BIGTREETECH Pi V1.2, SKR Mini E3 V3.0

BIGTREETECH Pi V1.2 + SKR Mini E3 V3.0 Control Board Kit User Manual

Brand: BIGTREETECH | Model: Pi V1.2, SKR Mini E3 V3.0

Introduction

This manual provides detailed instructions for the BIGTREETECH Pi V1.2 and SKR Mini E3 V3.0 Control Board Kit, designed to enhance your Ender-3 series 3D printer experience. This kit supports running Klipper firmware, offering advanced control and performance.

Key Features:

- BIGTREETECH Pi: Equipped with a quad-core 64-bit ARM Cortex-A53 @ 1.5GHz processor and 1GB DDR3 memory for powerful performance.
- BTT Pi Core Board: Features HDMI2.0A display interface supporting 4K, onboard 4-way USB2.0 ports, 40-pin GPIO, and a 3.5mm audio interface.
- Network Connectivity: Onboard 100M Ethernet interface and WIFI transmission support. The GPU is Mali G31 MP2, supporting OpenGL3.2.
- SKR Mini E3 V3.0: Utilizes STMicroelectronics' latest G0 series main control chip (STM32G0B1RET6 or STM32G0B0RET6).
- Enhanced Cooling: Reserves 3 CNC fan interfaces to increase heat dissipation and reduce printer temperature during operation.
- Improved USB Interface: PC communication USB interface upgraded from Mini USB to Micro USB B for better adaptability.
- Flexible Power Supply: Increased SPI output port +3.3V power supply, with external SPI sensor power supply voltage +3.3V and +5V options, allowing direct power to peripherals.

Setup and Installation

This section guides you through the installation of the BIGTREETECH SKR Mini E3 V3.0 Silent Board into your Ender-3 series 3D printer. Ensure the printer is powered off and unplugged before beginning any installation steps.

SKR Mini E3 V3.0 Installation Overview:

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Video: Installation guide for the BIGTREETECH SKR Mini E3 V3.0 Silent Board upgrade for Ender3 printers. This video demonstrates the process of replacing the old motherboard and connecting the new board's components.

1. **Preparation:** Power off and unplug your 3D printer. Carefully open the control box to access the existing motherboard.
2. **Remove Old Motherboard:** Disconnect all wires from the old motherboard, noting their positions for re-connection. Remove the old motherboard from the printer chassis.
3. **Connect New Motherboard:** Connect the heated bed thermistor, X motor, Z motor, X stop, Y stop, E motor, Z stop, TFT screen, thermistor, CNC fan, cooling fan, heater cartridge, and power supply to the corresponding ports on the SKR Mini E3 V3.0 board. Refer to the video for detailed connection points.
4. **Secure New Motherboard:** Mount the SKR Mini E3 V3.0 board securely in the control box.
5. **Connect TFT35 E3 V3.0 (if applicable):** If upgrading the display, connect the BTT TFT35 E3 V3.0 to the new motherboard.
6. **Final Checks:** Double-check all connections before closing the control box and powering on the printer.

Important: Always ensure the printer is unplugged when connecting or disconnecting cables to prevent damage to the motherboard or other components.

Product Overview and Features

BIGTREETECH Pi V1.2 Overview:

