
AN1173

PAM8908 as Audio Line Driver

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1. Revision Information

Date	Revision	Description	Comment
2021/11/03	V1.0	Initial release	
2021/11/08	V1.1	Updated Usage Cases	
2021/11/19	V1.2	Updated Unused Channel Setup	

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2. Description

The DIODES™ PAM8908 stereo headphone driver is designed for portable equipment where board space is at a premium. The PAM8908 uses a patented unique architecture to produce a ground-referenced output from a single supply, eliminating the need for large DC-blocking capacitors, saving cost, board space, and component height.

The PAM8908 delivers up to 25mW per channel into a 16Ω load and has low 0.03% THD+N.

A high power-supply rejection ratio allows this device to operate from noisy digital supplies without an additional linear regulator.

The PAM8908 operates from a single supply from 2.5V to 5.5V, has short-circuit and overtemperature protection. Shutdown mode reduces supply current to less than 1μA.

3. Advantages

- Patented three phase power line shift charge pump eliminates need for large DC-blocking capacitors
- TrueCapFree architecture, output biased at 0V (system ground)
- Excellent low-frequency fidelity
- High PSRR
- Less than 1μA shutdown current
- Support both fully differential and single-ended inputs
- Short circuit and overtemperature protection
- Selectable gain settings: -6dB, 0dB, 3dB and 6dB
- Available in space saving packages: TQFN3x3-16L

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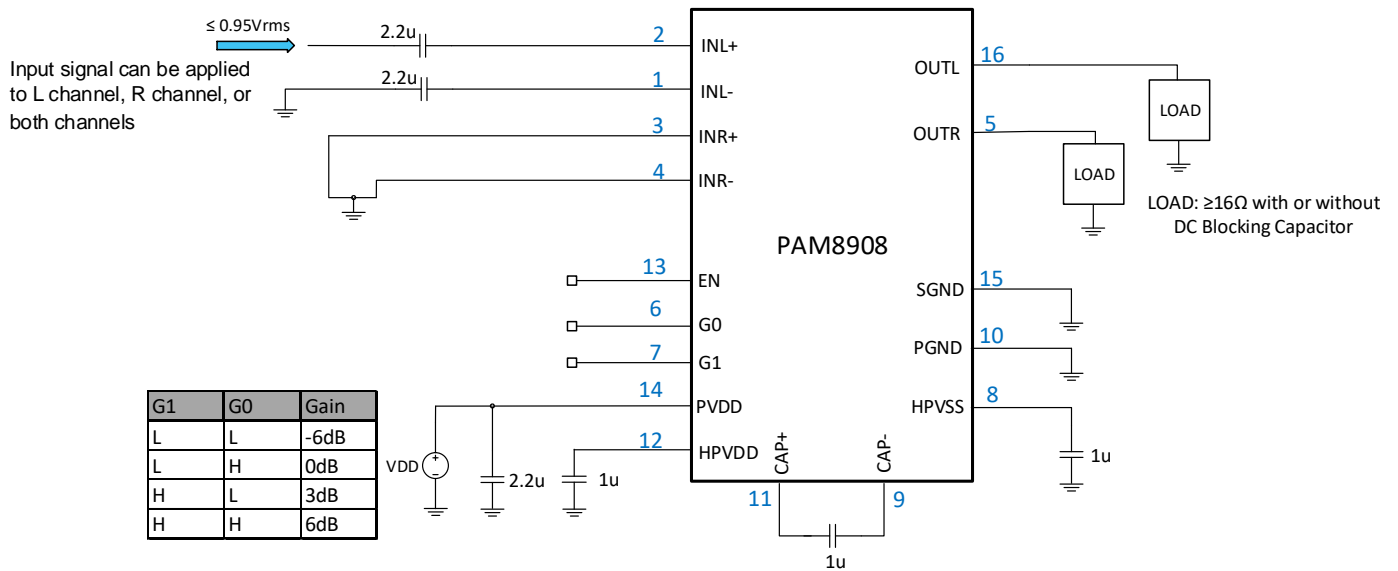
4. Recommendations for PAM8908 as Audio Line Driver

4.1 Audio IN $\leq 0.95V_{rms}$

For Audio IN $\leq 0.95V_{rms}$, no resistor divider is needed for the input signal.

If single-ended input configuration is used to drive PAM8908 (Left Channel in the example below), then it is recommended to use an identical resistor and capacitor arrangement on both the inputs to this channel (INL+ and INL-) for better audio fidelity. However, from a reliability standpoint, INL- can have any resistor and capacitor arrangement provided INL- is AC- or DC-grounded.

For the unused channel (Right Channel in the example below), there is no limitation on the external component values provided the unused audio input pins are either AC-grounded or DC-grounded. For the figure below, this applies to INR+ and INR-.



