DAJUNGUO ZK-3002

DAJUNGUO ZK-3002 Amplifier Board Instruction Manual

Model: ZK-3002

1. Introduction

This manual provides detailed instructions for the proper installation, operation, and maintenance of your DAJUNGUO ZK-3002 Amplifier Board. Please read this manual thoroughly before using the product to ensure optimal performance and safety. The ZK-3002 is a high-power digital audio amplifier board designed for various audio applications, featuring the TPA3255 chip for efficient and robust sound amplification.

2. Safety Information

- **Power Supply:** Use a DC power supply within the specified voltage range of 18-50V. Exceeding 53V can damage the board. Ensure the power supply can deliver sufficient current (10A or more is recommended for optimal performance).
- **Polarity:** Observe correct polarity when connecting the power supply. The board does not have input anti-reverse protection, and incorrect polarity will cause damage.
- **Connections:** Always power off the amplifier board before making or changing any connections (power, speakers, audio input).
- **Environment:** Operate the board in a dry, well-ventilated area. Avoid exposure to moisture, dust, and extreme temperatures.
- **Handling:** Handle the board with care to avoid static discharge, which can damage electronic components.
- **Heat Dissipation:** Ensure the fan is unobstructed for proper cooling, especially during high-power operation.

3. Product Overview

The DAJUNGUO ZK-3002 is a TPA3255-based digital power amplifier board offering high output power in both dual-channel (BTL) and mono (PBTL) configurations. It features integrated protection mechanisms and intelligent fan control.

Key Features:

- Original TPA3255 Power AMP Chip
- Wide Operating Voltage: DC 18-50V
- High Output Power: Up to 2x300W (BTL) or 600W (PBTL)
- Adjustable Gain: 26-36dB
- Intelligent Anti-POP Sound (MCU controlled)
- Advanced Protection: Undervoltage, Overheating, Overcurrent, Short Circuit
- Temperature-controlled Automatic Fan Cooling with Manual Override
- High-quality components: JRC2068 operational amplifiers, solid-state electrolysis

Component Identification:

Refer to the diagram below for the location of key components and connections on the ZK-3002 amplifier board.

