR5-5600 SODIMM (Non-ECC) slots, up to 64GB (32GB maximum/ slot)</td></tr>
<tr><td>Display</td><td>Intel® Integrated HD Graphic Engine<br>3 x Vertical DisplayPort++ Connectors (at rear I/O)</td></tr>
<tr><td>Maximum Resolution</td><td>. DP alone:<table><tr><th>Number of Simultaneous Displays</th><th>Max Resolution</th></tr><tr><td>1</td><td>4096 x 2304 @ 60Hz</td></tr><tr><td>2 or 3</td><td>3840 x 2160 @ 60Hz</td></tr></table>. LVDS alone: 1920 x 1200 @ 60Hz<br>. eDP alone: 4096 x 2304 @ 60Hz<br>NOTE:<br>If DP is combined with either LVDS or eDP display, the resolution may be limited by the connected display device with lower resolution.</td></tr>
<tr><td>SATA</td><td>1 x SATA 3.0 Connector</td></tr>
<tr><td rowspan="3">M.2</td><td>1x M.2 Type M 2280 Slot (PCIe Gen 4 x4)</td></tr>
<tr><td>1x M.2 Type B 2242 Slot (PCIe Gen 2 x 1, SATA 3.0, USB3.2 Gen1)</td></tr>
<tr><td>1 x M.2 Type E 2230 Slot with CNVi Support (PCIe Gen3 x 1, USB2.0)</td></tr>
<tr><td rowspan="5">USB</td><td>2 x USB 3.2 Gen 2 Type-A ports (Rear I/O)</td></tr>
<tr><td>2 x USB 3.2 Gen 2 Type-C ports (Rear I/O</td></tr>
<tr><td>2 x USB 3.2 Gen 1 ports (1x Header with Shroud)</td></tr>
<tr><td>2 x USB 2.0 ports (rear I/O)</td></tr>
<tr><td>2 x USB 2.0 ports (1x Header)</td></tr>
<tr><td>Super I/O Controller</td><td>NCT6126D</td></tr>
<tr><td>Serial Ports</td><td>2 x RS-232 (1x 2.0mm Locking Type Header (with Voltage Selection))<br>2 x RS-232/ 422/ 485 (1x 2.0mm Locking Type Header (with Voltage Selection))</td></tr>
<tr><td>Expansion Slot</td><td>1 x PCIe Gen 4 x4 Slot (physical slot type: PCIe x16)</td></tr>
<tr><td>Watch Dog Timer</td><td>1sec ~ 255 sec timer</td></tr>
</table>

| | |
|---|---|
| HW Monitor | CPU & System temperature, Voltages Monitoring |
| Audio | Realtek® ALC897 HD Audio Codec |
| LAN | 2 x Intel® i226-LM 2.5 Gigabit Ethernet Controllers,<br>support 2x 10M/100M/1G/2.5Gbps Ethernet LAN Ports @ rear I/O |
| GPIO | 8 Bit Header |
| BIOS | AMI® UEFI BIOS |
| | AMI BIOS with 256Mb SPI ROM |
| TPM | 1 x TPM 2.0 Security Device (Infineon® TPM Chip SLB9672) or Intel PTT |
| Onboard I/O Headers | |
| SATA | 1 x Std. SATA 3.0 Connector |
| SATA Power | 1 x SATA Power Connector |
| USB | 1 x USB2.0 Header (2 ports on Header) |
| | 1 x USB3.2 Gen 1 Header (2 ports on Header with Shroud) |
| RS232 | 2 x Locking Type Header |
| RS232/ RS422/ RS485 | 2 x Locking Type Header |
| Front Audio | 1 x Header with Shroud |
| Audio Amplifier | 1 x Locking Type Header |
| Front Panel | 1 x Header with Shroud |
| Fan Header | 2 x Headers (12V, 4-pins PWM) |
| LVDS | 1 x Header for LVDS Panel Connection |
| | 1 x Locking Type Header for LVDS Panel Backlight Connector |
| eDP (Optional) | 1 x Header (At bottom side) |
| I2C | 1 x Header |
| GPIO | 1 x 8-bits Header with Shroud |
| SIM Slot | 1 x SIM Slot |
| Onboard Jumpers | |
| COM Port Ring-In/ Power Select | 2 x jumper provide signal selection of "12V" or "5V" or "Ringin" on 4 COM ports |
| AT/ATX Mode Select | 1 x Header |
| Clear CMOS | 1 x Header |
| LVDS Backlight Control | 1 x Header |
| LVDS Backlight Voltage Select | 1 x Header |
| ME FW Enable/Disable | 1 x Header |
| eDP Panel Voltage Select (Optional) | 1 x Header |
| Rear I/O Ports | |

| | |
|---|---|
| DP (Display Port) | 3 x DP++ Connectors |
| USB 3.2 | 2 x USB3.2 Gen 2 Type-A Connectors |
| | 2 x USB3.2 Gen 2 Type-C Connectors |
| USB 2.0 | 2 x USB2.0 Type-A Connectors |
| LAN | 2 x 10M/100M/1G/2.5G bps LAN Ports |
| Audio | 1 x Line-Out |
| DC_IN Connector | 1 x DC Power Jack (DIA 5.5mm (Outer), 2.5mm (Inner)) (12~24V) |
| Power & Connector | |
| | 1 x 4 pin power Connector (12~24V) |
| | 1 x DC Power Jack (DIA 5.5mm (Outer), 2.5mm (Inner)) |
| Form Factor | |
| | Mini-iTX 6.7" x 6.7" (170mm x 170mm) |

# Chapter 1: System Setup

This chapter describes the mainboard features and the new technologies it supports

## 1.1 Welcome!

The mainboard delivers a host of new features and latest technologies, making it another line of BCM long life mainboards! Before you start installing the mainboard, and hardware devices on it, check the items in your package with the list below.

If any of the items listed below is damaged of missing, please contact with your vendor.

## 1.2 Packing Contents

- **Mainboard**
  - **1 x MX-MTLPS**

- **Accessories**
  - **1 x Full Height I/O Shield**
  - **1 x Low Profile I/O Shield (For 15W Processor ONLY)**
  - **1 x SATA Power Cable**

## 1.3 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 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 components.**

## 1.4 Mainboard Overview

Before you install the mainboard, study the configuration of your chassis to ensure that the mainboard can fit with it.

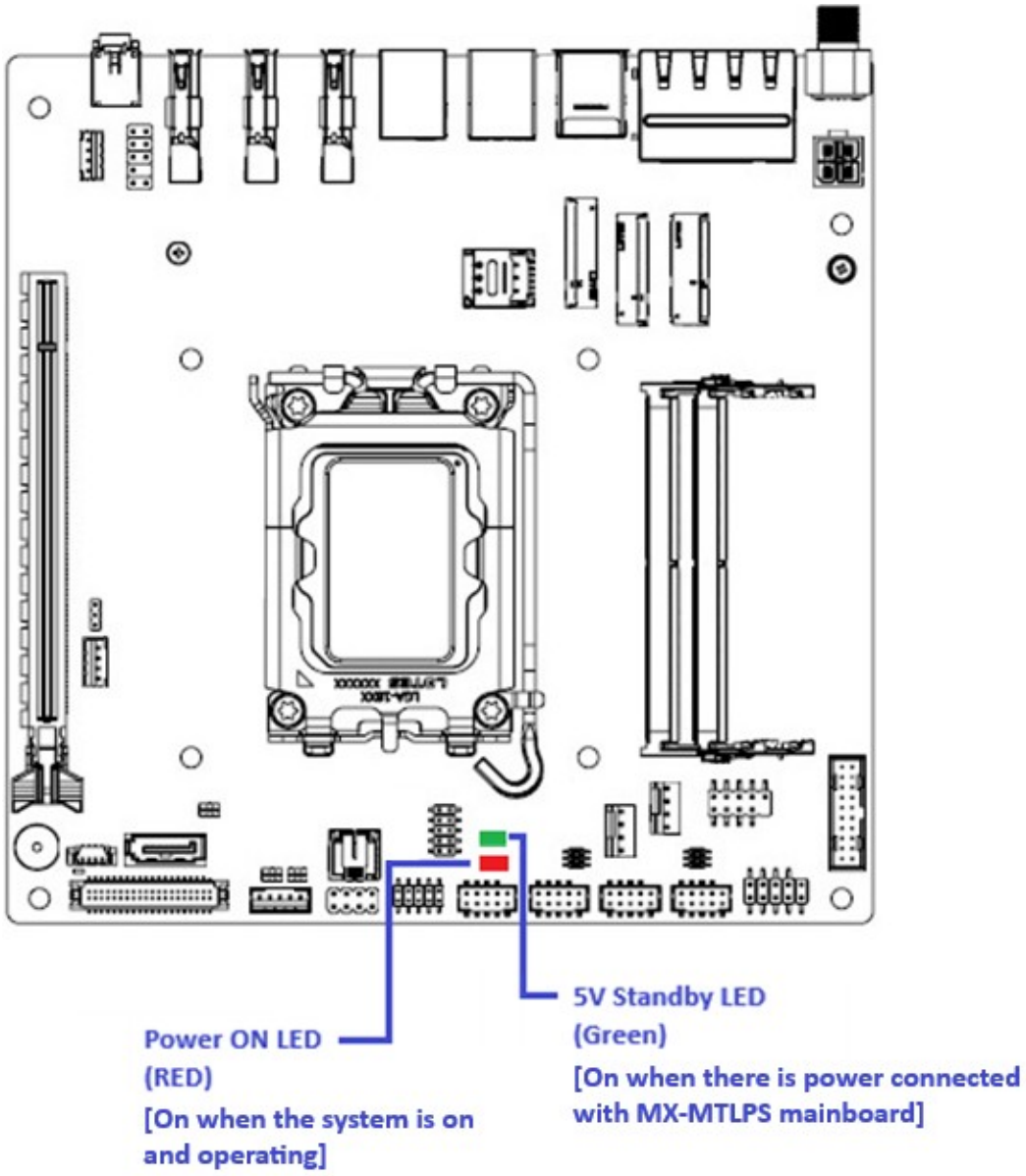
**Make sure to unplug the power cord before installing or removing the mainboard. Failure to do so could cause physical injury and/or damage to mainboard components.**

### 1.4.1 Mainboard LEDs

There are two LEDs onboard:

Power ON LED (Red): When the system is on and operating.

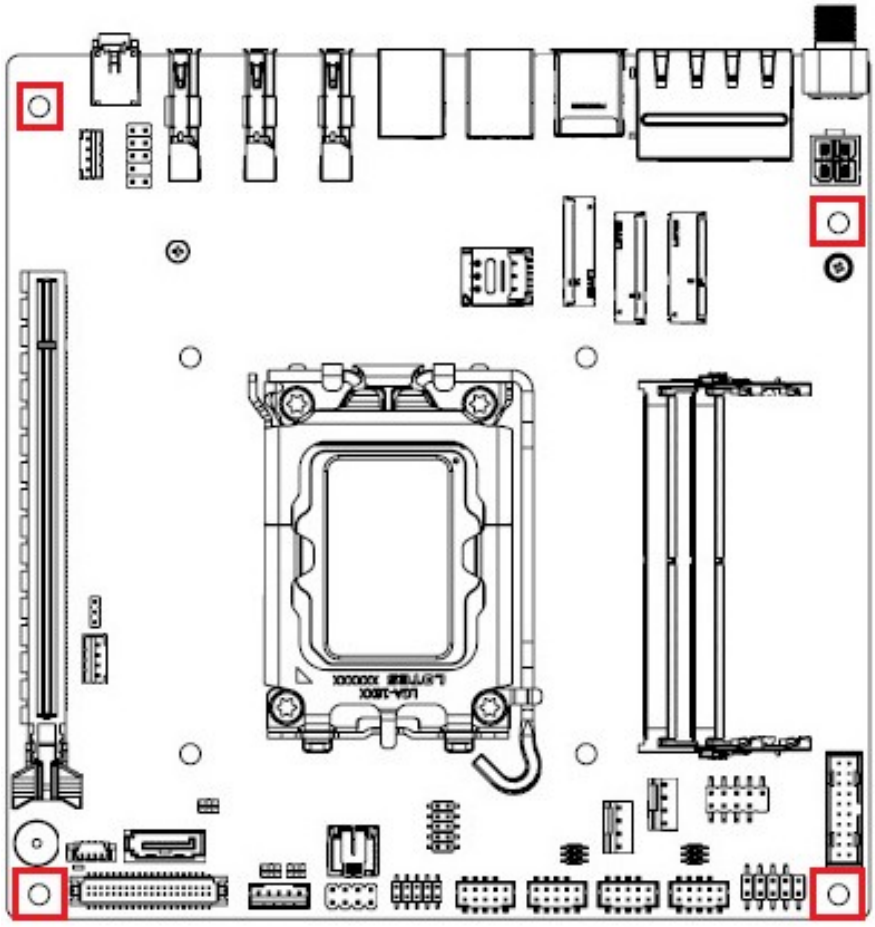
5V Standby LED (Green): When there is power connected with MX-MTLPS mainboard.



### 1.4.2 Mounting Holes

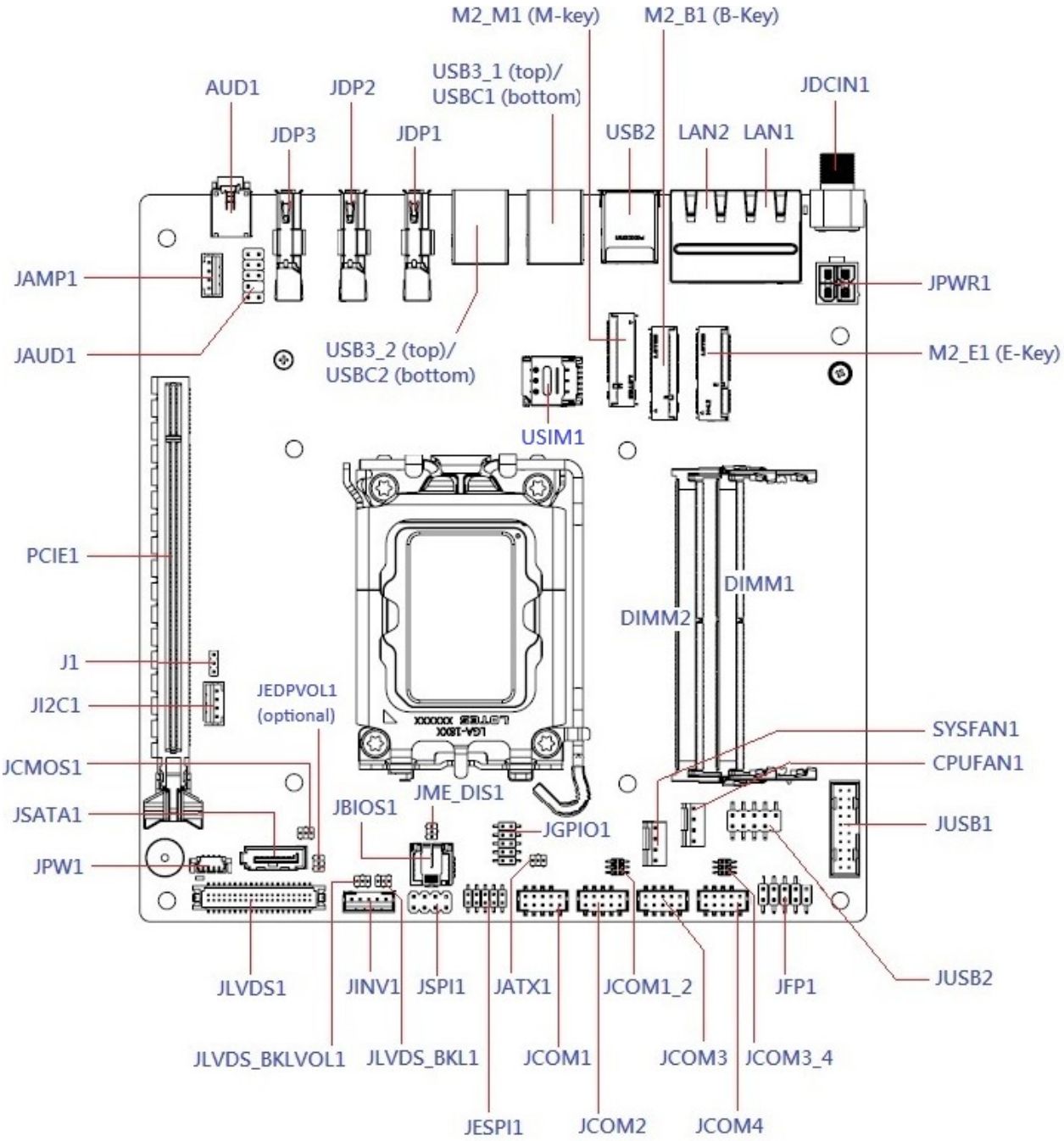
Place the screws into the mounting holes indicated by red squares to secure the mainboard to the chassis.

**Do not overtighten the screws! This may damage the mainboard.**

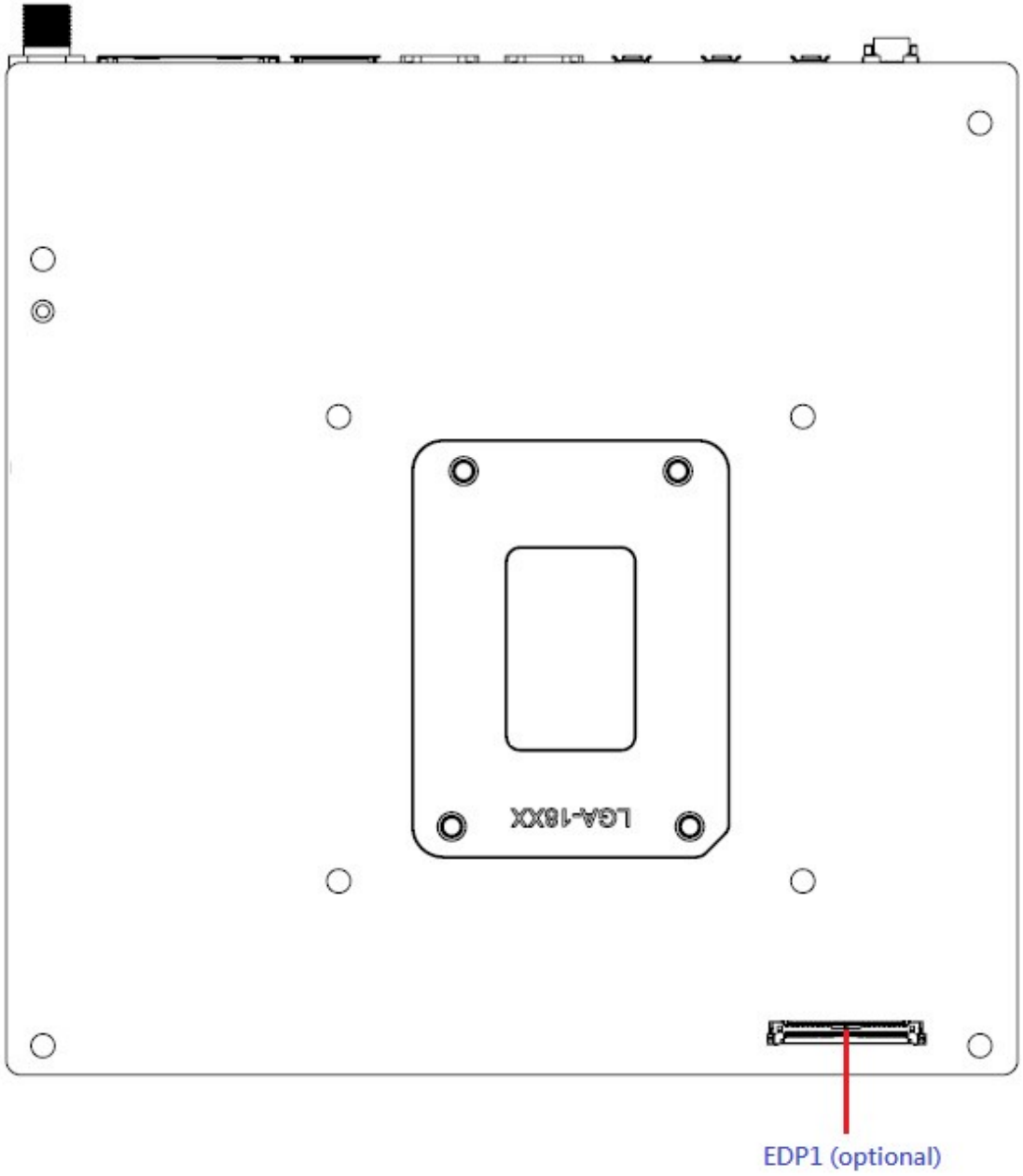


### 1.4.3 Mainboard Layout

**(Top View)**



**(Bottom View)**



## 1.4.4 Layout Content List

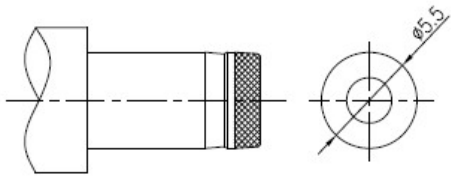
### • 1.4.4.1 Slots

| Label | Function | Note | Page |
|---|---|---|---|
| DIMM1 | 262-pin DDR5 SODIMM slot 1 (bottom) | 32MB maximum per slot | 32 |
| DIMM2 | 262-pin DDR5 SODIMM slot 2 (top) | 32MB maximum per slot | 32 |
| M2_M1 | M.2 Key-M Slot (2280) | Supports nVME SSD, PCIe x4 (Gen 4) | 56 |
| M2_E1 | M.2 Key-E Slot (2230) (Lower-Level Standoff) | Supports PCIe x1 (Gen 4) | 57 |
| M2_B1 | M.2 Key-B Slot (2242) (Top-Level Standoff) | Supports PCIe x1 (Gen 2), SATA3.0 | 58 |
| PCIE1 | PCIe slot | PCIe x16 physical interface, Supports PCIe x4 (Gen 4) | 55 |
| USIM1 | Nano SIM Slot | Connetion to Nano SIM card | 52 |