The recommended test conditions for this configuration are:

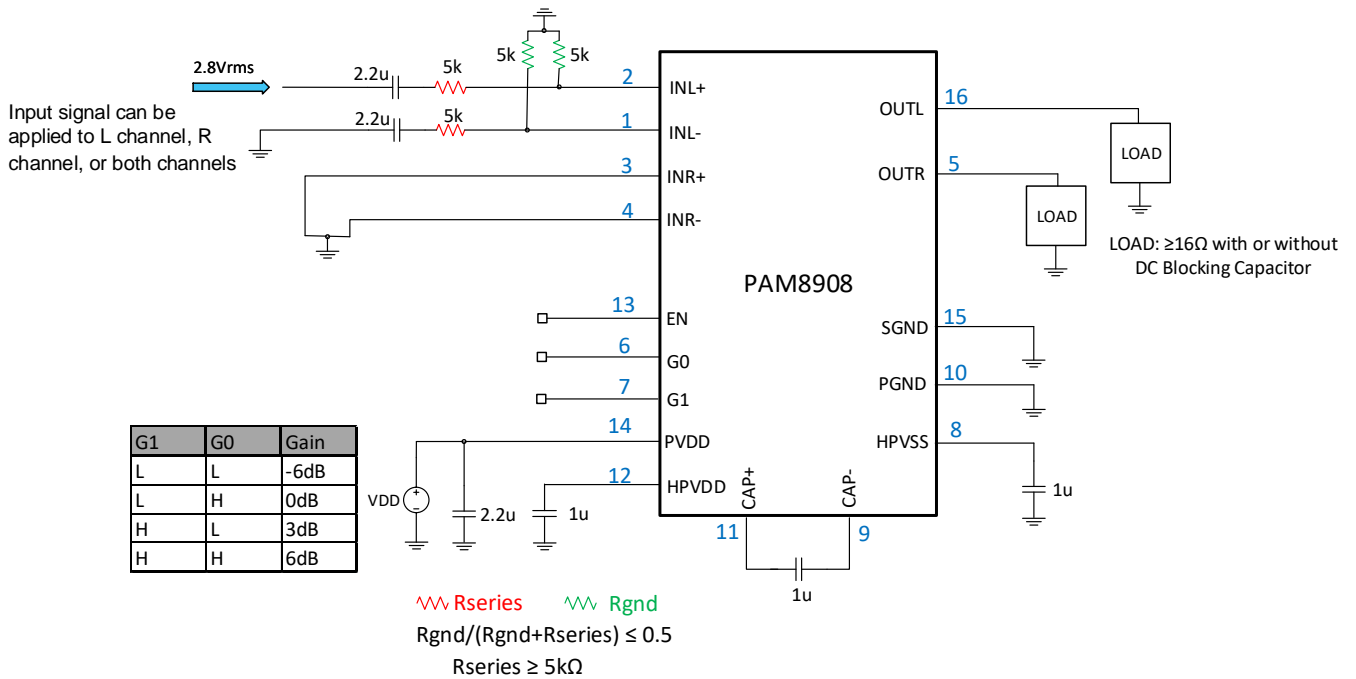
- VDD=5V, EN=5V
- VDD=GND, EN=GND
- VDD=5V, EN=GND
- VDD=Floating, EN=GND

4.2 Audio IN = 2.8Vrms

For larger Audio IN signal of up to 2.8Vrms, the following resistor divider values are recommended.

If single-ended input configuration is used to drive PAM8908 (Left Channel in the example below), then it is recommend to use identical resistor and capacitor arrangement on both the inputs to this channel (INL+ and INL-) for better audio fidelity. However, from a reliability standpoint, INL- can have any resistor and capacitor arrangement provided INL- is AC- or DC-grounded.

For the unused channel, there is no limitation on the external component values provided the unused audio input pins are either AC-grounded or DC-grounded. For the figure below, this applies to INR+ and INR-.



The recommended test conditions for this configuration are:

