



LattePanda Mu Evaluation Board

Product Manual

First Edition, March 2024

If this manual doesn't solve your issue, you can also try getting help through the following means:

- **LattePanda DOCS:**
Visit <https://docs.lattepanda.com/> for the latest product information.
- **LattePanda Forum:**
Join the LattePanda community at <https://www.lattepanda.com/forum/>, search for similar issues or post a description of the problem you are facing.
- **Product Warranty:**
You can contact LattePanda Technical Support (techsupport@lattepanda.com). After getting approval from Technical Support, you can send the defective product to the LattePanda warranty department.

After-sales Service

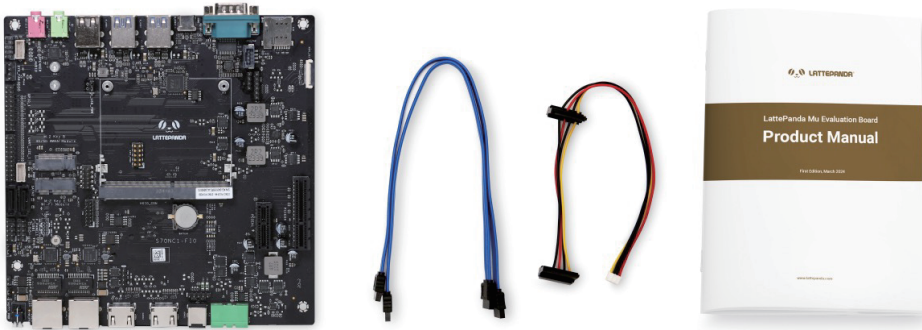
1. The warranty period for this product is 90 days.
2. LattePanda guarantees that the LattePanda products you purchase will not have material and workmanship defects under normal usage during the warranty period.
3. LattePanda will repair or replace any products found to be defective upon receipt, or those that develop defects during the standard warranty period after inspection by LattePanda After-sales Department.

For technical support issues and requests for returns or exchanges, please contact: techsupport@lattepanda.com.

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Package Contents



● LattePanda Mu Evaluation Board ● SATA Cable x2 ● SATA Power Cable x1 ● Product Manual x1

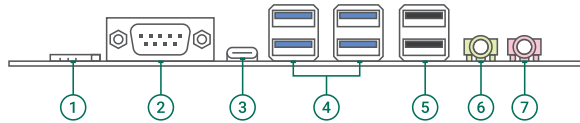
Product Specifications

Product Name	<ul style="list-style-type: none"> LattePanda Mu Evaluation Board
Expansion Slots	<ul style="list-style-type: none"> 1x PCIe 3.0 x1 slot 1x PCIe 3.0 x4 slot (multiplexed with the SATA signals) 1x M.2 E Key slot: Supports 2230 Type WLAN card (PCIe 3.0 x1, USB 2.0; multiplexed with the Ethernet port 2 (RJ45_2) signals) 1x M.2 B Key slot: Supports 3042/3052 Type 4G/5G WWAN card (USB 3.0, USB 2.0)
Storage Device Interface	<ul style="list-style-type: none"> 2x SATA 6Gb/s interfaces (multiplexed with the PCIe 3.0 x4 signals)
Network Interface	<ul style="list-style-type: none"> 2x Intel i225-V 2.5GbE network interfaces (multiplexed with the M.2 E Key slot)
Audio Features	<ul style="list-style-type: none"> Realtek ALC269 HD audio codec

Product Specifications

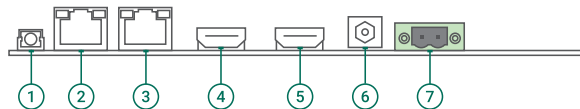
Front I/O Interface	<ul style="list-style-type: none"> 1x 3.5mm microphone interface 1x 3.5mm headphone interface 2x USB 2.0 4x USB 3.0 1x USB Type-C(supports USB 2.0, USB 3.0, DisplayPort) 1x DB9(RS232) 1x SIM card slot
Rear I/O Interface	<ul style="list-style-type: none"> 1x Power button 2x 2.5GbE network interfaces 2x HDMI 2.0 interfaces 1x DC 5.5x2.5mm power jack 1x DC Power 5.08mm Screw Terminal Plug
Pins/Jumpers/Buttons	<ul style="list-style-type: none"> 1x CPU fan interface (CPU_FAN) 1x System fan interface (SYS_FAN) 1x MIPI CSI-2 interface (MIPI_CSI) 1x I2S header (I2S1) 1x TPM header (TPM) 1x eSPI header (ESPI_CON) 1x Auto power-on jumper (AUTO_PWR) 1x Temperature sensor header (TMP) 1x USB 2.0 header (F_USB1) 1x Front panel header (F_PANEL1) 1x UART and I2C header (UART_I2C_1) 1x SoC GPIO header (GPIO_1) 1x Speaker interface (SPEAKER) 1x HD Audio header (F_AUDIO) 1x Function Configuration DIP switches (ID_SW) 1x USB header power control jumper (F_USB_PWR) 1x Front USB power control jumper (R_USB_PWR) 1x PoE power header (POE_IN) 1x Hard disk power interface (HDD_PWR1) 1x Power input header (POE_OUT)
Dimension	<ul style="list-style-type: none"> ITX 170 x 170mm

