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Makerbase MKS PI V1.1

Makerbase MKS PI V1.1 Control Board Instruction Manual for Klipper 3D Printers

Model: MKS PI V1.1 | Brand: Makerbase

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1. Introduction

The Makerbase MKS PI V1.1 Control Board is a high-performance microcomputer board designed as an alternative to Raspberry Pi for 3D printing applications, particularly for Klipper firmware. It features a powerful quad-core ARM Cortex-A53 CPU, 1GB DDR3 RAM, and various interfaces for versatile connectivity. This manual will guide you through the installation, operation, and maintenance of your MKS PI V1.1 board to optimize your 3D printing experience.



Figure 1: Makerbase MKS PI V1.1 Control Board overview, highlighting its RK3328 64-bit quad-core Cortex-A53 CPU and 1GB DDR3 RAM.

2. Setup

2.1 Initial Board Configuration

The MKS PI V1.1 is designed for ease of use with Klipper firmware. Users can download the image file provided by Makerbase and burn it to a TF card. The board supports various display options and connectivity methods.

- **Display Interfaces:** The board supports both the MKS PI-TS35 touch screen and HDMI screens for high-definition display up to 4K 60Hz.
- **USB Connectivity:** Features two USB 2.0 ports and one USB 3.0 port, allowing connection to 3D printer mainboards, USB wireless network cards, USB cameras, U disks, USB keyboards, and mice.
- **Ethernet Port:** A 100M Ethernet port is provided for network connectivity.

