

## PAM8008-EV Board User Guide

## **AE Department**

#### 1. Revision Information

Date	Revision	Description	Comment
2012/06/28	V1.0	Initial Release	

### 2. PAM8008 General Description

The PAM8008 is a 2.4W, class-D audio amplifier. Advanced 64-step DC volume control minimizes external components and allows speaker volume control.

Integrated power limit technology which suppress the output signal clip automatically due to the over level input signal. It offers low THD+N, to produce high-quality sound reproduction.

PAM8008 has an additional noise reduction circuit which achieve 6dB noise attenuation. This circuit may help eliminate external filtering, thereby saving the board space and components cost.

### 3. Key Features

- 2.4W Output at 1% THD with a 4Ω Load and 5V
  Power Supply
- Filter less , Low Quiescent Current and Low EMI
- Low THD+N
- Power Limit Function to Protect Speaker when Occuring large Input
- 64-step DC Volume Control from -80dB to 20dB

- 6dB Effective Noise Reduction
- Superior Low Noise: 60µV
- Minimize Pop/Clip Noise
- High Efficiency up to 90%
- Auto Recovery Short Circuit Protection
- Thermal Shutdown
- Pb-Free Package



#### 4. EV Board Schematic

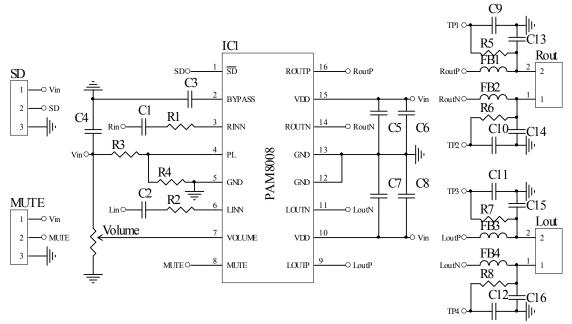


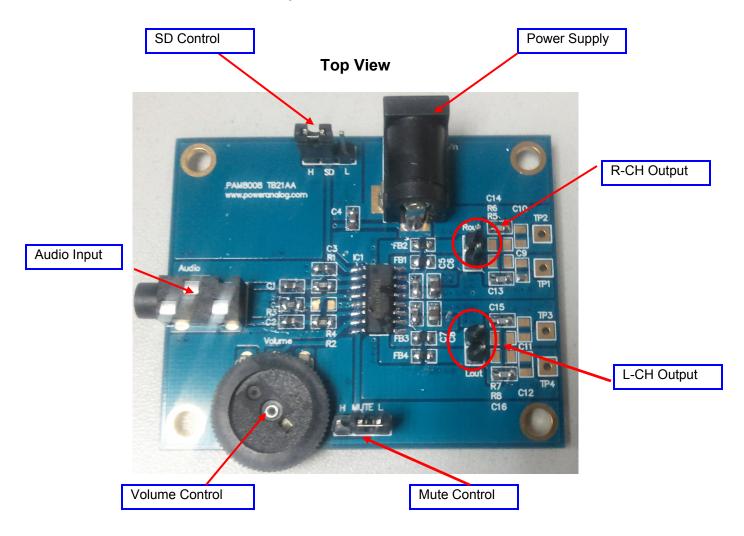
Figure 1

#### 5. PAM8008 EVB TB21AA Description

PAM8008 TB21AA is an evaluation board for the PAM8008, a stereo class-D audio power amplifier. The board is targeted to be used in providing a simple and convenient evaluation environment for the PAM8008. Requires parts, the standard RCA jacks for audio inputs, pin jacks for power supply and signal outputs etc. on the board make it easy to be evaluated.



