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› PAM8403 Mini 2 Channel 3W Stereo Class D Audio Power Amplifier Module User Manual

Envistia PAM8403

PAM8403 Mini 2 Channel 3W Stereo Class D Audio Power Amplifier Module User Manual

MODEL: PAM8403

1. Introduction and Overview

The PAM8403 Mini 2 Channel 3W Stereo Class D Audio Power Amplifier Module is a compact and efficient solution for audio amplification. Designed for DIY projects and portable applications, this module delivers high-quality sound reproduction with low total harmonic distortion plus noise (THD+N). Its small form factor makes it ideal for integration into various electronic designs, especially those powered by batteries.



Image 1.1: Two PAM8403 Mini Amplifier Modules. These small green circuit boards feature the PAM8403 chip and various surface-mount components, designed for stereo audio amplification.

2. Key Features

- **High Efficiency:** Achieves up to 90% efficiency, minimizing power loss and heat generation.
- **Dual Channel Stereo Output:** Provides 3W + 3W output power into a 4Ω speaker load with a 5V power supply.
- **Wide Operating Voltage:** Operates reliably within a voltage range of 2.5V to 5.5V.
- **Flexible Power Supply:** Can be powered by a computer USB port, USB power bank, mobile phone charger, or battery.
- **CMOS Class D Design:** Ensures high efficiency and cost-effectiveness.

- **Noise Canceling Circuit:** Integrated circuit minimizes noise, providing clear audio output.
- **Pop-Noise Suppression:** Designed for power on/off without audible popping noise.
- **Built-in Protections:** Includes short-circuit current protection, under-voltage lockout, and over-temperature protection (shuts down at approximately 140°C).
- **Compact Size:** Measures approximately 21 x 18 x 3.4 mm, making it suitable for space-constrained applications.

3. Specifications

Specification	Value
Operating Voltage	2.5V - 5.5V DC
Speaker Load Impedance	4 - 8 Ohms
Output Power (5V supply, 4Ω load)	3W + 3W (Stereo)
Efficiency	Up to 90%
Dimensions (L x W x H)	21 x 18 x 3.4 mm
Net Weight	Approximately 1g
Over-temperature Shutdown	140°C +/- 15°C

4. Setup and Installation

Proper connection of the PAM8403 module is crucial for optimal performance and to prevent damage. Refer to the diagrams below for connection points.