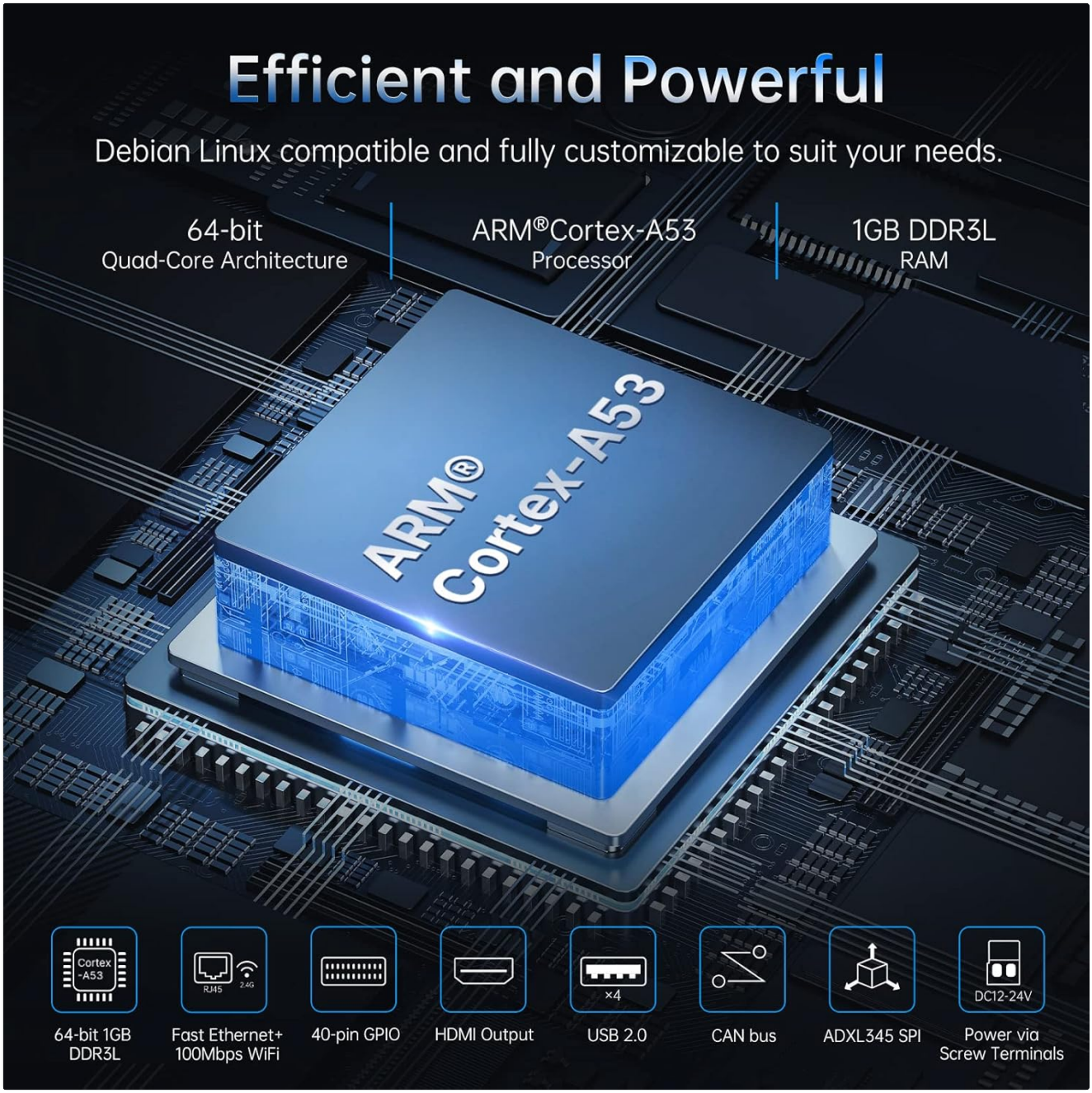

Image: Overview of the BIGTREETECH Pi V1.2, highlighting its core components like the 64-bit Quad-Core ARM Cortex-A53 processor and 1GB DDR3L RAM.

The BIGTREETECH Pi V1.2 is a powerful core board compatible with Debian Linux, offering extensive customization. It features a robust quad-core 64-bit ARM Cortex-A53 processor and 1GB DDR3L RAM, ensuring high performance for various 3D printing applications, especially with Klipper firmware.

