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› Freenove Breakout Board for ESP32 / ESP32-S3 (Model FNK0091) User Manual

FREENOVE FNK0091

Freenove Breakout Board for ESP32 / ESP32-S3 User Manual

Model: FNK0091

1. PRODUCT OVERVIEW

The Freenove Breakout Board for ESP32 / ESP32-S3 is designed to simplify wiring and provide visual feedback on the status of General Purpose Input/Output (GPIO) pins for compatible Freenove ESP32 and ESP32-S3 series microcontroller boards. This board integrates terminal blocks, pin headers, and status LEDs for each GPIO, along with regulated 5V and 3.3V power outputs, enhancing prototyping and debugging processes.

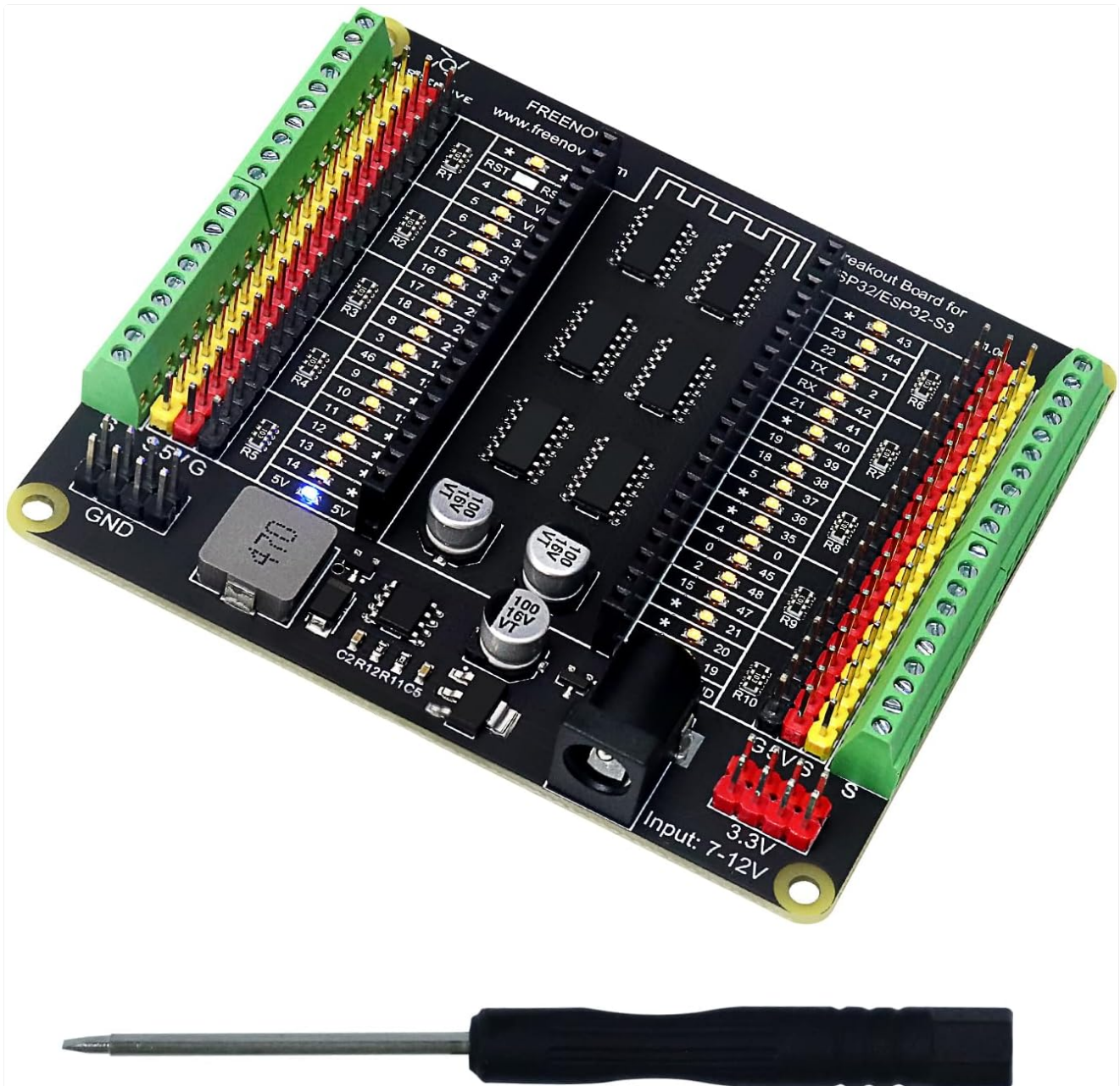


Figure 1: Freenove Breakout Board for ESP32 / ESP32-S3. This image displays the top-down view of the Freenove Breakout Board, highlighting its various connection points and components.

2. PACKAGE CONTENTS

Verify that all items listed below are included in your package:

- 1 x Freenove Breakout Board for ESP32 / ESP32-S3
- 1 x Slotted screwdriver (for terminal blocks)

Package

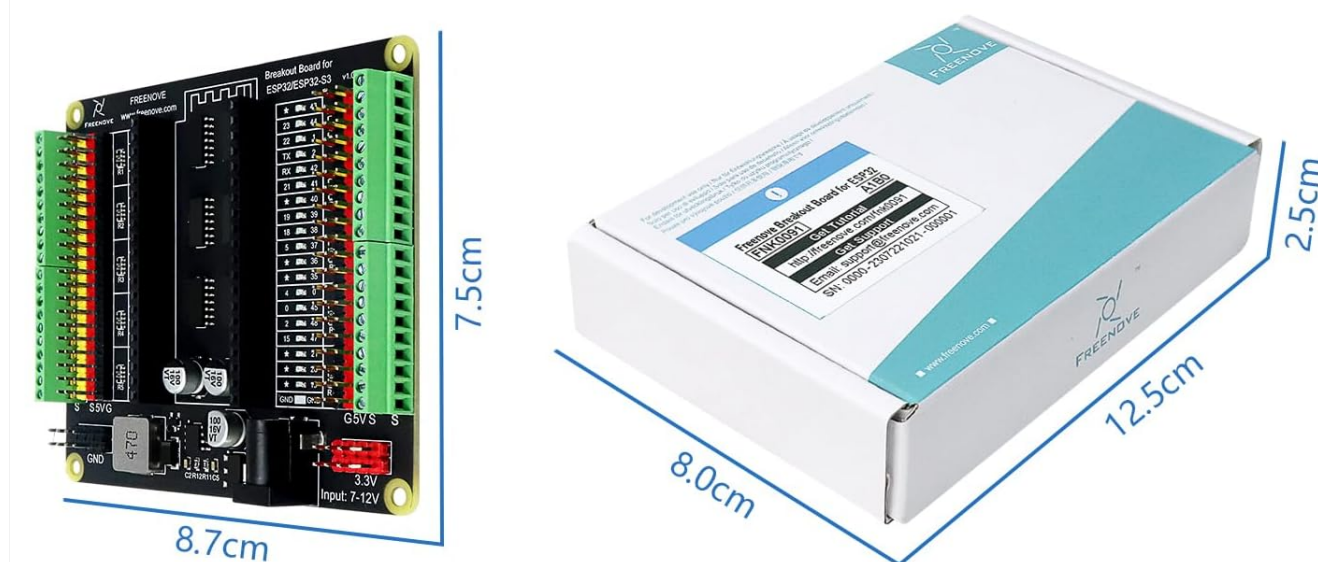


Figure 2: Package contents and dimensions. This image shows the Freenove Breakout Board alongside its packaging box, indicating the physical dimensions of the board and the box.