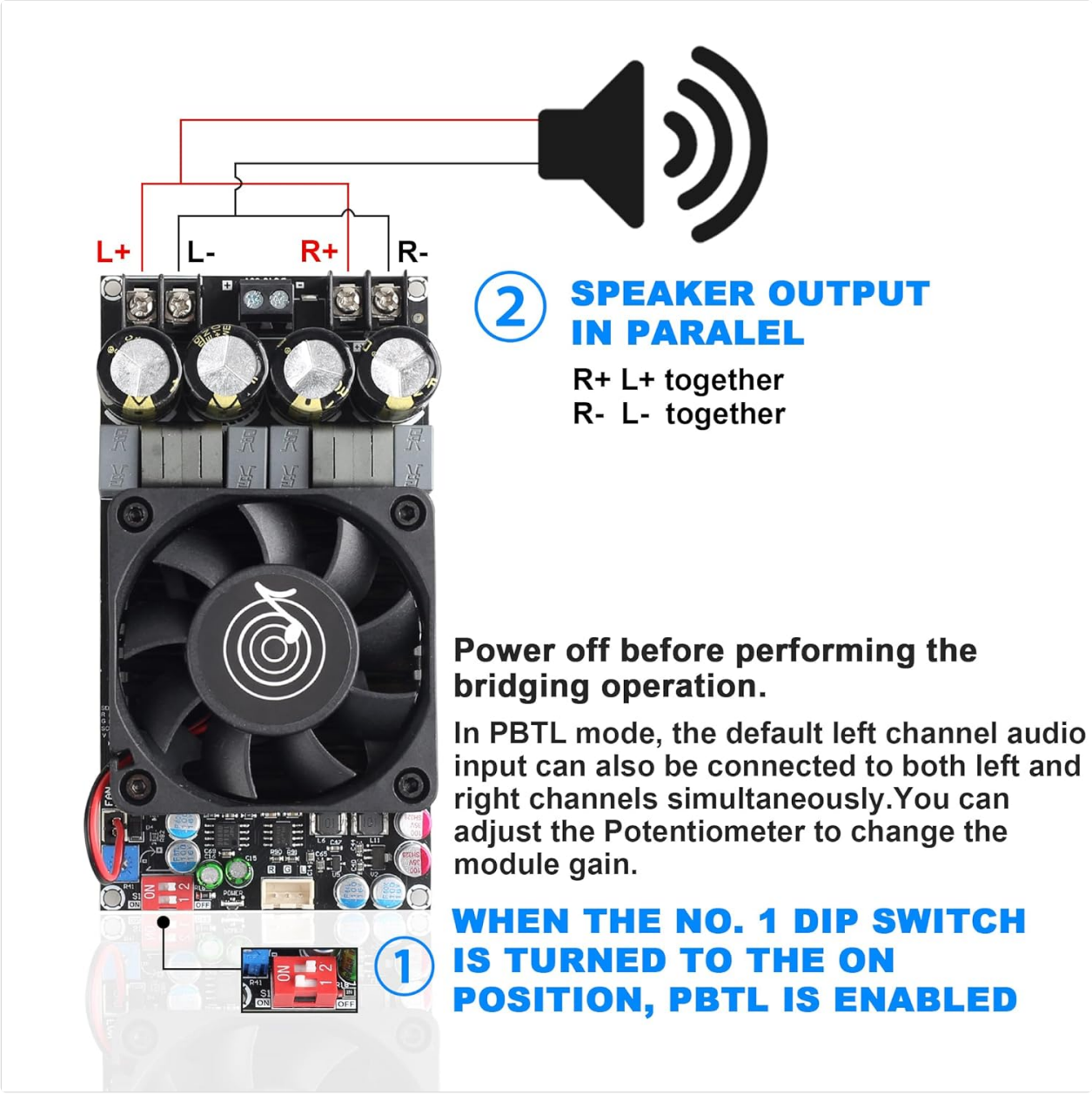

Figure 1: ZK-3002 Amplifier Board Component Layout

This image highlights the main connection points and adjustable features of the amplifier board, including power input, audio outputs, gain control, and fan settings.

- **DC18-50V Power Input:** Terminal for connecting the DC power supply.
- **Left Channel Output:** Speaker output for the left channel.
- **Right Channel Output:** Speaker output for the right channel.
- **Gain Size Adjustment (26-36dB):** A potentiometer to adjust the amplification gain. Turn clockwise to increase gain. Avoid forceful tightening at the end of its range.
- **Digital Power Amplifier Dedicated Inductor:** High-quality inductors designed for high current, low magnetic loss, and effective EMI suppression.
- **XH2.54-3P Audio Input Terminal:** Connector for the audio input signal.
- **DIP Switch (S1):** Used for fan control and PBTL mode selection.