Front Interfaces



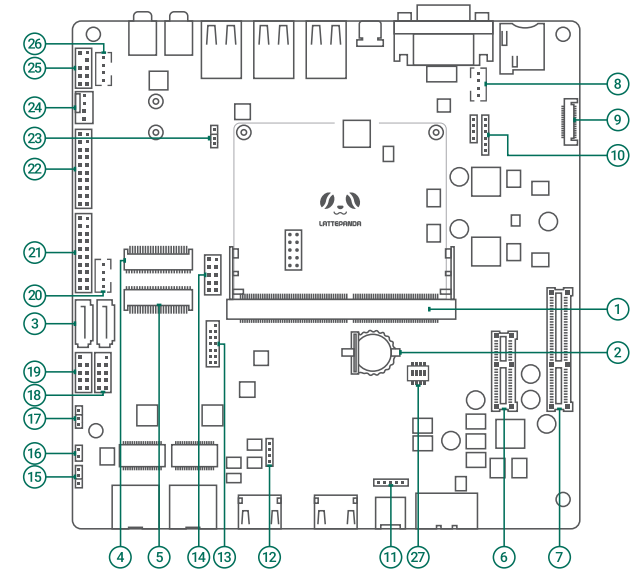
1. SIM card slot	5. USB 2.0 interface x2
2. DB9 interface (RS232)	6. 3.5mm headphone interface
3. USB Type-C interface (includes USB 2.0, USB 3.0, DisplayPort)	7. 3.5mm microphone interface
4. USB 3.0 interface x4	

Rear Interfaces



1. Power button with indicator light	5. HDMI 1 interface
2. 2.5GbE network interface (RJ45_2)	6. DC 5.5x2.5mm power
3. 2.5GbE network interface (RJ45_1)	7. DC Power 5.08mm Screw Terminal Plug
4. HDMI 2 interface	

Board Layout

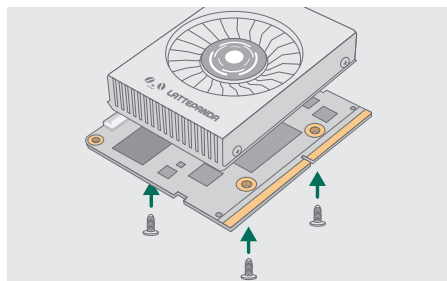


1. LattePanda Mu slot	15. Auto power-on jumper (AUTO_PWR)
2. CR1220 RTC battery slot	16. Temperature sensor header (TMP)
3. SATA 6Gb/s interfaces x2	17. USB header power control jumper (F_USB_PWR)
4. M.2 E Key slot (PCIe 3.0 x1, USB 2.0)	18. Front panel header (F_PANEL1)
5. M.2 B Key slot (USB 3.0, USB 2.0)	19. USB 2.0 header (F_USB1)
6. PCIe 3.0 x4 slot	20. Hard disk power interface (HDD_PWR1)
7. PCIe 3.0 x1 slot	21. UART and I2C header (UART_I2C_1)
8. CPU fan interface (CPU_FAN)	22. SoC GPIO header (GPIO_1)
9. MIPI CSI-2 interface (MIPI_CSI)	23. USB header power control jumper (R_USB_PWR)
10. I2S header (I2S1)	24. System fan interface (SYS_FAN)
11. Power input header (POE_OUT)	25. HD Audio header (F_AUDIO)
12. PoE power header (POE_IN)	26. Speaker interface (SPEAKER)
13. TPM header (TPM)	27. Function Configuration DIP Switches (ID_SW)
14. eSPI header (ESPI_CON)	

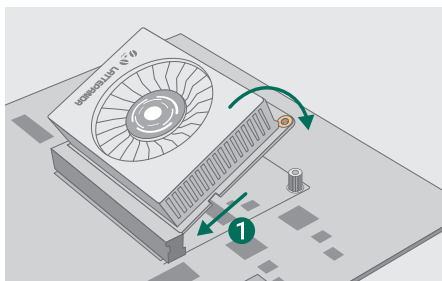
LattePanda Mu Slot

This evaluation board supports one LattePanda Mu compute module.