3. COMPATIBLE MODELS

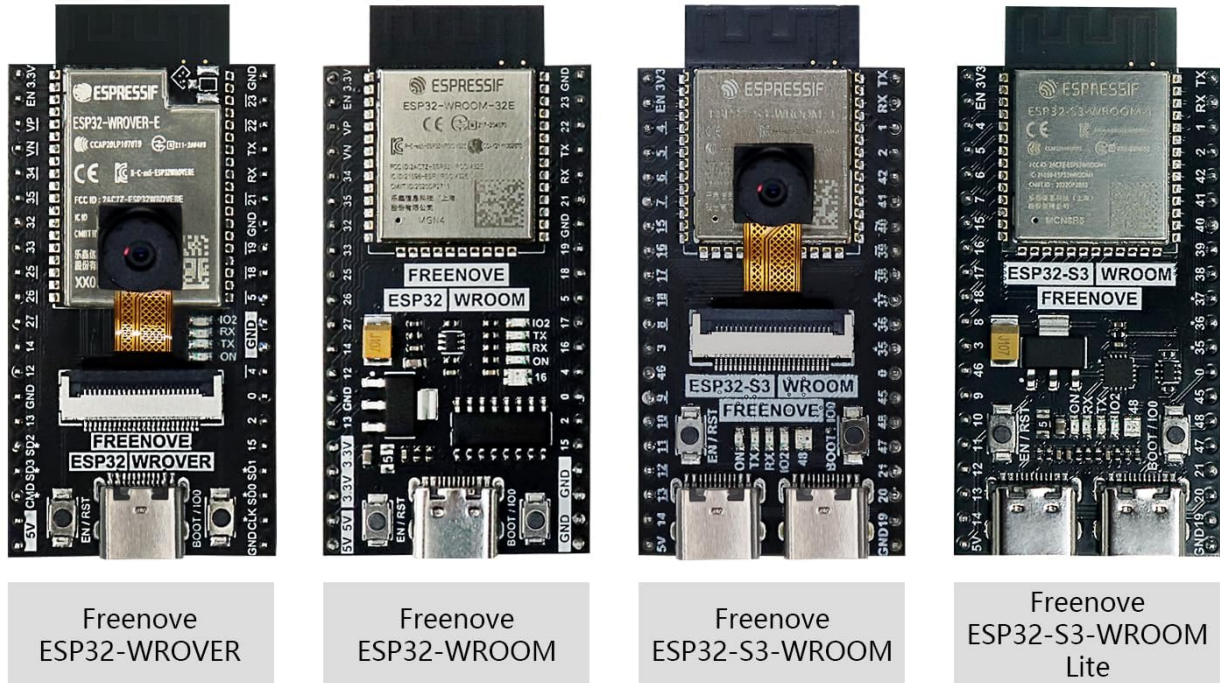
This breakout board is compatible with the following Freenove ESP32 / ESP32-S3 series boards:

- Freenove ESP32-WROVER Board (FNK0060)
- Freenove ESP32-WROOM Board (FNK0090)
- Freenove ESP32-S3-WROOM Board (FNK0085)
- Freenove ESP32-S3-WROOM Board Lite (FNK0099)

Important Note: This breakout board is not compatible with ESP32/ESP32-S3 boards from other brands due to differing pinouts. Always verify the pinout of your microcontroller board against the breakout board's design before connection.

Compatible Models

Compatible with Freenove ESP32 and ESP32-S3 series.



Note: Not compatible with boards from other brands due to different pinout.

Figure 3: Compatible Freenove ESP32 and ESP32-S3 boards. This image illustrates several Freenove ESP32 and ESP32-S3 microcontroller boards that are designed to be compatible with this breakout board.

4. FEATURES

4.1 GPIO Status LED

Each GPIO pin on the breakout board is equipped with an LED indicator. These LEDs illuminate when the corresponding GPIO outputs or inputs a high-level signal and turn off for a low-level signal. This feature provides immediate visual feedback for debugging and monitoring pin states.

GPIO Status LED

LED on / off based on GPIO high / low level.

