

2. Key Features

- ◆ Built-In Battery Tracking Automatic Gain Control (AGC)
- ◆ High Efficiency Integrated Boost Converter Over 85%
- ◆ 4W into an 4Ω Load At 10% THD
- ◆ 3.3W into an 4Ω Load At 1% THD
- ◆ Operates from 2.8V to 5.2V
- ◆ Efficient Class-D Prolongs Battery Life
- ◆ Minimized ON/OFF Pop Noise
- ◆ Superior Low Noise
- ◆ High PSRR
- ◆ DC Input Protection
- ◆ Auto-Recovery Short-Circuit Protection
- ◆ Thermal Shutdown
- ◆ Available in 1.5mm X 2.0mm 12-ball WCSP

3. EV Board Schematic

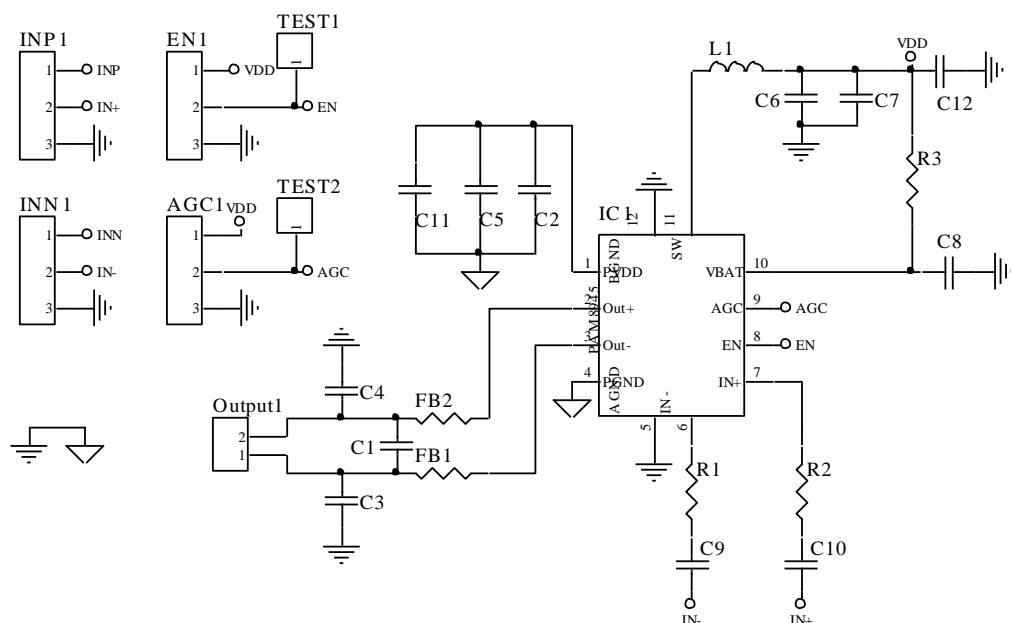


Figure 1

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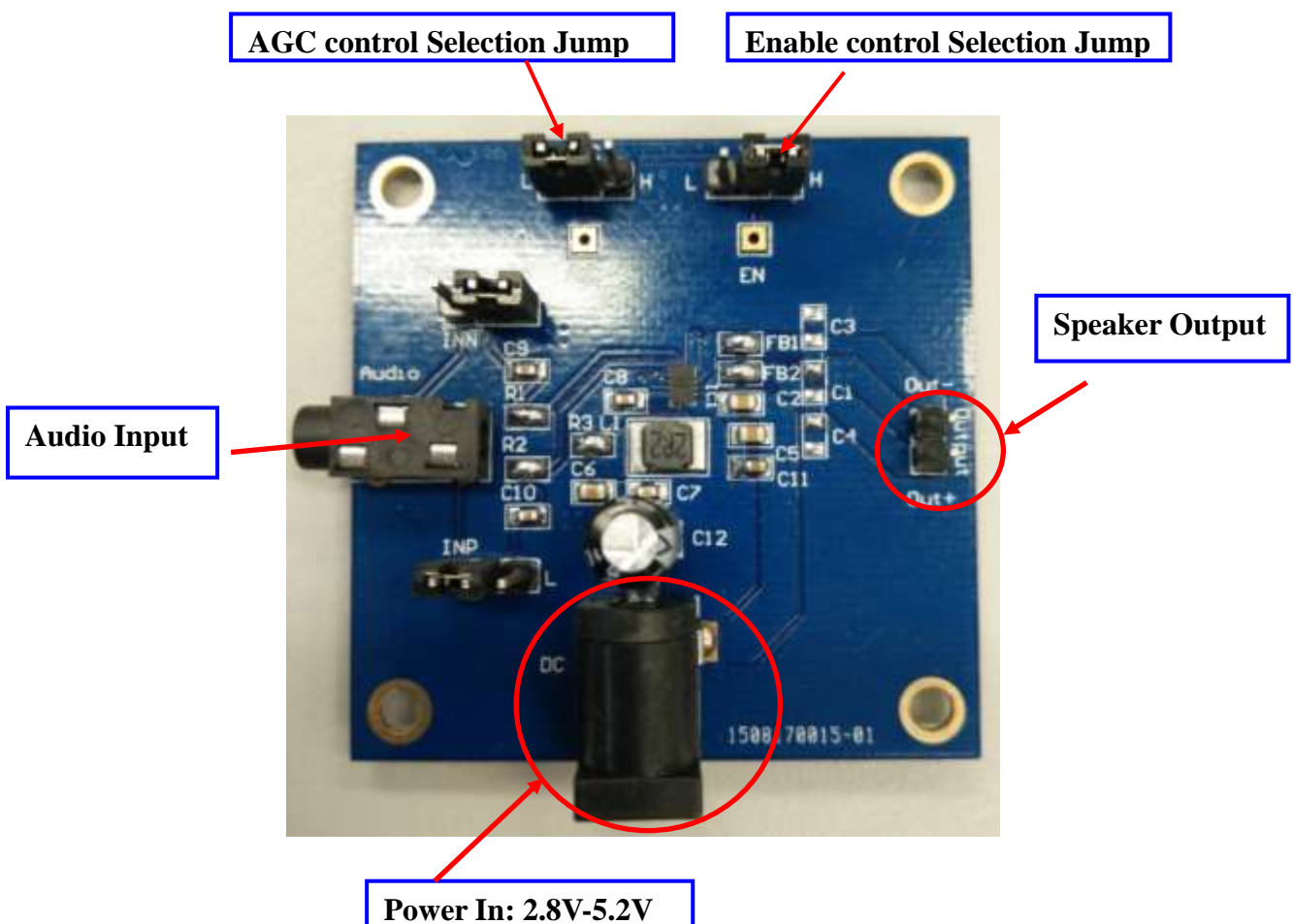
4. PAM8945 EB58AB Description

The PAM8945 is a high efficiency Class-G audio power amplifier with an integrated boost converter. It drives up to 4W (10% THD+N) into an 4Ω speaker. With 85% typical efficiency, the PAM8945 helps extend battery life when playing audio

The built-in boost converter generates the voltage rail for the output stage. This provides a louder audio output than a stand-alone amplifier connected directly to the battery. It also maintains a consistent loudness, regardless of battery voltage.

The PAM8945 features battery tracking AGC function which adjusts the Class-D gain to limit battery current at lower battery voltage.