4.1 Connection Points Overview

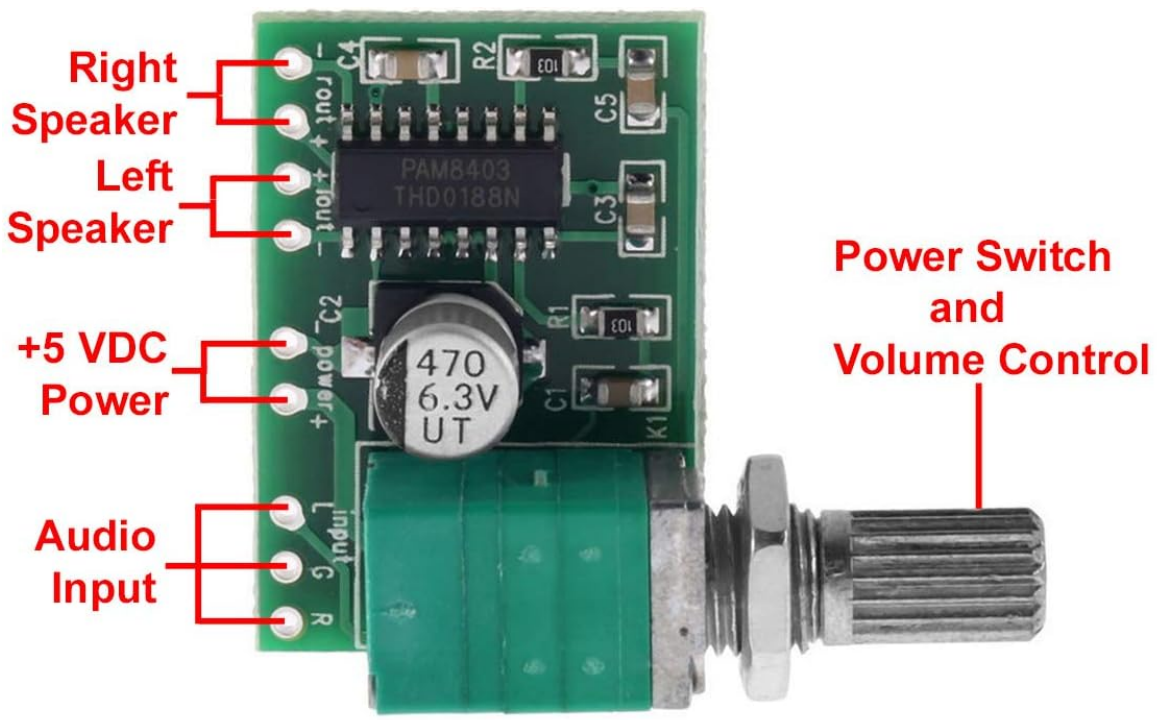


Image 4.1: PAM8403 Module with Labeled Connections. This image highlights the input and output terminals: +5 VDC Power, Audio Input (L, G, R), Right Speaker (+, -), Left Speaker (+, -), and a Power Switch and Volume Control potentiometer.

4.2 Wiring Diagram

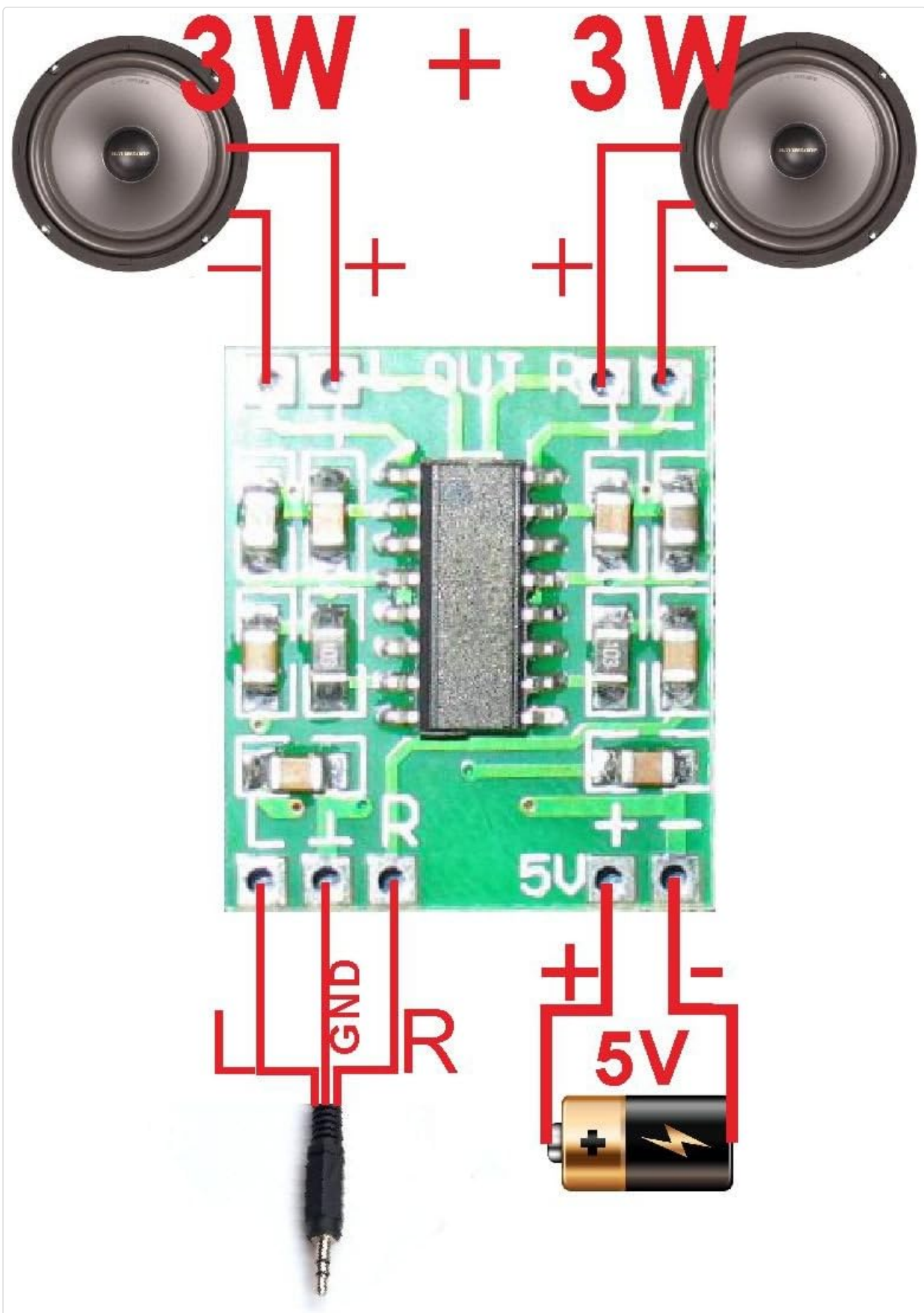


Image 4.2: PAM8403 Wiring Diagram. This diagram illustrates how to connect a 5V power source (e.g., battery), a stereo audio input (e.g., 3.5mm jack), and two 3W speakers to the PAM8403 module.

