Makerbase Monster8 V2

Makerbase MKS Monster8 V2 32-Bit Control Board User Manual

Model: **Monster8 V2** | Brand: **Makerbase**

1. PRODUCT OVERVIEW

The Makerbase MKS Monster8 V2 is an advanced 32-bit control board designed for large 3D printers, offering extensive compatibility and robust features. It is an upgraded version of the MKS Monster8 V1, featuring significant improvements in protection and functionality. This board is suitable for DIY enthusiasts and professionals seeking flexible and powerful control over their 3D printing projects.
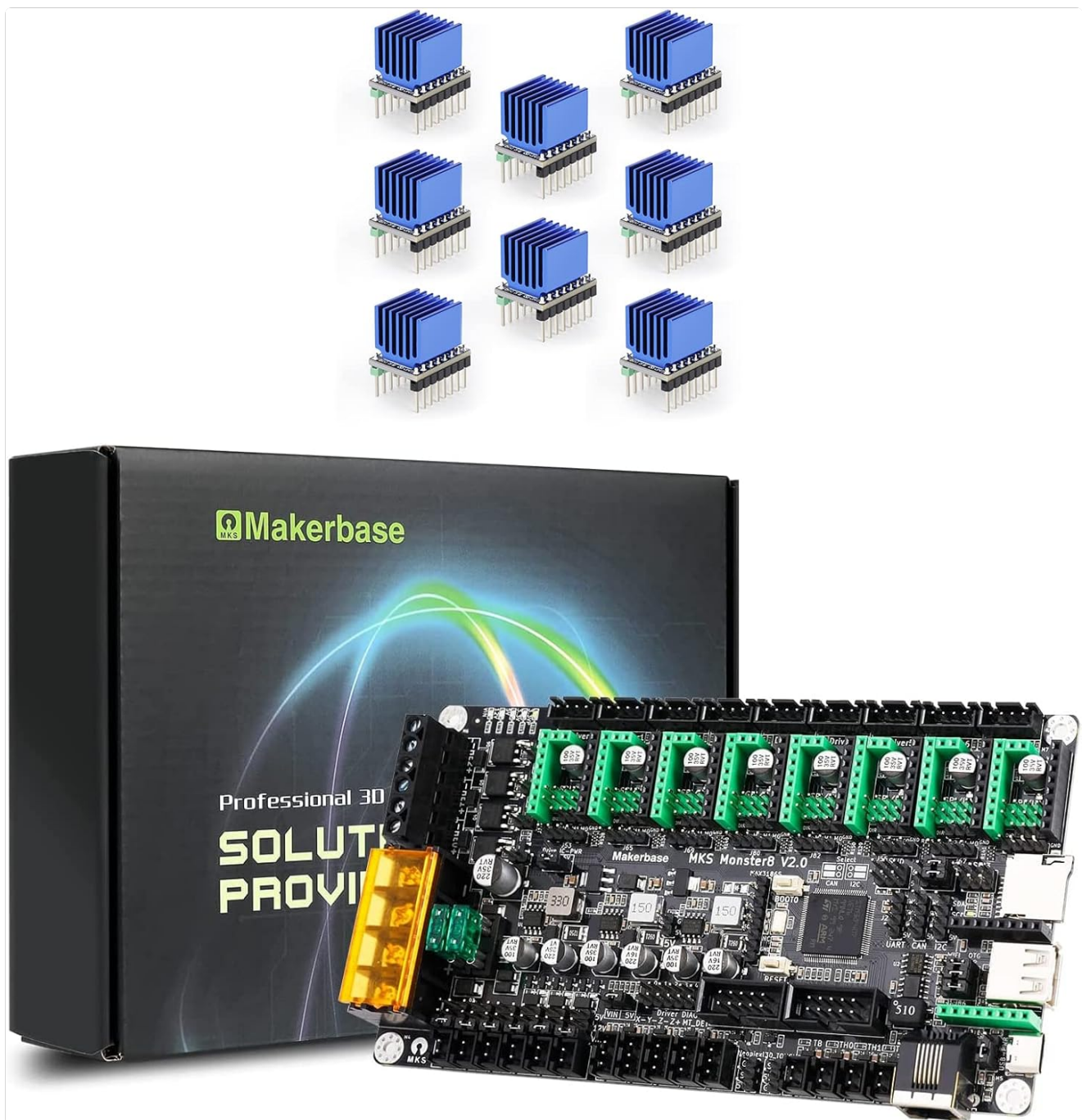
Figure 1: Makerbase MKS Monster8 V2 Control Board with included TMC2209 drivers.