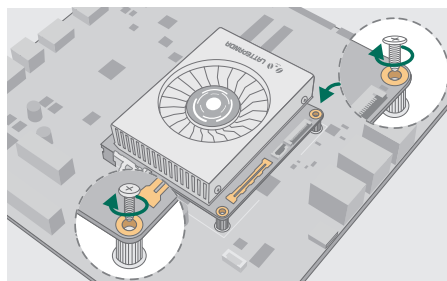
1 Install heatsink



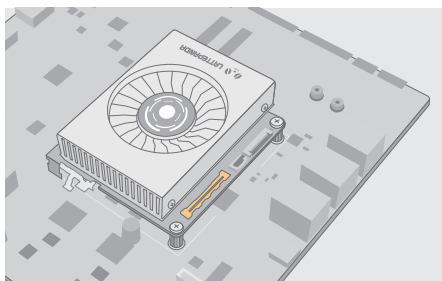
2 Insert Mu into slot



3 Install screws



4 Check installation



- ⚠ Before installing or removing the LattePanda Mu compute module, make sure that the evaluation board is completely powered off and the power connector is disconnected.
- The LattePanda Mu slot is the same size as the DDR4 SODIMM slot, but the pin configuration is different, hence they are not compatible. You cannot insert a DDR4 SODIMM into the LattePanda Mu slot, nor can you insert a LattePanda Mu into a DDR4 SODIMM slot in other devices. Incorrect installation can result in hardware damage.
- If the LattePanda Mu or the evaluation board gets damaged due to incorrect installation, it is not covered under the LattePanda warranty.

Power Supply Interface

The evaluation board provides three types of power supply methods, all supporting 9~20V wide voltage input, and you can choose any one to supply power:

- DC 5.5x2.5mm power jack
- DC Power 5.08mm Screw Terminal Plug
- Power input pin header (POE_OUT)

When only the LattePanda Mu is installed on the evaluation board, the minimum power requirement is 30W. If other hardware is expanded on the evaluation board, please increase the power supply capacity accordingly.

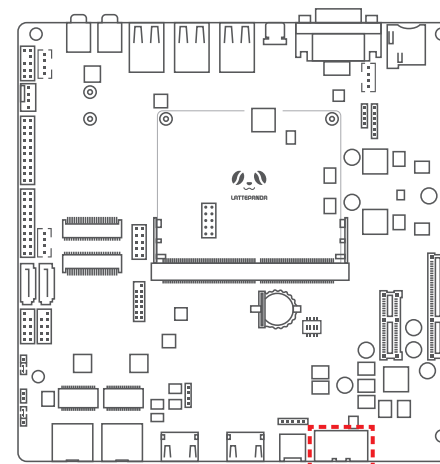
- ⚠ Only one of the three power supply interfaces can be chosen for power supply. Connecting multiple different power sources at the same time may damage the power adapter.
- The 12V circuit on the evaluation board requires a power input voltage higher than 12V to be usable. When the power supply voltage is lower than 12V, functions such as the PCIe slot, 12V system fan, and SATA hard drive power will be shut down.
- If you need to use high-power PCIe expansion cards, such as graphics cards, please ensure that the power supply capacity you use is sufficient.

DC 5.5x2.5mm Power Interface

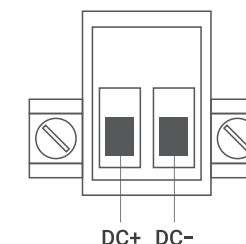
Supports 9~20V wide voltage input, maximum current 10A.
Compatible with common 12V and 19V power adapters.

DC Power 5.08mm Screw Terminal Plug

Supports 9~20V wide voltage input, maximum current 15A.

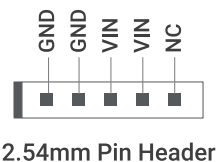
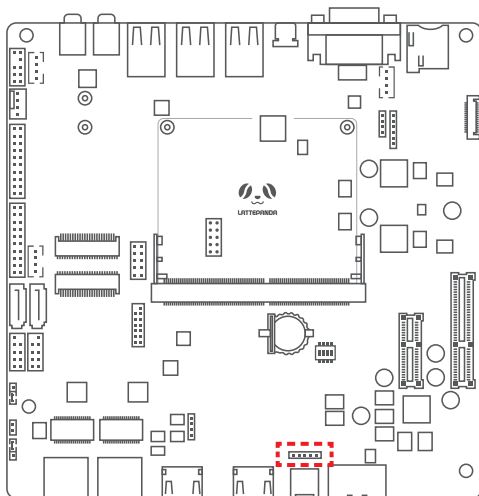


DC Terminal Block



Power Pin Header

Supports 9~20V wide voltage input, maximum current 6A.