4.3 Step-by-Step Installation

1. **Power Supply Connection:** Connect a 2.5V to 5.5V DC power source to the + and - terminals labeled "5V" on the module. Ensure correct polarity. A 5V supply is recommended for full 3W output per channel.

2. **Audio Input Connection:** Connect your audio source (e.g., smartphone, MP3 player) to the **L** (Left), **GND** (Ground), and **R** (Right) terminals. The "GND" terminal is common for both audio channels.
3. **Speaker Connection:** Connect your 4Ω or 8Ω speakers to the respective output terminals. For the Left speaker, connect to **L OUT +** and **L OUT -**. For the Right speaker, connect to **R OUT +** and **R OUT -**. Ensure correct polarity for optimal sound.
4. **Volume Control (Optional):** If your module includes a potentiometer for volume control, ensure it is properly connected as shown in Image 4.1.

Important: Do not short the speaker output terminals to ground or to each other, as this can damage the amplifier module. Ensure all connections are secure before applying power.

5. Operating Instructions

Once the module is correctly wired and powered, it is ready for operation.

1. **Power On:** Apply the 2.5V-5.5V DC power to the module. The module is designed to power on without a noticeable popping noise.
2. **Audio Playback:** Begin playing audio from your connected source.
3. **Volume Adjustment:** Adjust the volume using the connected potentiometer (if applicable) or directly from your audio source device.
4. **Power Off:** Disconnect the power supply from the module.

6. Maintenance

The PAM8403 module is a robust electronic component, but proper care can extend its lifespan and ensure continued performance.

- **Keep Dry:** Avoid exposing the module to moisture or liquids, which can cause short circuits and corrosion.
- **Cleanliness:** Keep the module free from dust and debris. Use a soft, dry brush or compressed air for cleaning if necessary. Do not use liquid cleaners.
- **Static Electricity:** Handle the module with care, especially in environments prone to static discharge. Consider using anti-static precautions when handling.
- **Ventilation:** While the Class D amplifier is highly efficient, ensure adequate airflow around the module, especially if operating at maximum power for extended periods, to prevent excessive heat buildup. The module has built-in over-temperature protection, but good thermal management is always recommended.
- **Secure Connections:** Periodically check that all wire connections are secure and free from fraying or corrosion.

7. Troubleshooting

If you encounter issues with your PAM8403 module, consider the following troubleshooting steps:

- **No Sound Output:**
 - Verify that the power supply is connected correctly and providing the required 2.5V-5.5V DC.
 - Check all audio input and speaker output connections for correct polarity and secure contact.
 - Ensure the audio source is playing and its volume is turned up.
 - Confirm that the speakers are functional and correctly wired.

- **Distorted or Low Sound:**

- Check the power supply voltage; insufficient voltage can lead to distortion.
- Ensure the speaker impedance is within the recommended 4-8 Ohms range.
- Reduce the input audio signal level if it is too high, causing clipping.
- Inspect for any loose or corroded connections.

- **Humming or Noise in Audio:**

- Ensure the power supply is clean and stable. A noisy power supply can introduce hum.
- Check for proper grounding of the audio input. Ensure the audio source's ground is connected to the module's GND terminal.
- Avoid running audio cables parallel to power cables to minimize interference.
- Ensure the speaker output return lead is not shorted to ground, as this can cause noise.

- **Module Overheating:**

- Verify the speaker load impedance is not too low (below 4 Ohms).
- Ensure adequate ventilation around the module.
- Check if the power supply voltage is within the specified range.

- **Module Not Powering On:**

- Confirm the power supply is active and providing the correct voltage.
- Check for any short circuits on the power input terminals.

8. Warranty and Support

Specific warranty details for the PAM8403 Mini 2 Channel 3W Stereo Class D Audio Power Amplifier Module are not provided in this manual. For any warranty claims or technical support, please contact the retailer or the brand, Envistia, directly. This product was first made available on January 22, 2019.