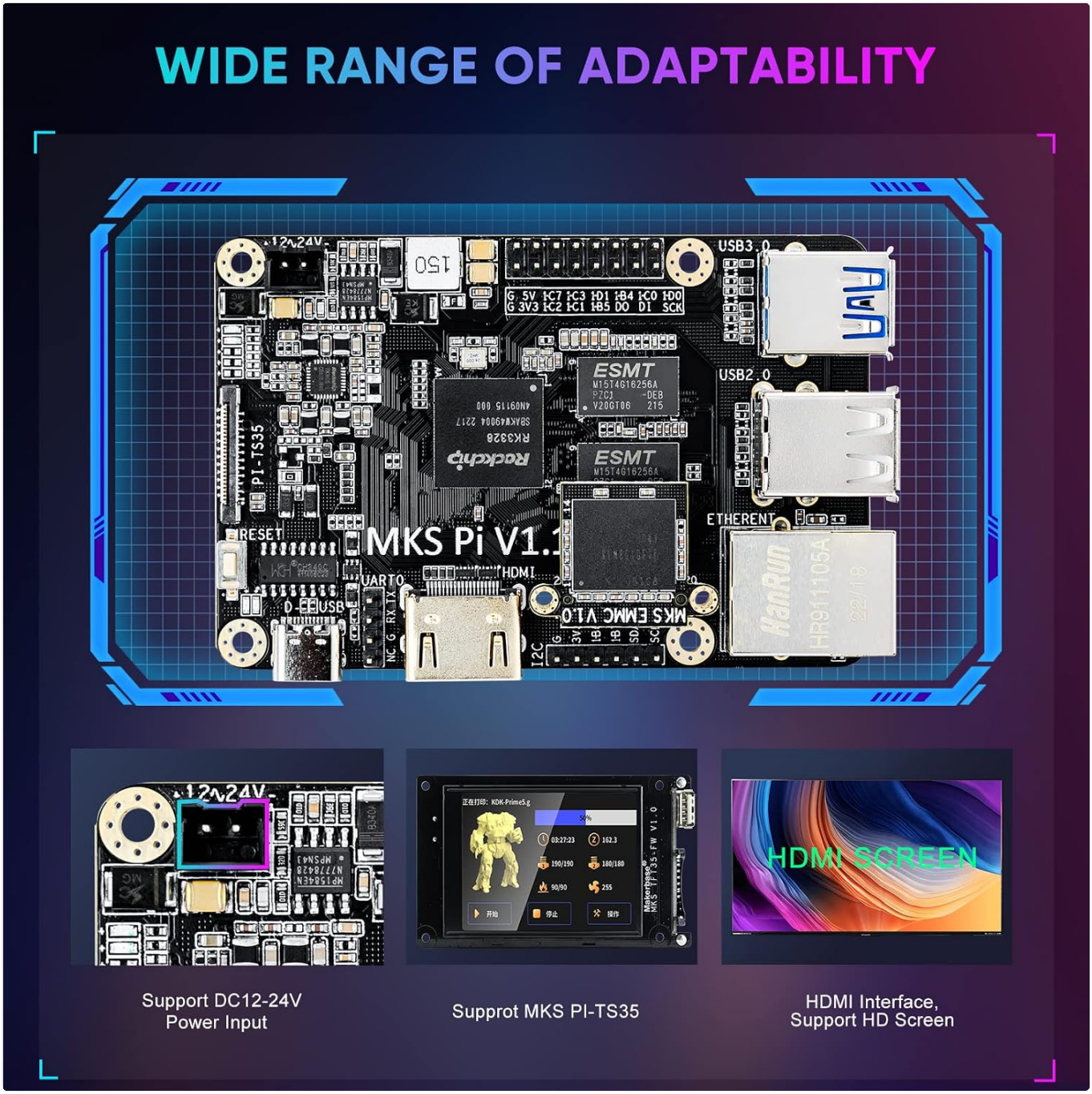


Figure 2: MKS PI V1.1 board showing USB 3.0, USB 2.0, and Ethernet ports, along with HDMI and PI-TS35 interfaces.

2.2 Connecting to a 3D Printer Mainboard

There are two primary methods to connect the MKS PI V1.1 to your 3D printer's mainboard:

1. **USB Connection:** Connect the MKS PI to your mainboard via a USB cable. This method is suitable if your 3D printer mainboard has a USB interface.
2. **Serial Port Connection:** Utilize the UART0 on the MKS PI to connect to your mainboard.



Figure 3: Illustration of connecting the MKS PI V1.1 to a 3D printer mainboard using either a serial port or USB connection.

2.3 Network Connection

For network access, you can use either the Ethernet port or a compatible USB WiFi adapter. Ensure your router is set to use DHCP, then plug the network cable into the MKS PI. Configuration can be done via the config file on the TF card.

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Video 1: Demonstration of MKS PI running Klipper Screen, showing network connection and interface usage. This video illustrates the setup and functionality of the MKS PI with Klipper Screen.

3. Operating Instructions

3.1 Klipper Firmware and Display Operation

The MKS PI V1.1 is optimized for Klipper firmware. Once configured, you can interact with your 3D printer through the connected display (MKS PI-TS35 or HDMI screen) or via a web interface (FluidD/Mainsail) if connected to a network.



Figure 4: MKS PI V1.1 connected to an MKS PI-TS35 screen, showing the Klipper interface for controlling the 3D printer.

3.2 Monitoring with USB Camera

You can connect a USB camera to one of the USB ports to monitor the printing process in real-time. This allows for remote observation and management of your 3D prints.

3.3 Input Shaping with ADXL345

The MKS PI V1.1 supports the ADXL345 interface for acceleration modules. This feature enables Klipper's "Input Shaping" function, which significantly reduces vibrations during printing, leading to improved print quality and smoother results.