2. KEY FEATURES

- **High-Performance MCU:** Equipped with STM32F407VET6 microcontroller, operating at 168MHz with 512KB Flash and 192KB RAM.

- **8 Stepper Drivers:** Features 8 stepper driver slots and 9 motor interfaces (Driver0, 1, 2-1, 2-2, 3, 4, 5, 6, 7), supporting various motor drives including A4988, DRV8825, LV8729, TMC2208, TMC2209, TMC2225, and TMC2226.

- **Firmware Compatibility:** Supports both Marlin 2.0.x and Klipper firmware. Klipper requires an external host like Raspberry Pi or MKS PI.

- **Display Support:** Compatible with a wide range of LCD displays (LCD2004, LCD12864, MKS MINI12864 V1.0, MKS MINI12864 V3.0) and touch screens (MKS TFT24, MKS TFT28, MKS TFT32, MKS TFT35, MKS H43) via EXP1 and EXP2 interfaces.

- **Enhanced Protection:** Includes a TVS power supply anti-reverse and spike protection chip, plug-in fuses, and Schottky diodes for MOS drive, endstop, and temperature measurement circuits.
- **Back EMF Protection:** Designed with a protection circuit to mitigate damage from back electromotive force generated by stepper motors.
- **Raspberry Pi Power Output:** Provides a stable DC5.1V/3A power supply specifically for Raspberry Pi, preventing "Currently Throttled" errors.
- **Extensive Expansion:** Features 6 endstop supports with power selection, 3D TOUCH (PA8) interface, DFU mode button, driver power selection (5V or 3.3V), TMC UART and SPI modes, SENSORLESS_HOMING function (Diag0-5), integrated SPI communication micro SD card, reserved SPI signal UDISK, and virtual USB device.
- **CAN Bus:** Built-in CAN transceiver and interface for advanced communication.
- **Cooling & Power:** Includes 3 PWM fan headers and 3 power output headers.
- **WiFi Module Slot:** Dedicated slot for Robin WiFi module.
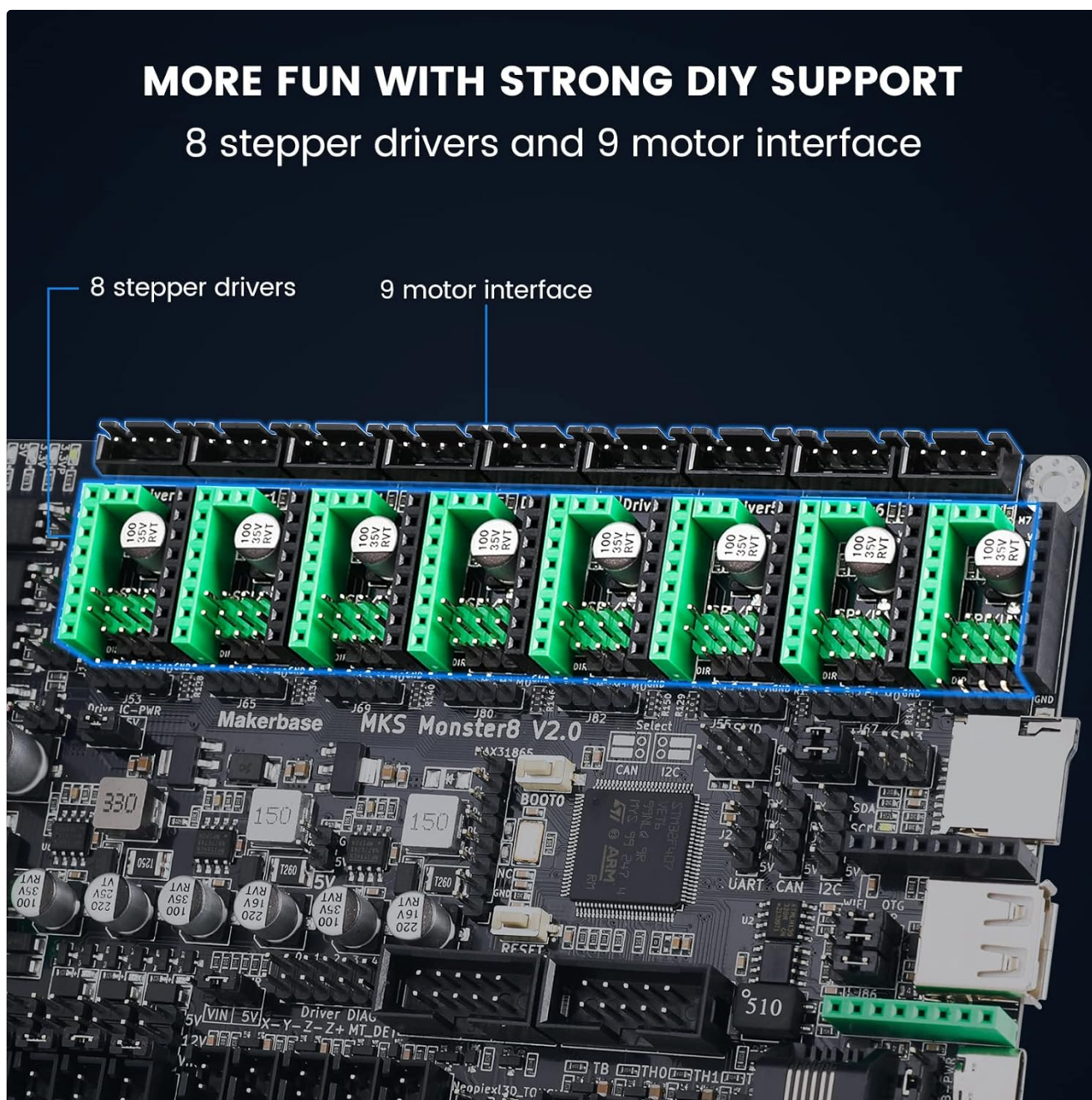- **MAX31865 Interface:** Supports MAX31865 temperature measurement interface.