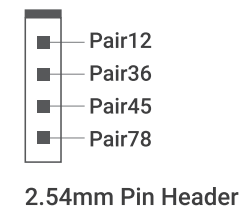
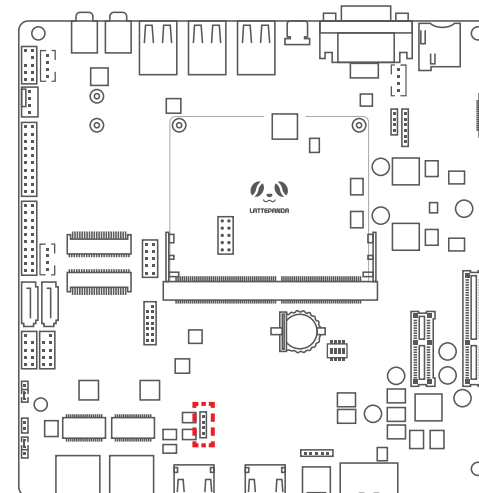
RTC Battery Interface

The RTC battery uses a CR1220 3V lithium battery. The LattePanda Mu requires an RTC battery to maintain the internal clock operation and save BIOS settings. If the battery is missing or the battery power is too low, the LattePanda Mu will revert to factory BIOS settings after losing power.

PoE Power Pin Header

The PoE power pin header is derived from Ethernet port 1 (RJ45_1). When a network cable that provides PoE power is inserted into Ethernet port 1 (RJ45_1), the PoE power pin header outputs a separated 48V power supply.

A dedicated PoE step-down module can convert the 48V DC power source to a 12V DC power source. This 12V DC power source can then be connected to the power input pin header (POE_OUT) to power the evaluation board.



PCIe Expansion Slots

The LattePanda Mu evaluation board provides two PCIe slots, which can be used to install network cards, graphics cards, and other expansion cards:

- PCIe 3.0 x4
- PCIe 3.0 x1

The signal of PCIe 3.0 x4 is multiplexed with the SATA interface. When the SATA interface is enabled, this port will downgrade to PCIe 3.0 x2 mode.

- When using a graphics card or other high-power expansion cards, please match the evaluation board with a power adapter of sufficient power.
- PCIe Expansion Slots can only be used when the power input voltage is within the 12~20V range.

M.2 Expansion Slots

The LattePanda Mu evaluation board provides two M.2 slots:

- **M.2 E Key:** Includes PCIe 3.0 x1 and USB 2.0 signals, supports 2230 Type WLAN cards
- **M.2 B Key:** Includes USB 3.0 and USB 2.0 signals, supports 3042/3052 Type 4G/5G WWAN cards.

The signal of M.2 E Key is multiplexed with Ethernet port 2(RJ45_2), and M.2 E Key is not available when Ethernet port 2(RJ45_2) is in use.

When expanding a 4G/5G network card on the M.2 B Key, it's necessary to install a SIM card in the SIM card slot.

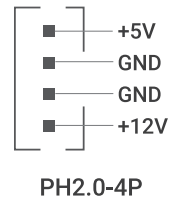
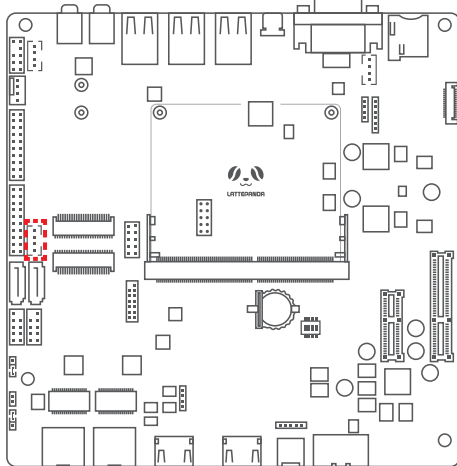
SATA 6Gb/s and Hard Drive Power Interface

The LattePanda Mu evaluation board provides two SATA ports, supporting AHCI mode, which can be used to expand SATA hard drives.

The signal of PCIe 3.0 x4 is multiplexed with the SATA interface. When the SATA interface is in use, this port will downgrade to PCIe 3.0 x2 mode.

Hard Drive Power Interface

Provides +12V and +5V power supply for hard drives.



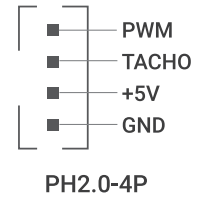
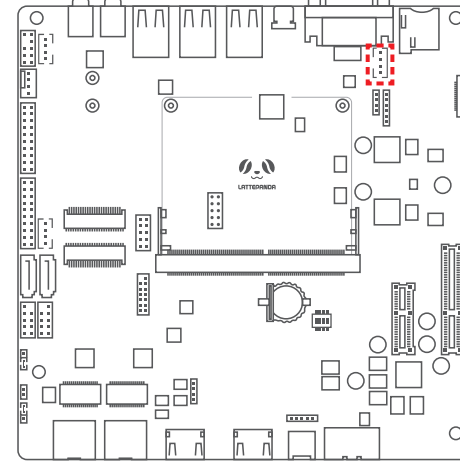
- The +12V pin in the Hard Drive Power Interface can only be used when the power input voltage is within the 12~20V range.

Fan Interfaces

The LattePanda Mu evaluation board provides two fan interfaces.