LED on: GPIO outputs or inputs high level

LED off: GPIO outputs or inputs low level

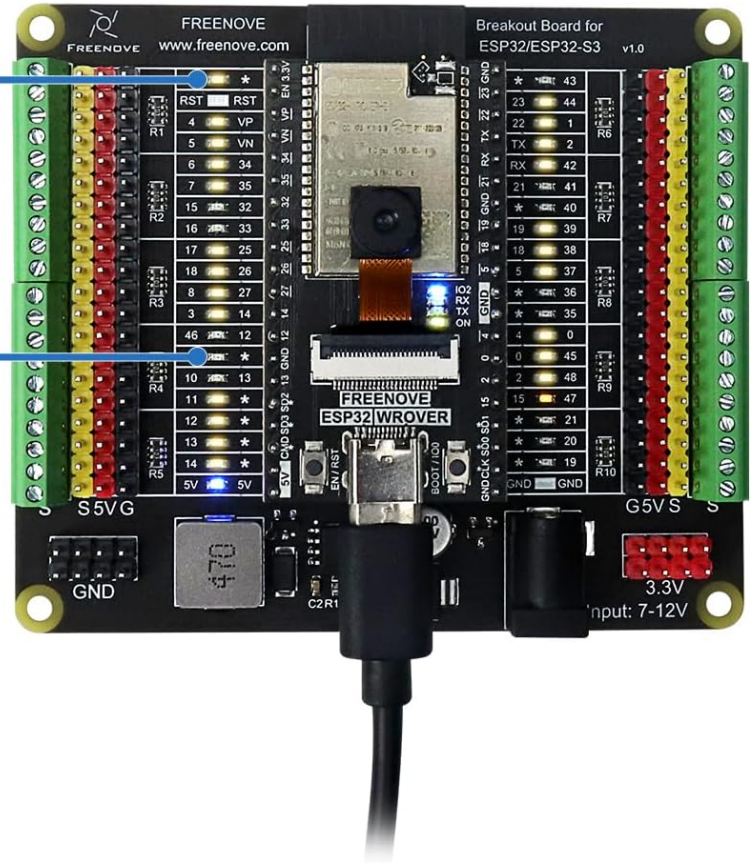


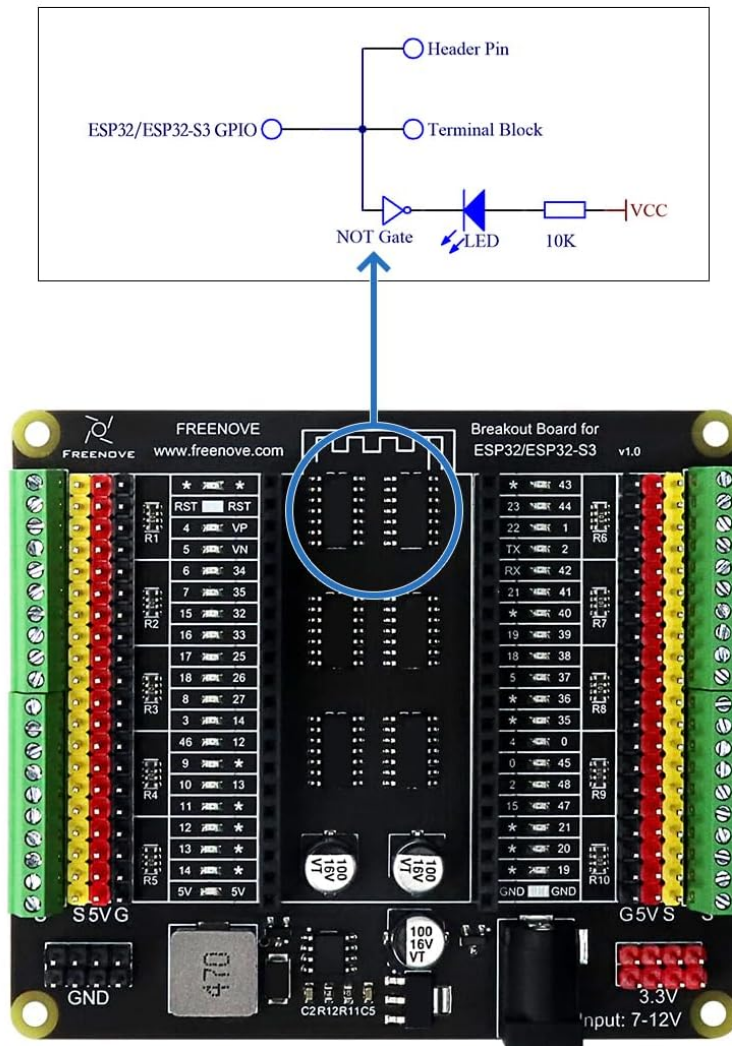
Figure 4: GPIO Status LED. This image demonstrates the LED indicators on the breakout board, showing how they light up to reflect the high or low state of individual GPIO pins.