Figure 2: The MKS Monster8 V2 board supports 8 stepper drivers and 9 motor interfaces for versatile configurations.

HIGH PERFORMANCE MAIN CONTROL CHIP
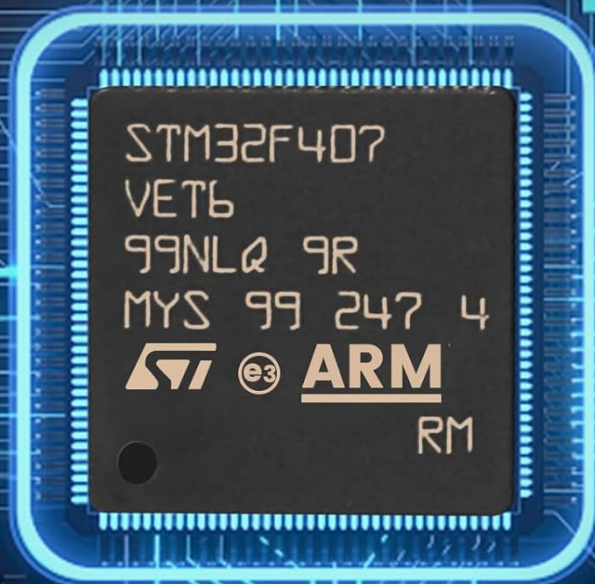## ARM STM32F407VET6 168MHZ