### • 1.4.4.2 Internal Jumpers

| Label | Function | Note | Page |
|---|---|---|---|
| JCMOS1 | Clear CMOS | 1 x 3 header, pitch 2.00mm | 39 |
| JATX1 | ATX/AT Mode Select (ATX Mode (default) / AT Mode) | 1 x 3 header, pitch 1.25mm | 40 |
| JCOMP1_2 | COM Port 1, 2 Power Setting (NRI (default), 12V, 5V) | 2 x 3 header, pitch 1.25mm | 40 |
| JCOMP3_4 | COM Port 3, 4 Power Setting (NRI (default), 12V, 5V) | 2 x 3 header, pitch 1.25mm | 41 |
| JME_DIS1 | ME FW Lock (default) / Unlock Jumper | 1 x 3 header, pitch 1.25mm | 41 |
| JLVDS_BKLVOL1 | LVDS Backlight Voltage Select (3.3V (default), 5V) | 1 x 3 header, pitch 1.25mm | 42 |
| JLVDS_BKL1 | LVDS Backlight Control Select (SIO PWM (default), SMB) | 1 x 3 header, pitch 1.25mm | 42 |
| JEDPVOL1 (optional) | eDP Panel Voltage Select (3.3V (default), 5V) | 1 x 3 header, pitch 1.25mm | 43 |

| • 1.4.4.3 Internal Headers | | | |
|---|---|---|---|
| **Label** | | **Note** | **Page** |
| JPWR1 | DC-in 4-Pins Power Connector | 2 x 2 Mini Fit 4.20mm Straight Type Power Header. (12V~24V, minimum 200W AC adapter recommended) | 36 |
| JFP1 | Front Panel Connector | 2 x 5 Box Header, pitch 2.54mm | 44 |
| CPUFAN1 | CPU Fan Connector | 1 x 4 wafer, pitch 2.54mm | 45 |
| SYSFAN1 | System Fan Connector | 1 x 4 wafer, pitch 2.54mm | 45 |
| JSATA1 | SATA 3.0 Port | 7-pin header (Red) | 46 |
| JPW1 | SATA Power Connector | 1 x 4 wafer, pitch 1.25mm | 46 |
| JUSB2 | Front USB2.0 Header | 2 x 5 wafer, pitch 2.54mm | 47 |
| JUSB1 | Front USB3.2 Gen 1 Header | 2 x 10 wafer, pitch 2.00mm | 47 |
| COM1<br>COM2<br>COM3<br>COM4 | Serial Port Connectors 1, 2 | 2 x 5 wafer header, pitch 2.00mm | 48 |
| JGPIO1 | Digital I/O Header | 2 x 5 header, pitch 2.00mm | 49 |
| JI2C1 | I2C Connector | 1 x 4 wafer, Pitch 2.00mm | 49 |
| JAUD1 | Front Audio Connector | 2 x 5 header, pitch 2.00mm | 50 |
| JAMP1 | Amplifier Connector | 1 x 4 wafer, pitch 1.25mm | 50 |
| JLVDS1 | LVDS Panel Connector | 2 x 20 wafer header, pitch 1.25mm | 51 |
| JINV1 | LVDS Panel Backlight Connector | 1 x 5 wafer header, Pitch 2.00mm | 52 |
| EDP1 (Optional) | eDP Connector | 1 x 40 header, pitch 0.5mm | 53 |

| • 1.4.4.4 Back Panel Connectors (Rear I/O) | | | |
|---|---|---|---|
| **Label** | **Function** | **Note** | **Page** |
| JDCIN1 | DC-in Connector | This connector is for AC Adapter DC_IN connection (12V~24V, minimum 200W recommended)<br>DC Mate Plug:<br>DIA. ~5.5mm (Outer) x ~2.5mm (Inner).<br>  | 37 |
| LAN1<br>(Intel i226-LM) | 2.5G LAN Connector | This port allows 2.5G connection to a Local Area Network (LAN) through a network hub. | 37 |
| LAN2<br>(Intel i226-LM) | 2.5G LAN Connector | This port allows 2.5G connection to a Local Area Network (LAN) through a network hub. | 37 |
| USB2 | USB2.0 Connectors<br>(Type A) | These Universal Serial Bus (USB) 2.0 ports are available for connecting USB type A devices. | 38 |
| USBC1,<br>USBC2 | USB C Connectors<br>(Type C) | These Universal Serial Bus (USB) ports are available for connecting USB type C devices. | 38 |
| USB3_1,<br>USB3_2 | USB3.2 Connectors<br>(Type A, Red) | These two Universal Serial Bus (USB) 3.2 ports are available for connecting USB devices. | 38 |
| JDP1, JDP2,<br>JDP3 | Display Ports | The Display Port Connectors. | 38 |
| AUD1 | Audio Combo Jack | This port connects headphone or speaker. | 38 |

## • 1.4.4.5 Connector/ Header Mating Connector List

| Connector/ Header | Location | Connector/ Header P/N | Mating P/N (Cable Side) |
|---|---|---|---|
| Amplified Speakers | JAMP1 | HORNG TONG WF04N35DJD102 | JST PHR-4 or equivalent |
| Backlight | JINV1 | HORNG TONG WF05N22WJQ006 | JST PHR-5 or equivalent |
| SATA Power | JPW1 | HORNG TONG WF04HA-8EJA069 | Molex 510210400 or equivalent |
| COM Port | JCOM1~JCOM4 | HORNG TONG WF10N63WAA210 | JST PHDR-10VS or equivalent |
| eDP (Optional) | EDP1 | HIROSE KN38A-40S-0.5H(800) | I-PEX 20453-040T-11 |
| Fan | CPUFAN1 SYSFAN1 | HORNG TONG WF04R2JDJQ113 | Molex 510210400 or equivalent |
| Front Audio | JAUD1 | HORNG TONG PH10R62BAAA08 | JTCT 12541H00-2x5PA-B05 or equivalent |
| Front Panel | JFP1 | HORNG TONG PH10R63YAAB18 | JTCT 12541H00-2x5PA-B05 or equivalent |
| GPIO | JGPIO1 | HORNG TONG PH10N6-7BAAA00 | JTCT 12003H00-2XNPX or equivalent |
| I2C | JI2C1 | HORNG TONG WF04N35DJD102 | JST PHR-4 or equivalent |
| USB 5Gbps | JUSB1 | HORNG TONG BH20NQ3GAFL14 | HORNG TONG BH20N03UAA042 |
| USB 2.0 | JUSB2 | HORNG TONG PH10R93BAAC09 | JTCT 12541H00-2x5PA-B05 or equivalent |
| LVDS | JLVDS1 | HORNG TONG WF40H6-7BAA178 | Hirose DF13-40DS-1.25C(10) or equivalent |
| DC-in 4-Pins Power Connector | JPWR1 | HORNG TONG PW04W52DJP028 | Molex 0039012040 or equivalent |

## 1.5 Central Processing Unit (CPU)

This mainboard supports Intel Meteor Lake-PS Ultra 3, 5, 7 LGA1851 processors (Series 1 ONLY), UL base power 15W; or HL base power 45W.

- Your boxed Intel® LGA1851 processor package should come with installation instructions for the CPU, fan, heatsink, and the retention assembly (if available in the box).
- Upon purchase of the mainboard, make sure that the CPU socket cap is on the socket and the socket pins are not bent. Contact your retailer immediately if the CPU socket cap is missing, or if you see any damage to the CPU socket cap/socket pins/mainboard components. BCM will shoulder the cost of repair only, if the damage is shipment/ transit related.
- Keep the CPU socket cap after installing the mainboard. BCM will process Return Merchandise Authorization (RMA) requests only if the mainboard comes with the cap installed on the LGA1851 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 CPU socket cap.

**NOTES:**

1. **Overheating: Overheating will seriously damage the CPU and mainboard. Always make sure the CPU cooling fan/heat sink works properly to protect the CPU from overheating.**
2. **If you purchased a separate CPU heatsink and fan assembly. Make sure that you applied an even layer of thermal paste between the CPU and the heatsink to enhance heat dissipation.**
3. **Replacing the CPU: While replacing the CPU, always disconnect the AC adapter or unplug the adapter's power cord from the grounded outlet first in order to prevent damage to the system.**
4. **If you change a different model of CPU with this mainboard, it is recommended to clear the CMOS with the board, in order to prevent the previous CPU information stored in NVRAM not getting cleared properly.**
5. **Due to the structure of processor (System on Chip), the Date and Time under BIOS need to be updated when a new processor is installed.**

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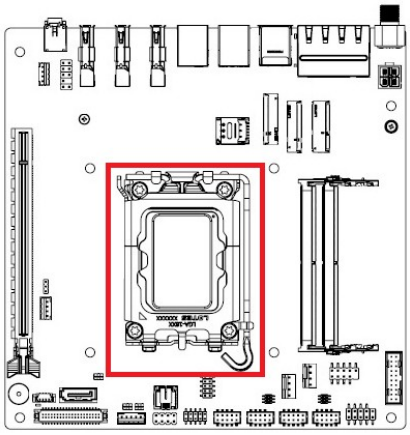
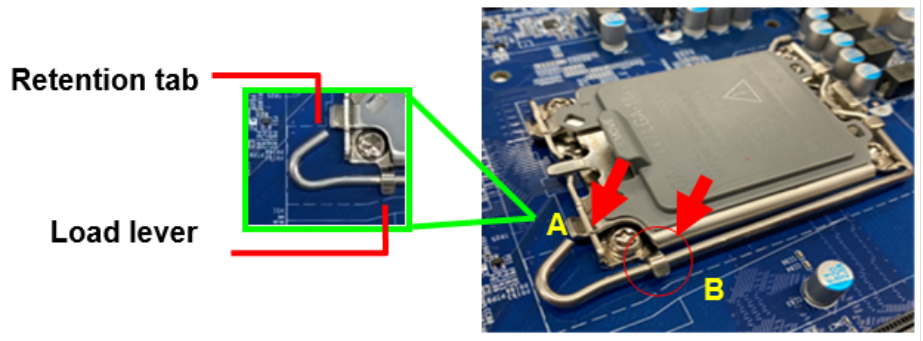
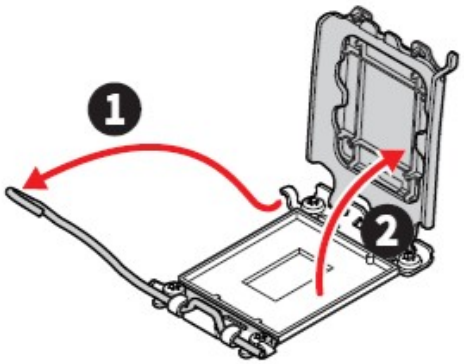
### 1.5.1 Installing the CPU

1. Locate the CPU socket (LGA1851 Socket) on the mainboard.



2. Press the load lever with your thumb at location (A), then move it toward the right side (B) until it is released from the retention tab (#1). Lift the CPU holder up (#2).

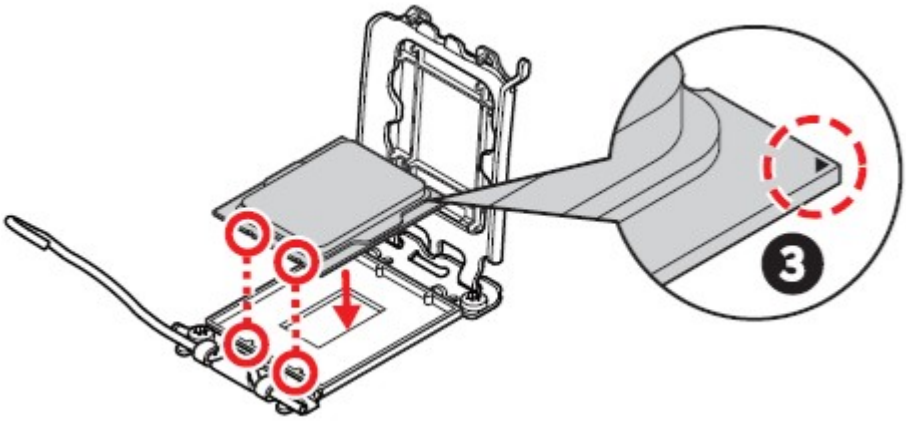



**NOTE:**

**To prevent damage to the socket pins, do not remove the "CPU Socket Cover", unless you are going to install a CPU.**

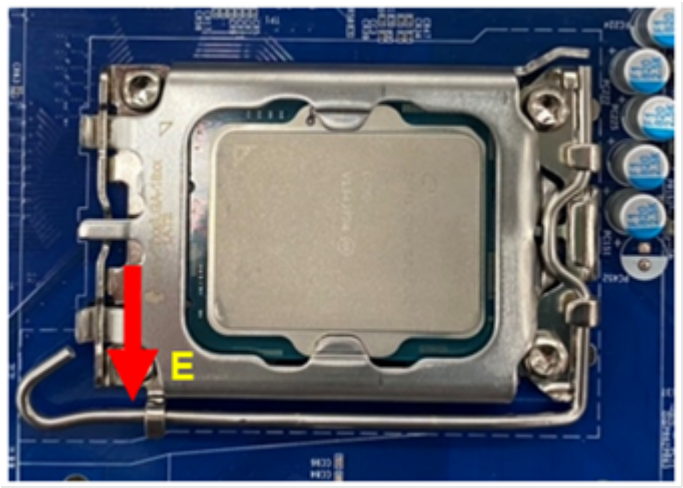
3. Place the CPU into the CPU socket. Note that there is a triangle mark at one corner of the CPU (#3), and two notches on one end of CPU. Fitting the CPU notch with the notch opening at CPU socket, and then Gently drop in the CPU into CPU socket

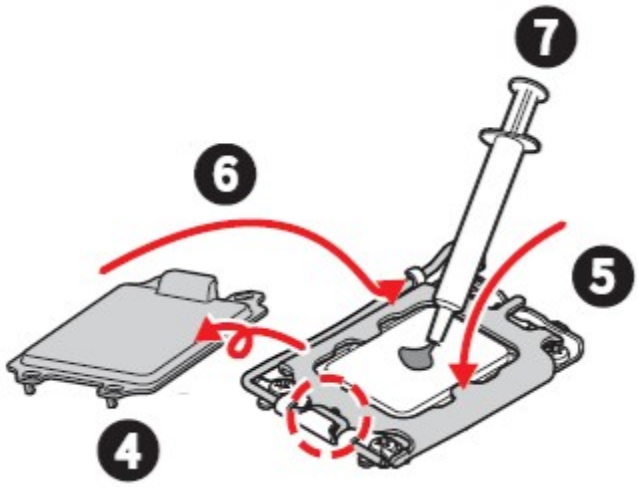



**NOTE:**

1. **The CPU fits in with correct orientation only. DO NOT force the CPU into the socket to prevent bending the pins in CPU socket.**
2. **Excess force may bend the CPU socket pins and cause CPU not to function properly.**
3. **Do not discard this plastic "CPU socket cover". Just in case the mainboard needs to RMA in the future, the CPU socket cover must be installed to protect the CPU Socket.**

4. Remove CPU socket cover from CPU holder (#4). Close the CPU holder (#5) (by pull the load lever down, then push the load lever (E) until it snaps into the retention tab (#6). ,
   If there is no thermal compound at the bottom side of CPU cooler, be sure to apply an even layer of thermal compound on top of CPU (the etal area, #7).



### 1.5.2 Installing the CPU Heatsink and Fan

The Intel LGA1851 processor requires a specially designed CPU heatsink and fan assembly to ensure optimum thermal condition and performance.

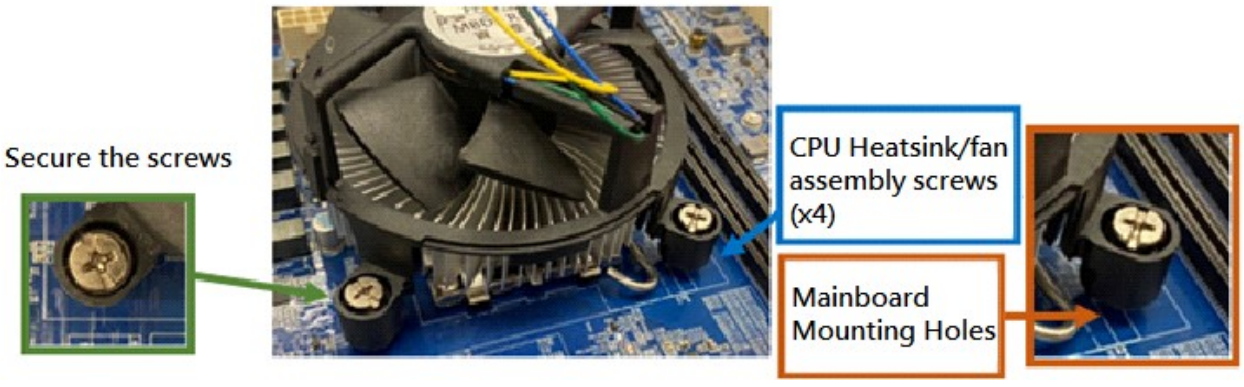
- When you purchase a boxed Intel® processor, the package includes the CPU fan and heatsink assembly. If you buy a CPU separately, make sure that you use only Intel®-certified multi-directional heatsink and fan.
- If you purchased a separate CPU heatsink and fan assembly, make sure that:

  a. The CPU heatsink and fan assembly is designed to withstand the "TDP" (Thermal Dissipation Power) specified by Intel specification of corresponding CPU that you are going to install.

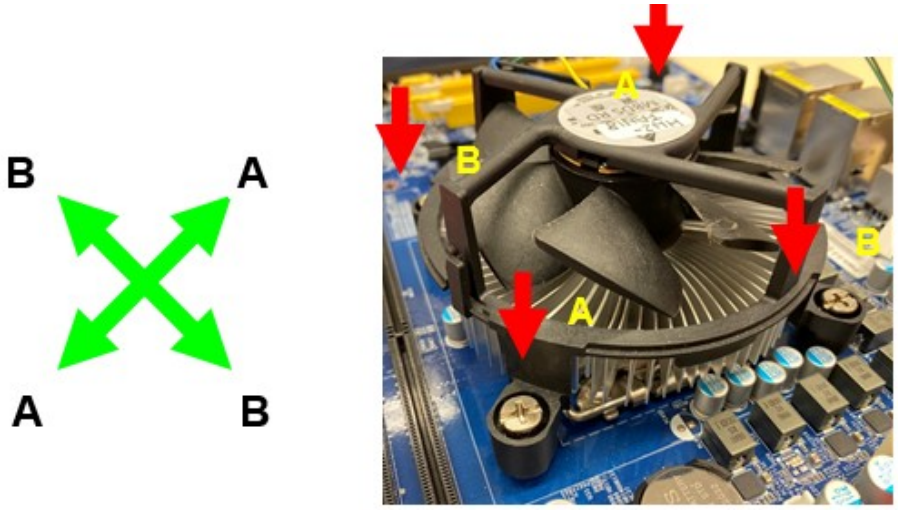
  b. You have properly applied an even layer of "Thermal Interface Material" (thermal compound) to between the CPU heatsink and the top of CPU before you install the heatsink and fan assembly (please check with your CPU fan/heatsink vendor for details).

### 1.5.3 To Install the CPU Heatsink and Fan

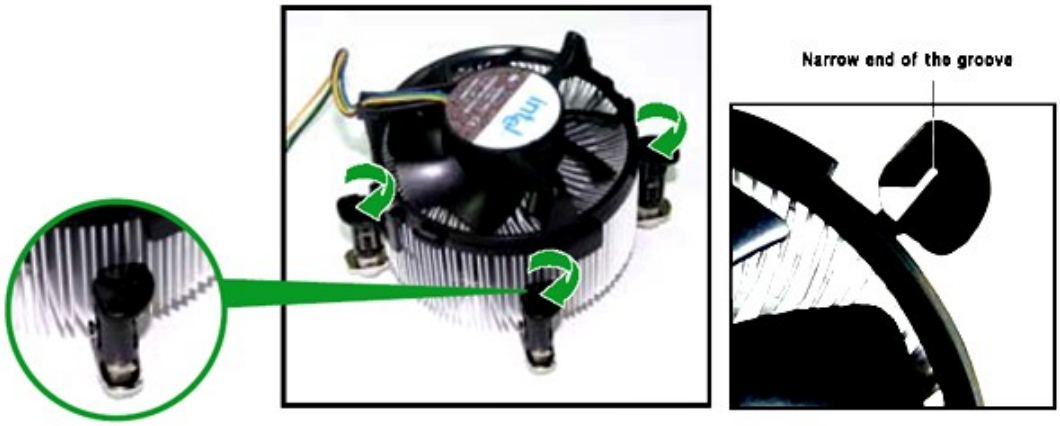
1. Place the CPU heatsink on top of the installed CPU and heatsink mounting plate (if needed). Make sure that the four fasteners or screws match the mounting holes around the CPU socket.



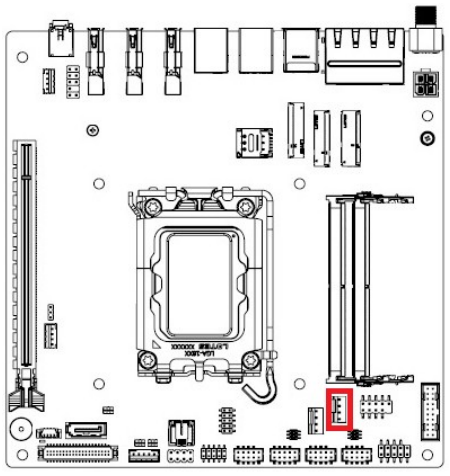
2A. **If the heatsink/fan assembly is installed through 4 screws**, install two screws at a time in a diagonal sequence to secure the heatsink and fan assembly in place.

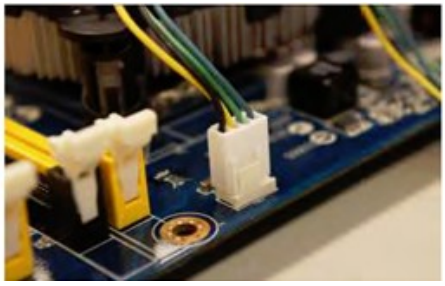



2B. **If the heatsink/fan assembly is installed through fasteners**, push down two fasteners at a time in a diagonal sequence into the 4 mounting holes around the CPU socket, then rotate each fastener clockwise to secure it with the mainboard.



3. Connect the CPU fan cable to the CPU fan connector on the mainboard labeled "CPUFAN1".



**NOTE:**

**1. Do not forget to connect the CPU fan connector. Insufficient air flow inside the system chassis may damage the mainboard components. Hardware monitoring errors can occur if you fail to plug in this connector.**

**2. Do not install any jumper connector on the header "CPU_FAN", doing so may damage the mainboard.**

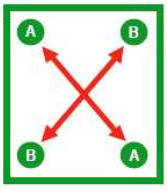
### 1.5.4 Uninstalling the CPU Heatsink and Fan

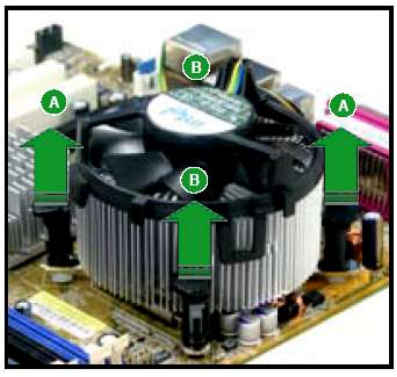
1. Disconnect the CPU fan cable from the CPU fan connector ("CPU_FAN1") on the mainboard.

2A. **If the heatsink/fan assembly is secured through 4 screws**, loosen the screws. And then remove the hestsink/fan and its mounting plate from the mainboard.