### 6. EV Board View and Jack Description



#### **EV Board Operational Sequence:**

- a) Connect SD to a high for normal operation
- b) Connect audio input from audio input jack
- c) Connect the loading(speaker or power resistor) to the output jack
- d) Power on: 2.5V to 5.5V DC power supply



#### 7. EV Board BOM List

Item	Value	Туре	Rating	Description	Vender and port
C1,C2	0.1µF	X5R/X7R, Ceramic/0603	10V	Input coupling CAP	LMK063BJ104KP-F
C5,C7	1μF	X5R/X7R, Ceramic/0603	25V	PVDD coupling CAP,	TMK107B7105KA-T
C6,C8	10μF	X5R/X7R, Ceramic/0805	10V	PVDD main coupling CAP,	LMK107BBJ106MALT
C3	1μF	X5R/X7R, Ceramic/0603	16V	BYPASS CAP	EMK107B7105KA-T
C4	1μF	X5R/X7R, Ceramic/0603	16V	Decoupling CAP	EMK107B7105KA-T
R1, R2	0		1%	Input Resistor	
R3, R4	0Ω	0805	5%	PL select resistor	
VR1	50kΩ			Volume setting	
FB1,FB2,FB3,FB4	200Ω	0805	2A	For EMI eliminate components	
C13,C14,C15,C16	220pF	0603	25V	form a FB-CAP filter	

#### 8. External Components Selection

#### Input Capacitors (C1, C2)

- (1) Form a high pass filter with Ri, and the cut off frequency is  $fc = 1/2*\Pi*Ri*Ci$
- (2) Have a tolerance of 10% or better for matching : any mismatch in capacitance causes an importance mismatch at the corner frequency and below
- (3) Low leakage current needed, 0.1µF, X5R/X7R ceramic recommend

#### Input Resistors (R1, R2)

- (1) Limit the closed-loop gain
- (2) Form a high pass filter with Ci, and the cut off frequency is fc=1/2\*Π\*Ri\*Ci
- (3) 1% tolerance needed for resistor matching to improve CMRR, PSRR

#### Power Supply decoupling Caps (C5, C6, C7, C8)

- (1) Low ESR for good THD, PSRR
- (2) 1uF ceramic for higher frequency transients, spikes, or digital hash on the line of PVDD/AVCC
- (3) Additional 10µF or greater for low frequency noise filtering and serves as a local storage capacitor for supplying current during large signal transients on the amplifier outputs
- (4) Need place very closed to the IC

#### **Bias Voltage Capacitor (C3)**

- (1) Internal power supply for pre-amplifier,
- (2) 1uF, X5R/X7R ceramic recommend
- (3) Place very closed to the device

#### EMI Eliminate Filter (FB1, FB2, FB3 and FB4)

- (1) High impedance at high frequency and very low impedance at low frequency
- (2) The current rating is higher than 2A

### 9. PCB Layout Guidelines

#### Grounding

- (1). Use plane grounding or separate grounds
- (2). Do not use one line connecting power GND and analog GND
- (3). Output noise grounds must tie to system ground at the power in exclusively.
- (4). Signal currents for the inputs need to be returned to quite ground. This ground only ties to the signal components and the GND pin.

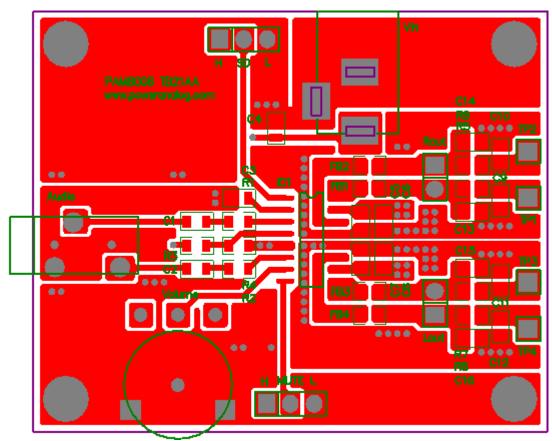
#### **Power Supply**

#### **Others**

- (1). The power supply capacitors (C5, C6, C7, C8, ) need to place very close to the PAM8008's pins.
- (2). Input capacitors (C1, C2) place closed to input pin as near as possible

### 10. PCB Layout Example

### **Top Layer**





## **Bottom Layer**