Figure 3: The high-performance STM32F407VET6 main control chip ensures efficient operation.
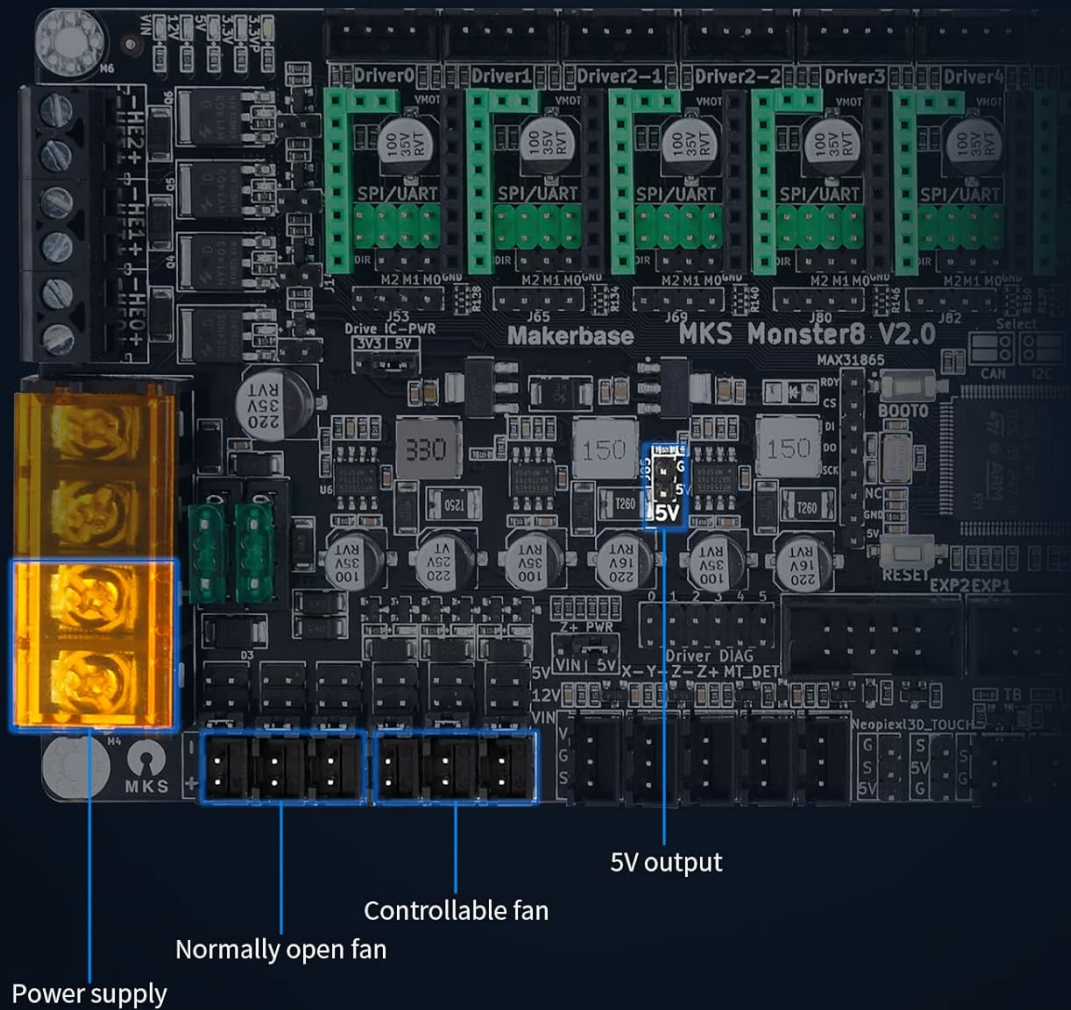
Figure 4: Intensive interfaces for DIY, including 3 PWM fan headers and 3 power output headers.