4.2 Independent LED Drive

The status LEDs are driven by a dedicated NOT gate chip, ensuring that the GPIO pins themselves are not affected by the current draw or electrical characteristics of the LEDs. This design maintains the integrity and performance of your microcontroller's GPIOs.

Independent LED

The GPIO will not be affected by the status LED.



The status LED is driven by the NOT gate chip instead of the GPIO.

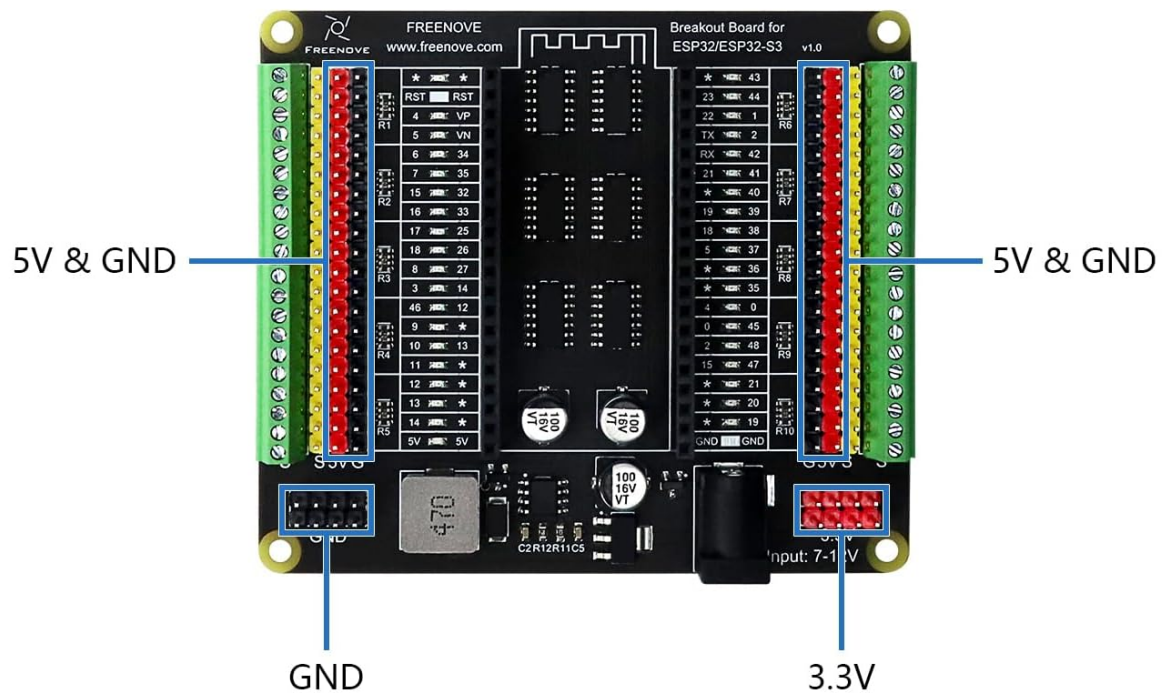
Figure 5: Independent LED circuit. This diagram illustrates how the status LEDs are independently driven by a NOT gate chip, preventing interference with the GPIO signals.

4.3 Power Circuit

The breakout board provides multiple 5V and 3.3V power outputs. When powered by an external power supply (7-12V input), the 5V output can supply up to 3A, and the 3.3V output can supply 0.5A. When powered via a USB cable, both 5V and 3.3V outputs provide 0.5A. This allows for convenient power distribution to connected sensors and modules.