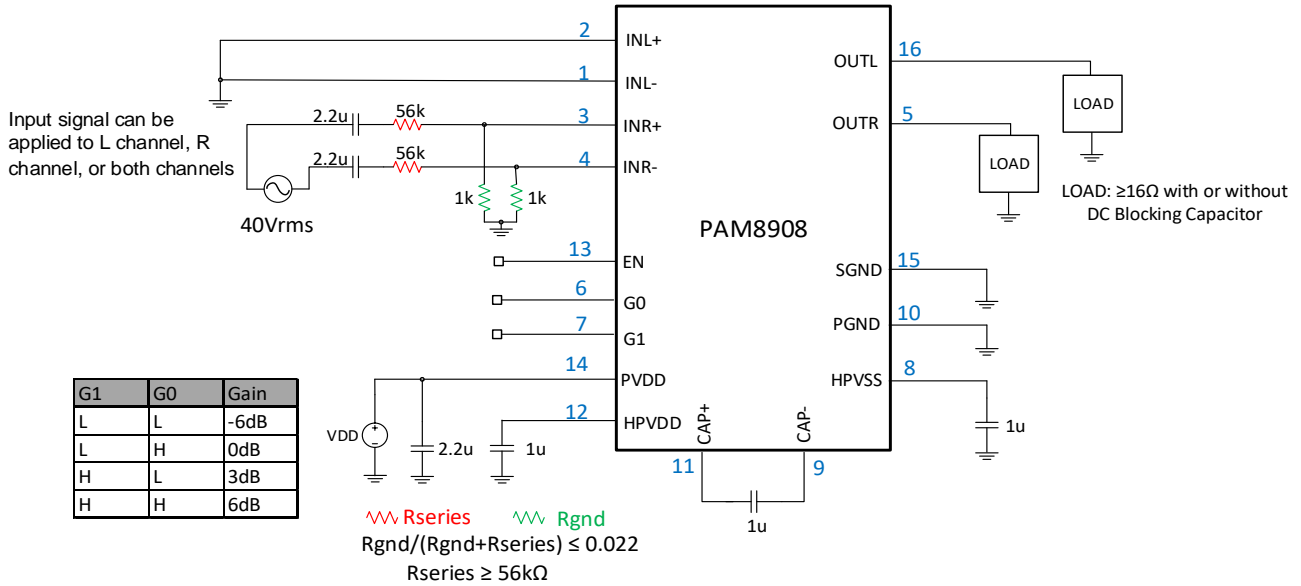
- a) VDD=5V, EN=5V
- b) VDD=GND, EN=GND
- c) VDD=5V, EN=GND
- d) VDD=Floating, EN=GND

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4.3 Audio IN = 40Vrms

For even larger Audio IN signal of up to 40Vrms, the following resistor divider values are recommended.

For the unused channel, there is no limitation on the external component values provided the unused audio input pins are either AC-grounded or DC-grounded. For the figure below, this applies to INL+ and INL-.



The recommended test conditions for this configuration are:

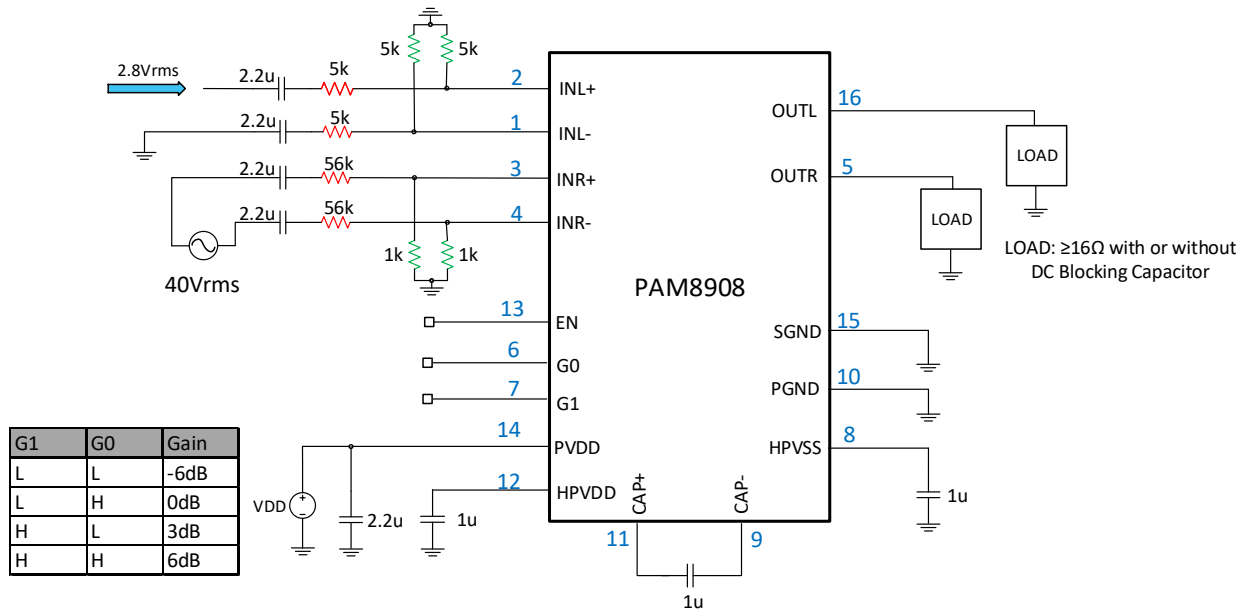
- a) VDD=5V, EN=5V
- b) VDD=GND, EN=GND
- c) VDD=5V, EN=GND
- d) VDD=Floating, EN=GND

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4.4 Combination of Signal Conditioning of L/R Channels

The signal conditioning discussed in Section 4.1 to 4.3 can be combined within one application. See below for an example.

If single-ended input configuration is used to drive PAM8908 (Left Channel in the example below), then it is recommend to use identical resistor and capacitor arrangement on both the inputs to this channel (INL+ and INL-) for better audio fidelity. However, from a reliability standpoint, INL- can have any resistor and capacitor arrangement provided INL- is AC- or DC-grounded.



The recommended test conditions for this configuration are:

- a) VDD=5V, EN=5V
- b) VDD=GND, EN=GND
- c) VDD=5V, EN=GND
- d) VDD=Floating, EN=GND

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