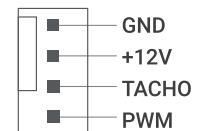
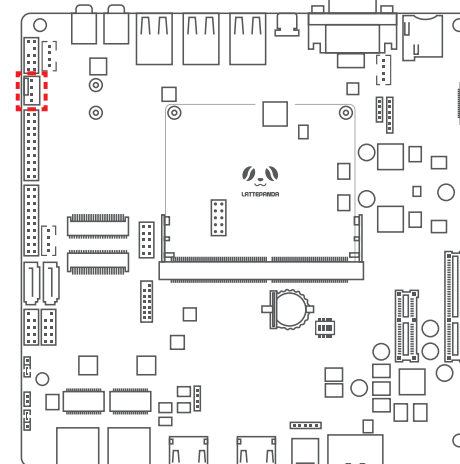
CPU Fan

4-Pin CPU fan interface supports 5V PWM speed control fans.



System Fan

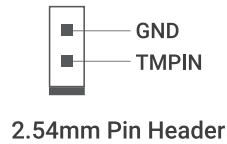
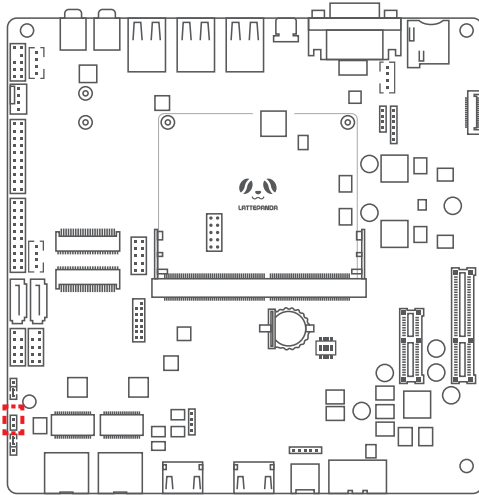
4-Pin system fan interface supports 12V PWM speed control fans. When using a 3-Pin fan, the fan speed can be detected but cannot be controlled.



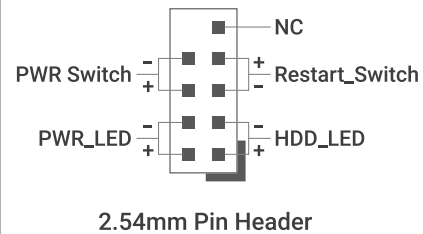
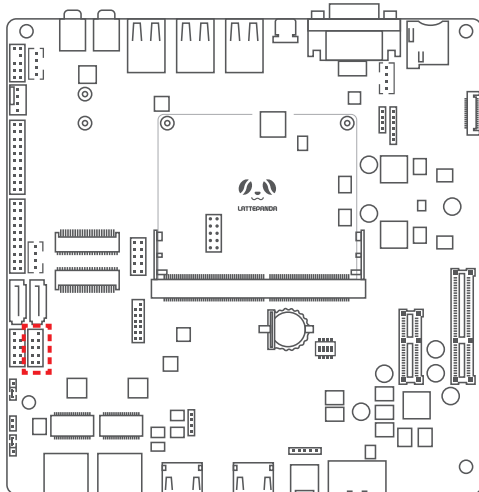
- These fan interfaces can only be used when the power input voltage is within the 12~20V range.

Temperature Sensor Pin Header

The temperature sensor pin header is used to connect external temperature sensors. After connection, you can view the sensor temperature in BIOS and the system.

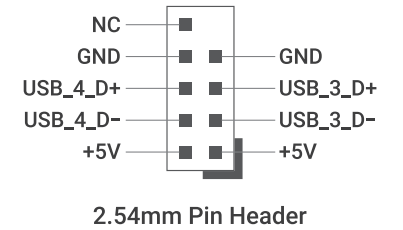
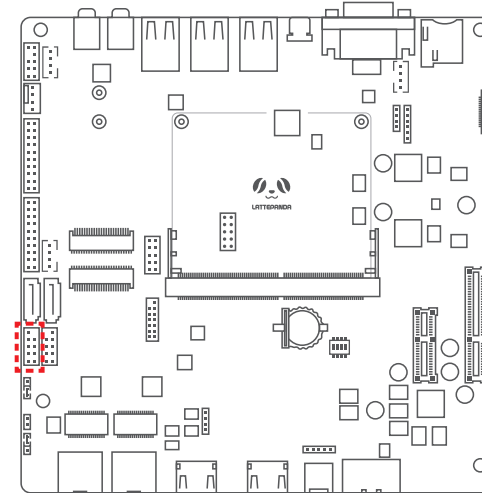