2B. **If the heatsink/fan assembly is secured through the fasteners**, rotate each fastener counterclockwise.

And then pull up two fasteners at a time in a diagonal sequence to disengage the heatsink/fan assembly from the mainboard.



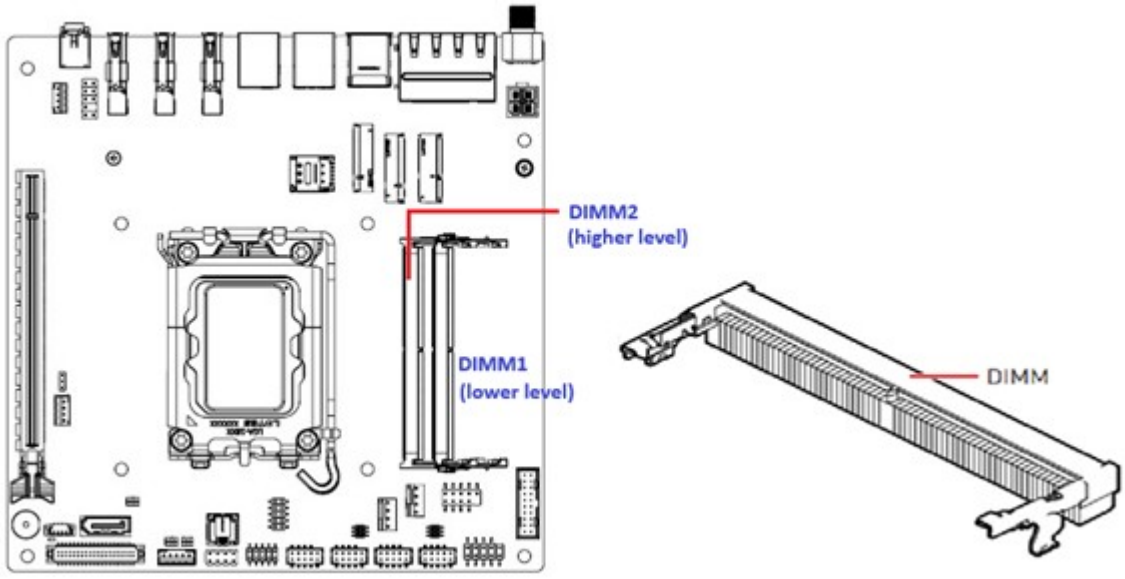
## 1.6 System Memory

### 1.6.1 Overview

The mainboard comes with two 262-pin Double Data Rate 5 (DDR5) Dual Inline Memory Modules (SODIMM) sockets.

DDR5 memory brings several key performance and power gains to the table, as well as new design challenges. From the JEDEC JESD79-5 DDR5 standard. DDR5 specification has significant improvement in capacity, speed, and voltage. Structure-wise, the power management IC (PMIC) is moved onto the DIMM, reducing redundant power management circuitry on the mainboard for unused DIMM slots in previous generations.

The following figure illustrates the location of the sockets:




### 1.6.2 Memory Configurations

The MX-MTLPS board supports 1.1V, non-ECC, 262-pins DDR5-5600 SODIMM up to 64GB (32GB maximum/ slot).

**NOTE:**

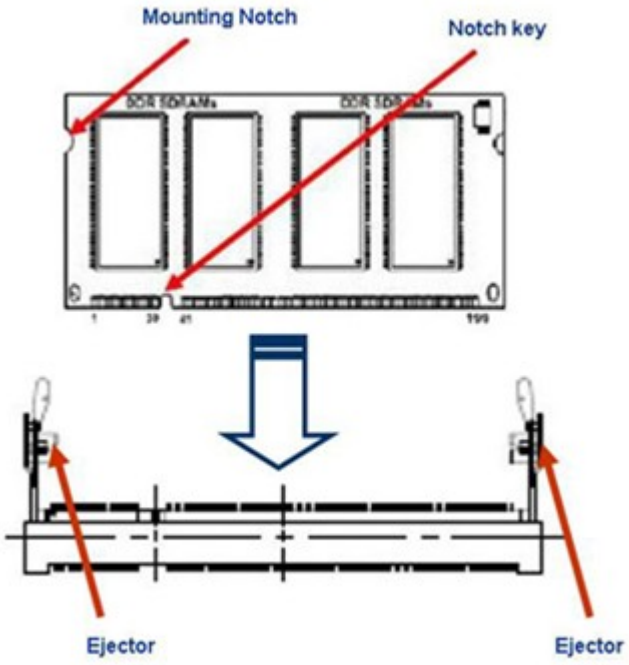
1. **When two SODIMMs are populated, it is recommended to install identical (same type, same size, same CAS latency, same manufacturer) DDR5 SODIMMs for stability.**
2. **When only one SODIMM is installed, it is recommended to populate it at "DIMM1".**

## 1.6.3 Installing the DDR5 SODIMM

**NOTE:**

**Make sure to unplug the power connection before installing or removing SODIMMs, or other peripherals from the system. Failure to do so may cause severe damage to both the mainboard and the peripherals.**

1. Locate the SODIMM sockets onboard.
2. Hold two edges of the SODIMM module carefully and keep away from touching its connectors
3. Align the notch key on the SODIMM module with the rib on the slot.
4. Firmly press the SODIMM module into the socket which will be snapped into the mounting notch automatically. Do not force the SODIMM module in with extra force since the SODIMM module can only fit in one direction.




**NOTE:**

**1. DDR5 memory module is keyed with a notch so it fits in only one direction.**

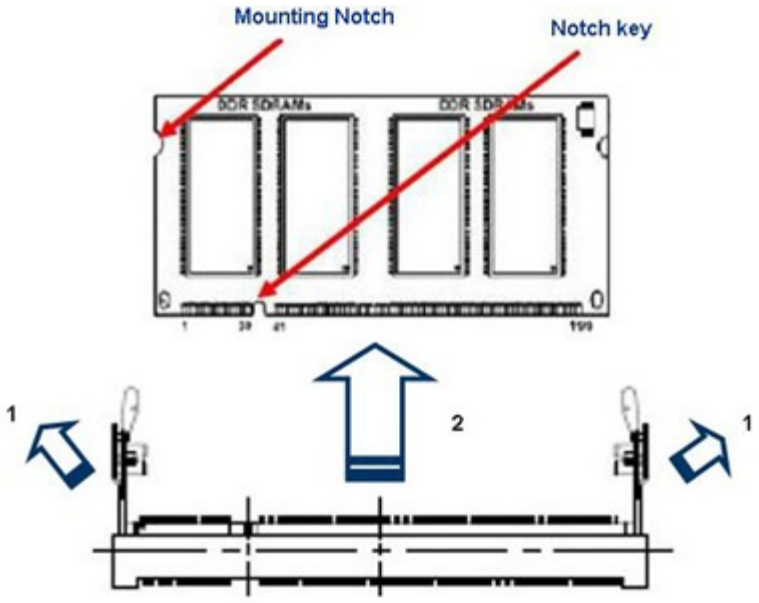
**2. DO NOT force the memory module into the socket to avoid damaging the memory module and the socket.**

**3. DDR5 memory modules are not interchangeable with DDR/ DDR2/ DDR3/ DDR4. Do not install DDR, DDR2, DDR3, or DDR4 SODIMMs to the DDR5 SODIMM sockets.**

### 1.6.4 Uninstalling the DDR5 SODIMM

Follow these steps to remove SODIMM.

1. Press the two ejector tables on the socket outward simultaneously.
2. Pull out the SODIMM module from the socket.




**NOTE:**

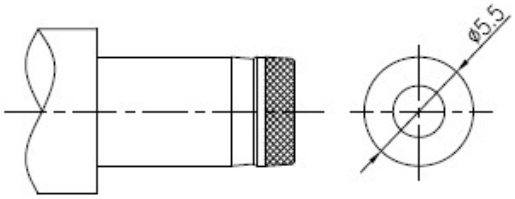
**Hold the SODIMM module gently when pressing the ejector tabs. The SODIMM might get damaged when it flips out with extra force.**

## 1.7 Power Supply

The MX-MTLPS board recommends using a 12~24V AC adapter (**minimum 200W required**).

**Barrel connector size:**

**DIA. 5.5mm (Outer) x 2.5mm (Inner).**




For example:

**1. FSP "FSP230-AAAN3": 24V/ 9.58A (~230W).**

**2. Adapter Tech "ATS200A1-P240": 24V/ 8.3A (~200W).**

### 1.7.1 Power Connectors:

The MX-MTLPS board can be powered through **EITHER**:

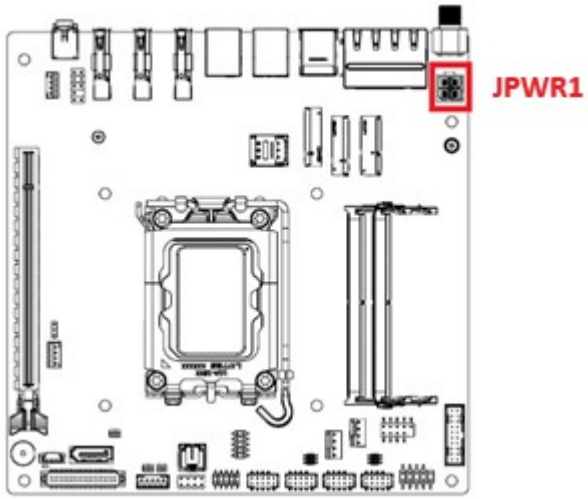
**A. Connected with DC-IN "JDCIN1" connector at rear I/O:**

**Connect barrel connector of AC adapter to "JDCIN1" connector at the rear I/O of MX-MTLPS board**


**Or**

**B. Connected with 4-pin onboard connector "JPWR1" through a 4-pin power connector cable.**

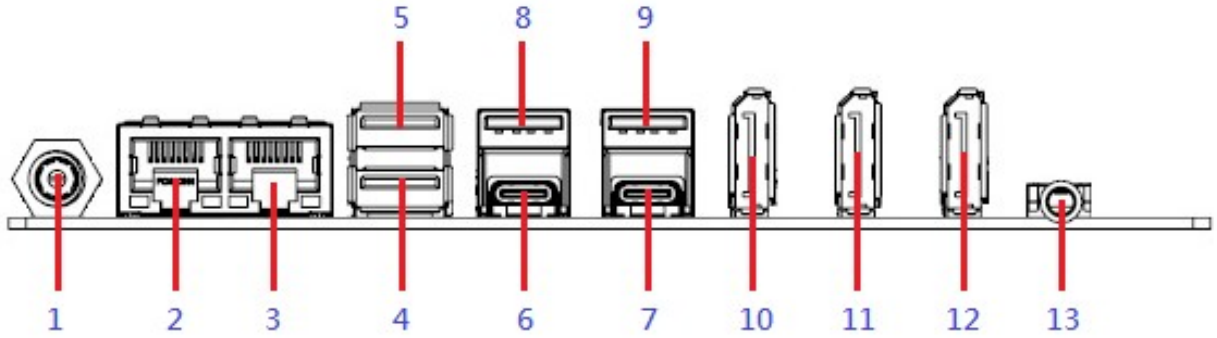
**The 4-pin connector end of this cable will be connected with onboard "JPWR1" connector. The other end of this cable (barrel type connector) is connected with barrel connector of AC adapter.**

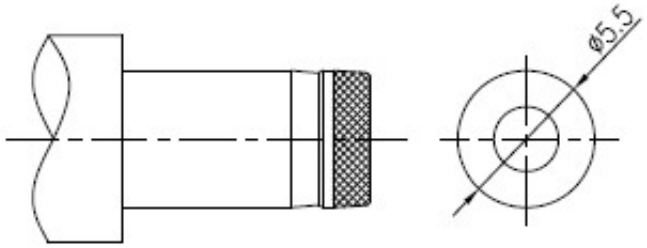
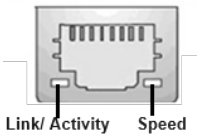



**1. A minimum 200W AC adapter is recommended with MX-MTLPS board.**
**2. Use an AC adapter with adequate power output is recommended when configuring a system with more power-consuming devices (e.g. adding a PCIe card). The system may become unstable or not able to boot if the power supply wattage is not adequate.**

## 1.8 Back Panel (Rear I/O Ports)

### 1.8.1 Back Panel Connectors



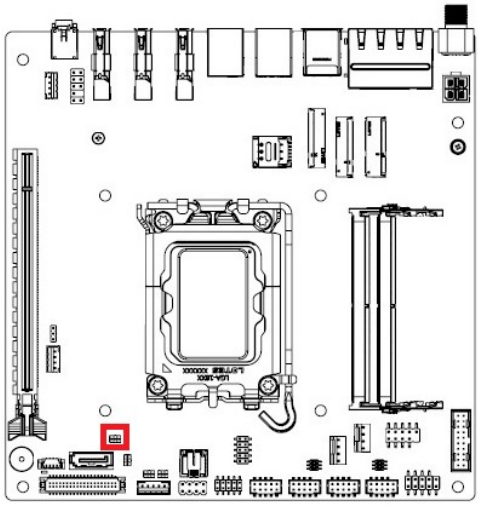

<table>
<tr><th>Item</th><th>Name</th><th>Function</th><th>Description</th></tr>
<tr><td>1</td><td>JDCIN1</td><td>DC-in Jack</td><td>DC-in Jack 12~24V.<br><br>(minimum 200W AC Adapter Recommended).<br><br>DC Mate Plug: DIA. 5.5mm (Outer) x 2.5mm (Inner).<br><br>  </td></tr>
<tr><td>2</td><td>LAN1</td><td>2.5G LAN<br><br>(RJ-45) Connectors<br><br>  </td><td>This port allows 2.5G connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.<br><br>
<table>
<tr><th colspan="2">ACT/Link LED</th><th colspan="2">Speed LED</th></tr>
<tr><td>Status</td><td>Description</td><td>Status</td><td>Description</td></tr>
<tr><td>OFF</td><td>No link</td><td>OFF</td><td>10/100Mbps connection</td></tr>
<tr><td>Orange</td><td>Linked</td><td>Orange</td><td>1Gbps connection</td></tr>
<tr><td>Blinking</td><td>Data activity</td><td>Green</td><td>2.5Gbps connection</td></tr>
</table>
</td></tr>
<tr><td>3</td><td>LAN2</td><td></td><td></td></tr>
</table>

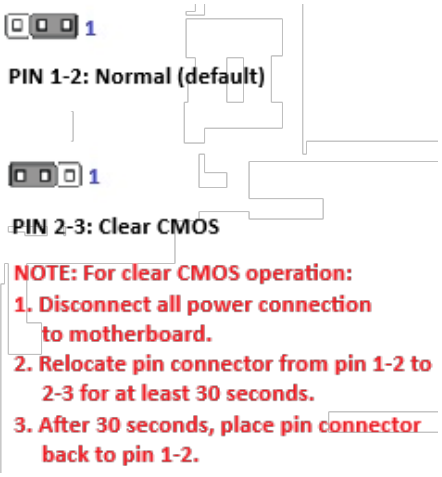
| | | | |
|---|---|---|---|
| 4 | USB2.<br>(Bottom) | USB 2.0<br>Connectors<br>(Type A) | These Universal Serial Bus (USB) 2.0 ports are available for connecting USB type A devices. |
| 5 | USB2.<br>(Top) | | |
| 6 | USBC1 | USB C Connectors<br>(Type C) | These Universal Serial Bus (USB) ports are available for connecting USB type C devices. |
| 7 | USBC2 | | |
| 8 | USB3_1 | USB 3.2<br>Connectors<br>(Type A) | These two Universal Serial Bus (USB) 3.2 ports are available for connecting USB devices. |
| 9 | USB3_2 | | |
| 10 | JDP1 | Display Ports | The display port Connectors. (DP++, 1.4a supported) |
| 11 | JDP2 | | |
| 12 | JDP3 | | |
| 13 | AUD1 | Audio Combo Jack | This port connects headphone or speaker. |

## 1.9 Jumpers

### 1.9.1 Clear CMOS Jumper: JCMOS1

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information.






**Procedure for clear CMOS:**

1. Turn off the system and unplug all power connections to MX-MTLPS mainboard.
2. Disconnect the onboard battery from mainboard.
3. Relocate the jumper connector on "JCMOS1" from pin 1-2 to pin 2-3 for at least 30 seconds. Then move the jumper connector back to pin 1-2.
4. Re-connect the onboard battery back to the mainboard.
5. Re-connect power connections back to the mainboard.
6. Turn-on system, enter BIOS menu by pressing <DEL> key during system post.
7. Under BIOS menu, enter "Save & Exit" menu, load the option "Load Optimized Defaults", and then load the option "Save Changes and Exit".

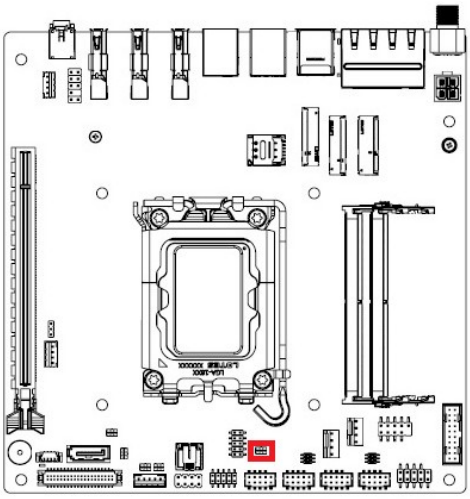
**NOTE:**

**Avoid clearing the CMOS while the system is ON; this may damage the mainboard.**

### 1.9.2 ATX/AT Mode Selection: JATX1

This jumper provides the option to boot the system in the form of ATX mode (default) or AT Mode.

When the system is set in AT mode, the system power on/off will be controlled directly by the power switch on power supply. And some of the power saving modes will not function as ATX mode provided.

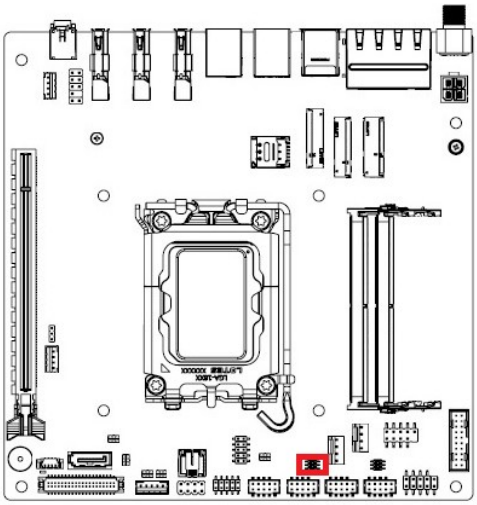


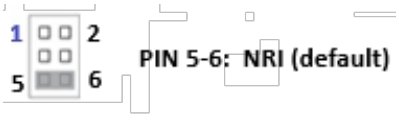

PIN 1-2: ATX Mode (default)


PIN 2-3: AT Mode

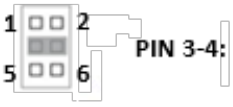
### 1.9.3 COM1, COM2 Ring-in/ +12V/ +5V Power Select: JCOM1_2

This header provides ring-in (default), or 5V, or 12V on COM1 and COM2.

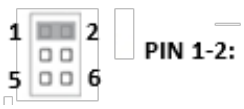





PIN 5-6: NRI (default)



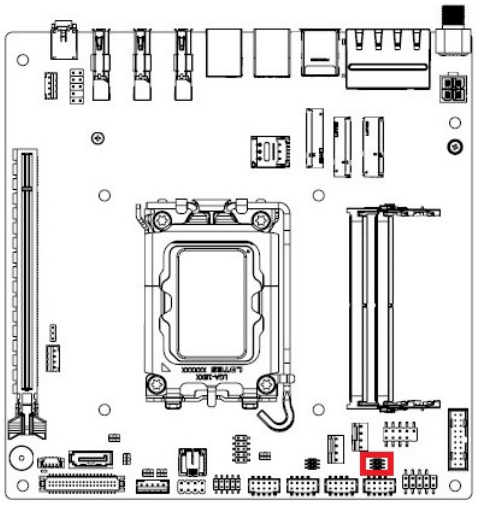

PIN 3-4: 12V

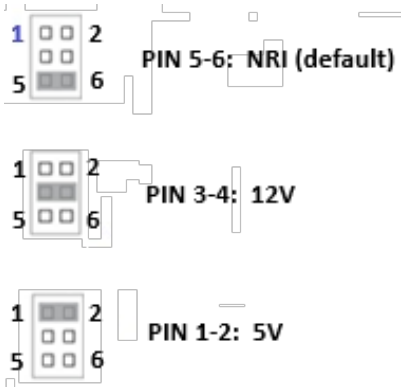



PIN 1-2: 5V

### 1.9.4 COM3, COM4 Ring-in/ +12V/ +5V Power Select: JCOM3_4

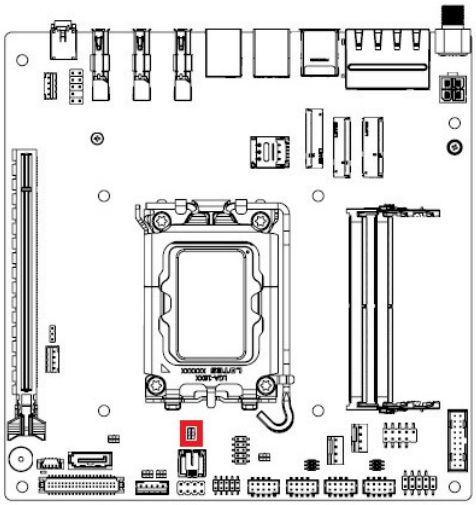
This header provides ring-in (default), or 5V, or 12V on COM3 and COM4.

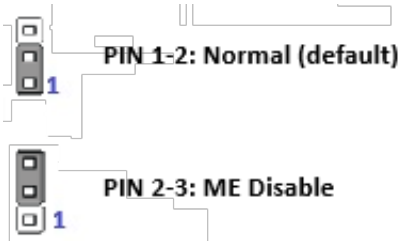





### 1.9.5 ME F/W Jumper: JME_DIS1

This jumper is used to enable/disable the Intel ME function. This jumper can only be disabled when the going-to-update BIOS requires to update its ME region.



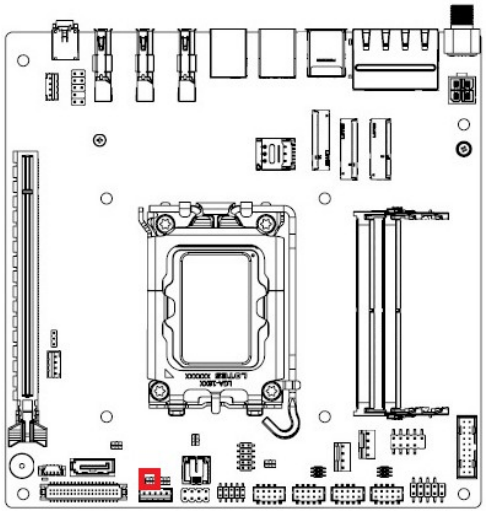



**CAUTION:**

**Unless the going-to-update BIOS file requires to update its ME region, DO NOT change jumper to ME disable position while the system is on.**

### 1.9.6 LVDS Backlight Power Jumper: JLVDS_BKLVOL1

This header provides the options for selecting the LVDS backlight control power in "3.3V" (default) or "5V".

