

# IS31AP2010B 3W@5.0V MONO FILTER-LESS CLASS-D AUDIO POWER AMPLIFIER

## DESCRIPTION

The IS31AP2010B demo board is a fully assembled and tested PCB that uses the IS31AP2010B Class-D power amplifier to drive a 4Ω speaker (or larger) in audio applications such as cellular handsets, the earpiece and mobile phones. Designed to operate from a 2.7V to 5.5V DC power supply, the demo board accepts a single-ended or differential input signal. The demo board provides a BTL output capable of delivering 3W into a 4Ω speaker at 5V.

## FEATURES

- Supply voltage range from 2.7V to 5.5V
- Delivers 3W into a 4Ω speaker at 5V supply. (THD+N=10%).
- Delivers 1.68W into an 8Ω speaker at 5V supply. (THD+N=10%)
- Available in UTQFN-9 package

## QUICK START



Figure 1: Photo of IS31AP2010B Evaluation Board

## RECOMMENDED EQUIPMENT

- 5.0V, 2A power supply
- Audio source (i.e. MP3 player, Notebook PC, etc.)
- 8Ω or 4Ω speaker

## ABSOLUTE MAXIMUM RATINGS

- ≤ 5.5V power supply

**Caution: Do not exceed the conditions listed above; otherwise the board will be damaged.**

## PROCEDURE

The IS31AP2010B demo board is fully assembled and tested. Follow the steps listed below to verify board operation.

**Caution: Do not turn on the power supply until all connections are completed.**

- 1) Connect 4Ω (or larger) speaker across the OUT-terminal and OUT+ terminal.
- 2) Connect the ground terminal of the power supply to the GND and the positive terminal to the VCC. Or connect DC power to connector (DC IN).
- 3) If the audio source is differential, remove jumper JP1, connect the negative of the audio source to the IN- terminal, and connect the positive of the audio source to IN+ terminal.
- 4) If the audio source is single-ended, connect the audio source to the IN+ terminal, and close jumper JP1; or connect audio source to the audio connector (AUDIO IN) and close jumper JP1.
- 5) Turn on the power supply.
- 6) Turn on the audio source.

## ORDERING INFORMATION

Part No.	Temperature Range	Package
IS31AP2010B-UTLS2-EB	-40°C ~ +85°C (Industrial)	UTQFN-9, Lead-free

Table 1: Ordering Information

For pricing, delivery, and ordering information, please contact ISSI's analog marketing team at [analog@issi.com](mailto:analog@issi.com) or (408) 969-6600.

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## DETAILED DESCRIPTION

The IS31AP2010B demo board features the IS31AP2010B Class-D power amplifier IC, designed to drive speaker impedance of 4Ω or larger.

## CUSTOMIZING THE GAIN

The IS31AP2010B demo board is shipped with a gain of 18.4dB and is set by resistors R<sub>1</sub> (R<sub>1</sub>, R<sub>2</sub>). Change resistors R<sub>1</sub> and R<sub>2</sub> to reconfigure the gain of the board. Gain determined in Equation (1) and refer to IS31AP2010B data sheet for more detail.

$$Gain = \frac{2 \times 150k\Omega}{R_1} \left( \frac{V}{V} \right) \quad (1)$$

## HIGH-PASS FILTER

The input capacitors C<sub>1</sub> (C<sub>5</sub>, C<sub>4</sub>) and input resistors R<sub>1</sub> (R<sub>1</sub>, R<sub>2</sub>) form a high-pass filter with the corner frequency, f<sub>c</sub> determined in Equation (2).

$$f_c = \frac{1}{(2\pi R_1 C_1)} \quad (2)$$

## SHUTDOWN MODE

Jumper (JP2) controls the shutdown pin of the IS31AP2010B IC. Connect the shunt across pin 1 and 2 of the jumper (JP2) to enter the shutdown mode of the board.