Front Panel Pin Header



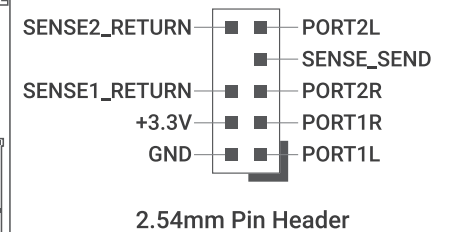
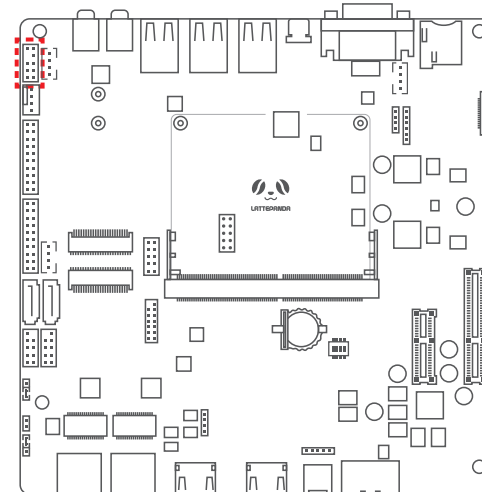
USB 2.0 Pin Header

Used for connecting USB 2.0 devices.



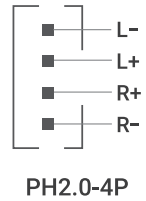
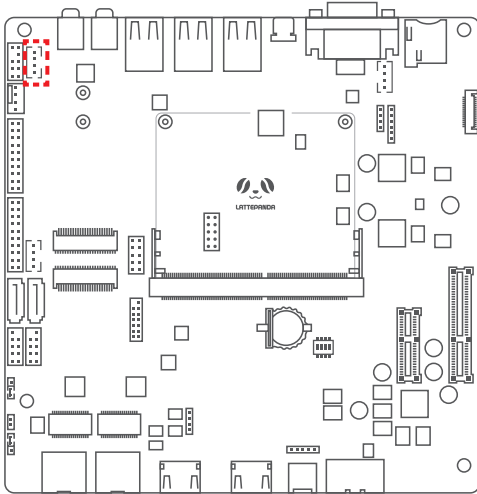
Audio Pin Header

Audio Pin Header



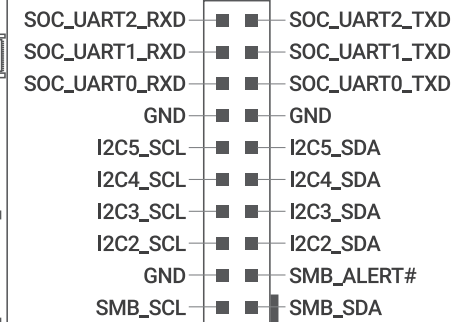
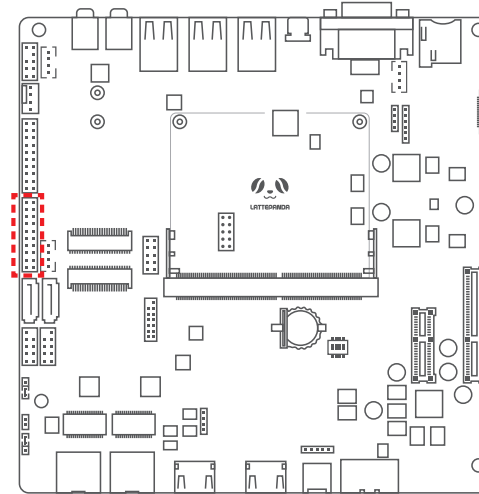
Speaker Interface

Used for connecting speakers.



UART and I2C Pin Header

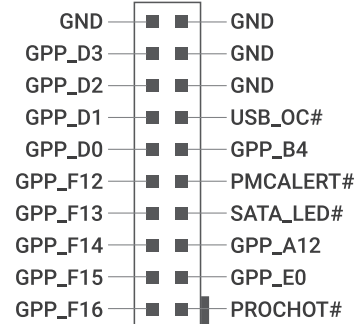
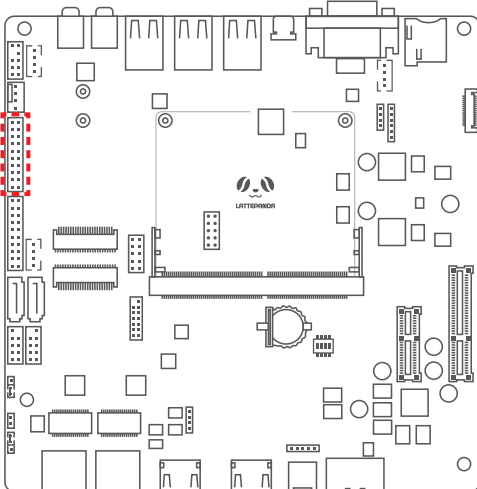
Used for debugging UART and I2C functions.