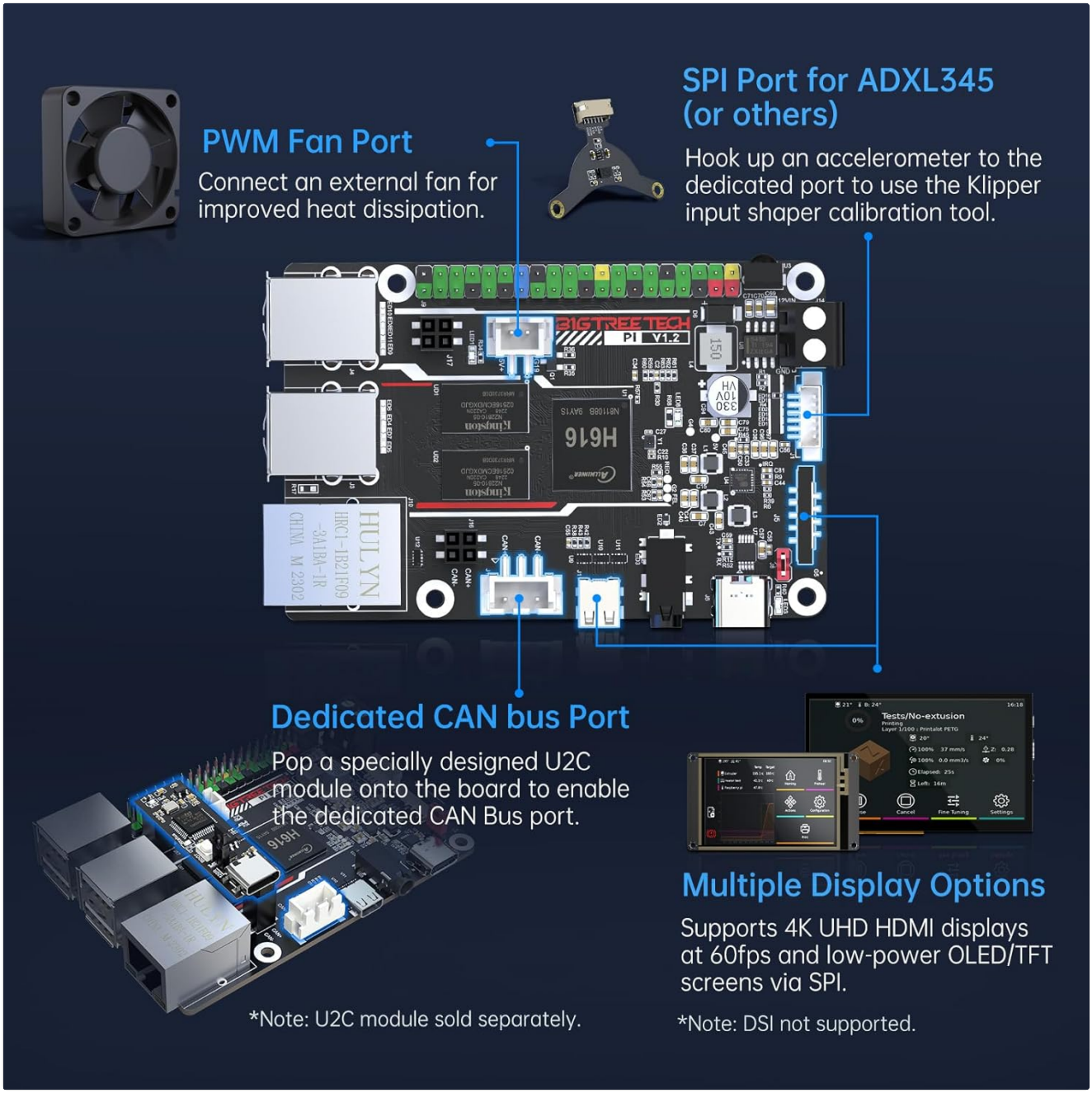

Image: Detailed view of the BIGTREETECH Pi V1.2, showing various connectivity options such as PWM Fan Port, SPI Port for ADXL345, Dedicated CAN bus Port, and support for 4K HDMI displays.

- **Connectivity:** Includes a PWM Fan Port for external cooling, an SPI Port for ADXL345 (useful for Klipper input shaper calibration), and a dedicated CAN bus port (U2C module sold separately).
- **Display:** Supports 4K HDMI displays at 60fps and low-power OLED/TFT screens via SPI. DSI is not supported.

Image: Flexible power and rich connectivity options on the BIGTREETECH Pi V1.2, including DC 12V-24V via screw terminals, DC 5V via USB Type-C, 40-pin GPIO, and four USB 2.0 ports.

- **Power Options:** Can be powered via DC 12V-24V screw terminals or DC 5V±5%/2A via the USB Type-C port.
- **GPIO and USB:** Features a 40-pin GPIO for various extensions and four USB 2.0 ports for connecting peripherals like keyboards, mice, USB drives, and cameras.