5. EV Board View



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EV board operational sequence:

- a. Preset the power supply to between 2.8V and 5.2V.
- b. Turn off the power supply.
- c. Connect power supply to EV board power.
- d. Connect audio input from audio input jack.
- e. Connect the Speaker to the output jack
- f. Turn on the power supply

EV Board BOM List

Item	Value	Type	Rating	Description	Vender and port
C9,C10	1uF	X5R/X7R, Ceramic/0603	10V	Input coupling CAP	Taiyo Yuden EMK107B7105KA-T
C8	1uF	X5R/X7R, Ceramic/0603	10V	VBAT decoupling CAP	Taiyo Yuden EMK107B7105KA-T
C6	10uF	X5R/X7R, Ceramic/0805	10V	VBAT decoupling CAP	Taiyo Yuden LMK107BBJ106MALT
C7	1uF	X5R/X7R, Ceramic/0805	10V	VBAT decoupling CAP	Taiyo Yuden LMK107BBJ105MALT
C2,C5	10uF	X5R/X7R, Ceramic/0805	10V	PVDD decoupling CAP	Taiyo Yuden LMK107BBJ106MALT
C11	2.2uF	X5R/X7R, Ceramic/0805	10V	PVDD decoupling CAP	Taiyo Yuden LMK107B7225KA-T
C12	220uF		10V	VBAT decoupling CAP	Taiyo Yuden
R3		0805		VBAT Connection resistance	
L1	2.2uH	3.4A			SWPA4020S2R2NT sunlord
IC1		PAM8945			DIODES
FB1,FB2		1A		EMI Components	
C3,C4		220pF/10V			

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6. External Components Selection

Input Capacitors (C9,C10)

- (1). Form a high pass filter with R_i , and the cut off frequency is $f_c = 1/2\pi R_i \cdot C_i$
- (2). Have a tolerance of 10% or better for matching: any mismatch in capacitance causes an importance mismatch at the corner frequency.
- (3). Low leakage current needed, 1uF, X5R/X7R ceramic

Power Supply decoupling Caps (C6, C7,C8,C12)

- (1). Low ESR for good THD, PSRR
- (2).C6,C7, C8 Additional 1uF /10uF 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
- (3). VBAT decoupling need place electrolytic capacitor 220uF/10
- (4).Need place very closed to the IC

7. 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

- (1) VBET and Boost Converter need to be separated and tied together at the system power supply.
- (2) Recommend that the all the trace could be routed as short and thick as possible.
- (3) Any barricade placed in the trace could result in the bad performance of the amplifier.

Components Placement

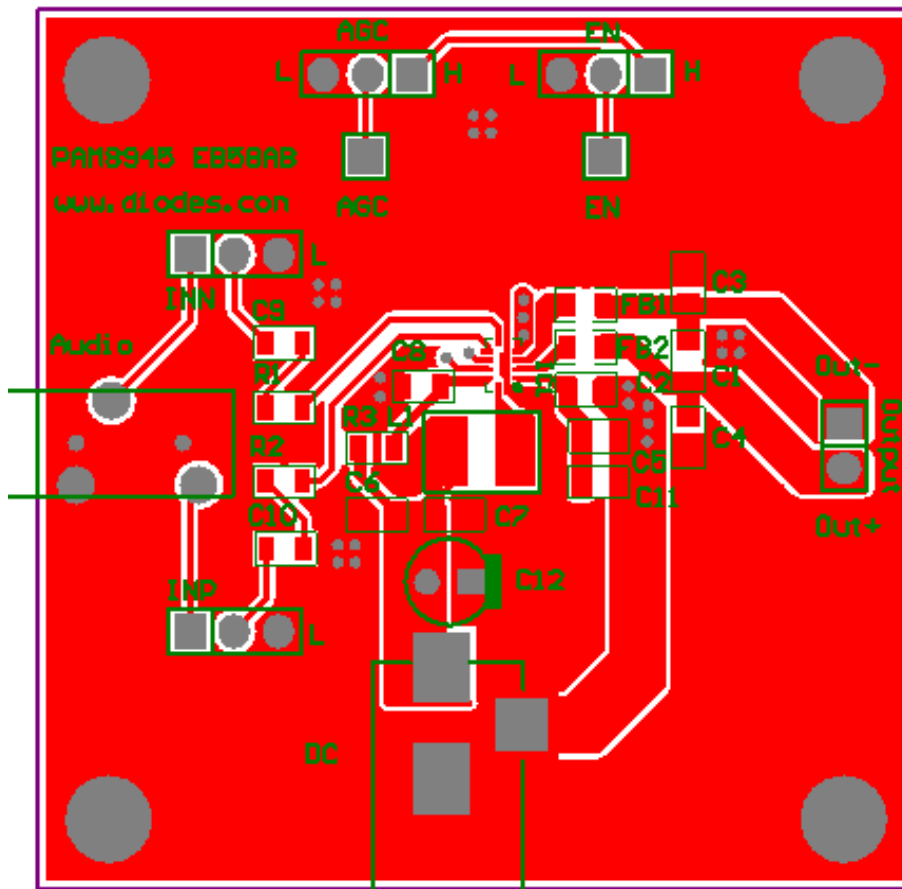
- (1). The power supply capacitors (C6,C7) need to place very close to the L1 pins.
- (2).The power supply capacitors (C8) need to place very close to the PAM8945 VBAT pins.
- (3). Input capacitors (C9,C10) place closed to input pin as near as possible