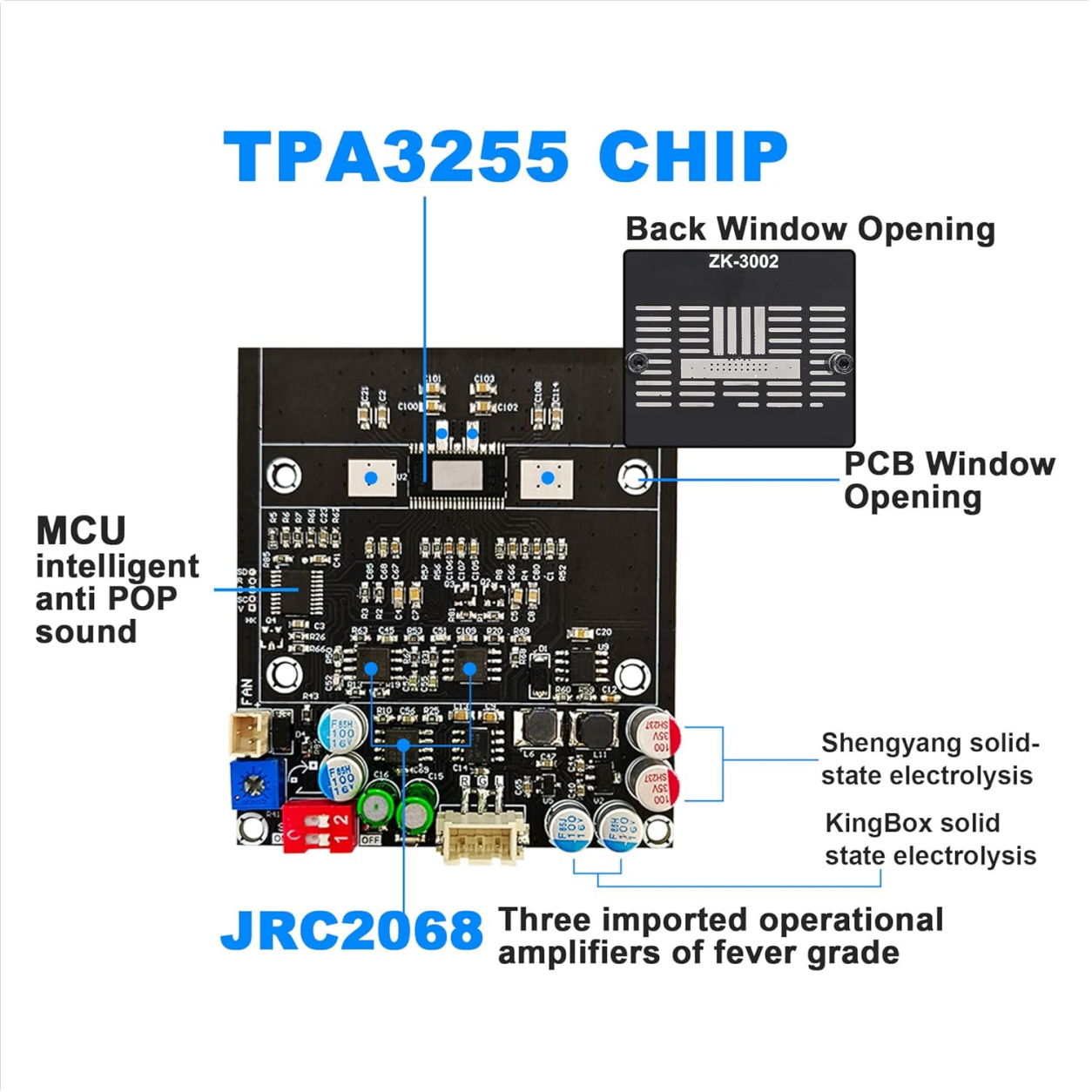

Figure 2: Internal Components and Chip Details
This image provides a closer look at the core components, including the TPA3255 chip, the MCU for anti-POP sound, and the high-grade operational amplifiers and capacitors.

Dimensions:

The physical dimensions of the ZK-3002 amplifier board are provided below for integration into your projects.