2.54mm Pin Header

SoC GPIO Pin Header

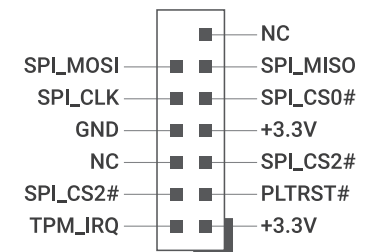
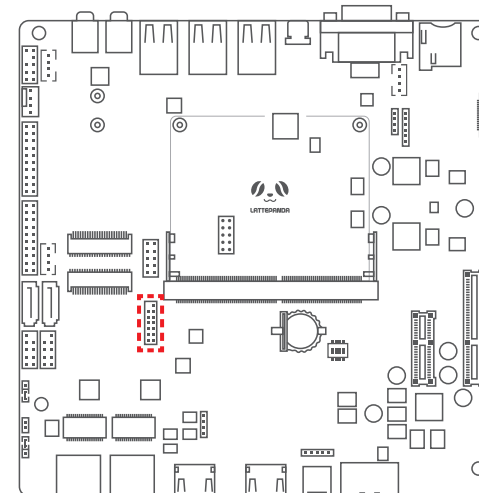
Used for debugging GPIO functions.



2.54mm Pin Header

TPM Pin Header

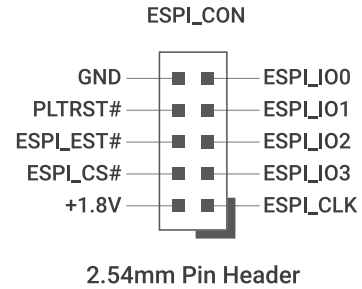
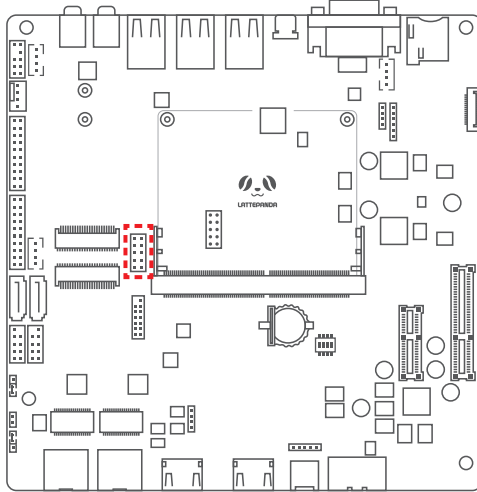
Used for connecting a discrete TPM module.



2.0mm Pin Header

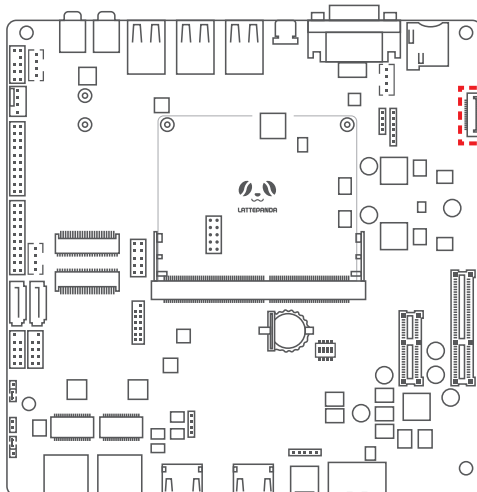
eSPI Pin Header

The eSPI pin header is connected to the LattePanda Mu's eSPI bus through pogo pins and can be used to connect a diagnostic card to diagnose the boot self-test process.



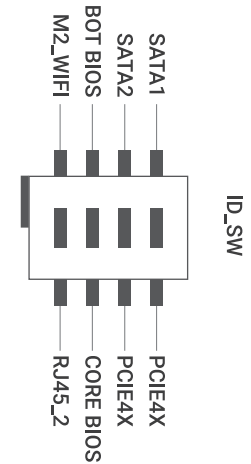
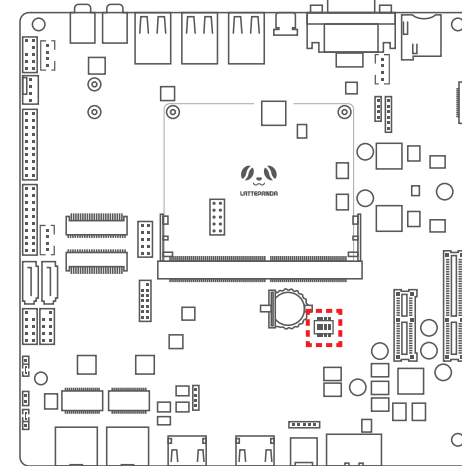
MIPI CSI-2 Interface

Used for connecting MIPI cameras.



