NEW PRODUCT ANNOUNCEMENT

Speaker Amplifier

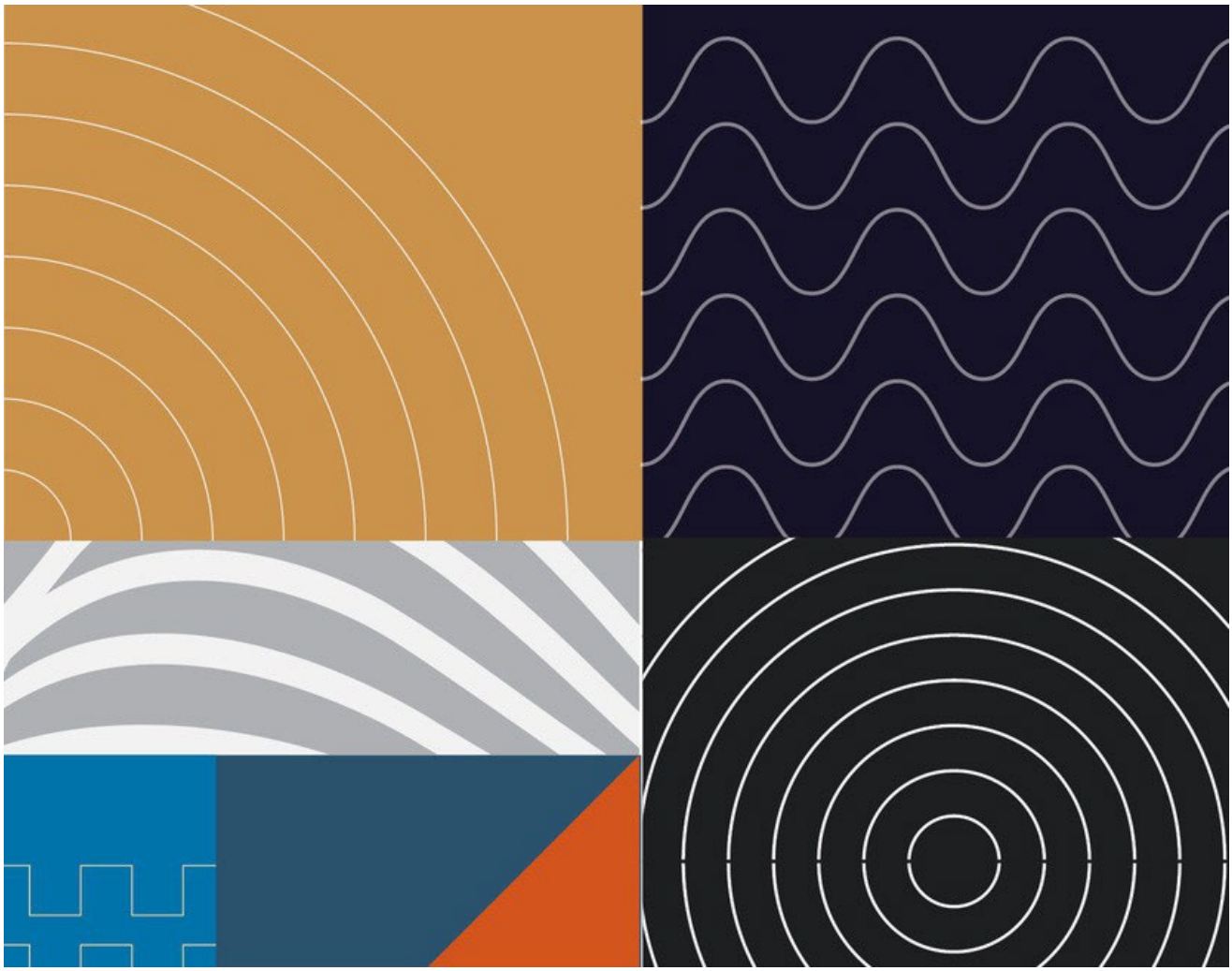

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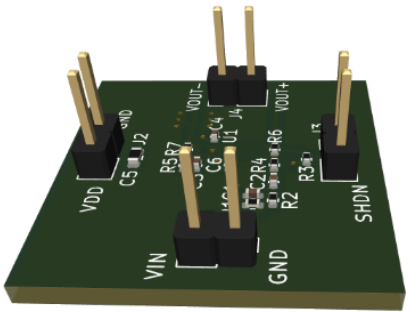
Table of Contents

New Product Introduction

PUI Audio's AMP1X1 single-channel audio amplifier board features an Analog Device's MAX98309 Class AB mono amplifier circuit for maximum signal fidelity. We opted for a cost-effective Class AB amplifier over a Class D, despite Class D's slightly higher efficiency. With most audio signals and a typical crest factor, especially for low-voltage amplifiers, the efficiency difference is minimal, and Class AB amplifiers simply deliver better sound quality.

This amplifier delivers 1.4W per channel into 8Ω loads and 2.1W per channel into 4Ω loads, both at 1% THD+N while using a 5V DC supply.



The board features a small size of 25.4mm x 25.4mm and comes with 100 mil spaced header pins for easy design prototype development.

This amplifier offers low, 1.8mA (typical, VDD = 5VDC), an excellent 110dB (typical) SNR, and high linearity expressed in its 0.008% THD+N. The amplifier features circuitry that produces high suppression of output transients when the power supply voltage is applied. Additionally, the amplifier's power supply rejection ratio (PSRR) is an outstanding 90dB.