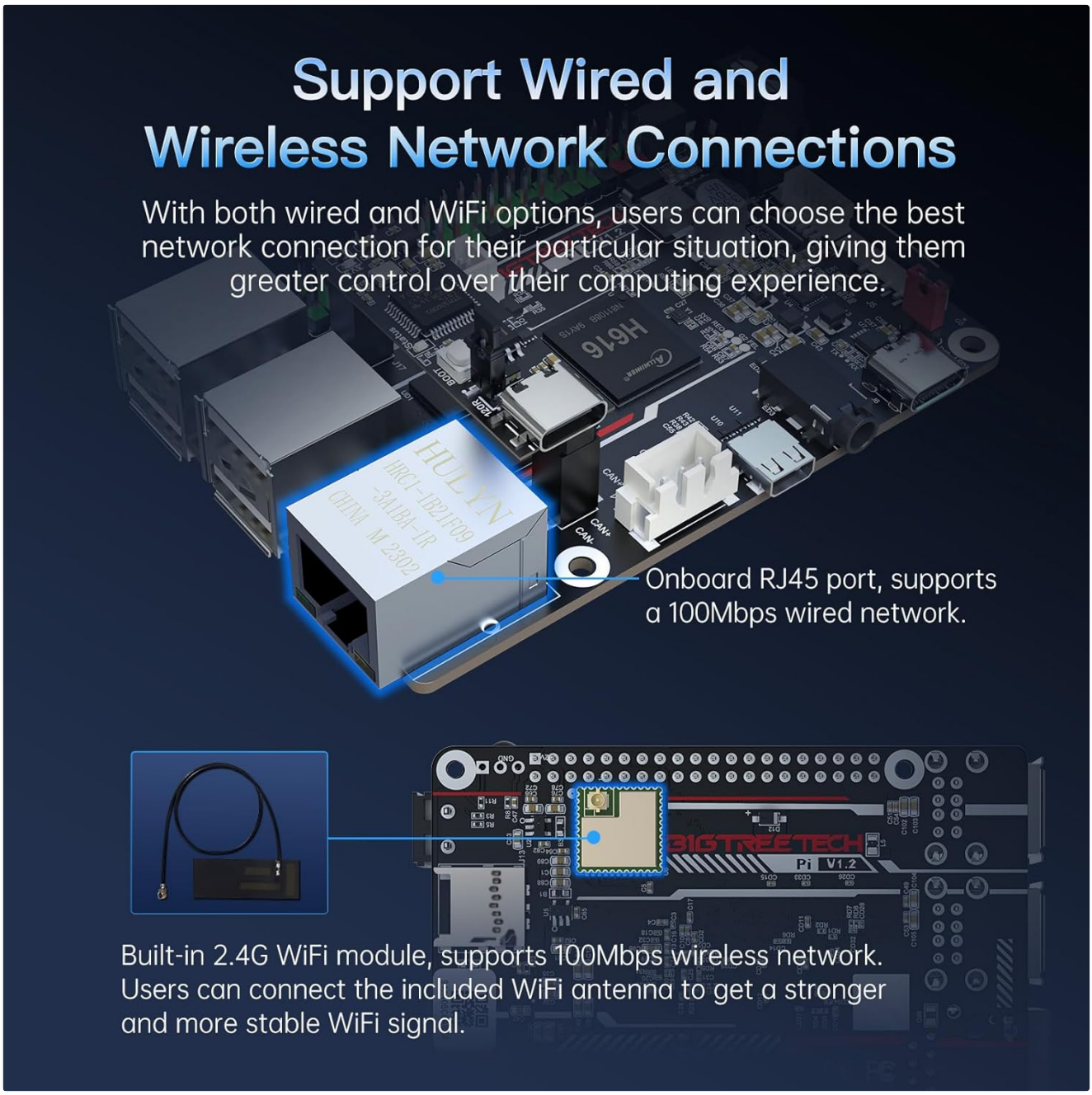

Image: Network connection capabilities of the BIGTREETECH Pi V1.2, featuring an onboard 100Mbps Ethernet interface and a built-in 2.4G WiFi module with support for an external antenna.

- **Network:** Supports both wired (100M Ethernet) and wireless (2.4G WiFi with external antenna support) network connections.

SKR Mini E3 V3.0 Overview:

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Video: Feature overview of the BIGTREETECH SKR Mini E3 V3.0 Silent Board for Ender 3 printers, highlighting its key improvements and capabilities.