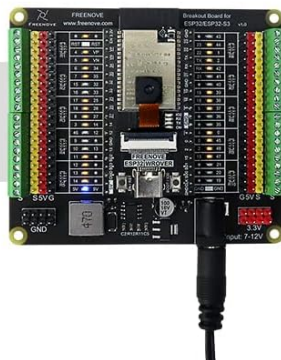
Power Circuit

Provide multiple 5V and 3.3V power outputs.



Use external power

5V: Up to 3A
3.3V: 0.5A



Use USB cable

5V + 3.3V: 0.5A

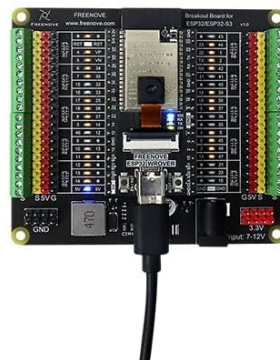


Figure 6: Power circuit and output options. This image details the power input and output sections of the board, showing options for external power supply and USB power, along with their respective current capabilities.

4.4 Terminal Block and Header Connections

The board offers both terminal blocks and standard 2.54 mm (0.1 inch) pitch pin headers for connecting to all pins of the ESP32 / ESP32-S3. The terminal blocks provide secure connections for wires, while the pin headers allow for easy integration with jumper wires or other prototyping components.

Terminal Block and Header

Connect to all pins of ESP32 / ESP32-S3.