3. SETUP AND INSTALLATION

3.1 Driver Installation

The MKS Monster8 V2 supports various stepper motor drivers. Ensure correct orientation and secure seating when installing drivers into the dedicated slots.
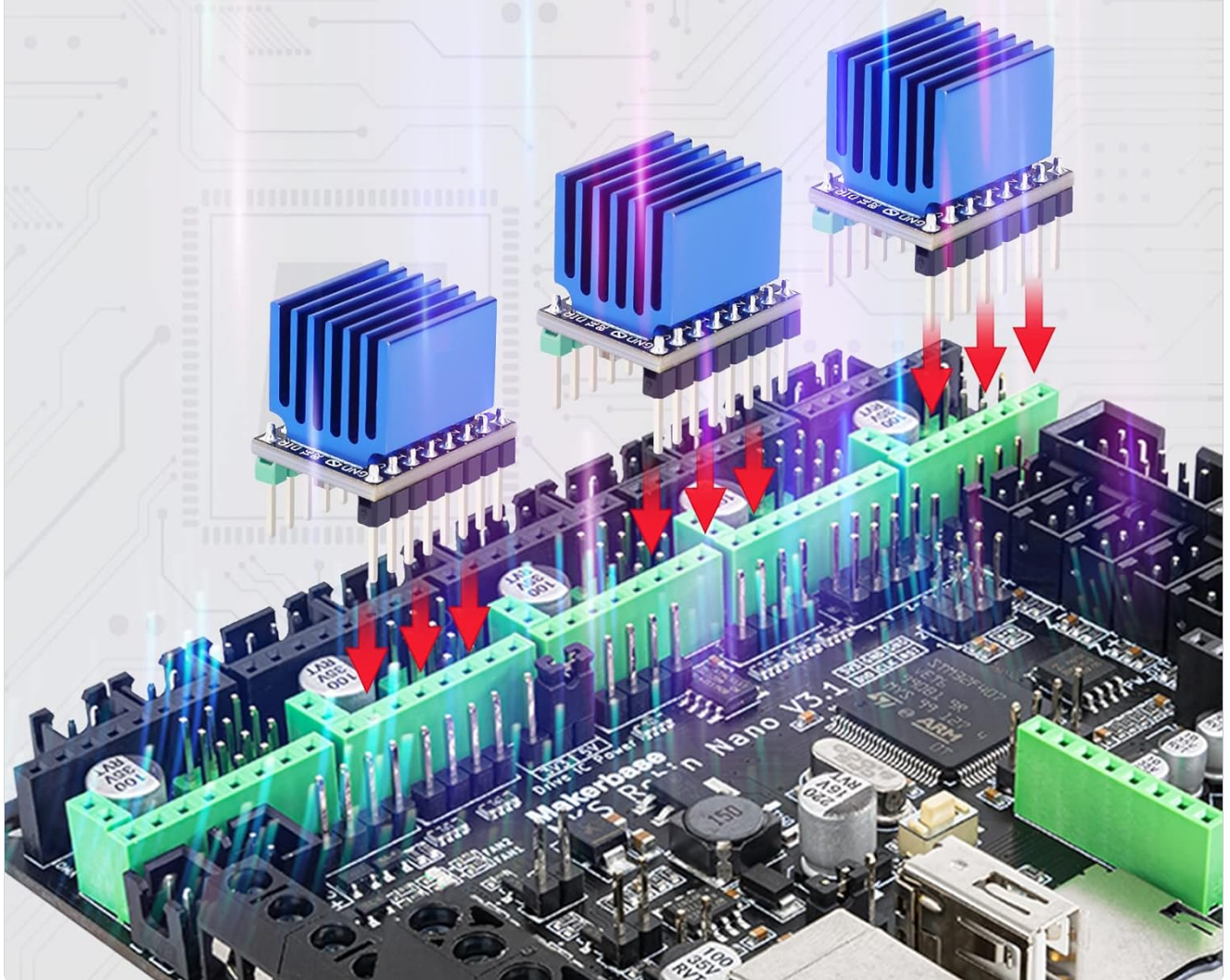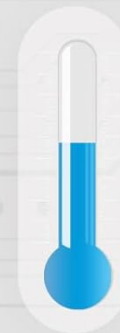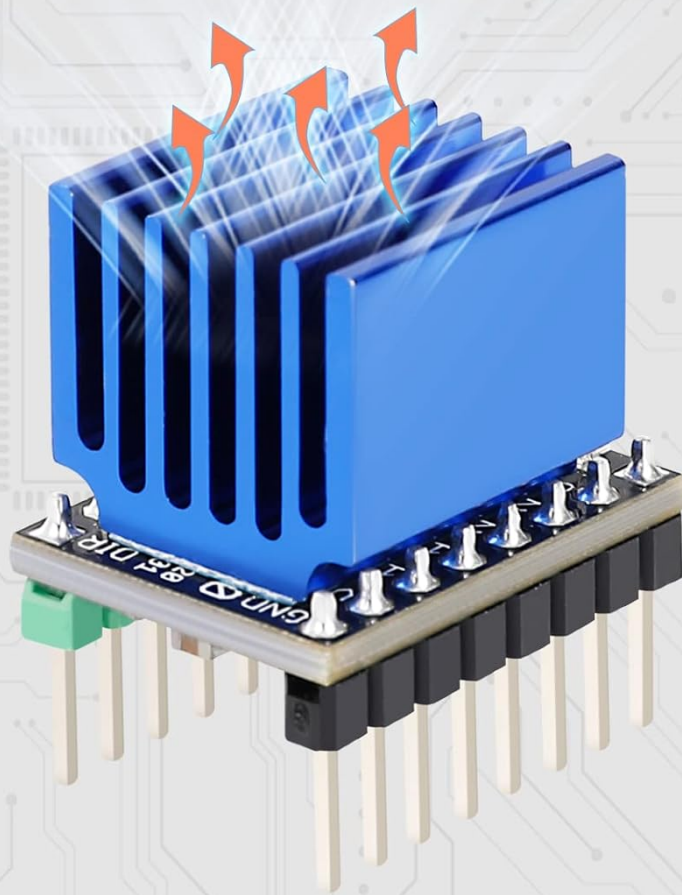
Figure 5: Proper insertion of stepper motor drivers into the mainboard.