The AMP1X1's amplifier's closed-loop gain is set by the value of external resistors.

The AMP1X1's amplifier features a pin-selectable 10ms or 100ms turn-on time. The board is set to a default 10ms turn-on time.

The AMP1X1's amplifier is designed to differentially drive loads connected between the OUT+ and OUT- pins. The output is a bridge-tied-load (BTL) meaning that speaker terminals are directly connected across the output pins. In this configuration, none of a speaker's terminals are connected to ground. This configuration has advantages over a single-ended, ground referenced load. Differential output drive doubles the output voltage across the load when compared by the drive voltage across a single-ended load. Doubling the voltage applied across a load quadruples the power dissipated by the load. Additionally, this configuration eliminates the high value coupling capacitor that is necessary for single-supply, single-ended-output audio amplifiers.

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AMP1X1 : Amplifier Evaluation Board

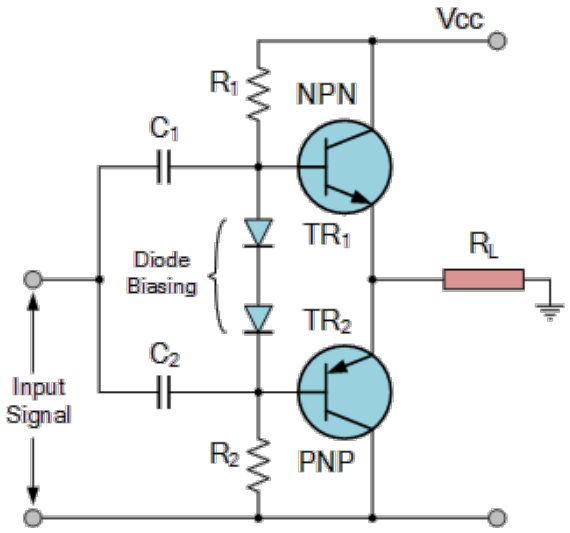

Figure 1: Generic typical Class AB, ground-referenced load audio amplifier

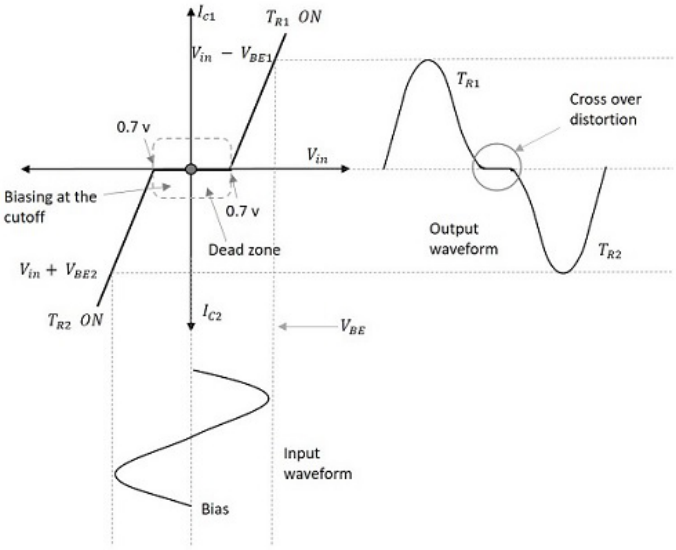

Figure 2: Waveform

Key Highlights

- Higher fidelity – approaches Class A performance.
- Amplifier output stage: the diode biasing is added to ensure that both output transistors conduct during zero-crossing, eliminating the zero-crossing non-linearity shown in Figure 2.
- Amplifier dissipation higher than Class B, but lower than Class A
- Higher efficiency: Close to that of Class B (it will be less, a result o the bias current)

Key Definitions

- **Crest Factor** in amplifier and speaker systems refers to the ratio of the peak signal level (the highest point of the waveform) to its RMS (root mean square) value, which represents the average signal level. It essentially measures how "peaky" or dynamic an audio signal is.

- **THD+N (Total Harmonic Distortion plus Noise)** is calculated as the ratio of the sum of all unwanted harmonics and noise to the total desired signal's magnitude, a method that helps explain a circuit's non-linearities. It is usually expressed as a percentage or in decibels (dB). Lower values indicate better audio performance, meaning the output signal is closer to the original input signal without significant distortion or noise.

- **SNR (Signal-to-Noise Ratio)** is a measure of how much stronger the useful signal is compared to the background noise in a system. A higher SNR means the music or speech is clearer and less affected by background noise.

- **BTL (Bridge Tied Load)** audio amplifiers connect the driven load (usually a speaker) between the output of two amplifiers. The amplifiers are configured to generate the same signal magnitude. Relative to each other's output, however, the amplifiers operate 180° out-of-phase. This configuration doubles the voltage across the load, significantly increasing the power delivered to speakers while keeping the system efficient and cost-effective, particularly in low-voltage applications.

- **PSSR** stands for **Power Supply Rejection Ratio**. It is a key parameter in amplifiers and other electronic circuits, describing how well a device can reject or suppress variations or noise that are present on the power supply voltage.

Conclusion

Class AB Amplifiers offer a balance of performance and efficiency, making them ideal for high-fidelity audio applications where linearity and low distortion are crucial.

Stay tuned for a series of amplifier evaluation boards optimized for different power levels designed for fast and efficient speaker testing or as a turn-key, ready-to-implement audio amplifier solution in a larger overall design.

View our offerings **at:**

https://puiaudio.com/products/category/accessories

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