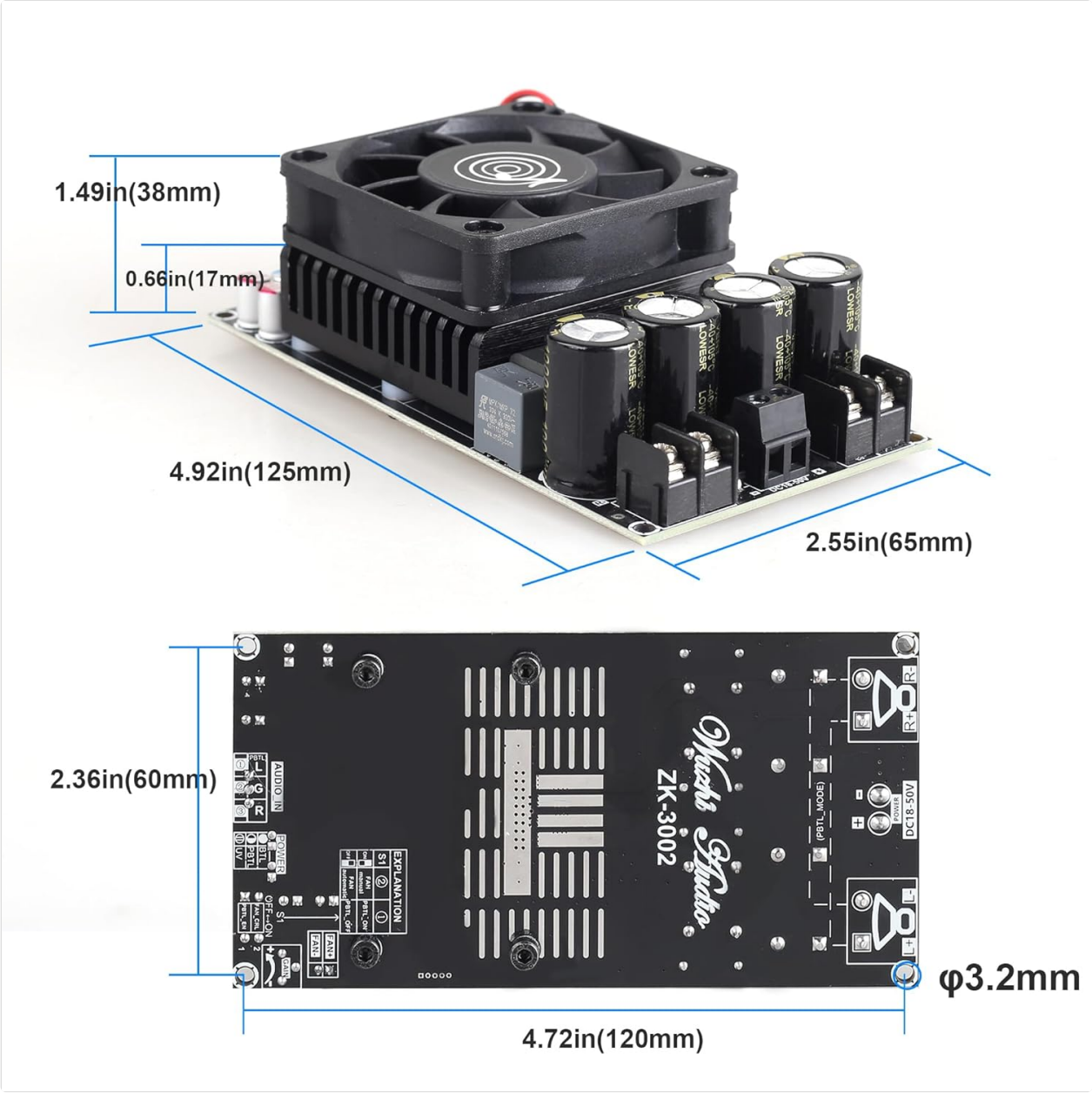

Figure 3: ZK-3002 Amplifier Board Dimensions
This diagram illustrates the precise measurements of the amplifier board, including the PCB and overall height with the fan, crucial for enclosure design and mounting.

4. Setup

Follow these steps to correctly set up your ZK-3002 amplifier board.

4.1 Power Supply Connection

1. Ensure your power supply is a DC source within the 18-50V range. A 36-48V supply with 10A or more current capability is recommended for maximum performance.
2. Connect the positive (+) terminal of your DC power supply to the DC18-50V input's positive terminal on the board.
3. Connect the negative (-) terminal of your DC power supply to the DC18-50V input's negative terminal on the board.
4. **WARNING:** The board does not have anti-reverse protection. Double-check polarity before applying power to prevent damage.

4.2 Speaker Connection

The ZK-3002 supports both dual-channel (stereo) and mono (bridged) configurations.

4.2.1 Dual-Channel (BTL) Mode

In this mode, the amplifier operates as a stereo amplifier. Connect speakers with an impedance of 3-8 ohms.

1. Connect your left speaker to the 'Left Channel Output' terminals.
2. Connect your right speaker to the 'Right Channel Output' terminals.

4.2.2 Mono (PBTL) Mode

For higher power output into a single speaker, the board can be configured for mono (PBTL) operation. This requires bridging the output channels. Connect a speaker with an impedance of 2-8 ohms.