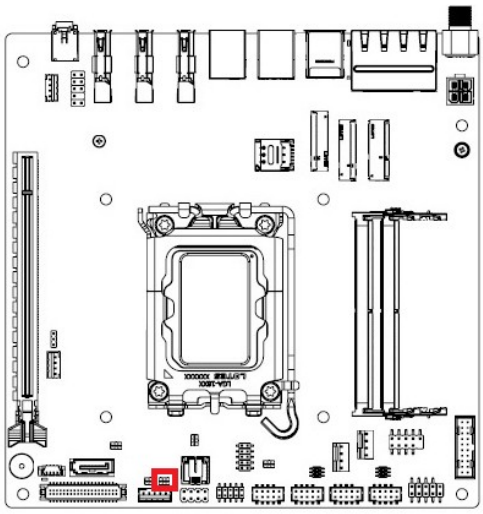



PIN 1-2: 5V


PIN 2-3: 3.3V (default)

### 1.9.7 LVDS Backlight Control Jumper: JLVDS_BKL1

This jumper provides the selection for control mode of LVDS backlight in "SMB" mode, or "SIO PWM" mode (default).

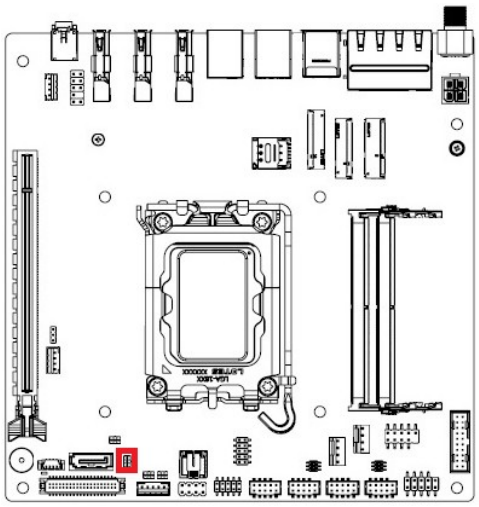



PIN 2-3: SMB


PIN 1-2: SIO PWM (default)

### 1.9.8 eDP Backlight Control Jumper: JEDPVOL1 (Optional)

This header provides the options for selecting the eDP backlight control power in "3.3V" (default) or "5V".

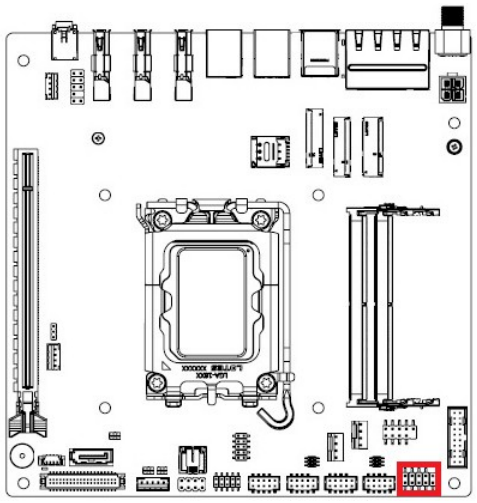



**PIN 1-2: 5V**
**PIN 2-3: 3.3V (default)**

## 1.10 Connectors/ Headers

### 1.10.1 Front Panel Connector: JFP1

This connector provides electrical connections to the front panel switches and LEDs. The "JFP1" connector is compliant with Intel® Front Panel I/O Connectivity Design Guide.




1. HDD LED+ 2. Power LED+
3. HDD LED- 4. Power LED-
5. GND 6. Power Button#
7. Reset# 8. GND
9. NC

**•Power Button/Soft-off Button (Pin 6, 8)**

This 2-pin connector is for the system power button. Pressing the power button turns the system on or puts the system in soft-off mode depending on the BIOS/ OS settings. Pressing the power switch and holding it for more than four seconds while the system is ON will turn the system OFF.

**•Reset Button (Pin 5, 7)**

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

**•Power LED (Pin 2, 4)**

This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power.

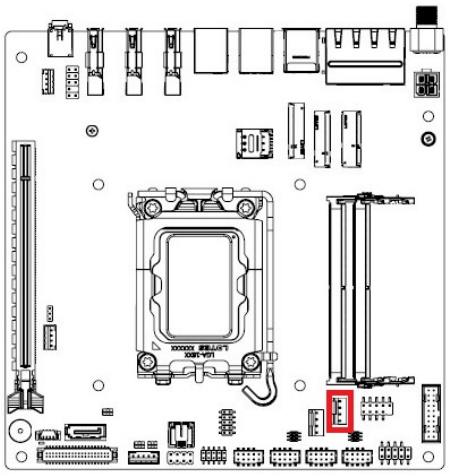
**•HDD LED (Pin 1, 3)**

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD LED lights up or flashes when data is read from or written to the HDD.

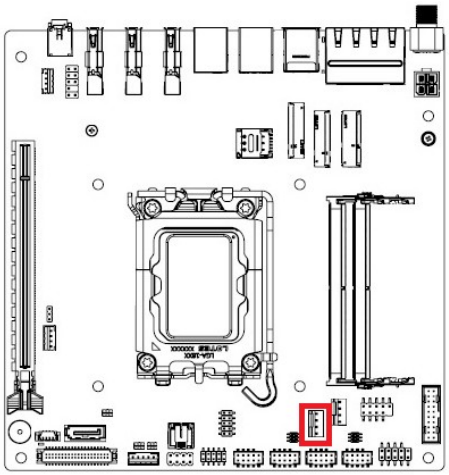
### 1.10.2 CPU & System Fan Connectors: CPUFAN1, SYSFAN1

The fan power connectors support CPU and system cooling fan with +12V. When connecting the wire to these fan connectors, note that the red wire is designated as "Power" and should be connected to "+12V" pin; the black wire is designated as "Ground" and connected to "GND". To take advantage of System Hardware Monitor and Smart fan feature, be sure to use the fan which is specifically designed with speed sensor.

**CPUFAN1**




**SYSFAN1**

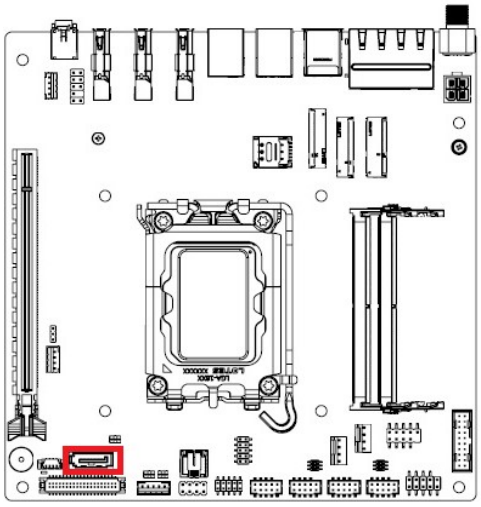



**NOTE:**

1. **Please refer to the recommended CPU fans at processor's official website or consult with the fan vendor for choosing the proper CPU cooling fan.**
2. **Be sure to connect the CPU fan or SYS fan at the correct connector. ("CPUFAN1" is located further away from CPU socket).**

### 1.10.3 Serial ATA 3.0 Connector: JSATA1

SATA port "JSATA1" supports SATA3.0 standard hard drive.

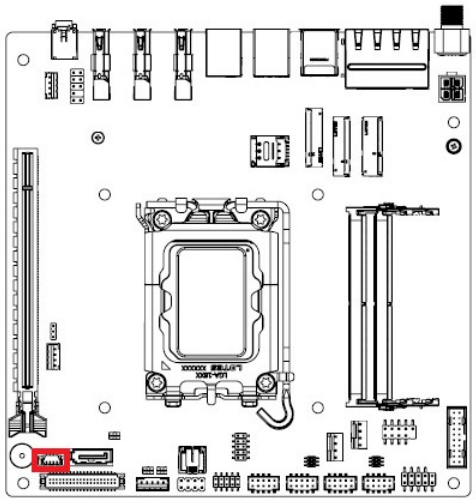


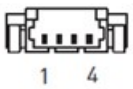

1: GND
2: TX+
3: TX-
4: GND
5: RX-
6: RX+
7: GND

**Do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during data transmission.**

### 1.10.4 SATA Power Connector: JPW1

This connector provides onboard power connection for SATA hard drive.

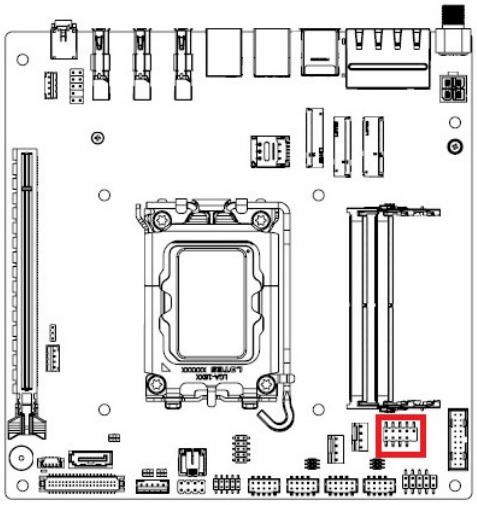


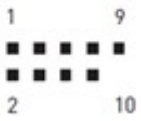



1: +5V
2: GND
3: GND
4: +12V

### 1.10.5 Front USB2.0 Header: JUSB2

This header provides two USB2.0 connections (An USB2.0 cable is required).



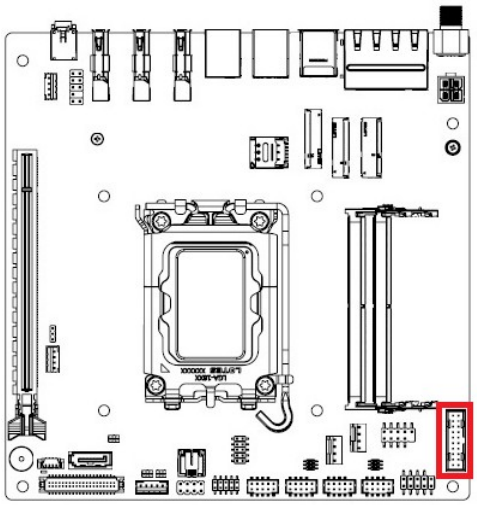


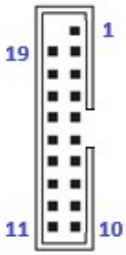

| | |
|---|---|
| 1. USB 5V | 2. USB 5V |
| 3. USB- | 4. USB- |
| 5. USB+ | 6. USB+ |
| 7. GND | 8. GND |
| 9. NC | 10. NC |

**Be sure the pins of USB+5V and GND signals on USB2.0 cable are connected to the corresponding USB2.0 header correctly. Otherwise, it may cause damage to the USB port and/or the connected USB device.**

### 1.10.6 Front USB3.2 Header: JUSB1

This header provides two USB3.2 Gen 1 port connections (An USB3.2 cable is required).





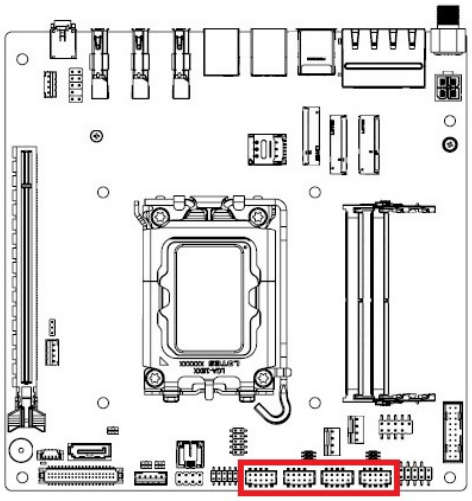

| | |
|---|---|
| | 1: +5V |
| 19: +5V | 2: USB3.0_RX- |
| 18: USB3.0_RX- | 3: USB3.0_RX+ |
| 17: USB3.0_RX+ | 4: GND |
| 16: GND | 5: USB3.0_TX- |
| 15: USB3.0_TX- | 6: USB3.0_TX+ |
| 14: USB3.0_TX+ | 7: GND |
| 13: GND | 8: USB_D- |
| 12: USB_D- | 9: USB_D+ |
| 11: USB_D+ | 10: NC |

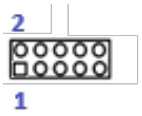
### 1.10.7 Serial Port Connectors: JCOM1, JCOM2, JCOM3, JCOM4

These headers provide serial connections.

COM1, COM2 support RS232, or RS422, or RS485 protocols (selected through BIOS).

COM3, COM4 support RS232 only.






**1: NDCD: Data Carrier Detect**
**2: NSIN: Signal In**
**3: NSOUT: Signal Out**
**4: NDTR: Data Terminal Ready**
**5: GND: Signal Ground**
**6: NDSR: Data Set Ready**
**7: NRTS: Request to Send**
**8: NCTS: Clear to Send**
**9: VCC: 5V or 12V Selected by Jumper**
**10: NC: No Connection**

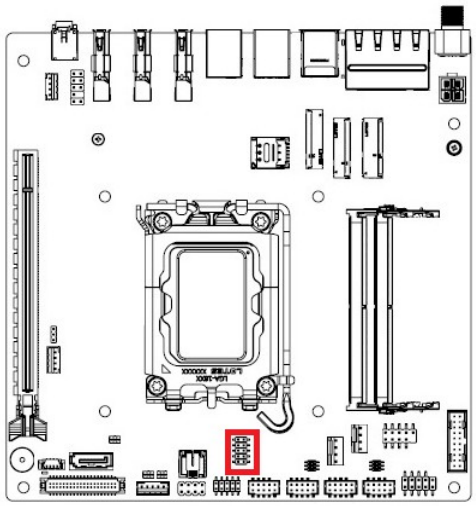
| RS232 | | |
|---|---|---|
| PIN | SIGNAL | DESCRIPTION |
| 1 | NDCD | Data Carrier Detect |
| 2 | NSIN | Signal In |
| 3 | NSOUT | Signal Out |
| 4 | NDTR | Data Terminal Ready |
| 5 | GND | Signal Ground |
| 6 | NDSR | Data Set Ready |
| 7 | NRTS | Request To Send |
| 8 | NCTS | Clear To Send |
| 9 | VCC_COM/ NC | VCC_COM/ No Connection |
| 10 | No Pin | No Pin |

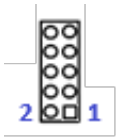
| RS422 | | |
|---|---|---|
| PIN | SIGNAL | DESCRIPTION |
| 1 | 422 TXD- | Transmit Data, Negative |
| 2 | 422 TXD+ | Receive Data, Positive |
| 3 | 422 RXD+ | Transmit Data, Positive |
| 4 | 422 RXD- | Receive Data, Negative |
| 5 | GND | Signal Ground |
| 6 | NC | No Connection |
| 7 | NC | No Connection |
| 8 | NC | No Connection |
| 9 | NC | No Connection |
| 10 | NC | No Connection |

| RS485 | | |
|---|---|---|
| PIN | SIGNAL | DESCRIPTION |
| 1 | TXD- | Transmit Data, Negative |
| 2 | TXD+ | Transmit Data, Positive |
| 3 | NC | No Connection |
| 4 | NC | No Connection |
| 5 | GND | Signal Ground |
| 6 | NC | No Connection |
| 7 | NC | No Connection |
| 8 | NC | No Connection |
| 9 | NC | No Connection |
| 10 | NC | No Connection |

### 1.10.8 Digital I/O Header: JGPIO1

This header provides GPIO connections.

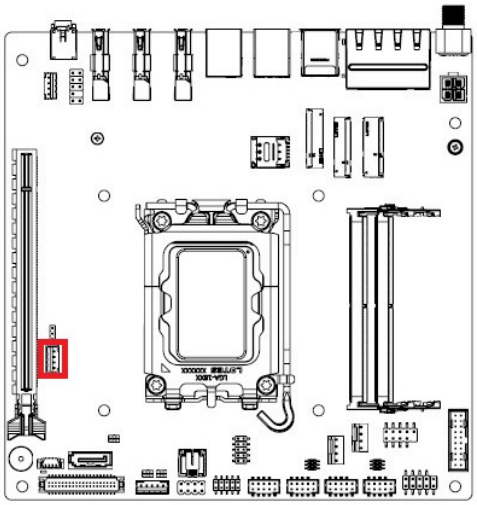


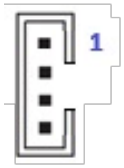



| | |
|---|---|
| 10: N_GPO3 | 9: N_GPI3 |
| 8: N_GPO2 | 7: N_GPI2 |
| 6: N_GPO1 | 5: N_GPI1 |
| 4: N_GPO0 | 3: N_GPI0 |
| 2: VCC5 | 1: GND |

### 1.10.9 I2C Header: JI2C1

This header provides I2C signal connections.



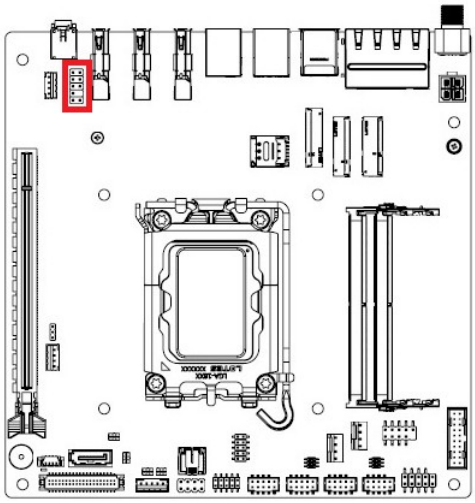


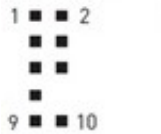

1: VCC
2: CLK
3: DATA
4: GND

## 1.10.10 Front Audio Connector: JAUD1

This connector is prepared for a chassis-mounted front panel audio I/O module that supports HD Audio standard (compliant with Intel® Front Panel I/O Connectivity Design Guide).

"JAUD1" volume can be adjusted through OS volume control.

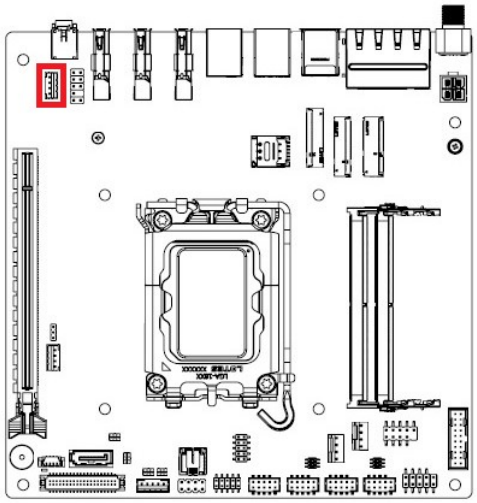


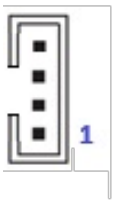



| | |
|---|---|
| 1: MIC_L | 2: GND |
| 3: MIC_R | 4: FRONT PANEL AUDIO DETECTION |
| 5: HEAD_PHONE_R | 6: MIC DETECTION |
| 7: SENSE_SEND | 8: NC |
| 9: HEAD_PHONE_L | 10: HEAD PHONE DETECTION |

## 1.10.11 Audio Amplifier Connector: JAMP1

This header provides amplified audio signals to external speakers (2-channels), which supports maximum 3W/ 3ohm speaker (THD+N = 10%) per channel.






4: AMP_L+
3: AMP_L-
2: AMP_R+
1: AMP_R-

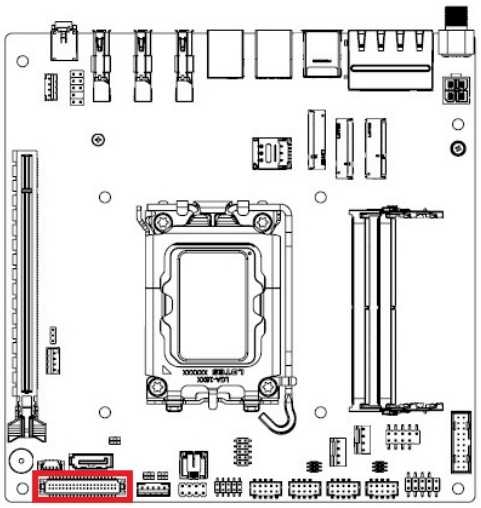
## 1.10.12 LVDS Header: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels.

Be sure the following settings are correct when connecting with a LVDS panel:

1. Signal assignment of cable(s) that connects between the LVDS panel and this header is correct.
2. Check the panel datasheet and set the LVDS power signal connected to the voltage recommended by the panel datasheet.
3. The BIOS LVDS panel resolution setting matches with connected panel datasheet.

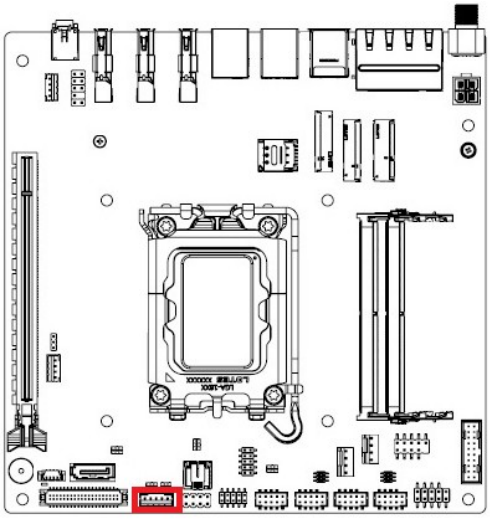
If the three items listed above were double checked but still not able to get video through the connected panel, customized video converter firmware might be needed.




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

### 1.10.13 LVDS Panel Backlight Connector: JINV1

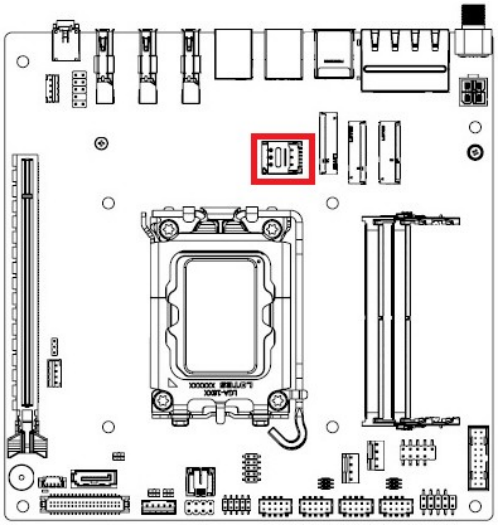
This header provides connections for LVDS panel backlight control connections.