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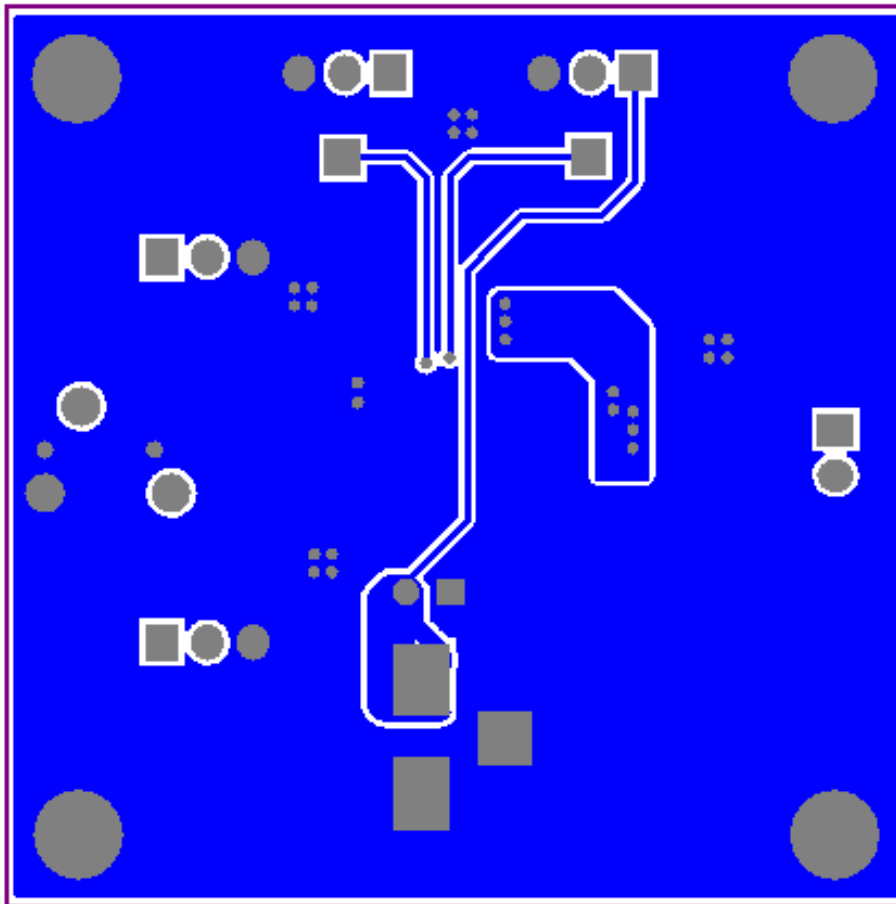
8. PCB Layout Example

Top Layer



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Bottom Layer



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