1. GND	12. CSI_D_D0+
2. CSI_C_D0-	13. GND
3. CSI_C_D0+	14. CSI_D_D1-
4. GND	15. CSI_C_D1+
5. CSI_C_D1-	16. GND
6. CSI_C_D1+	17. GPP_A12
7. GND	18. NC
8. CSI_C_CK-	19. GND
9. CSI_C_CK+	20. I2C3_SCL
10. GND	21. I2C3_SDA
11. CSI_D_D0-	22. +3.3V

Function Configuration DIP Switches



SATA/PCIe Signal Switch:

Switch Position	SATA	PCIe x4 Slot
SATA1, SATA2	SATA Enabled	PCIe 3.0 x2
PCIE4X, PCIE4X	SATA Disabled	PCIe 3.0 x4

BIOS ROM Switch:

Switch Position	Function
BOT BIOS	Use the BIOS firmware stored in the evaluation board ROM
CORE BIOS	Use the BIOS firmware stored in the LattePanda Mu ROM

M.2 E Key/Ethernet Port 2 Switch:

Switch Position	M.2 E Key	RJ45_2
M2_WIFI	Enabled	Disabled
RJ45_2	Disabled	Enabled

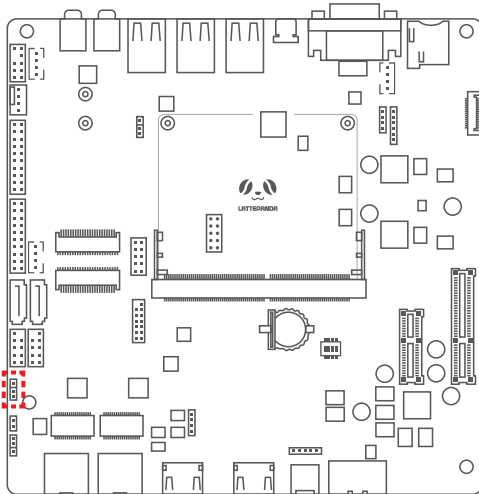
- Before changing any DIP switch settings, please power off and disconnect the power supply.
- The switch between SATA and PCIe functions will only take effect after flashing the corresponding BIOS firmware following the modification of the DIP switch settings.
- When setting to use the evaluation board BIOS, please ensure the evaluation board ROM has been correctly flashed with the appropriate BIOS firmware. Otherwise, the LattePanda Mu will not boot up.

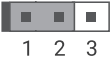
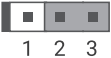
USB Power Control Jumpers

The USB ports on the evaluation board are controlled in two groups, allowing control over whether USB ports continue to supply power after the system is powered down.

F_USB_PWR

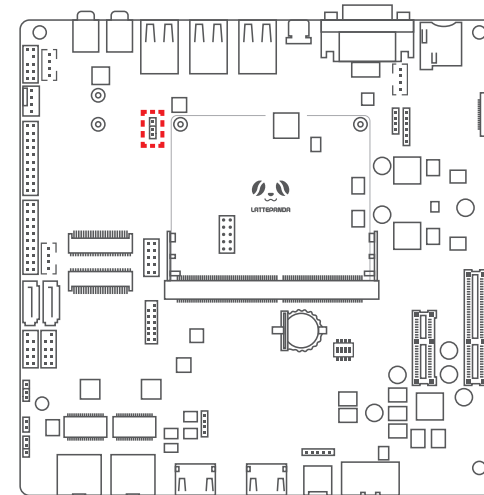
The F_USB_PWR controls the power mode of the F_USB1 pin header

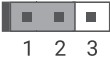
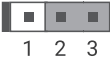


F_USB_PWR	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Enable USB power supply during power-on and sleep
 1 2 3	Pin 2-3 Short/Closed	Always enable USB power supply

R_USB_PWR

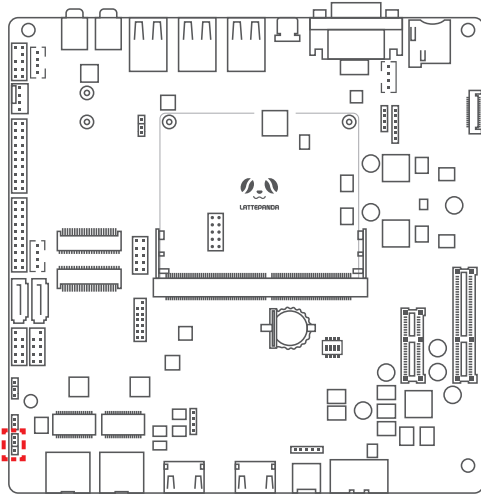
The R_USB_PWR controls the power mode for the front two USB 2.0 and four USB 3.0 ports:

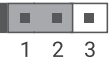
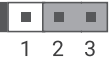


R_USB_PWR	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Enable USB power supply during power-on and sleep
 1 2 3	Pin 2-3 Short/Closed	Always enable USB power supply

Auto Power-On Jumper

The auto power-on jumper enables you to set the LattePanda Mu to either automatically power on or not when power is applied:



Auto Power-On Jumper	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Enable auto power-on upon receiving power
 1 2 3	Pin 2-3 Short/Closed	Disable auto power-on upon receiving power



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 <https://docs.lattepanda.com>

 <https://www.lattepanda.com/forum/>

 <https://discord.com/invite/UHgtJbf978>

Due to continuous improvement of the product,
if there were any changes, sorry for no further notice.