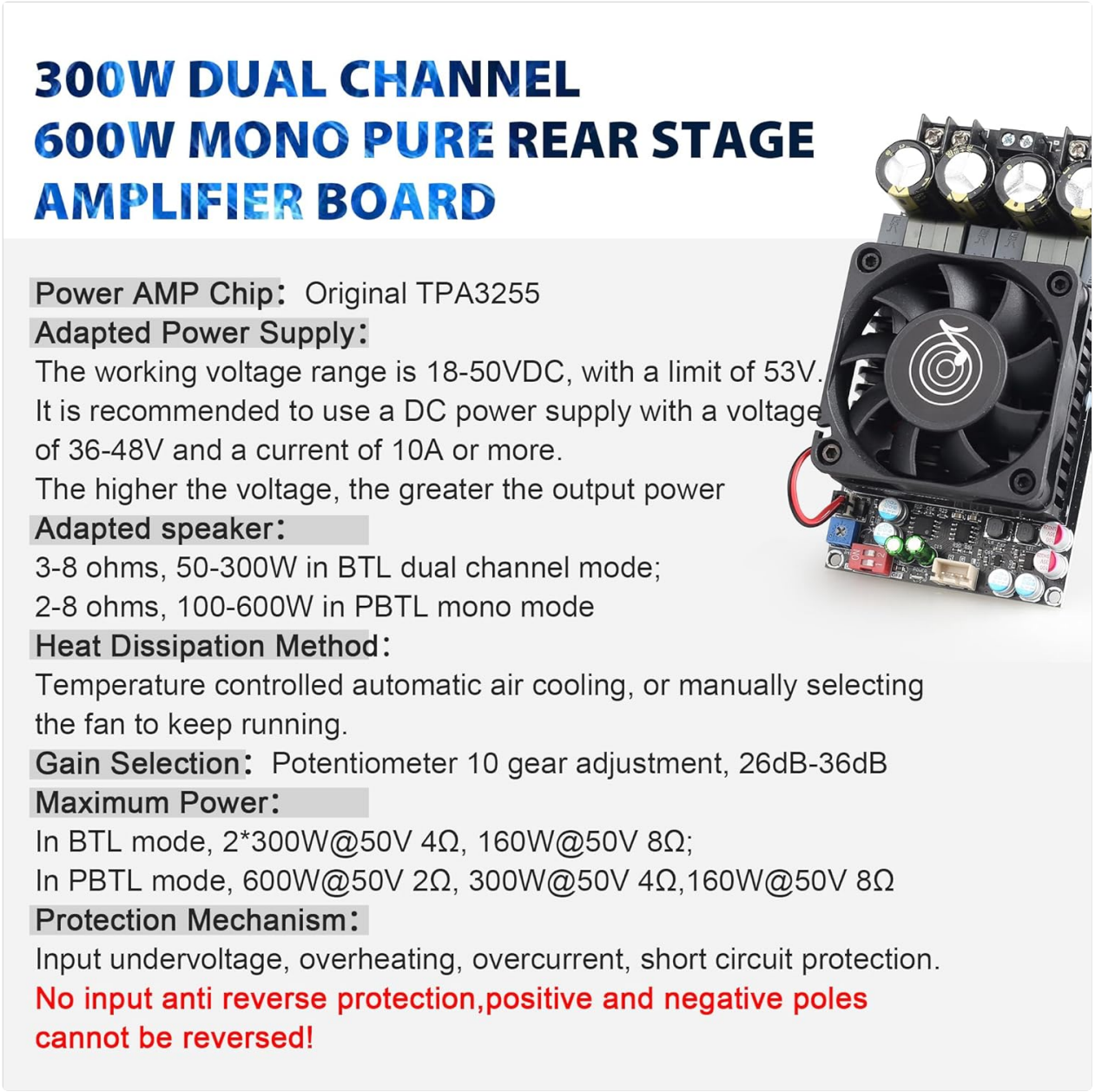

Figure 4: PBTL Mono Mode Speaker Connection

This image demonstrates how to bridge the amplifier outputs for mono operation and indicates the DIP switch setting required to activate PBTL mode.

1. **Power off the board before making any changes.**
2. Locate the DIP switch on the board. Set DIP switch**No. 1 to the ON position** to enable PBTL mode.

3. Connect the positive (+) terminal of your speaker to both the R+ and L+ output terminals, effectively connecting them in parallel.
4. Connect the negative (-) terminal of your speaker to both the R- and L- output terminals, effectively connecting them in parallel.

4.3 Audio Input Connection

Connect your audio source (e.g., preamplifier, DAC) to the XH2.54-3P Audio Input Terminal. Ensure correct channel assignment (Left, Right, Ground) as per your audio source's output.

5. Operating Instructions

5.1 Gain Adjustment

The ZK-3002 features a gain adjustment potentiometer, allowing you to set the amplification level between 26dB and 36dB. Locate the 'Gain Size Adjustment' potentiometer (refer to Figure 1).

- Turn the potentiometer clockwise to increase the gain.
- Turn the potentiometer counter-clockwise to decrease the gain.
- Adjust the gain to match your audio source's output level and your desired volume without causing distortion. Do not force the potentiometer when it reaches its limits.