1: +12V_BL
2: GND
3: BL_EN
4: BRIGHT1
5: +5V_BL

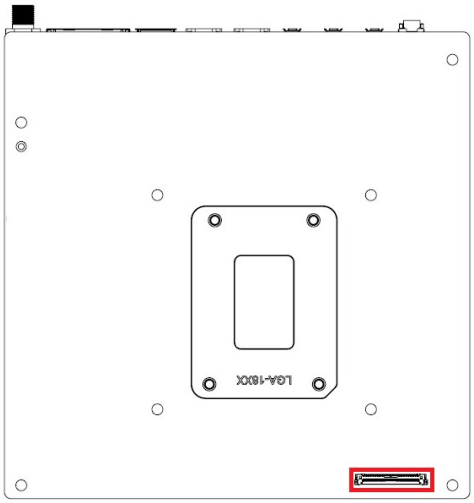
### 1.10.14 Nano SIM Slot: USIM1

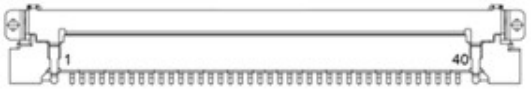
This slot provides connection to Nano SIM card.



## 1.10.15 eDP Connector: EDP1 (Optional)

This header provides eDP panel signal connections.






| | | | |
|---|---|---|---|
| 1: | NC | 21: | 3.3V/5V (eDP Power) |
| 2: | GND | 22: | NC |
| 3: | EDP_DATA#3_C | 23: | GND |
| 4: | EDP_DATA3_C | 24: | GND |
| 5: | GND | 25: | GND |
| 6: | EDP_DATA2#_C | 26: | GND |
| 7: | EDP_DATA2_C | 27: | EDP_HPD |
| 8: | GND | 28: | GND |
| 9: | EDP_DATA#1_C | 29: | GND |
| 10: | EDP_DATA1_C | 30: | GND |
| 11: | GND | 31: | GND |
| 12: | EDP_DATA#0_C | 32: | EDP_BKLTEN |
| 13: | EDP_DATA0_C | 33: | EDP_BKLCTL |
| 14: | GND | 34: | NC |
| 15: | EDP_AUX_P | 35: | NC |
| 16: | EDP_AUX_N | 36: | 12V |
| 17: | GND | 37: | 12V |
| 18: | 3.3V/5V (eDP Power) | 38: | 12V |
| 19: | 3.3V/5V (eDP Power) | 39: | 12V |
| 20: | 3.3V/5V (eDP Power) | 40: | NC |

## 1.11 The Expansion Slots

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

**NOTE:**

**Make sure to unplug the power cord before adding or removing expansion cards. Failing to do so may cause injury and damage to mainboard components.**

### 1.11.1 Installation of Expansion Card

To install an expansion Card:

1. Before install the expansion card, read the documentation that came with it and make the necessary hardware setting for the card.
2. Be sure there is no power connection to the system.
3. Align the card connector with the slot and press it firmly until the card is completely seated on the slot.
4. Secure the card to the chassis (or mainboard) with the screw that have been removed earlier.

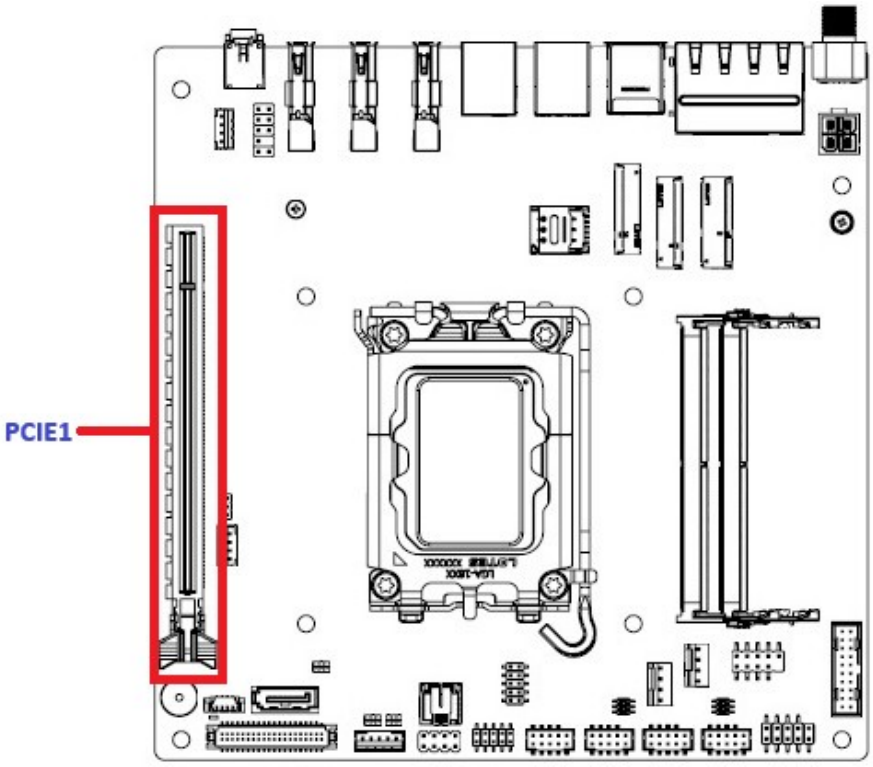
### 1.11.2 Setup an Expansion Card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the BIOS settings if necessary.
2. Assign an IRQ to the card if necessary.
3. Install the software drivers for the expansion card (provided by expansion card manufacturer).

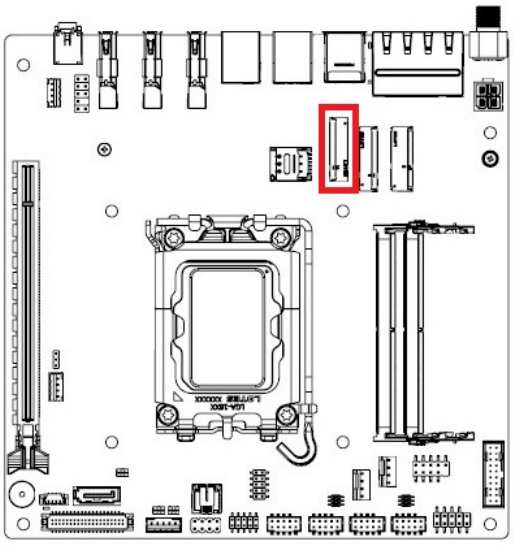
### 1.11.3 PCIe x4 Slot: PCIE1

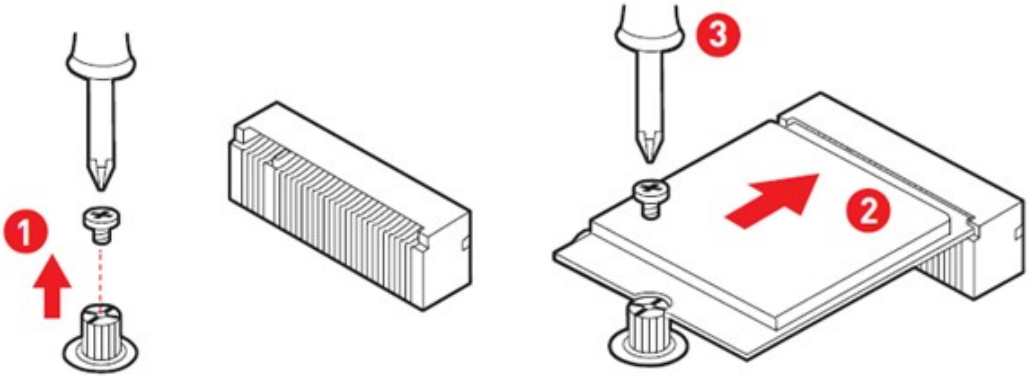
The "PCIE1" slot supports PCIe x4 Gen4 with a x16 physical slot (supports PCIe LAN cards, or some PCIe x16 video cards (at x4 performance)).



### 1.11.4 M.2 Slot (M-Key, 2280): M2_M1

The "M2_M1" slot provides PCIe Gen4 x4 signal and supports nVME SSD.



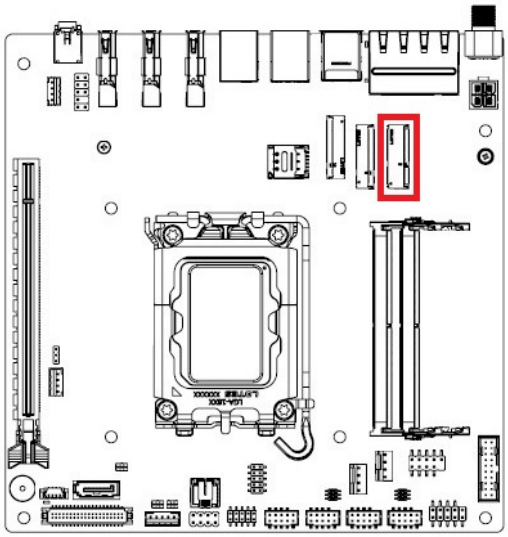


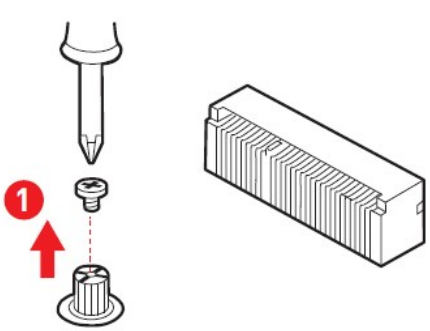

**NOTE:**

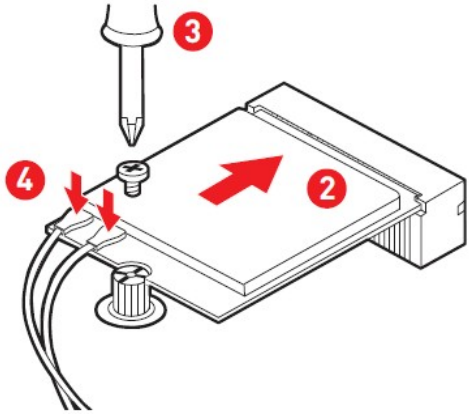
1. **When adding or removing expansion cards, make sure that you unplug the power connection first.**
2. **Be sure to read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, or BIOS configuration.**

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

The "M2_E1" slot provides PCIe Gen3 x1 & USB2.0 signal.





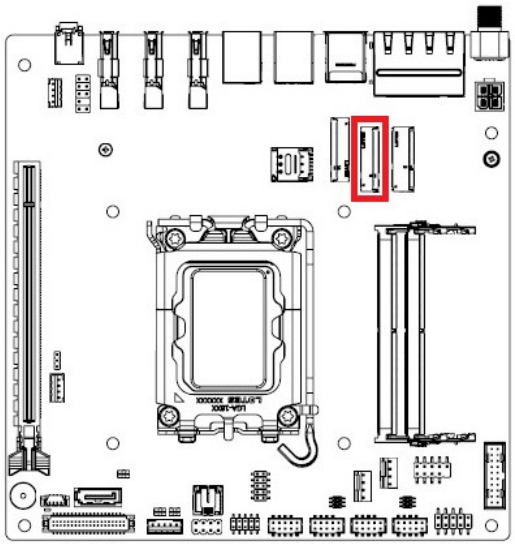



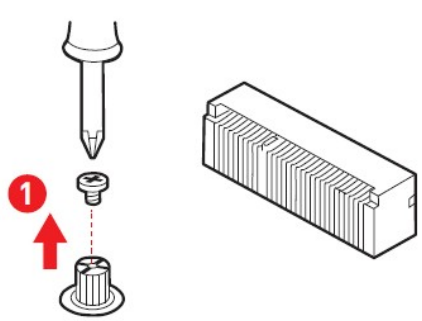

**NOTE:**

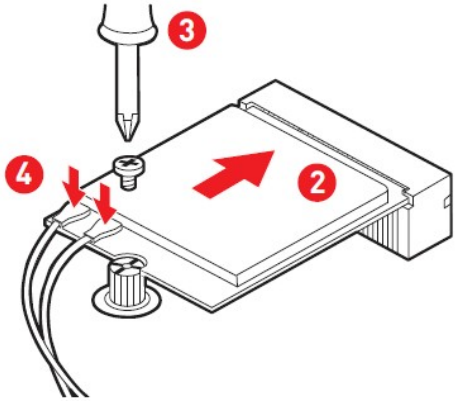
1. **When adding or removing expansion cards, make sure that you unplug the power connection first.**
2. **Be sure to read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, or BIOS configuration.**

### 1.11.6 M.2 Slot (B-Key, 2242): M2_B1

The "M2_B1" slot provides PCIe Gen2 x1, SATA 3.0, and USB3.2 Gen1 signals, and supports LTE/5G module, or M.2 SATA (2242) module.






**NOTE:**

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

# Chapter 2: BIOS Setup

## BIOS Update Related Procedure

1. **After the BIOS is updated, shut down the system.**
2. **Disconnect all power connections from power supply to the mainboard.**
3. **Clear the CMOS (For at least 30 seconds) (Check Section "1.9.1" for details).**
4. **Reconnect all power connections from power supply to the mainboard.**
5. **When the system is booting at first time after the new BIOS is updated, it is recommended to enter the BIOS; load the option "Load Optimized Defaults", and then "Save and Exit Setup".**

**IF ANY OF THE ABOVE STEPS IS NOT FOLLOWED, IT MAY CAUSE THE FLASHED BIOS NOT FUNCTION PROPERLY.**

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

## 2.1 BIOS Setup Program

This mainboard supports a programmable firmware chip that you can update using the provided utility. Use the BIOS Setup program when you are installing a mainboard, reconfiguring your system, or prompted to "Run Setup." This section explains how to configure your system using this utility.

The firmware hub on the mainboard stores the BIOS Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On-Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

If you wish to enter BIOS Setup after POST, restart the system by pressing <Ctrl+Alt+Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two methods mentioned above fail.

The BIOS Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.

- The default BIOS settings for this mainboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Select the "**Load Optimized Defaults"** from the BIOS menu screen.

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.

### 2.1.1 Legend Box

The keys in the legend bar allow you to navigate through the various setup menus

| Key(s) | Function Description |
|---|---|
| →← | Select Screen |
| ↑↓ | Select Item |
| Enter | Select |
| + - | Change Opt. |
| F1 | General Help |
| F2 | Previous Values |
| F3 | Optimal Defaults |
| F4 | Save and Exit |
| ESC | Exit |

### 2.1.2 List Box

This box appears only on the opening screen. The box displays an initial list of configurable items in the menu you selected.

### 2.1.3 Sub-menu

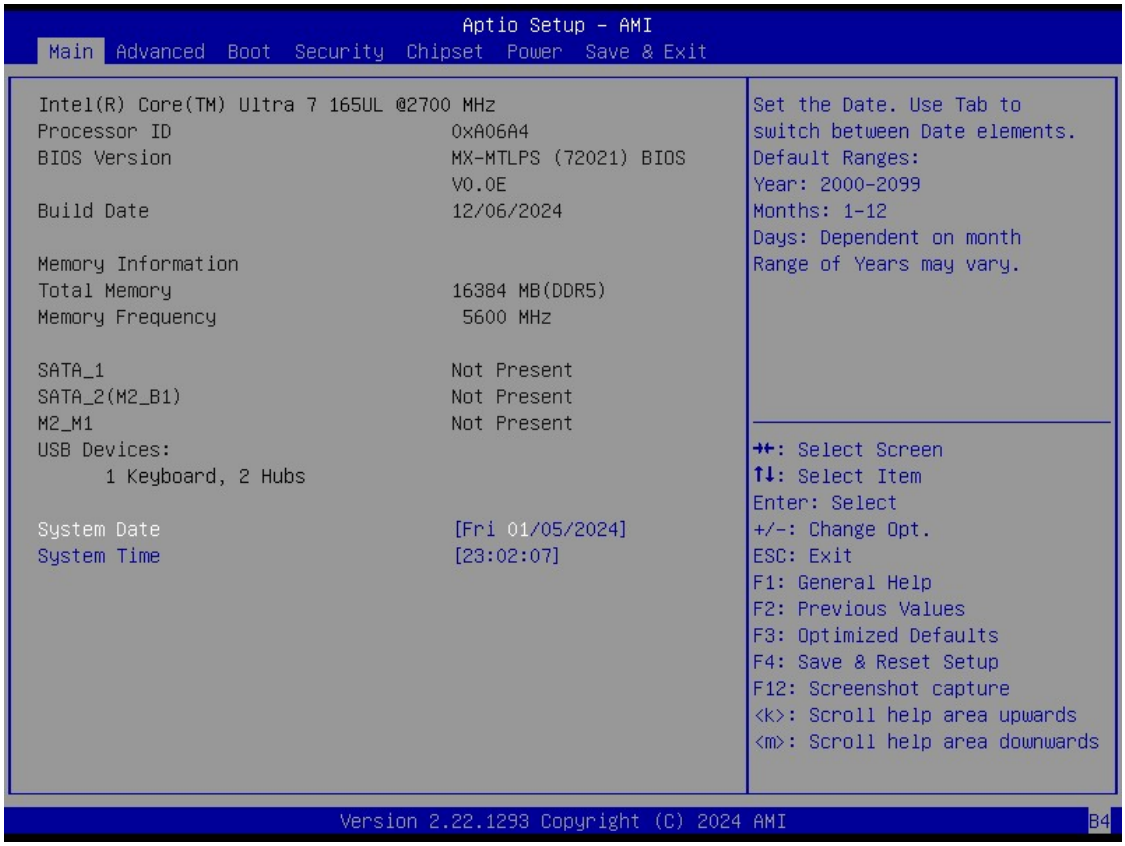
Note that a right pointer symbol  appears to the left of certain fields. This pointer indicates that you can display a sub-menu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. The sub-menu appears. Use the legend keys to enter values and move from field to field within a sub-menu as you would within a menu. Use the <Esc> key to return to the main menu.

Take some time to familiarize yourself with the legend keys and their corresponding functions. Practice navigating through the various menus and submenus. If you accidentally make unwanted changes to any of the fields, press <F3> to load the optimal default values. While moving around through the Setup program, note that explanations appear in the Item Specific Help window located to the right of each menu. This window displays the help text for the currently highlighted field.

00

## 2.2 BIOS Menu Screen

When you enter the BIOS, the following screen appears. The BIOS menu screen displays the items that allow you to make changes to the system configuration. To access the menu items, press the up/down/right/left arrow key on the keyboard until the desired item is highlighted, then press [Enter] to open the specific menu.




The following are the menu options available:

**▶ Main**

Use this menu for basic system configurations, such as time, date, etc.

**▶ Advanced**

Use this menu to set up the items of special enhanced features.

**▶ Boot**

Use this menu to specify the priority of boot devices.

**▶ Security**

Use this menu to set supervisor and user passwords.

**▶ Chipset**

This menu controls the advanced features of the on-board chipsets.

**▶ Power**

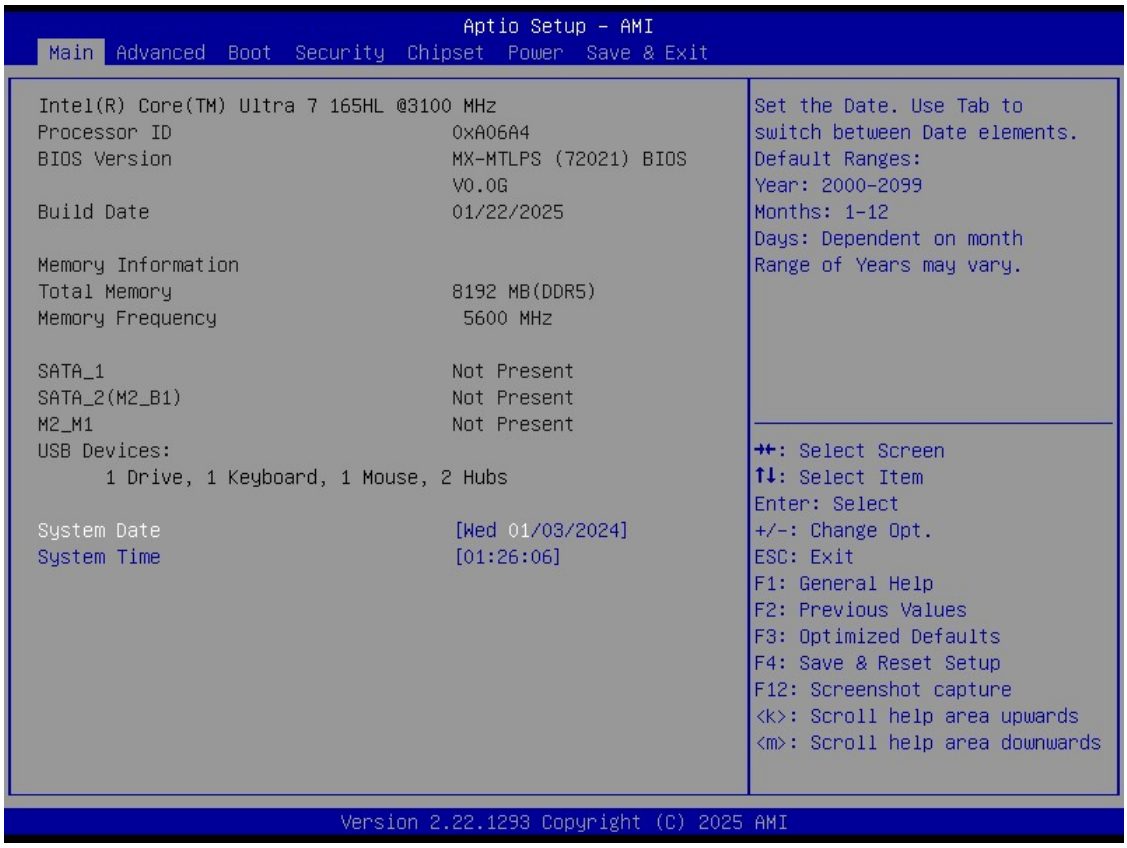
Use this menu to specify your settings for power management.

**▶Save & Exit**

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

## 2.3 Main Menu

This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu. Use this menu for basic system configurations, such as time, date etc.




**▶ System Date**

This setting allows you to set the system date.

Format: <Day> <Month> <Date> <Year>.

**▶ System Time**

This setting allows you to set the system time.