HEATSINK FOR EXCELLENT HEAT DISSIPATION

Low heat generate

Figure 6: Heatsinks are crucial for excellent heat dissipation from the drivers.
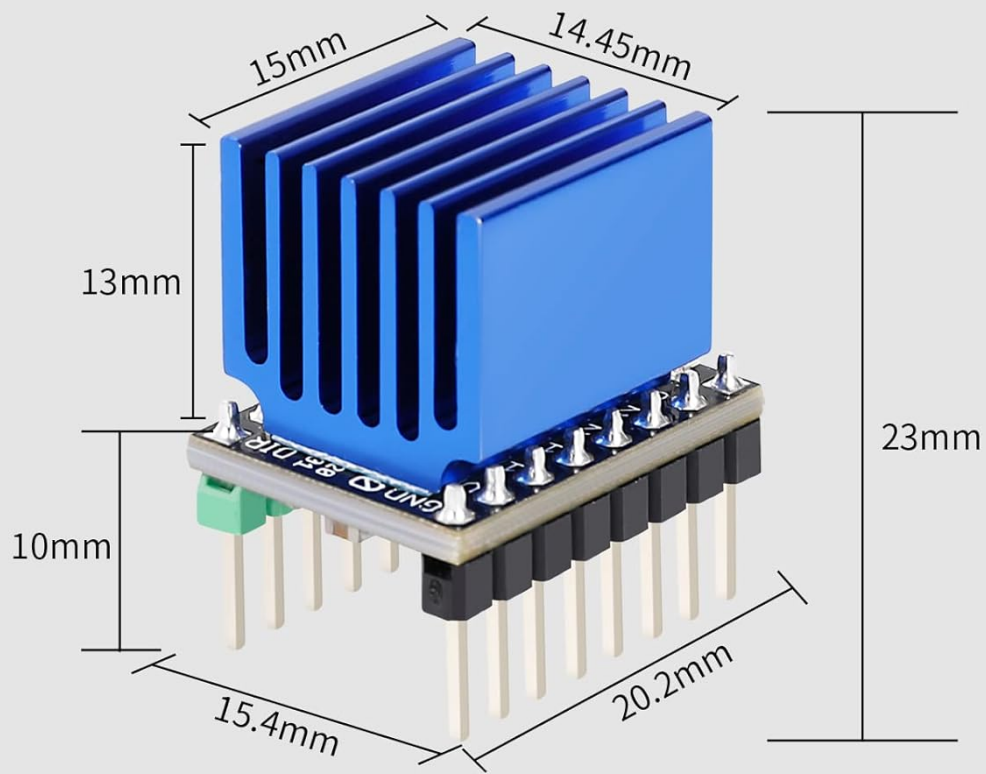
Default Current	1.25A
Default Vref	1.25v
Max Current	2.5A
Formula	i=Vref
Current Adjustment	add articlockwise, decrease clockwise
Microstep	Max 1/256
Motor	5.5-28v<2.5a
Mode	UART(stealthchop/spreadCycle,din)STEP
Feature	4-layer PCB, Silent driver, less heat, sensorless homing