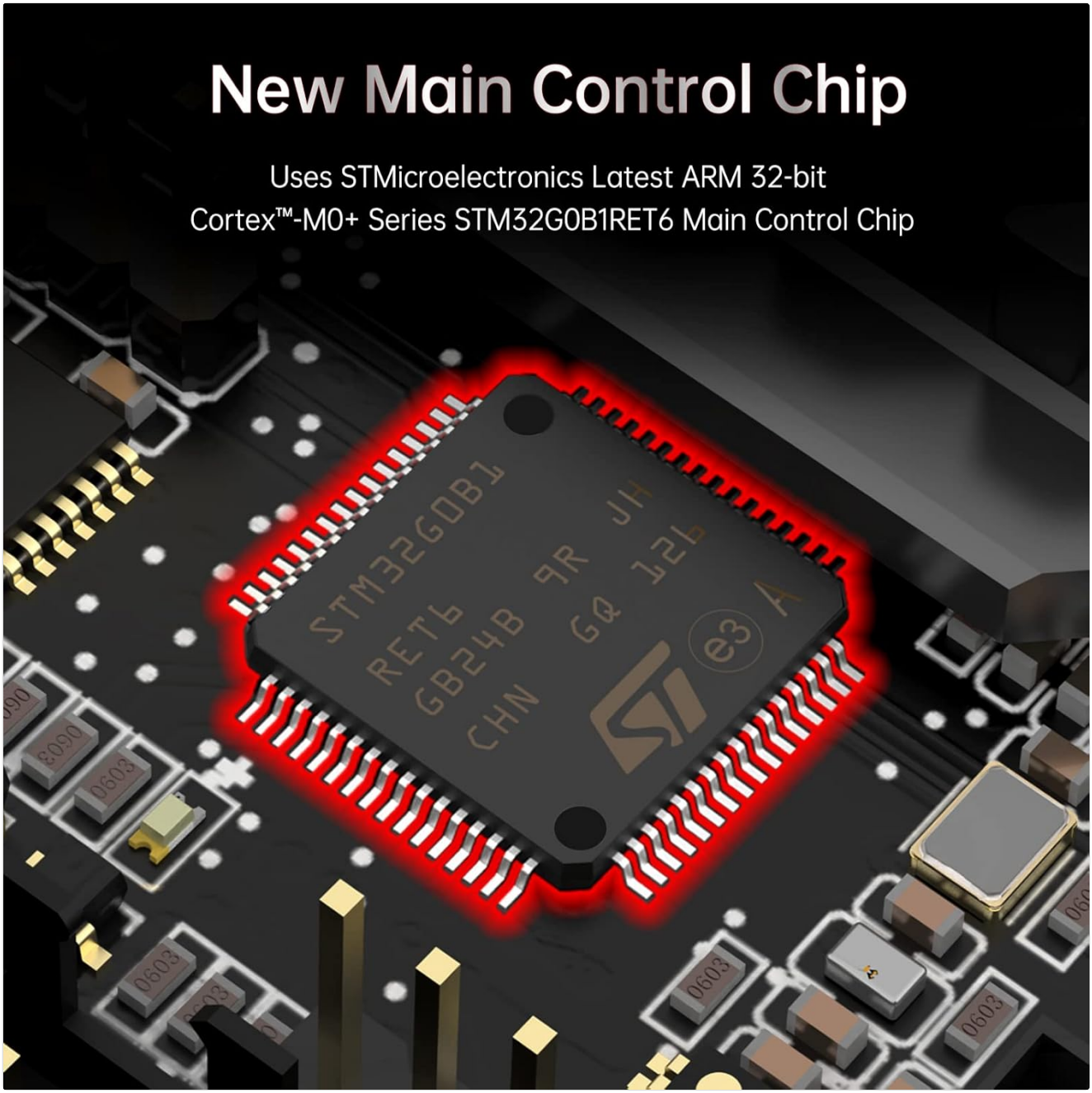

Image: The new main control chip on the SKR Mini E3 V3.0, an STMicroelectronics ARM 32-bit Cortex-M0+ Series STM32G0B1RET6.

- **Main Control Chip:** Features STMicroelectronics' latest G0 series main control chip (STM32G0B1RET6 or STM32G0B0RET6) for improved performance.
- **Driver Chips:** Utilizes TMC2209 drivers in UART mode for silent operation and increased stability.