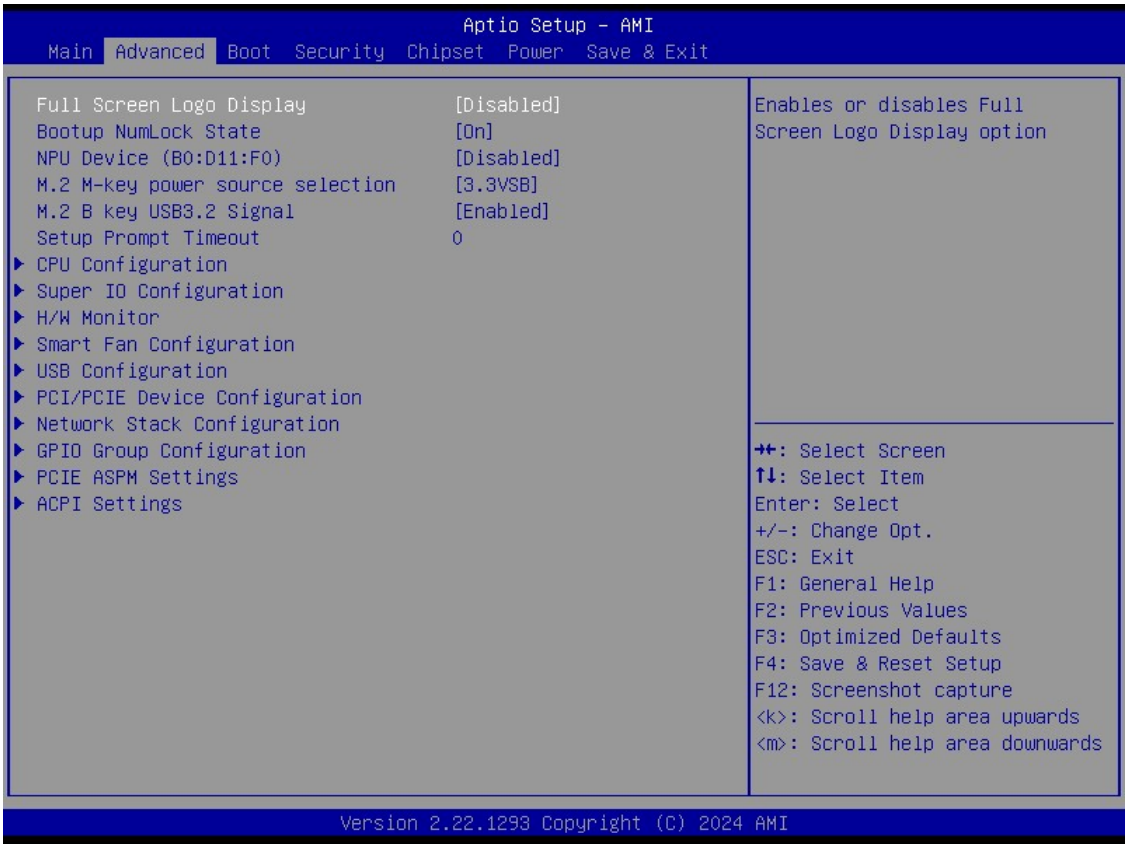
Format: <Hour> <Minute> <Second>.

**NOTE:**

**Due to the SoC (System on Chip) structure of Meteor Lake Processor, it is recommended to set up the system date and time when processor is installed at the first time with MX-MTLPS board.**

## 2.4 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.




**Take caution when changing the settings of Advanced menu items. Incorrect field settings may cause the system unstable.**

**▶ Full Screen Logo Display**

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's full-screen logo.

[Enabled] BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

[Disabled] BIOS will display the normal POST messages, instead of the fullscreen logo (Default).

**▶ 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 (Default).

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

**▶ NPU Device (B0:D11:F0)**

NPU Device support for Windows 11 only.

[Enabled] Enable NPU Device.

[Disabled] Disable NPU Device (Default).

**▶ M.2 M-Key power source selection**

Select power source for M.2 M-key slot.

[3.3VSB] Preserve power on S0, S4, S5 (Default).

[3.3VDC] Preserve power on S0 only.

**▶ M.2 B Key USB3.2 Signal**

Disabled or Enabled peripheral of M.2 B key.

[Enabled] Enable M.2 B-key USB3.2 signal (Default).

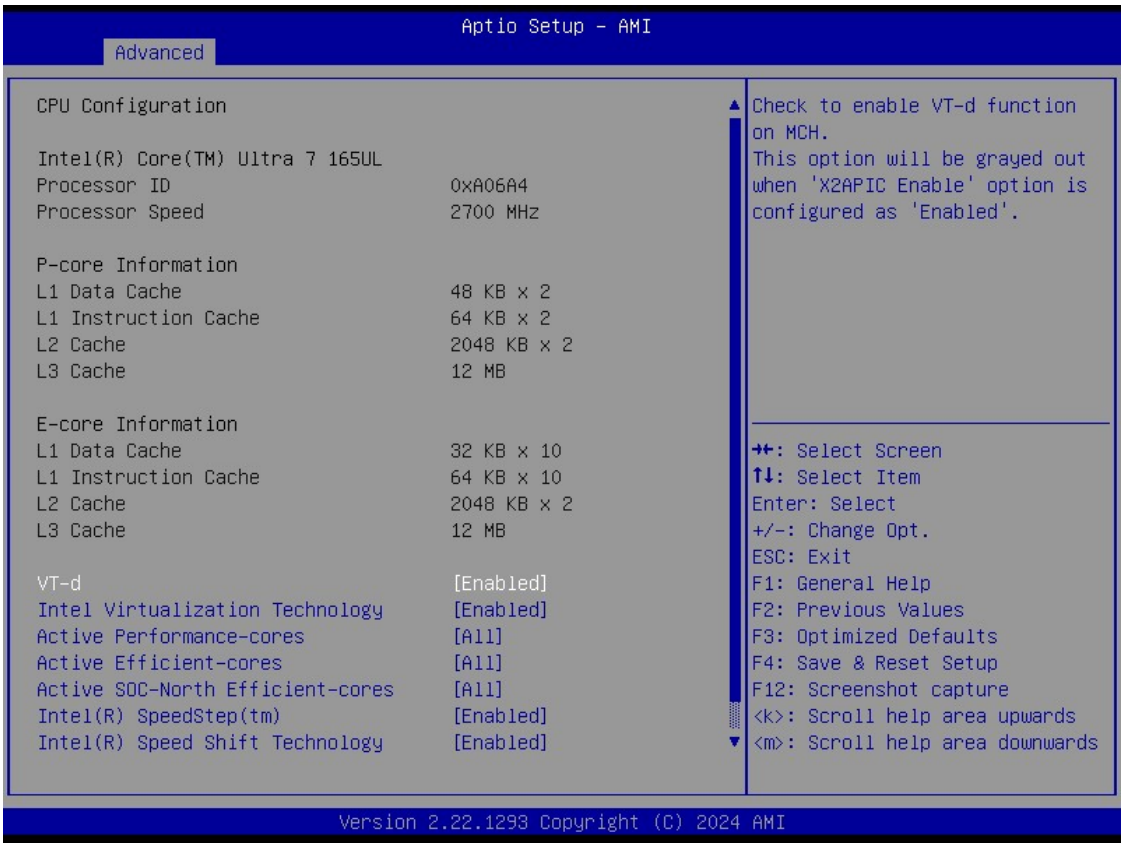
[Disabled] Disable M.2 B-key USB3.2 signal.

**▶ Setup Prompt Timeout**

Number of second to wait for setup activation key.

## 2.4.1 CPU Configuration

Display CPU information and related settings.




**▶ VT-d**

Check to enable VT-d function on MCH.

**▶ Intel Virtualization Technology**

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 Performance-cores**

Select the number of active Performance-cores (P-cores).

**▶ Active Efficient-cores**

Select the number of active Efficient-cores (E-cores).

**▶ Active SOC-North Efficient-cores**

Number of SOC-North Efficient-cores to enable in SOC North.

**▶ 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. When disabled, the processor will return the actual maximum CPUID (CPU Identification) input value of the processor when queried.

**▶ Intel(R) Speed Shift Technology**

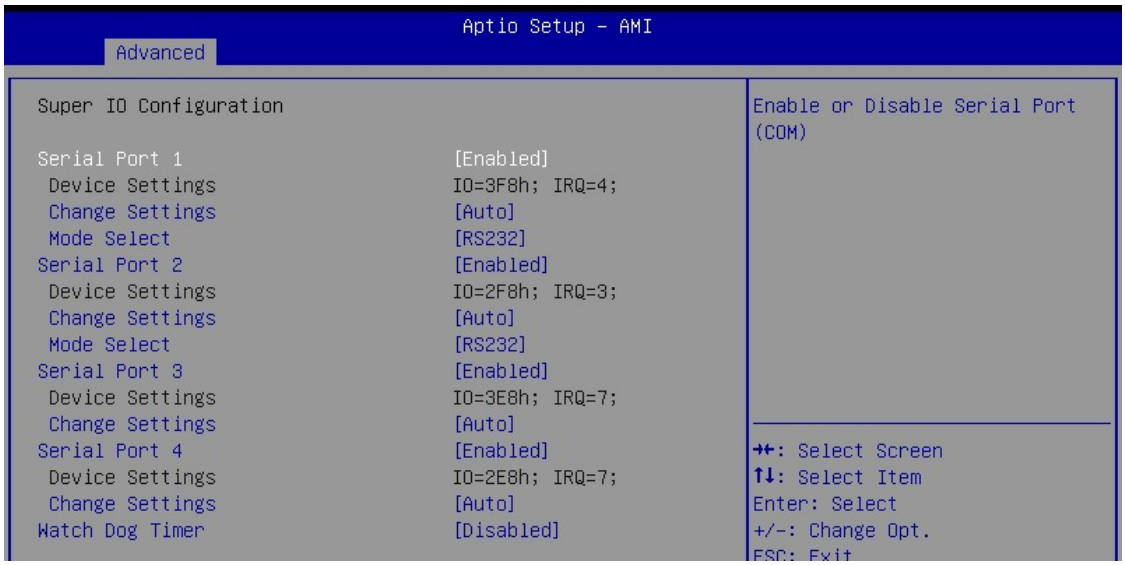
It is an energy-efficient method that allows frequency control by hardware rather than the OS.
[Enabled] When enabled, Intel® Speed Shift Technology is activated. Technology enables the management of processor power consumption via hardware performance state (P-State) transitions (Default).
[Disabled] Disable this function.

**▶ C States**

This setting controls the C-States (CPU Power states).
[Enabled] Detects the idle state of system and reduce CPU power consumption accordingly (Default),
[Disabled] Disable this function.

## 2.4.2 Super IO Configuration

Super IO related settings.




**▶ 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.

» **Mode Select**

Select an operation mode for Serial Port 1/ 2/ 3/ 4.

Serial Port 1, 2 (COM1, COM2) support RS232 (default), or RS422, or RS485 protocols.

Serial Port 3, 4 (COM3, COM4) support RS232 only.

**▶ FIFO Mode**

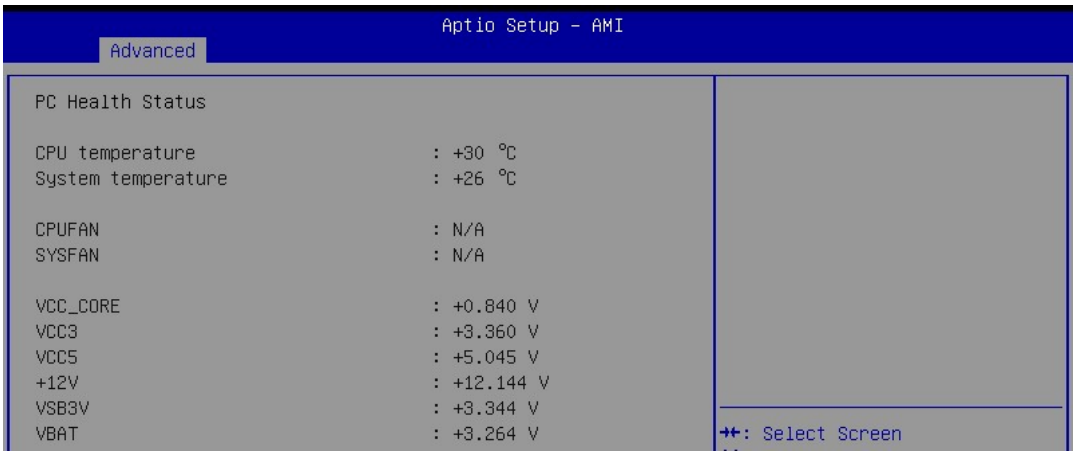
This setting controls the FIFO (First In First Out) data transfer mode.

**▶ Watch Dog Timer**

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

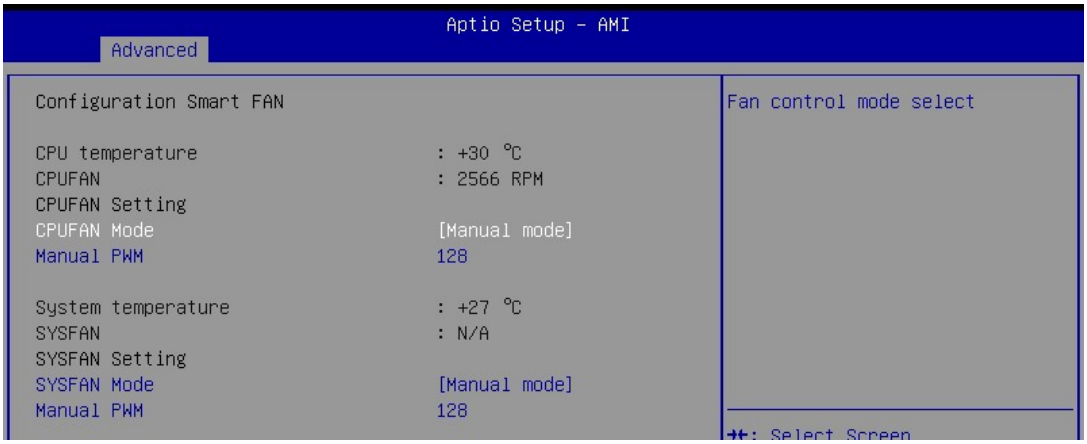
### 2.4.3 H/W Monitor (PC Health Status)

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



## 2.4.4 Smart Fan Configuration

Smart Fan settings.




**▶ CPU Temperature**

The current CPU temperature display.

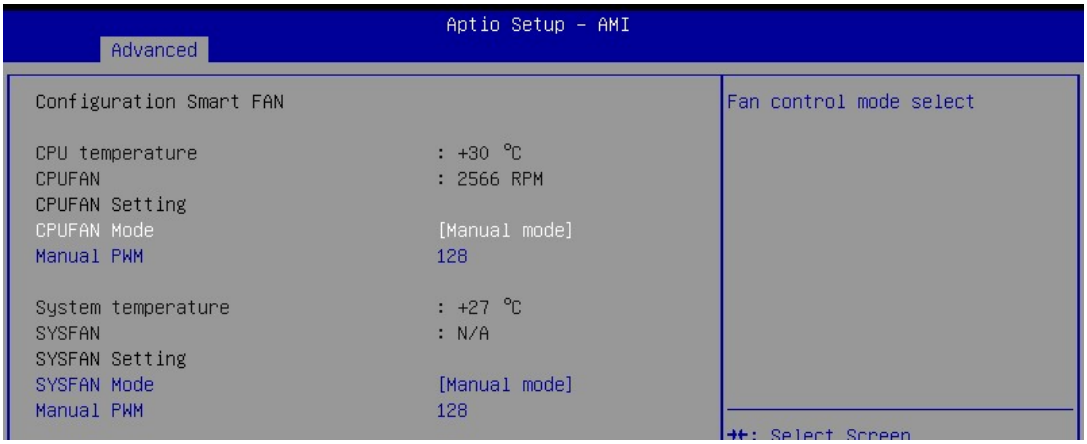
**▶ CPUFAN**

The current CPU fan speed (in RPM).

### 2.4.4.1 CPUFAN Mode: Manual Mode

**▶ CPUFAN Mode**

Setup Smart Fan in different modes.




» **Manual Mode**

Control CPU Fan by manually setting its desired PWM value.

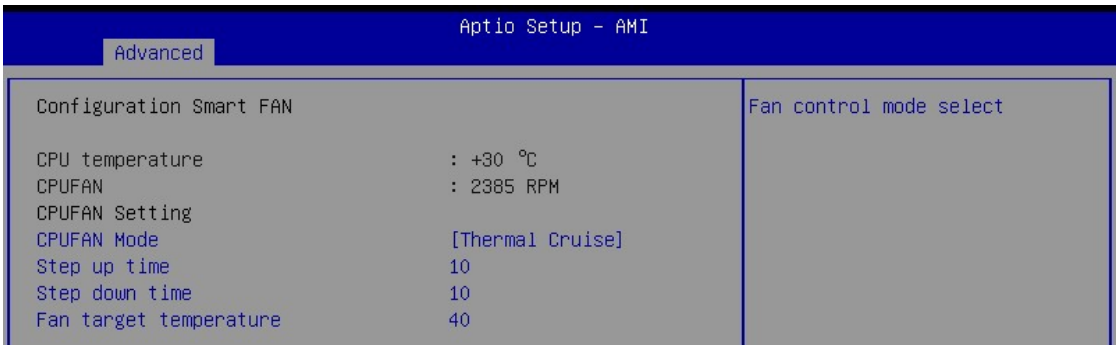
**» Manual PWM**

Fan will work with this manual PWM value (0~255 for 0%~100%).

### 2.4.4.2 CPUFAN Mode: Thermal Cruise

**» Thermal Cruise**

Control CPU fan by setting its desired step up, down rates, and CPU fan target temperature.




» **Step up time**

The amount of time Fan takes to increase its value by one step. (units are intervals of 0.1 second).

» **Step Down time**

The amount of time Fan takes to decrease its value by one step. (units are intervals of 0.1 second).

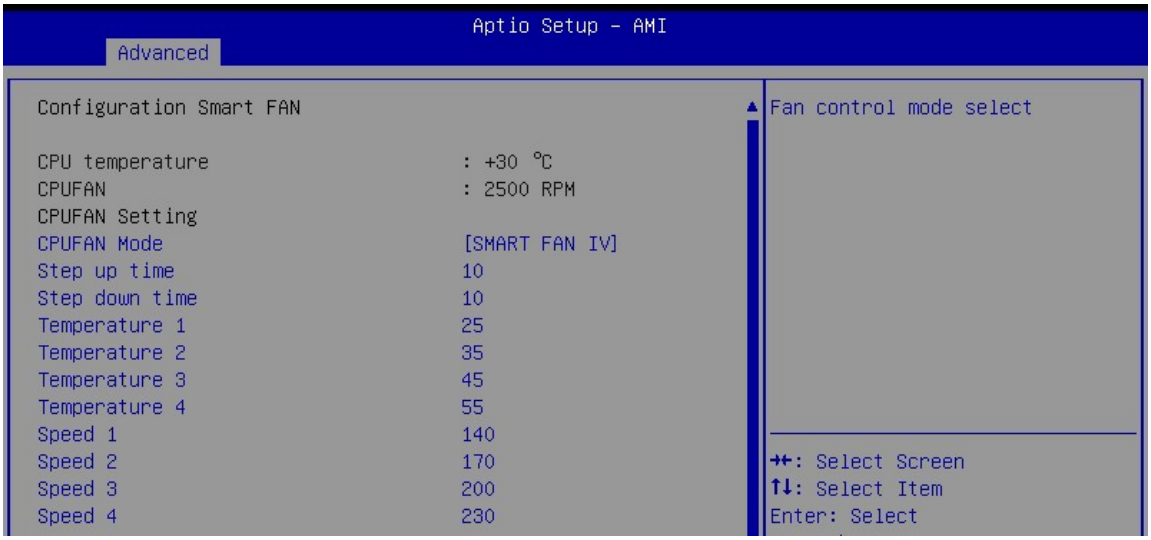
» **Fan target temperature**

Desired CPU Fan target temperature.

### 2.4.4.3 CPUFAN Mode: SMART FAN IV

**» SMART FAN IV**

Control CPU fan by setting its desired step up, down rates, and fan RPM when CPU temperature reached 4 designated temperature zones.




» **Step up time**

The amount of time Fan takes to increase its value by one step. (units are intervals of 0.1 second).

» **Step Down time**

The amount of time Fan takes to decrease its value by one step. (units are intervals of 0.1 second).

» **Temperature 1, 2, 3, 4**

Designate desired CPU temperature at zones 1, 2, 3, 4.

» **Speed 1, 2, 3, 4**

Designate desired CPU Fan speed RPM (0~255) when CPU temperature reached corresponding temperature zone.

### 2.4.4.4 SYSFAN Mode: Manual Mode

**▶ System Temperature**

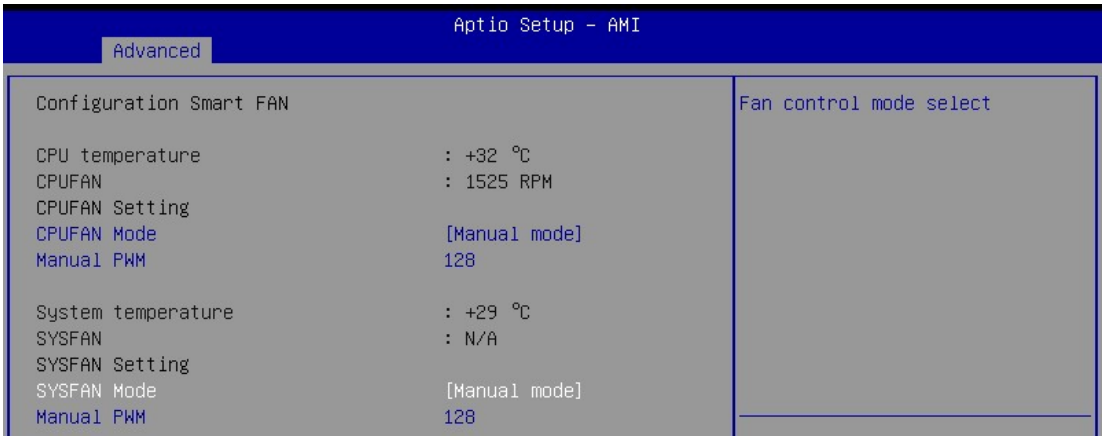
The current System temperature display.

**▶ SYSFAN**

The current system fan speed (in RPM).

**▶ SYSFAN Mode**

Setup Smart Fan in different modes.




» **Manual Mode**

Control system Fan by manually setting its desired PWM value.

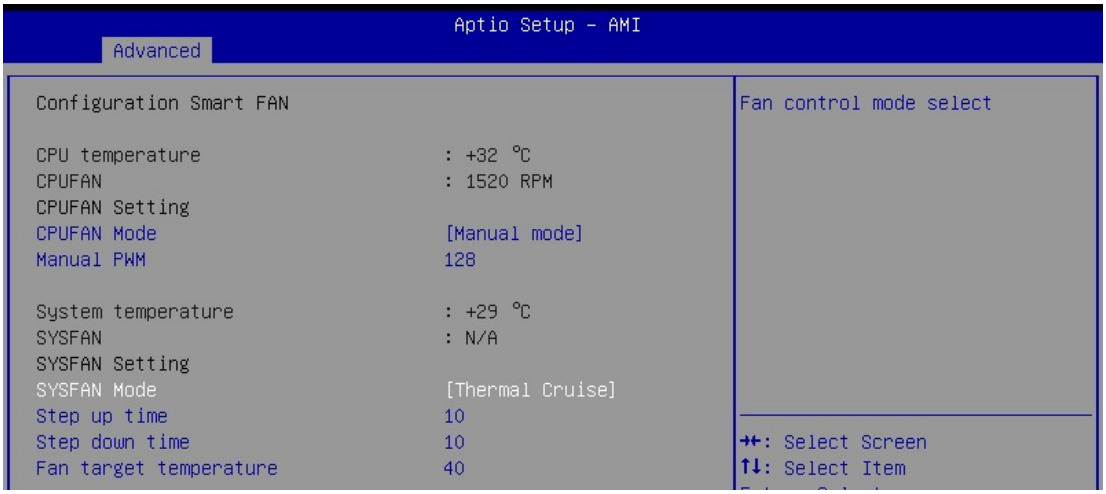
**» Manual PWM**

Fan will work with this manual PWM value (0~255 for 0%~100%).