5.2 Fan Control

The amplifier board includes a cooling fan with both automatic temperature control and manual override options. The fan control is managed by DIP switch S1 (1).

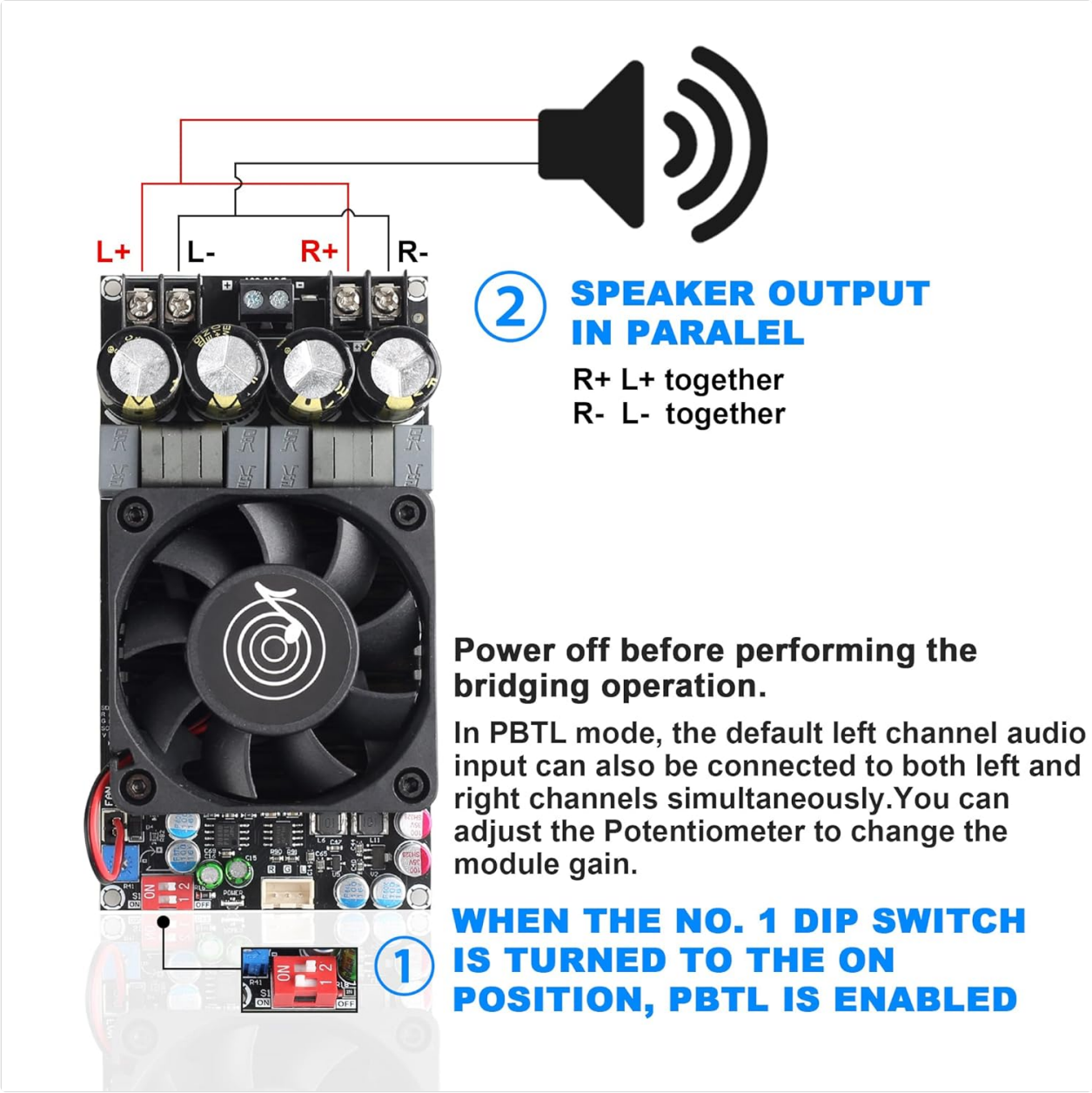

Figure 5: Fan Control DIP Switch Explanation

This image details the function of the DIP switch for controlling the cooling fan's operation mode.