Figure 7: Detailed dimensions and electrical specifications for the stepper motor drivers.
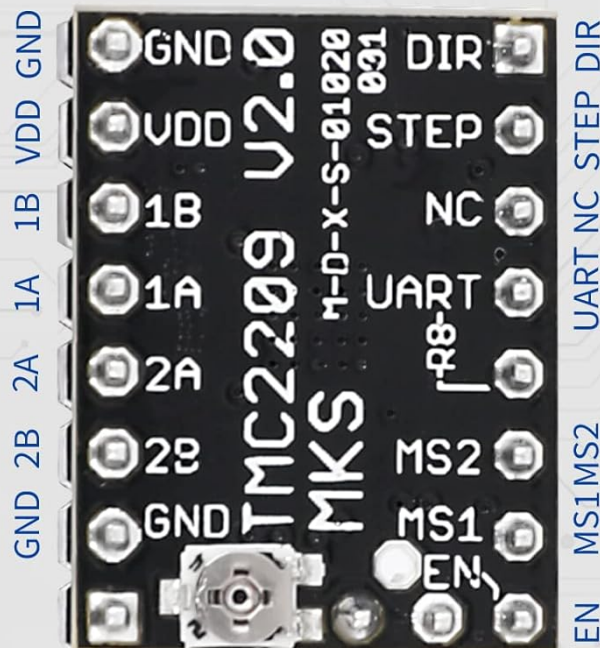
Microstep setting

M0	M1	STEP
GND	GND	8
VCC_IO	GND	32
GND	VCC_IO	64
VCC_IO	VCC_IO	16

Figure 8: Microstep setting configurations for TMC2209 drivers.

3.2 Firmware Installation

The MKS Monster8 V2 supports Marlin 2.0.x and Klipper firmware. For optimal performance and compatibility, it is recommended to update the firmware from the official Makerbase GitHub repository. A Klipper host, such as a Raspberry Pi or MKS PI, is required for Klipper firmware.

For detailed instructions and firmware files, visit the Makerbase MKS-Monster8 GitHub page.

3.3 Power Supply Connection

The motherboard is equipped with a TVS power supply anti-reverse and spike protection chip to prevent damage from incorrect power connections. If the positive and negative poles of the power supply are reversed, the motherboard will not function. Always double-check wiring before powering on.

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Video 1: Demonstration of the power supply anti-reverse protection. The video shows that if the power supply is connected in reverse, the board will not power on, preventing damage. It also shows how to correctly connect the power supply.

The Monster8 V2 also provides a dedicated DC5.1V/3A power output for Raspberry Pi. This ensures a stable power supply, preventing common "Currently Throttled" errors that can occur with unstable power to the Raspberry Pi.

Figure 9: The dedicated DC5.1V/3A power supply for Raspberry Pi ensures stable operation and prevents throttling issues.

4. OPERATING INSTRUCTIONS

Once the board is correctly installed and firmware is loaded, you can begin operating your 3D printer. The board supports U disk printing, allowing for convenient file transfer and printing.

4.1 Display and Control

Connect your preferred LCD or touch screen display to the EXP1/EXP2 interfaces. These displays provide a user interface for controlling printer movements, monitoring temperatures, and managing print jobs.

4.2 Advanced Features

Utilize the DFU mode button for firmware flashing. Configure driver power selection (5V or 3.3V) and set up TMC UART and SPI modes for advanced stepper motor control. The SENSORLESS_HOMING function can be configured using the Diag0-5 pins.

MKS SERVO 42C

Figure 10: The board supports various driver modes including UART, SPI, and Normal STEP/DIR for flexible control.

5. MAINTENANCE AND PROTECTION

The MKS Monster8 V2 is built with several protective features to ensure longevity and reliability.

5.1 Fuse Protection

The board includes plug-in fuses that provide overcurrent protection, safeguarding the motherboard wiring effectively.

Figure 11: Plug-in fuses are added to the motherboard for enhanced protection.

5.2 Back EMF Protection

A dedicated protection circuit is integrated to handle back electromotive force (EMF) generated by stepper motors, significantly reducing potential damage to the motor drivers. This is particularly important when the print head is manually moved or encounters resistance.

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Video 2: Demonstration of back EMF protection. The video shows a Voron printer's print head being moved manually, generating back EMF, and the board's protection circuit preventing damage, allowing normal operation after power-on.

5.3 ESD Protection

The motherboard's MOS drive circuit and temperature measurement circuit are protected by Schottky diodes to reduce damage from external static electricity spikes to the input/output (IO) pins.

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Video 3: Anti-static test of the motherboard. The video demonstrates applying 4kV static electricity to the heating head interface and temperature measurement interface, showing the board continues to function normally due to its robust protection.