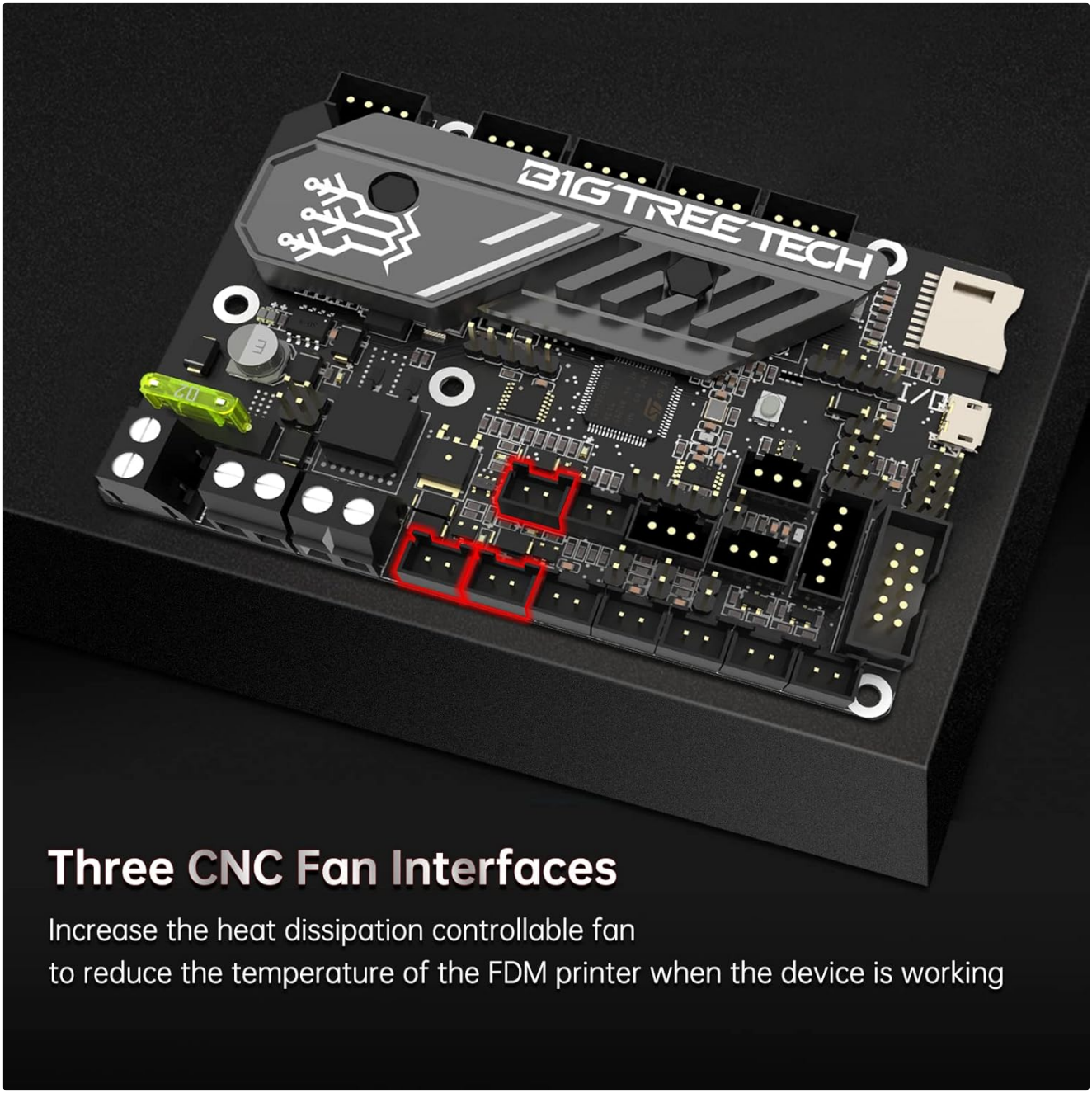

Image: Three CNC fan interfaces on the SKR Mini E3 V3.0, designed to increase heat dissipation and reduce the operating temperature of the FDM printer.

- **Cooling:** Three CNC fan interfaces are reserved to increase heat dissipation and reduce printer temperature during operation.

Image: Strengthened heat dissipation capacity of the drive on the SKR Mini E3 V3.0, featuring a redesigned heat sink.

- **Heat Dissipation:** Redesigned driving heat sink to strengthen heat dissipation capacity.