Fan Control Settings (DIP Switch S1)

DIP Switch S1 (1) Position	Fan Mode	Description
ON	Manual (PBTL_ON)	The fan runs continuously. This setting also enables PBTL (mono) mode.
OFF	Automatic (PBTL_OFF)	The fan activates automatically when the board reaches a certain temperature. This setting disables PBTL (mono) mode, operating in BTL (stereo) mode.

Select the desired fan mode based on your operational needs. For high-power applications or in warm environments, manual fan operation (ON) is recommended to ensure consistent cooling.

5.3 PBTL Mode Operation

When DIP switch No. 1 is set to ON for PBTL mode, the amplifier operates as a single, high-power mono

channel. In this configuration, the default left channel audio input can be connected to both the left and right channels simultaneously if your audio source provides a mono signal, or if you are using a stereo-to-mono summing cable. Adjust the gain potentiometer as needed for the desired output level.

6. Maintenance

The ZK-3002 amplifier board is designed for reliable operation with minimal maintenance. Follow these general guidelines:

- **Cleaning:** Keep the board clean and free of dust. Use a soft, dry brush or compressed air to gently remove dust from components and the fan. Do not use liquid cleaners.
- **Environment:** Ensure the operating environment remains dry and free from corrosive gases or excessive humidity.
- **Inspection:** Periodically inspect connections for tightness and ensure no wires are frayed or shorting.
- **Fan:** Ensure the cooling fan is free from obstructions and operating correctly. A malfunctioning fan can lead to overheating.

7. Troubleshooting

If you encounter issues with your ZK-3002 amplifier board, consider the following common troubleshooting steps:

- **No Power:**
  - Check the power supply voltage and current rating.
  - Verify power supply connections for correct polarity and secure contact.
  - Ensure the power supply is functioning correctly.
- **No Sound:**
  - Check all audio input and speaker connections.
  - Ensure the audio source is active and providing a signal.
  - Adjust the gain potentiometer.
  - Verify speaker impedance matches the amplifier's requirements for the selected mode (BTL/PBTL).
- **Distorted Sound:**
  - Reduce the audio input level from your source.
  - Decrease the gain setting on the amplifier board.
  - Ensure speaker impedance is within the specified range.
  - Check for loose or faulty speaker connections.
- **Overheating/Fan Constantly Running (in Auto mode):**
  - Ensure adequate ventilation around the board.
  - Check if the fan is obstructed or dirty.
  - Verify speaker impedance is not too low, causing excessive load.
  - Consider operating in manual fan mode (DIP switch S1 ON) for continuous cooling if operating conditions are demanding.
- **Protection Circuit Activation:**

- If the amplifier shuts down, check for short circuits at the speaker outputs.
- Verify the power supply voltage is stable and within the operating range (undervoltage protection).
- Allow the board to cool down if it has been operating at high temperatures (overheating protection).

If problems persist after following these steps, consult a qualified technician.