6. TROUBLESHOOTING

6.1 Power-On Issues

If the motherboard does not power on, first check if the power supply wiring is reversed. Correcting the polarity should resolve the issue. Refer to Video 1 in the Setup section for a visual guide.

6.2 Raspberry Pi "Currently Throttled" Error

This error typically indicates an unstable or insufficient power supply to the Raspberry Pi. The MKS Monster8 V2 provides a dedicated 5.1V/3A output to prevent this. Ensure your Raspberry Pi is powered directly from this interface on the Monster8 V2 board.

6.3 PL08N Leveling Sensor Signal Pin Burnout

The PL08N leveling sensor signal interface is protected by Schottky diodes with a withstand voltage of 40V. This design ensures that the signal pin of the chip will not be burned out due to sensor issues or voltage spikes.

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Video 4: Demonstration of PL08N leveling sensor signal pin protection. The video shows a 24V input applied to the PL08N signal pin, confirming that the board remains functional and the pin is not damaged, thanks to the integrated protection.

7. Specifications

Component/Feature	Detail
MCU	STM32F407VET6 (168MHz, 512KB Flash, 192KB RAM)
Stepper Drivers	8 Stepper Driver Slots, 9 Motor Interfaces (Driver0,1,2-1,2-2,3,4,5,6,7)
Driver Compatibility	A4988, DRV8825, LV8729, TMC2208, TMC2209, TMC2225, TMC2226
Firmware Support	Marlin 2.0.x, Klipper (requires Raspberry Pi/MKS PI host)
Display Interfaces	EXP1, EXP2 (for LCD2004, LCD12864, MKS MINI12864 V1.0/V3.0), MKS TFT24/28/32/35, MKS H43
Endstop Support	6 Endstops with Power Select (X-,X+,Y-,Y+,Z-,Z+), 3D TOUCH (PA8)
Driver Modes	TMC UART, SPI Mode, SENSORLESS_HOMING (Diag0-5)
Power Protection	TVS Anti-reverse & Spike Protection, Plug-in Fuses, Schottky Diodes (MOS, Endstop, Temp)
Raspberry Pi Power	Independent DC5.1V/3A output
CAN Bus	Built-in CAN transceiver and interface
Temperature Sensor Interface	MAX31865
WiFi Module Slot	Yes (for Robin WiFi module)
Other Interfaces	Integrated SPI communication micro SD card, reserved SPI signal UDISK, virtual USB device

Figure 12: Detailed layout of the MKS Monster8 V2 board highlighting various components and interfaces.

8. Support and Resources

For further assistance, firmware updates, and community support, please refer to the following resources:

GitHub: https://github.com/makerbase-mks (Official Makerbase GitHub for firmware and documentation)

YouTube: https://www.youtube.com/@makerbaseteam4217 (Official Makerbase YouTube channel for tutorials and guides)
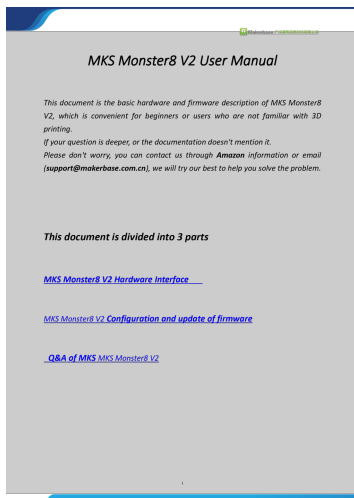
Documents - Makerbase – Monster8 V2

[MKS Monster8 V2 User Manual - Makerbase 3D Printer Controller](#)
Comprehensive user manual for the Makerbase MKS Monster8 V2 3D printer motherboard. Covers hardware interface, wiring, firmware configuration (Marlin, Klipper), installation, and troubleshooting.
lang:en score:48 filesize: 890.66 K page_count: 10 document date: 2023-03-26

[MKS Monster8 V2 User Manual: Hardware and Firmware Configuration Guide](#)
Comprehensive user manual for the MKS Monster8 V2 3D printer motherboard, covering hardware interface, firmware configuration (Marlin and Klipper), installation, and troubleshooting.
lang:en score:41 filesize: 890.66 K page_count: 10 document date: 2023-03-26