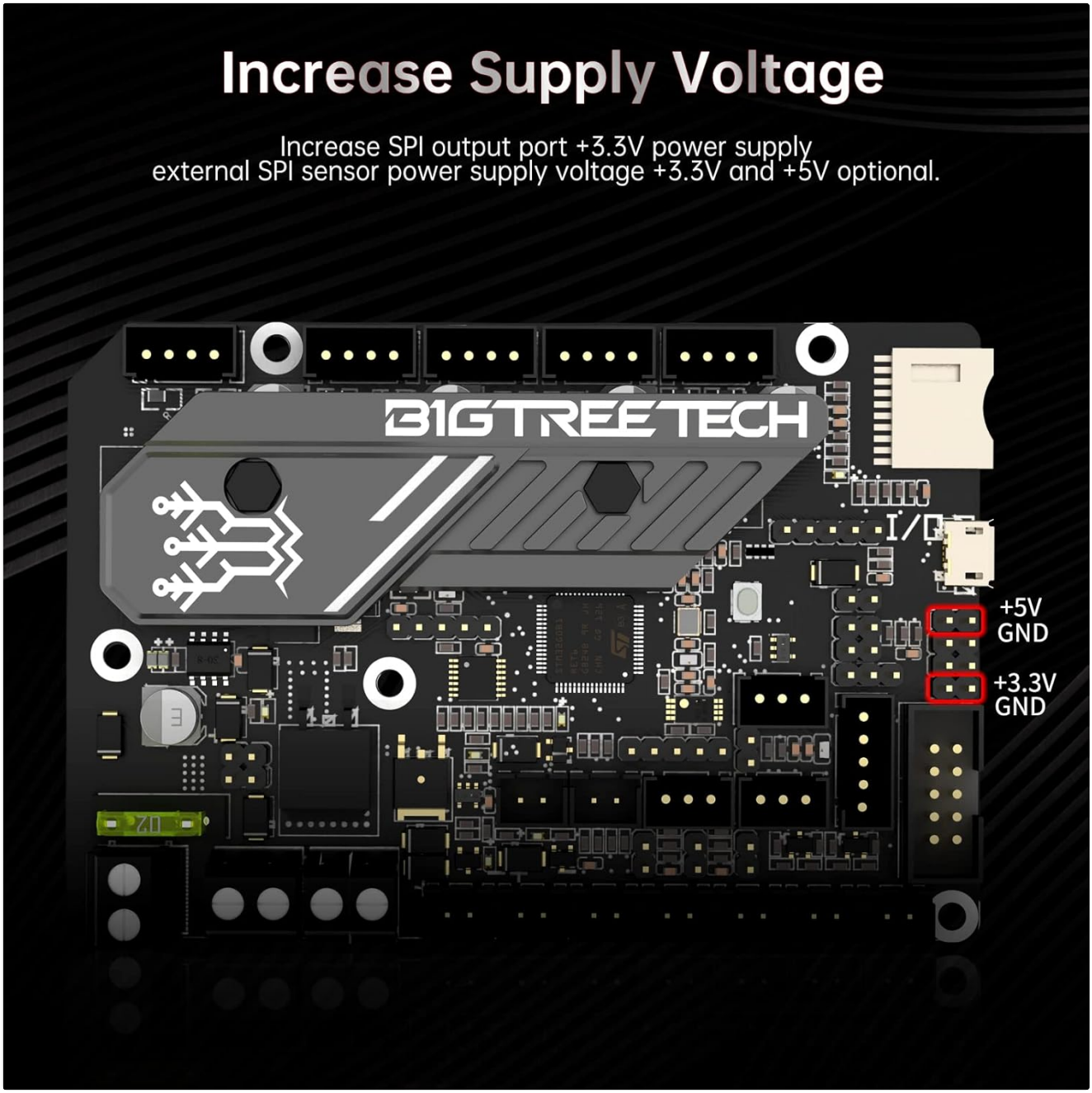

Image: Increased supply voltage options on the SKR Mini E3 V3.0, with an SPI output port offering +3.3V and +5V external sensor power supply.

- **SPI Output:** Increased SPI output port with +3.3V power supply, and external SPI sensor power supply voltage +3.3V and +5V are optional, supporting direct power to peripherals.

Operating Instructions

The BIGTREETECH Pi V1.2 and SKR Mini E3 V3.0 are designed to run Klipper firmware, offering advanced control and high-speed printing capabilities. After successful installation, you will need to configure Klipper for your specific printer model and setup.

Klipper Firmware:

Klipper is a 3D printer firmware that runs on a Raspberry Pi (or compatible board like the BTT Pi) and communicates with the 3D printer's microcontroller (like the SKR Mini E3 V3.0). This setup offloads complex calculations to the more powerful Pi, allowing for faster and more precise movements.