8. Specifications

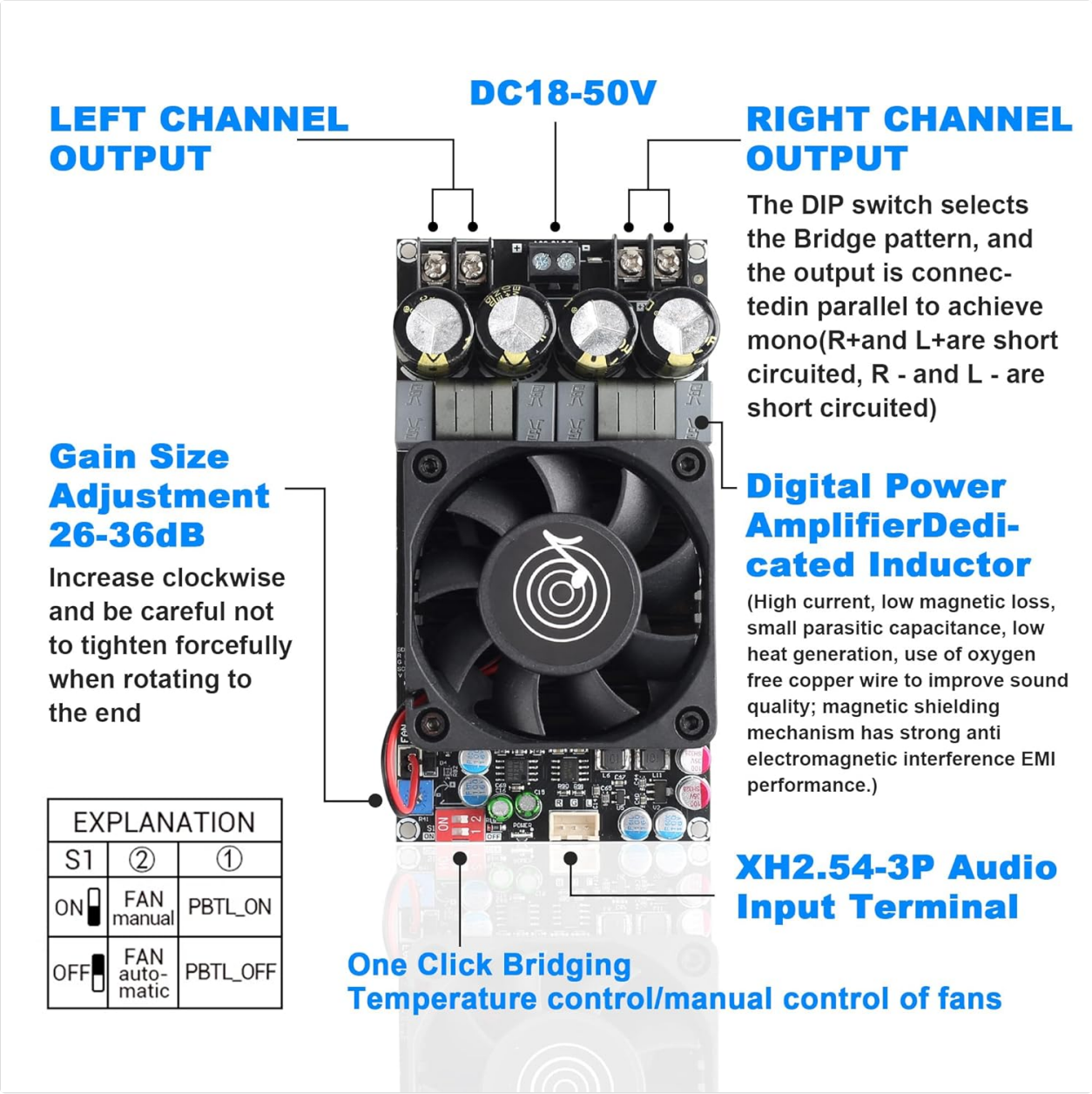

Figure 6: ZK-3002 Key Specifications Overview

This image summarizes the main technical specifications and features of the amplifier board.

Feature	Specification
Model	ZK-3002
Amplifier Chip	Original TPA3255
Operating Voltage	DC 18-50V (Limit 53V)

Feature	Specification
Recommended Power Supply	DC 36-48V, 10A or more
Output Channels	2 (BTL Stereo) or 1 (PBTL Mono)
Adapted Speaker (BTL)	3-8 ohms
Adapted Speaker (PBTL)	2-8 ohms
Maximum Power (BTL)	2*300W@50V 4Ω, 160W@50V 8Ω
Maximum Power (PBTL)	600W@50V 2Ω, 300W@50V 4Ω, 160W@50V 8Ω
Gain Selection	Potentiometer 10-gear adjustment, 26dB-36dB
Heat Dissipation	Temperature controlled automatic air cooling / Manual fan selection
Protection Mechanisms	Input undervoltage, overheating, overcurrent, short circuit protection. No input anti-reverse protection.
Audio Input Terminal	XH2.54-3P
Item Weight	300 g
Dimensions (Overall)	12.5 x 6.5 x 3.8 cm (approx. 4.92 x 2.55 x 1.49 inches)
PCB Dimensions	12.0 x 6.0 cm (approx. 4.72 x 2.36 inches)
Mounting Type	Surface Mount
Material	Metal (heatsink, components)
UPC	194852393509

9. Warranty and Support

DAJUNGUO products are manufactured to high-quality standards. For specific warranty information, please refer to the documentation provided at the time of purchase or contact your retailer. For technical support or inquiries, please reach out to the product vendor or manufacturer's customer service channels.