### 2.4.4.5 SYSFAN Mode: Thermal Cruise

**» Thermal Cruise**

Control system fan by setting its desired step up, down rates, and system fan target temperature.




» **Step up time**

The amount of time Fan takes to increase its value by one step. (Units are intervals of 0.1 second).

» **Step Down time**

The amount of time Fan takes to decrease its value by one step. (Units are intervals of 0.1 second).

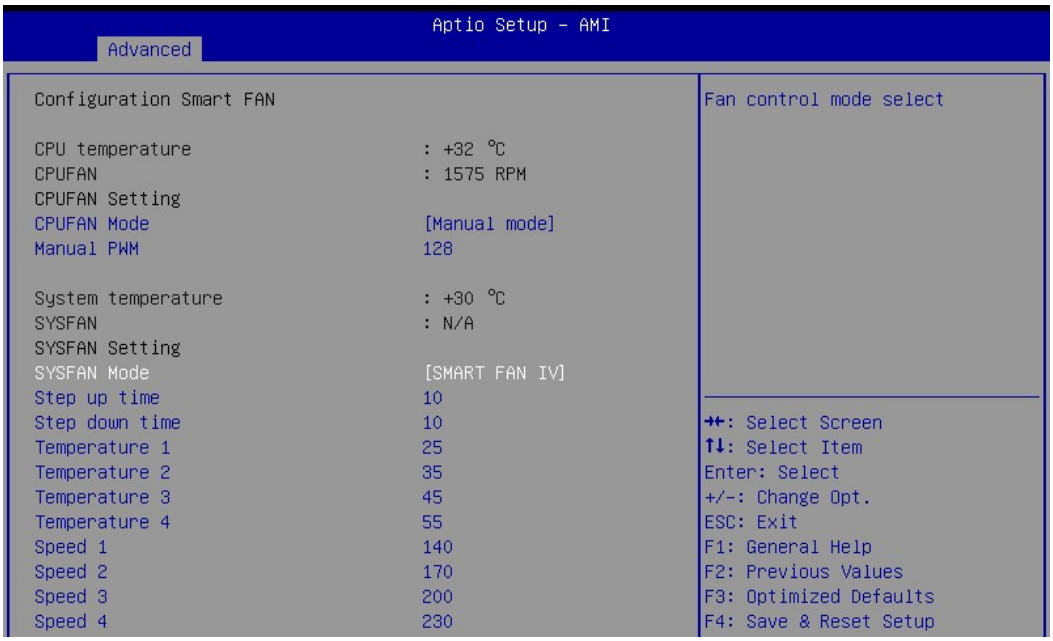
» **Fan target temperature**

Desired system Fan target temperature.

### 2.4.4.6 SYSFAN Mode: SMART FAN IV

**» SMART FAN IV**

Control system fan by setting its desired step up, down rates, and fan RPM when system temperature reached designated 4 different temperature zones.




» **Step up time**

The amount of time Fan takes to increase its value by one step. (units are intervals of 0.1 second).

» **Step Down time**

The amount of time Fan takes to decrease its value by one step. (units are intervals of 0.1 second).

» **Temperature 1, 2, 3, 4**

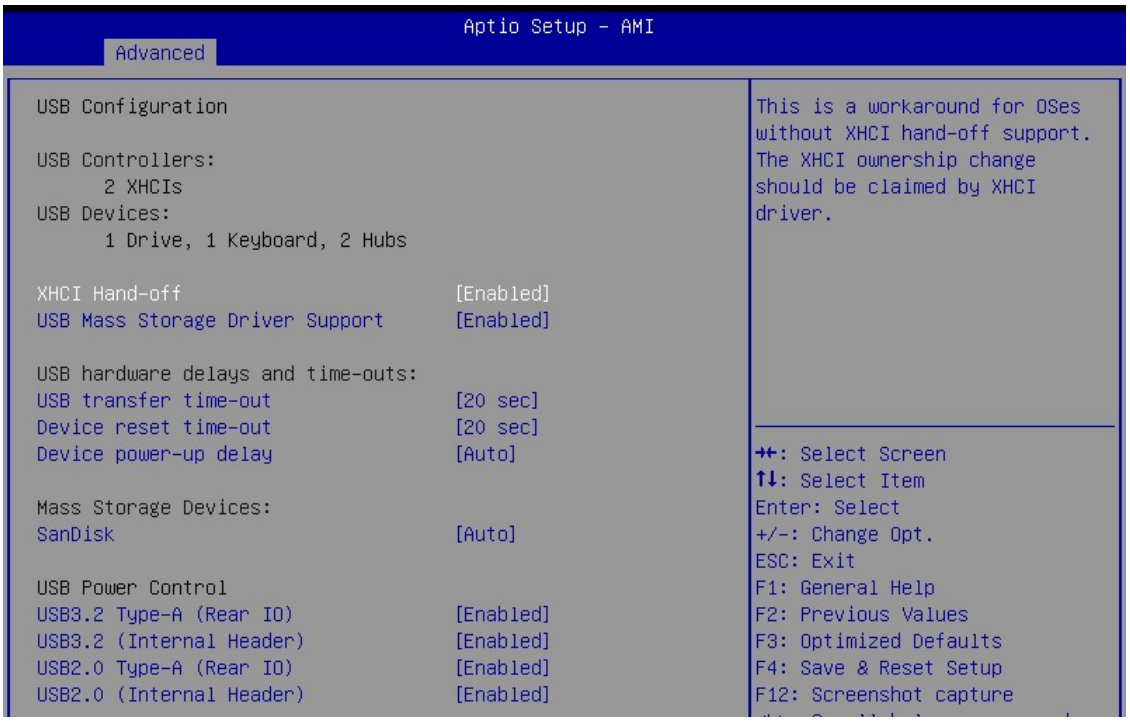
Designate desired system temperature at zones 1, 2, 3, 4.

» **Speed 1, 2, 3, 4**

Designate desired system Fan speed RPM (0~255) when system temperature reached corresponding temperature zone.

## 2.4.5 USB Configuration

USB related settings.




**▶ XHCI Hand-off**

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

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

[Disabled] On-board USB 3.2 por 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 used after start unit command.

▶ **Device power-up delay**

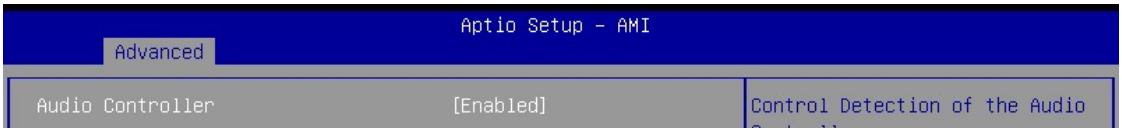
Set the maximum time that a USB device will wait before reporting itself to the host controller.

▶ **USB Power Control**

This setting enables/disables USB Ports.

## 2.4.6 PCI/ PCIE Device Configuration

This setting enable/disable the onboard audio controller.

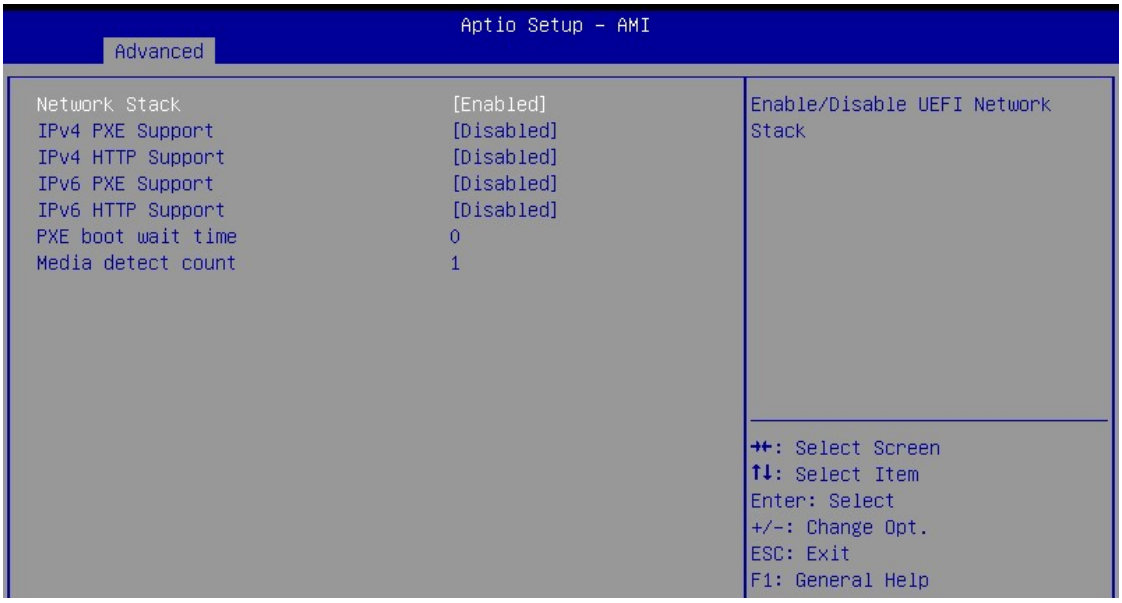



▶ **Audio Controller**

This setting enables/disables the onboard audio controller.

## 2.4.7 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**" option is enabled.

» **IPV4 PXE Support**

Enables or disable IPv4 PXE boot support.

» **IPV4 HTTP Support**

Enables or disable Ipv4 HTTP Support.

» **IPV6 PXE Support**

Enables or disable Ipv6 PXE Support.

» **IPV6 HTTP Support**

Enables or disable Ipv6 HTTP Support.

» **PXE boot wait time**

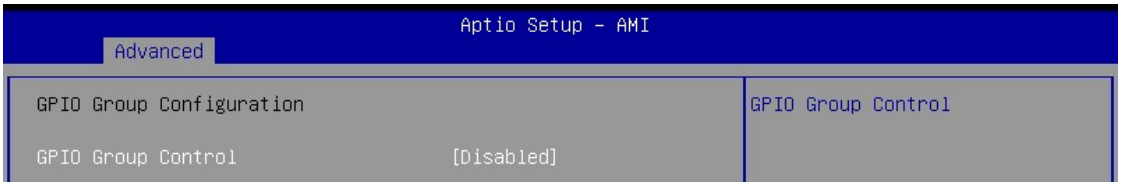
Use this option to specify the wait time to press the ESC key to abort the PXE boot. Press "+" or "-" on your keyboard to change the value. The default setting is 0.

» **Media detect count**

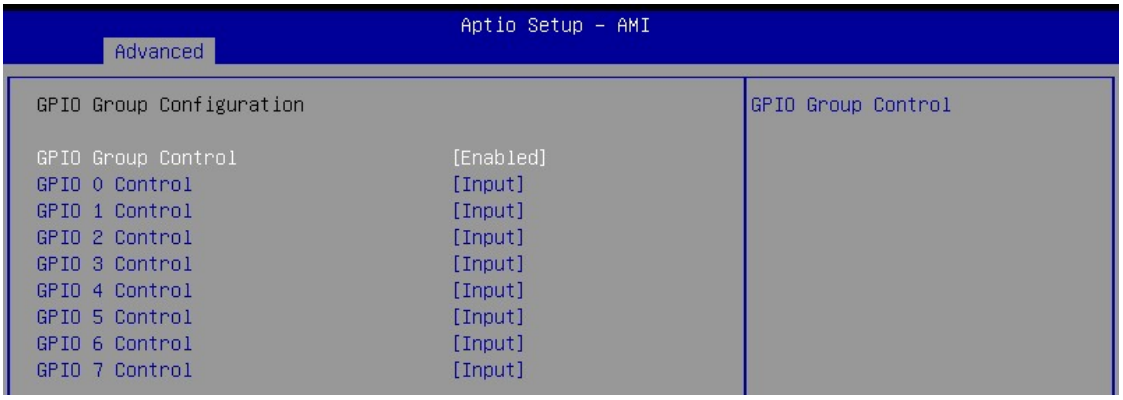
Use this option to specify the number of times media will be checked. Press "+" or "-" on your keyboard to change the value. The default setting is 1.

## 2.4.8 GPIO Group Configuration

Provides operation mode of the specified GPIO.




When "GPIO Group Control" option is enabled, it provides access to individual GPIO setting.

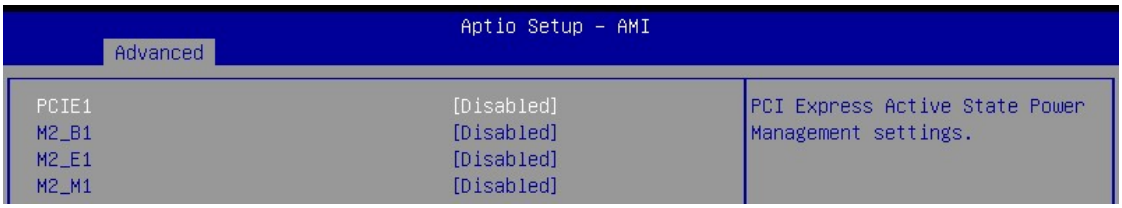



**▶ GPIO 0, 1, 2, 3, 4, 5, 6, 7 Control**

Set corresponding GPIO to the option of "Input", "Output High", or "Output Low".

## 2.4.9 PCIE ASPM Settings

This menu provides settings for PCIe ASPM (Active State Power Management) level for different installed devices.




**▶ PCIE1/ M2_B1/ M2_E1/ M2_M1**

Sets PCI Express ASPM (Active State Power Management) state for power saving.

[L0s] Initiate an automatic shutdown of the system to protect from potential damage due to overheating.

[L1] Higher latency, lower power "standby" state (optional).

[L0sL1] Activate both L0s and L1 support.

[Disabled] Disable this function.

## 2.4.10 ACPI Settings

ACPI related settings.


**▶ Enable ACPI Auto Configuration**

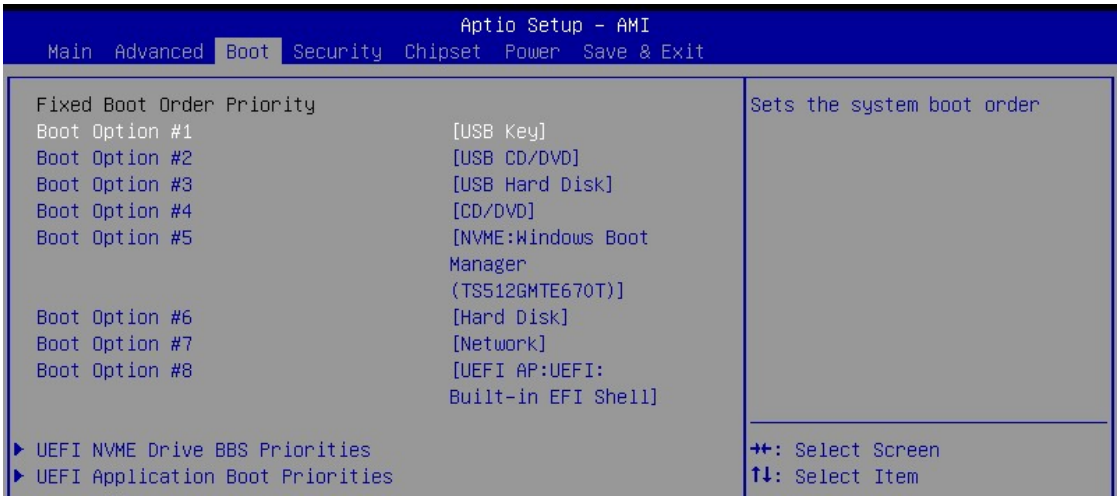
Enable or Disable ACPI Auto Configuration. Configuration options: [Enable], [Disable]

**▶ Enable Hibernation**

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

## 2.5 Boot

Boot sequence related settings.




**▶ Boot Option #1~8**

This setting allows users to set the sequence of boot devices where BIOS attempts to load the disk operating system.

**▶ UEFI NVME Drive BBS Priorities**

Specifies the Boot Device Priority sequence from available UEFI NVME Drives.

**▶ UEFI Application Boot Priorities**

Specifies the Boot Device Priority sequence from available UEFI Application.

## 2.6 Security

Security related settings.


**▶ Administrator Password**

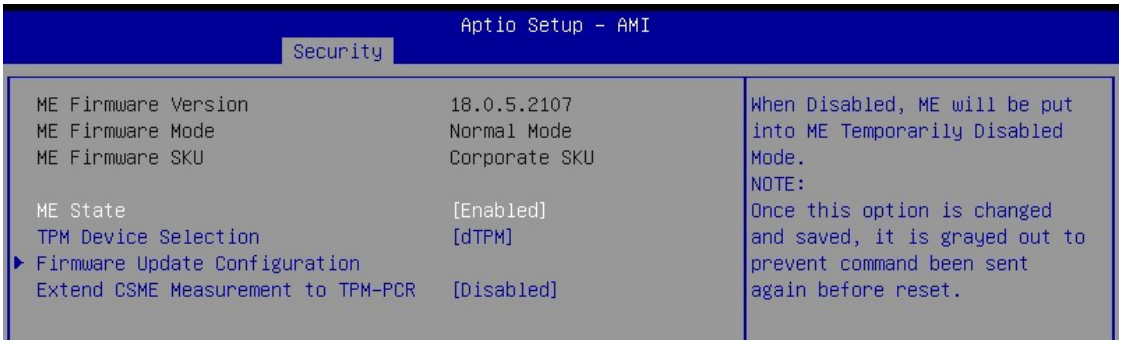
Administrator Password controls access to the BIOS Setup utility.

**▶ User Password**

User Password controls access to the system at boot and to the BIOS Setup utility.

## 2.6.1 PCH-FW Configuration

PCH-FW related settings.




**▶ ME State**

This menu controls the Intel® Management Engine State (ME state) parameters, which provide various management and security capabilities. The following items will display when **ME State** is enabled.

**▶TPM Device Selection**

Select TPM (Trusted Platform Module) devices from PTT (Intel TPM) or dTPM (Infineon TPM).

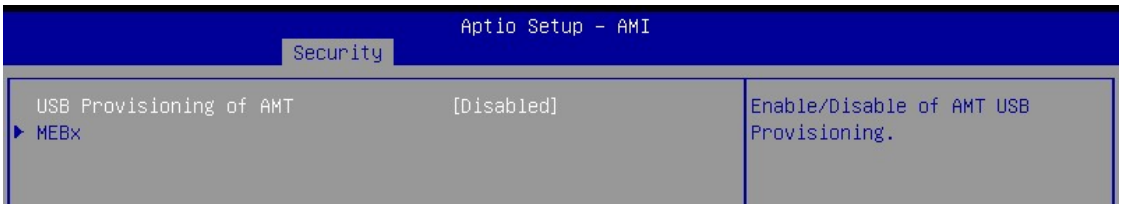
**NOTE:**

1. **When TPM is enabled and utilized through TPM software under OS, there is a possibility that the encrypted data will not be accessible, or recoverable if one of the following situations occurred:**
   - **a. Lost of TPM password.**
   - **b. System or board failure, or being replaced.**
   - **c. Hard Drive failure.**

2. **Please refer to "Application Note" section; "TPM Selection (Infineon TPM (IFX), or Intel PTT (INTC))" for TPM device selection and activation details.**

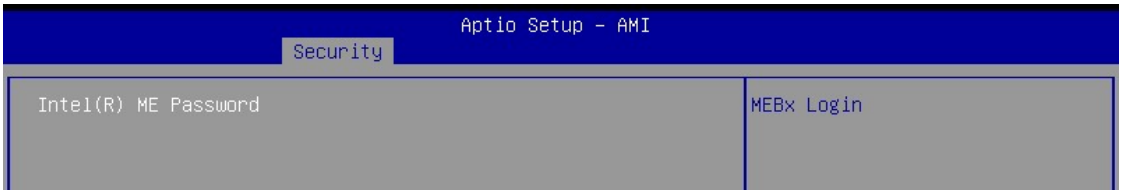
## 2.6.2 AMT Configuration

Intel AMT related settings.




**▶ USB Provisioning of AMT**

Provision AMT via USB drive.




**▶ MEBx**

Setup Intel® ME Password to access AMT menu. When entering this menu for the first time, the user password is "admin", then user needs to setup a new password in order to access this menu next time.

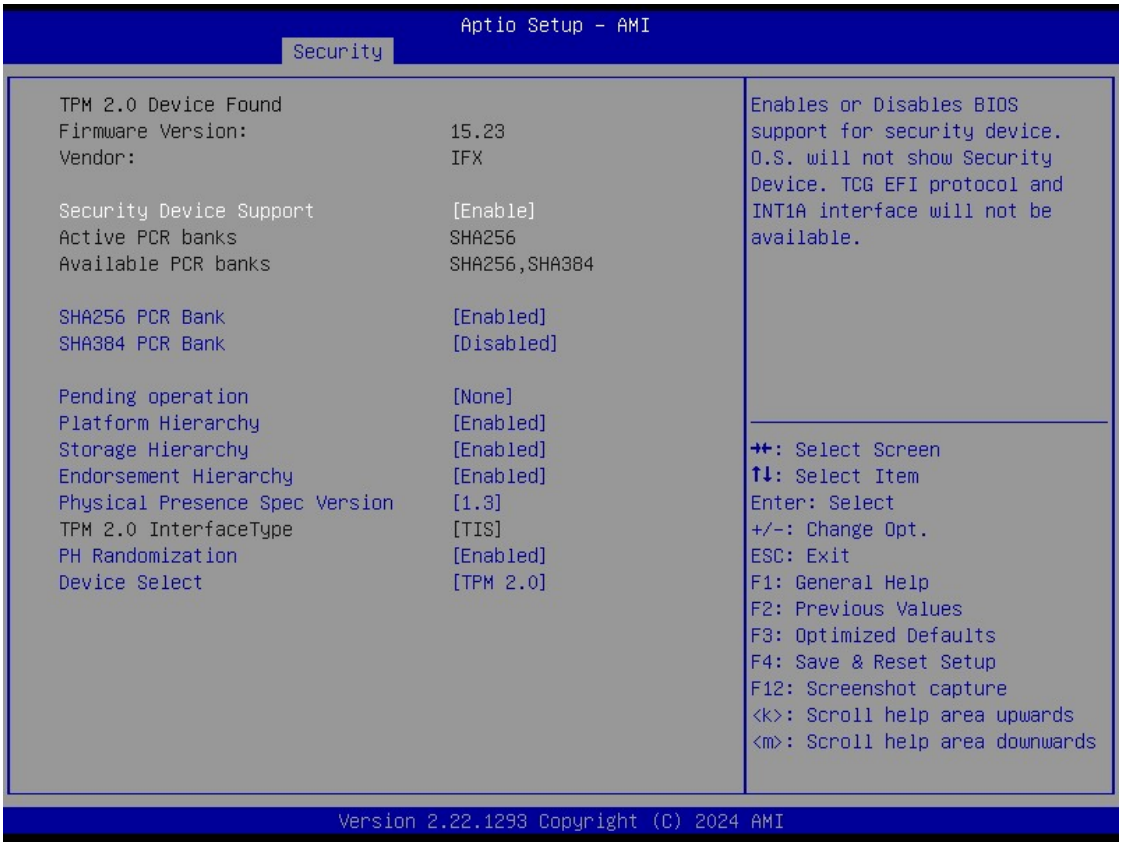
**Intel® ME passwords must be between 8 and 32 characters long, have at least one upper case character, one lower case character, one number, and a special character (for example: !, @, #, $, %, ^, &, *).**

**NOTE:**

**Please refer to "Application Note" section; "The Intel "MEBx" (iAMT)" for MeBx password setup details.**

## 2.6.3 Trusted Computing

Trusted Computing related settings.