- **Configuration:** Refer to the official Klipper documentation for detailed instructions on installing and configuring

Klipper firmware. This typically involves flashing the SKR Mini E3 V3.0 with Klipper firmware and setting up the configuration files on the BTT Pi.

- **Web Interface:** Klipper is typically controlled via a web interface (e.g., Mainsail or Fluidd) accessible from any device on your network.
- **Printing:** Once configured, you can upload G-code files to the web interface and start prints. Monitor your prints and adjust settings as needed through the interface.

Maintenance

Regular maintenance ensures the longevity and optimal performance of your BIGTREETECH control board kit.

- **Dust Removal:** Periodically clean the control boards and fans to prevent dust buildup, which can hinder heat dissipation and lead to overheating. Use compressed air or a soft brush.
- **Cable Connections:** Ensure all cable connections are secure and free from damage. Loose connections can cause intermittent issues or component failure.
- **Firmware Updates:** Regularly check for and install firmware updates for both the BTT Pi and SKR Mini E3 V3.0 to benefit from bug fixes and new features.
- **Heat Dissipation:** Verify that the cooling fans are operating correctly and that there is adequate airflow around the control boards. The SKR Mini E3 V3.0's three CNC fan interfaces are crucial for maintaining optimal operating temperatures.

Troubleshooting

This section addresses common issues you might encounter with your BIGTREETECH control board kit.

- **Printer Not Powering On:**
  - Check all power connections to the SKR Mini E3 V3.0 board.
  - Ensure the power supply is functioning correctly and providing the correct voltage (12V/24V).
- **Motors Not Moving/Incorrect Movement:**
  - Verify motor cable connections are secure and correctly oriented.
  - Check Klipper configuration for correct stepper motor settings and pin assignments.
  - Ensure TMC2209 drivers are properly configured (UART mode).
- **Temperature Reading Errors:**
  - Inspect thermistor connections for looseness or damage.
  - Confirm thermistor type is correctly set in Klipper configuration.
- **Connectivity Issues (Ethernet/WiFi):**
  - For Ethernet, ensure the cable is properly connected and your network is active.
  - For WiFi, verify the antenna is attached and WiFi settings on the BTT Pi are correct.
- **Power-loss Recovery:** The SKR Mini E3 V3.0 supports power-loss recovery. If a print is interrupted due to power failure, the board can resume printing from the last saved position once power is restored. Ensure this feature is enabled in your firmware configuration.
- **Filament Run-out Detection:** The SKR Mini E3 V3.0 supports filament run-out sensors. If your printer stops mid-print, check if the filament sensor has been triggered due to filament running out or a jam.
- **Automatic Shutdown:** The SKR Mini E3 V3.0 can be configured for automatic shutdown after printing using a

PS-ON interface. If the printer does not shut down automatically, check the PS-ON connection and firmware settings.

Specifications

Feature	Detail
Brand	BIGTREETECH
Model Name	Pi V1.2, SKR Mini E3 V3.0
Manufacturer	BIGTREETECH
CPU (BTT Pi)	Quad-core 64-bit ARM Cortex-A53 @ 1.5GHz
RAM (BTT Pi)	1GB DDR3L
GPU (BTT Pi)	Mali G31 MP2 (supports OpenGL3.2)
Display Interface (BTT Pi)	HDMI2.0A (supports 4K)
USB Ports (BTT Pi)	4-way USB2.0
Network (BTT Pi)	100M Ethernet, WIFI (2.4G)
Main Control Chip (SKR Mini E3 V3.0)	STM32G0B1RET6 or STM32G0B0RET6
Fan Interfaces (SKR Mini E3 V3.0)	3 CNC fan interfaces
PC Communication USB (SKR Mini E3 V3.0)	Micro USB B
SPI Output Port (SKR Mini E3 V3.0)	+3.3V power supply, +3.3V/+5V optional for external sensors
Compatible Devices	Personal Computer, 3D Printer (Ender-3 V2, Ender-3 Pro, Ender-3)

Warranty and Support

For warranty information, technical support, or any inquiries regarding your BIGTREETECH Pi V1.2 + SKR Mini E3 V3.0 Control Board Kit, please refer to the official BIGTREETECH website or contact their customer service directly. Keep your purchase receipt for warranty claims.
Official BIGTREETECH Store: Visit Store