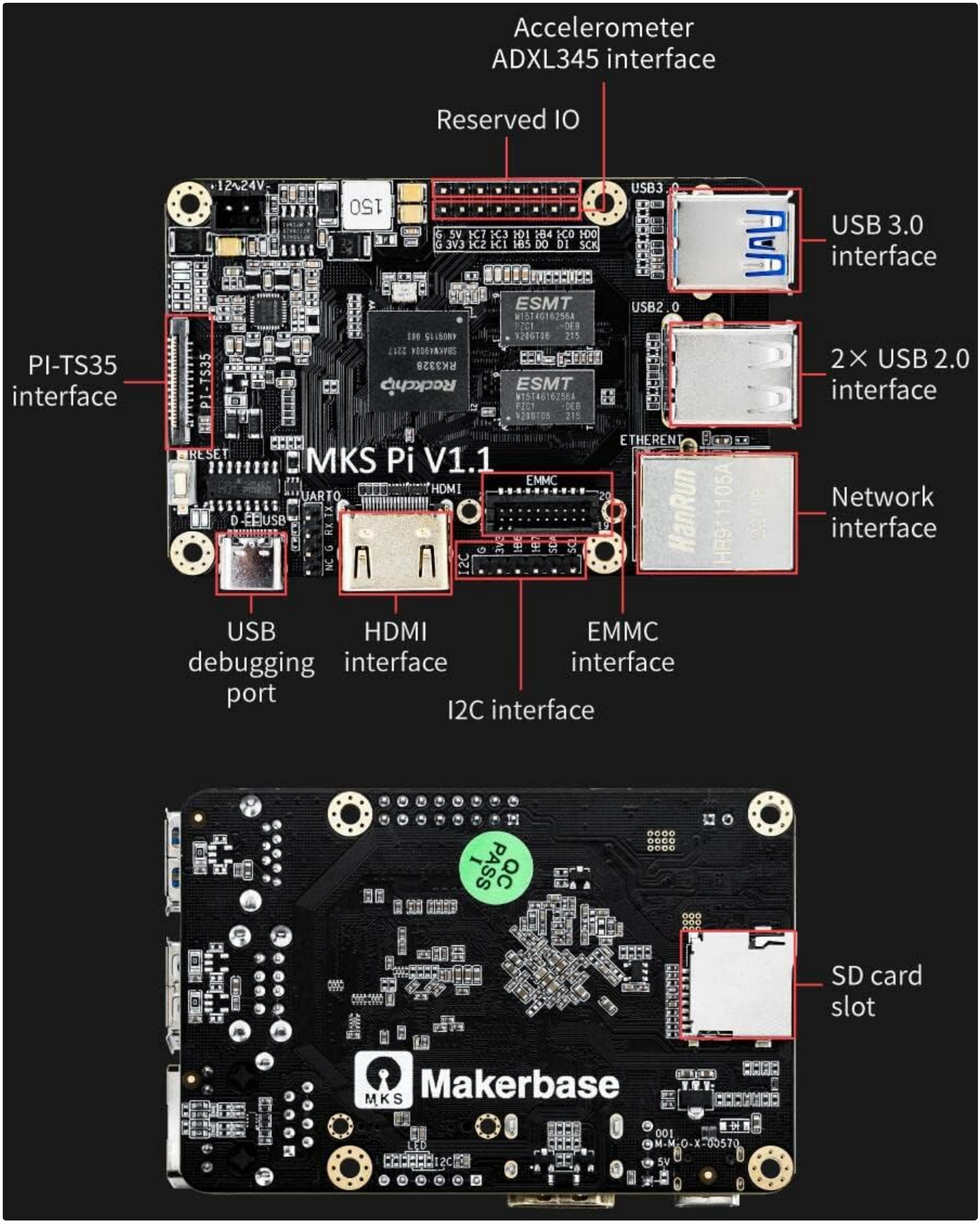


Figure 5: MKS PI V1.1 board showing the GPIO extension and ADXL345 interface, crucial for advanced Klipper features like Input Shaping.

4. Maintenance & Protection

The MKS PI V1.1 Control Board incorporates several protection features to ensure reliable and safe operation:

- **Power Supply Anti-Reverse and Spike Protection:**The motherboard is equipped with a TVS power supply anti-reverse and spike protection chip. This prevents short circuits caused by incorrect power supply polarity,

protecting the board from damage.

- **Stepper Motor Back Electromotive Force (EMF) Protection:** A dedicated protection circuit is designed to handle back EMF generated by stepper motors, reducing potential damage to the motor drivers.
- **Schottky Diode Protection:** The MOS drive circuit and temperature measurement circuits are protected by Schottky diodes, minimizing damage from external electrical spikes to the input/output (IO) pins.
- **PL08N Leveling Sensor Signal Protection:** The PL08N leveling sensor signal interface is protected by Schottky diodes with a withstand voltage of 40V, preventing burnout of the signal pin due to sensor issues.
- **Plug-in Fuses:** The board includes plug-in fuses for enhanced protection, allowing for easier replacement and improved safety.

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Video 2: This video demonstrates the various protection features of the MKS Monster8 V2 (similar to MKS PI V1.1 in protection aspects), including power supply anti-reverse, back EMF, and static electricity protection. It shows how the board withstands incorrect wiring and external electrical stresses.

5. Troubleshooting

- **Board Not Powering On:** If the board does not power on, first check if the power supply wiring is reversed. The built-in anti-reverse protection will prevent the board from working if the polarity is incorrect. Correct the wiring to resolve this.
- **"Currently Throttled" Error (Raspberry Pi):** If using a Raspberry Pi with the MKS PI, an unstable power supply or low voltage/current can cause a "Currently Throttled" error. The MKS PI V1.1 provides a stable DC 5.1V/3A power output specifically designed for Raspberry Pi to prevent this issue.

6. Specifications

Feature	Detail
Power Input	DC 12/24V, 15W
CPU	RK3328, 64bits, Quad-core Cortex-A53
RAM	1GB DDR3 onboard
Display Interface	HDMI (up to 4K 60Hz display), SPI (for MKS PI-TS35 touch screen)
Ethernet Interface	100M Ethernet
USB 2.0 Interfaces	2
USB 3.0 Interfaces	1
Mainboard Interfaces	Connect with UART interface or USB interfaces
TFCard	For running system, suggest A1 class 10 cards from SanDisk
ADXL345 Interface	Supported
Size	85*56mm, φ2.75mm, compatible with Raspberry Pi 3B

7. Support & Resources

For further assistance, firmware downloads, and community engagement, please refer to the following official

Makerbase resources:

- **Official GitHub Repository:** Access firmware, documentation, and community discussions. github.com/makerbase-mks
- **YouTube Channel:** Find video tutorials and product demonstrations. youtube.com/@makerbaseteam4217
- **Facebook Page:** Connect with the Makerbase community and get updates. facebook.com/Makerbase.mks/

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