**▶ 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 / SHA384 PCR Bank**

These settings enable/disable the SHA-1 PCR Bank and SHA256 & SHA384 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 setting show the Physical Presence Spec Version.

▶ **TPM 2.0 Interface Type**

This setting shows the TPM 2.0 Interface Type.

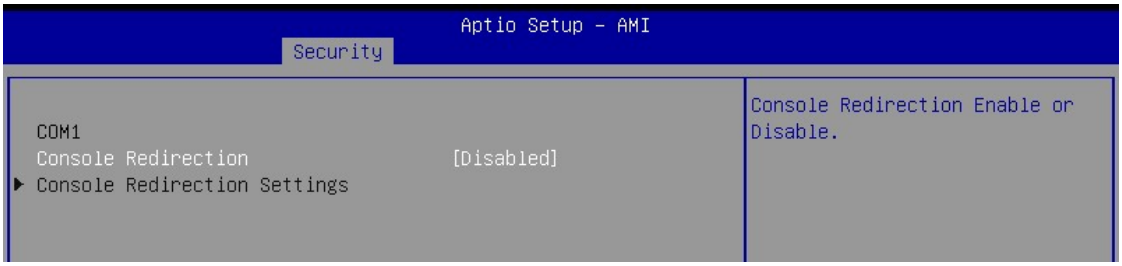
▶ **PH Randomization**

Enables or disables Platform Hierarchy (PH) Randomization.

▶ **Device Select**

Select your TPM device through this setting.

## 2.6.4 Serial Port Console Redirection

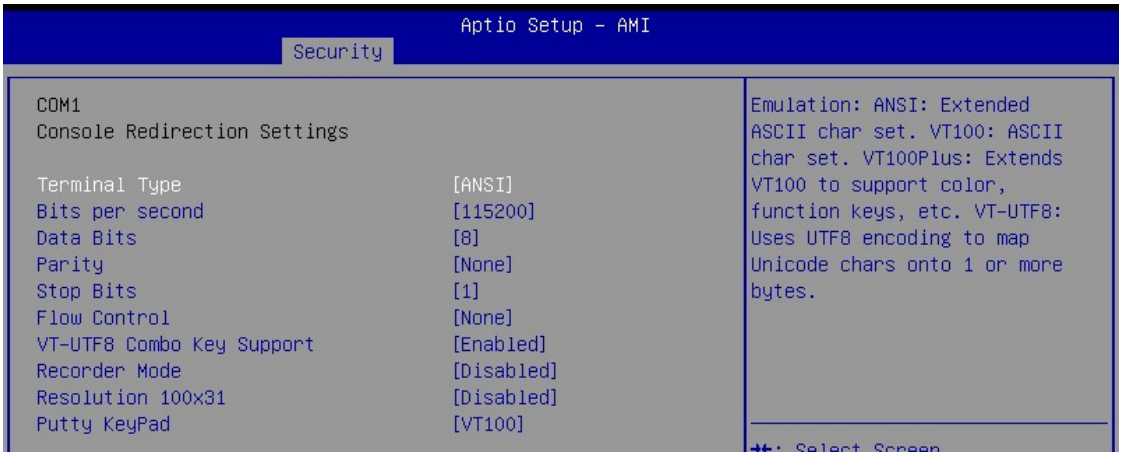



**▶ Console Redirection**

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

### 2.6.4.1 Console Redirection Settings (COM1)

The following "Console Redirection Settings" will accessible whe "Console Redirection" option is enabled.




**▶ 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(s). 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**

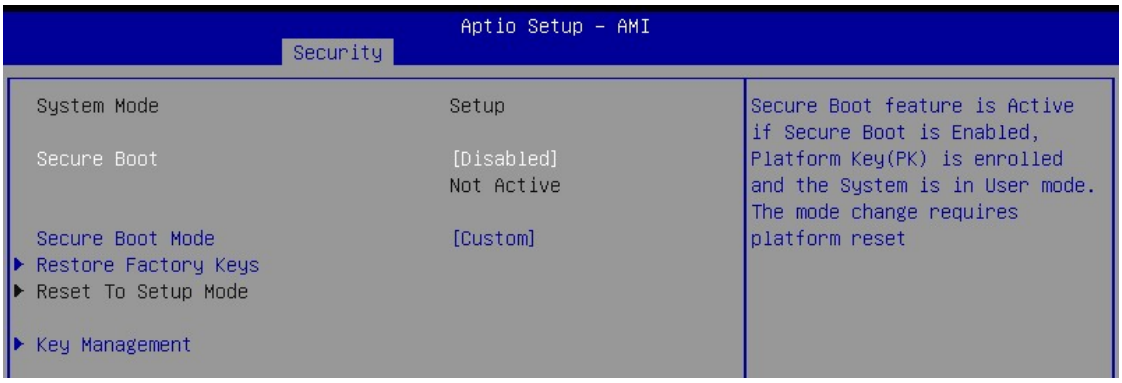
These settings enable/disable the recorder mode and the resolution 100x31.

**▶ Putty KeyPad**

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

## 2.6.5 Secure Boot

Secure boot related settings.




**▶Secure Boot**

Secure Boot function can be enabled only when the **Platform Key (PK)** is enrolled and running accordingly.

**▶ Secure Boot Mode**

Select the secure boot mode. This item appears when Secure Boot is enabled.

[Standard] The system will automatically load the secure keys from BIOS.

[Custom] Allows user to configure the secure boot settings and manually load the secure keys.

**▶ Restore Factory Keys**

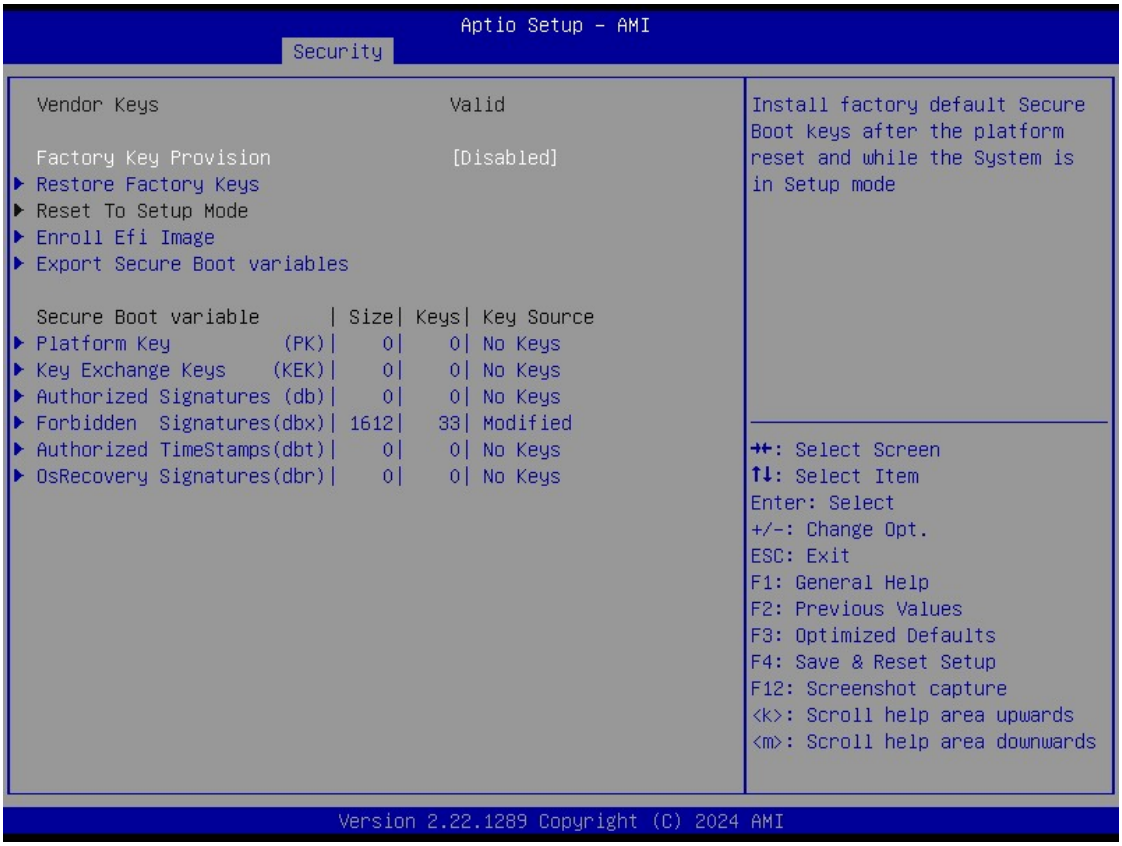
Allows you to restore all factory default keys. The settings will be applied after reboot or at the next reboot. This item appears when **"Secure Boot Mode"** sets to **[Custom]**.

**▶ Reset to setup Mode**

Allows you to delete all the Secure Boot keys (PK,KEK,db,dbt,dbx). The settings will be applied after reboot or at the next reboot. This item appears when **"Secure Boot Mode"** sets to **[Custom]**.

### 2.6.5.1 Key Management

Secure boot keys management.




**▶Platform Key (PK):**

The Platform Key (PK) can protect the firmware from any un-authenticated changes. The system will verify the PK before your system enters the OS. Platform Key (PK) is used for updating KEK.

**▶ Set New Key**

Set a new PK to your system.

**▶ Delete Key**

Delete the PK from your system.

**▶ Key Exchange Keys (KEK):**

Key Exchange Key (KEK) is used for updating DB or DBX.

▶ **Set New Key**

Set a new KEK to your system.

▶ **Append Key**

Loads an additional KEK from storage devices to your system.

▶ **Delete Key**

Delete the KEK from your system.

▶ **Authorized Signatures (db) :**

Authorized Signatures (db) lists the signatures that can be loaded.

▶ **Set New Key**

Set a new db to your system.

▶ **Append Key**

Loads an additional db from storage devices to your system.

▶ **Delete Key**

Delete the db from your system.

▶ **Forbidden Signatures (dbx):**

Forbidden Signatures (dbx) lists the forbidden signatures that are not trusted and cannot be loaded.

▶ **Set New Key**

Sets a new dbx to your system.

▶ **Append Key**

Loads an additional dbx from storage devices to your system.

▶ **Delete Key**

Delete the dbx from your system.

**▶ Authorized TimeStamps (dbt):**

Authorized TimeStamps (dbt) lists the authentication signatures with authorization time stamps.

**▶ Set New Key**

Sets a new DBT to your system.

**▶ Append Key**

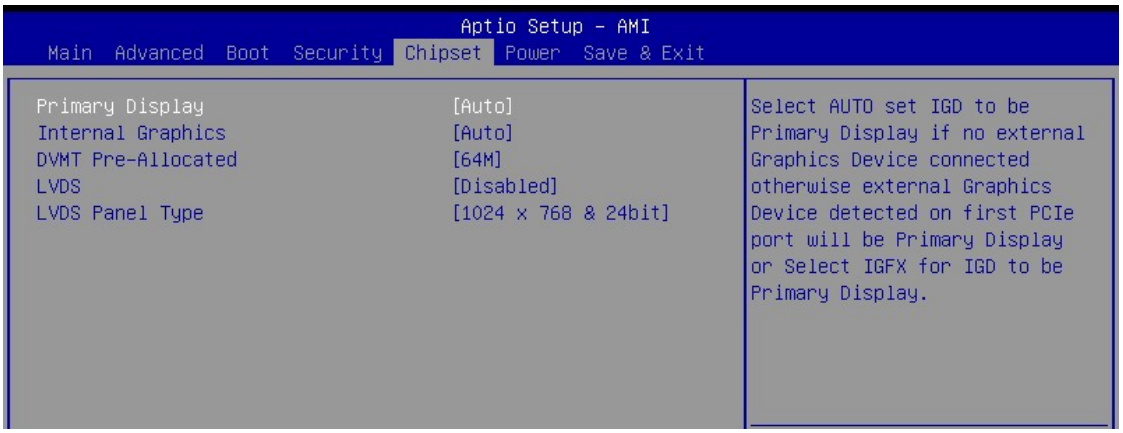
Loads an additional DBT from storage devices to your system.

**▶ OsRecovery Singnatures (dbr):**

Lists the available signatures for OS recovery.

## 2.7 Chipset

Display related settings.




**▶Primary Display**

Select which of IGFX/PEG/PCIE graphic device should be primary display or select HG for Hybrid Gfx. Configuration options: [Auto], [IGFX]

**▶Internal Graphics**

Keep IGFX enabled based on the setup options. Configuration options: [Auto], [disabled], [enabled]

**▶ DVMT Pre-Allocated**

Select DVMT 5.0 Pre-allocated (Fixed) Graphics memory size used by the internal graphics device. Configuration options: 64M/128M/256M/512M/1024M

**▶ 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.

## 2.8 Power

Power related setting.


**▶ 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 power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous 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 S3/S4 sleep state.

**▶ Ring /LAN /PCIE PME**

Enables or disables the system to be awakened from power saving modes when activity or input signal of onboard PCIE PME/Ring is detected.

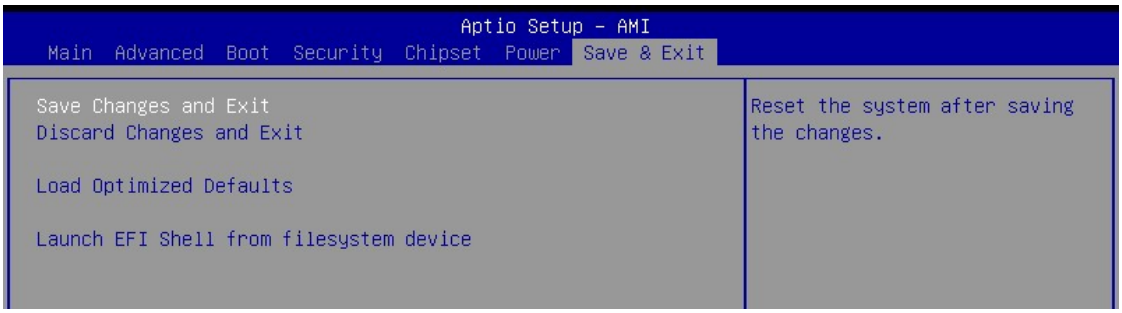
Enables or disables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device is detected.

**▶ RTC**

When [Enabled], your can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

## 2.9 Save & Exit

Save BIOS options settings.




**▶ Save Changes and Reset**

Save changes to CMOS and reset the system.

**▶ Discard Changes and Exit**

Abandon all changes and exit the Setup Utility.

**▶ Load Optimized Defaults**

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

**NOTE:**

**Loading this option is recommended after BIOS update. Then load "Save changes and Exit" BIOS option.**

**▶ Launch EFI Shell from filesystem device**

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

# Chapter 3: Application Note

**Please read the following application notes before proceeding with the system setup and/or OS installation:**

## 3.1 PXE Boot:

1. Connect an ethernet cable with desired LAN1 or LAN2 port at rear I/O of MX-MTLPS board.

**NOTE:**

**Where "LAN1" is located right next to the rear I/O "JDCIN1" port. "LAN2" is located next to the rear I/O "USB2" port.**

2. Enter BIOS menu.
3. Under "Advanced"->"Network Stack Configuration"; enable "Network Stack", and then enable the desired "IPv4 PXE Support" or "IPv6 PXE Support" (choose only one).
4. Save and Exit BIOS.
5. After system rebooted, enter BIOS again.
6. Under "Boot"; change "Boot Option #1" to "Network:UEFI: PXE IPv…..".
7. Under "Save & Exit", click on "Save Changes and Exit".
8. During the system reboot, the screen shall prompted with message "Checking Media Presence….", "Media Present….", "Start PXE over IPv# (# is either 4 or 6, depending on what you had chosen at step 3) on MAC (showing the MAC address of chosen LAN port that connected with ethernet cable).

## 3.2 When a different model of CPU is installed:

1. **If a different model of processor is installed with MX-MTLPS board, it is recommended to clear the CMOS to be sure the previous processor's information stored at NVRAM is cleared.**

2. **Due to the SoC architecture, it will require to set up the date and time under BIOS menu when a new processor is installed.**

## 3.3 The optional Realtek Audio Console installation:

**The optional "Realtek Audio Console" will be installed after the Win10 is being updated to Version "22H2" (through "Windows Update").**

## 3.4 TPM Selection (Infineon TPM (IFX), or Intel PTT (INTC)):

1. Enter BIOS menu.
2. Under "Security"->"PCH-FW Configuration"->"TPM Device Selection"; choose "dTPM" for Infineon TPM (IFX)" (default), or "PTT" for Intel PTT (INTC).
3. Under "Security"->"Trusted Computing"; make sure option "Security Device Support" is "Enabled".
4. Under "Save & Exit" option, choose "Save Changes and Exit".
5. Let the system reboot into Windows environment, under "Search", type "Device Manager". And make sure the Device Manager displays the option "Security devices"->"Trusted Platform Module 2.0" and there is no exclamation mark or question mark associated with it.
6. Under "Search", type "Manage Bitlocker"; the menu "BitLocker Drive Encryption" shall be prompted. Click on "TPM Administration" at lower left-hand corner of its screen.
7. The next screen shall prompt with the status of TPM;
    a. Make sure "Status" section indicates "The TPM is ready to use".
    b. Under "TPM Manufacturer Information" section, the "Manufacturer Name" is shown as

    "IFX" if you chose "dTPM" under step 2 above.

    Or

    "INTC" if you selected "PTT" under step 2 above.
8. If the information at "2", "3", "5" & "7" were verified to be correct, you may click on "Turn on BitLocker" option under "BitLocker Drive Encryption" screen to start BitLocker execution process.

## 3.5 When a new CPU is installed, or system power on at first time:

**The first time boot (system post) when installing a new processor will be longer (about several minutes), and the system could reboot several times, which is normal. The subsequent boot time (system post) will be shorter.**

## 3.6 Multiple Displays (through Intel Video Graphic):

1. **During the system post, before entering the OS environment, there will be maximum of 2 video outputs from connected DP, and/or LVDS, and/or eDP ports.**
2. **Due to the limitations of Intel video driver, 4 display outputs are the maximum of multiple video outputs available with MX-MTLPS board (under OS environment).**
3. **It is recommended that if users prefer to have multiple display outputs, the physical display devices (DP monitors, or LVDS or eDP (optional) panel) can be connected to the desired video port before power on the system. (maximum 4 display output connections).**
4. **If the connected video monitors are in different resolutions, all connected monitors resolution will be limited to the one with the lowest resolution initially.**
5. **After all MX-MTLPS drivers are installed, and there is no exclamation mark shown under device manager, you may fine-tune the resolution of each connected monitor through Window's "Display Settings" (right click on the Windows desktop), and through "Intel Graphics Command Center" (through Windows Start Menu, or downloaded from MS store).**

## 3.7 The "JAMP1" audio header:

**When the rear I/O audio port is connected with speakers, there is no audio output on "JAMP1" Header, unless the speaker connection on the rear I/O connection is disconnected.**

## 3.8 The Intel "MEBx" (iAMT):

**1. Enter BIOS menu.**

2. **Enter "MEBx" option (on far right of BIOS menu).**

**3. Click on "Intel ME Password. For the 1st time enter, type "admin" first, then Intel MEBx will ask for a new password setup.**

**NOTE:**

**Intel® ME passwords must be between 8 and 32 characters long, have at least one upper case character, one lower case character, one number, and a special character (for example: !, @, #, $, %, ^, &, *).**

**4. The MEBx menu will be prompted.**

## 3.9 Win10/11 Drivers Installation Recommendations:

### A. Win11 Installation without network connection:

1. When Win11 prompted with message "Let's connect you to a network", press "Shift" and "F10" keys to open command prompt.
2. Under command prompt, type "oobe\bypassnro", then press ENTER.
3. The system will restart and begin the setup process again.
4. Make the proper selection again for Region and Keyboards. When the Win11 Installation process reach the screen with "Let's connect you to a network", there is another option "I don't have internet", click on it to continue with Win11 installation process.

### B. Install Win11 with network connection:

1. When Win11 prompted with message that requires to "Install Driver", click "Install Driver" button.
2. Insert the USB thumb drive that contains all MX_MTLPS Win11 drivers (posted on BCM website), Browse to the folder "3. Intel LAN_29.4 (Win11)->"Release_29.4", then click the button "Select Folder" to proceed.
3. After the LAN driver is installed, the system will prompt with button "Reboot Now". Install the RJ45 ethernet cable to one of two LAN ports at rear IO of MX-MTLPS board, then click on button "Reboot Now" to continue with the Win11 installation process.

## C. For Win10 Driver Installation:

1. **There is a designated number in the front of each driver. Please install the driver by following the number in sequence.**
2. **The Intel audio driver "4. Intel Smart Sound Technology (ISST)_20.40.10149.8 (Win10)" must be installed BEFORE Realtek audio driver "5. Realtek Audio_6.0.9667.1 (Win10)".**
3. **Some of the drivers contain README txt file, which contains instructions for how to install the corresponding driver. Please read it first.**

## D. For Win11 Driver Installation:

1. **There is a designated number in front of each driver. Please install the driver by following the number in sequence.**
2. **The Intel audio driver "4. Intel Smart Sound Technology (ISST)_20.40.11032.0 (Win11)" must be installed BEFORE Realtek audio driver "5. Realtek Audio_6.0.9667.1 (Win11)".**
3. **Some of the drivers contain README txt file, which contains instructions for how to install the corresponding driver. Please read it first.**