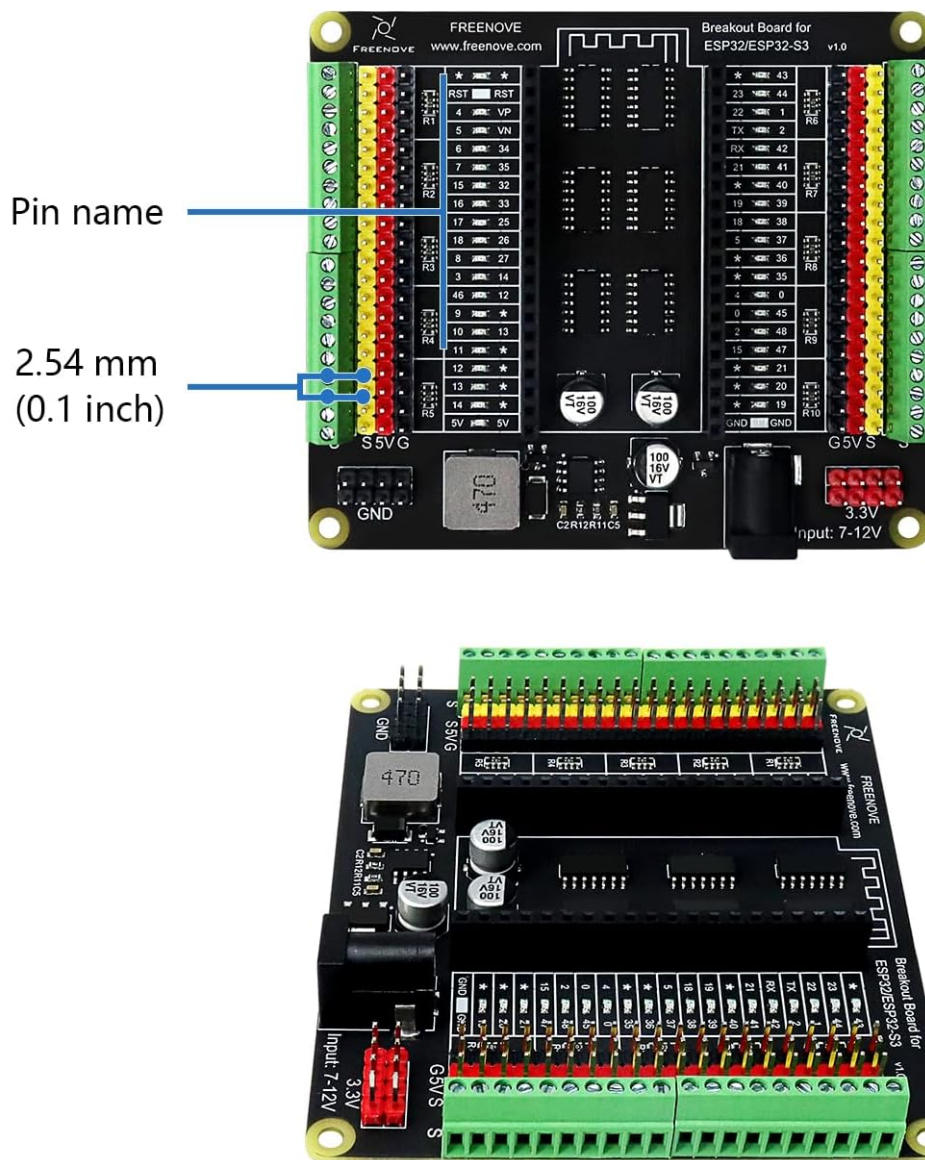


Figure 7: Terminal block and header connections. This image provides a close-up view of the terminal blocks and pin headers, illustrating the 2.54 mm pitch and labeled pin names for easy identification.

5. SETUP

1. **Insert ESP32/ESP32-S3 Board:** Carefully align your compatible Freenove ESP32 or ESP32-S3 board with the central header pins on the breakout board. Gently press down until the microcontroller board is securely seated. Ensure all pins are correctly aligned to prevent damage.
2. **Connect Power:** Connect the breakout board to a power source. You can use a USB cable (Type-C or Micro-USB) depending on your ESP32 board) or an external DC power supply (7-12V) via the barrel jack.
3. **Wire Connections:** Use the provided slotted screwdriver to connect wires to the terminal blocks for your peripherals. Alternatively, use jumper wires with the pin headers. Refer to the pin labels on the board for correct connections.

6. OPERATION

Once your ESP32/ESP32-S3 board is connected and powered, the breakout board's features become active:

- **GPIO Status Monitoring:** Observe the individual LEDs next to each GPIO pin. An illuminated LED indicates a high-level signal, while an unlit LED indicates a low-level signal. This visual feedback is crucial for verifying code execution and hardware interactions.
- **Power Outputs:** Utilize the 5V and 3.3V power rails to supply power to external components. Ensure that the total current draw does not exceed the specified limits (3A for 5V with external power, 0.5A for both 5V and 3.3V with USB power).
- **Reset and Boot Buttons:** The breakout board provides access to the RST (Reset) and BOOT buttons of the connected ESP32/ESP32-S3 board, facilitating programming and debugging.

7. SPECIFICATIONS

Feature	Specification
Model Number	FNK0091
Compatible Microcontrollers	Freenove ESP32 / ESP32-S3 series
GPIO Connection	Terminal blocks and 2.54 mm (0.1 inch) pitch pin headers
GPIO Status Indicators	Individual LEDs for each GPIO pin
LED Drive Method	Independent NOT gate chip (does not affect GPIO)
External Power Input	7-12V DC (barrel jack)
5V Power Output (External Power)	Up to 3A
3.3V Power Output (External Power)	0.5A
5V Power Output (USB Power)	0.5A
3.3V Power Output (USB Power)	0.5A
Item Weight	2.82 ounces
Package Dimensions	4.92 x 3.31 x 1.02 inches

8. TROUBLESHOOTING

- **LEDs Not Lighting Up:**
 - Ensure the ESP32/ESP32-S3 board is correctly seated and powered.
 - Verify your code is correctly setting the GPIO pins to high or low states.
 - Check power connections to the breakout board. If using an external power supply, ensure it provides 7-12V DC.
- **External Components Not Receiving Power:**
 - Confirm that the breakout board is powered, either via USB or an external DC supply.
 - Check the wiring to the 5V and 3.3V power rails.
 - Ensure the current draw of your external components does not exceed the board's power output capabilities.
- **Incorrect Pinout:**
 - Double-check the pinout of your specific Freenove ESP32/ESP32-S3 board against the labels on the breakout board.

- Remember that this board is designed for Freenove brand microcontrollers; third-party boards may have different pin assignments.

9. SUPPORT

For technical assistance, tutorials, or further information, please refer to the official Freenove website or the documentation provided with your product. The download link for detailed tutorials can typically be found on the product packaging.