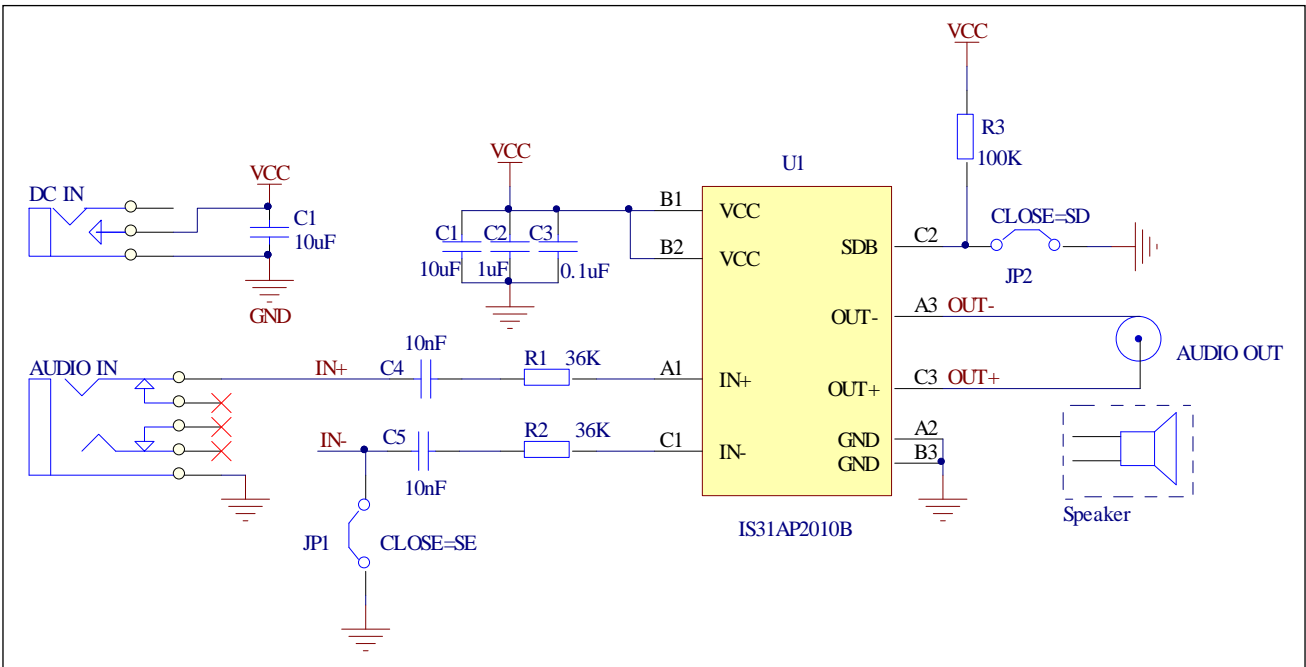


Figure 2: IS31AP2010B Application Circuit



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**BILL OF MATERIALS**

Name	Symbol	Description	Qty	Supplier	Part No.
Amplifier	U1	Class-D power amplifier	1	ISSI	IS31AP2010B
Resistor	R1,R2	RES,36k,1/16W,±1%,SMD	2	Yageo	RC0603FR-0736KL
Resistor	R3	RES,100k,1/16W,±5%,SMD	1	Yageo	RC0603JR-07100KL
Capacitor	C1	CAP,10µF,10V,±20%,SMD	1	Yageo	CC0805KKX7R6BB106
Capacitor	C2	CAP,1µF,50V,±10%,SMD	1	Yageo	CC0603KKX7R9BB105
Capacitor	C3	CAP,0.1µF,50V,±10%,SMD	1	Yageo	CC0603KKX7R9BB104
Capacitor	C4,C5	CAP,10nF,50V,±10%,SMD	2	Yageo	CC0603KKX7R9BB103
Connector	DC IN	2.5mm DC connector	1		
Connector	AUDIO OUT	RCA -type connector	1		
Connector	AUDIO IN	3.5mm min connector	1		

*Bill of materials, refer to Figure 2 above.*

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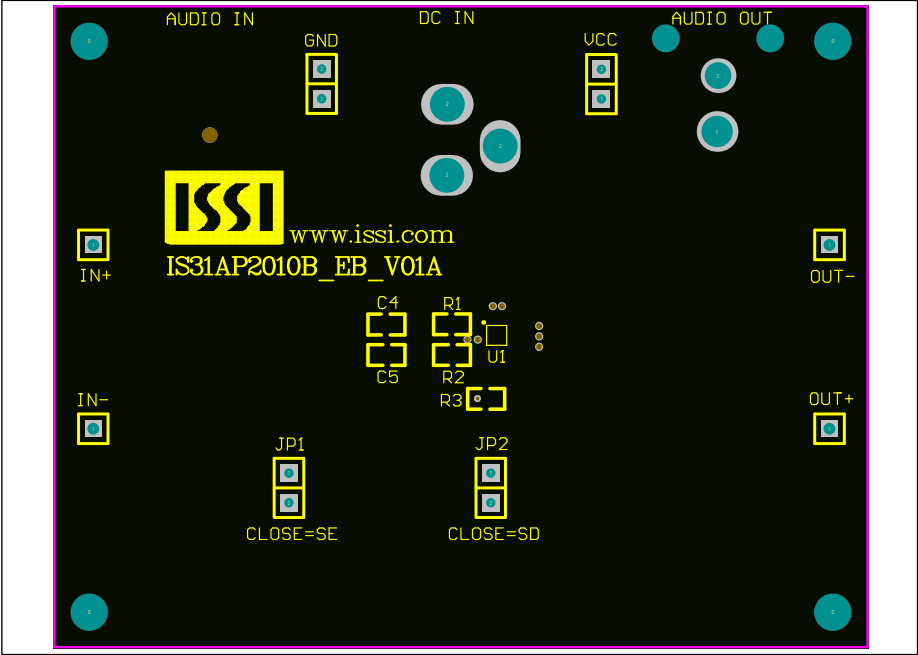


Figure 3: Board Component Placement Guide - Top Layer

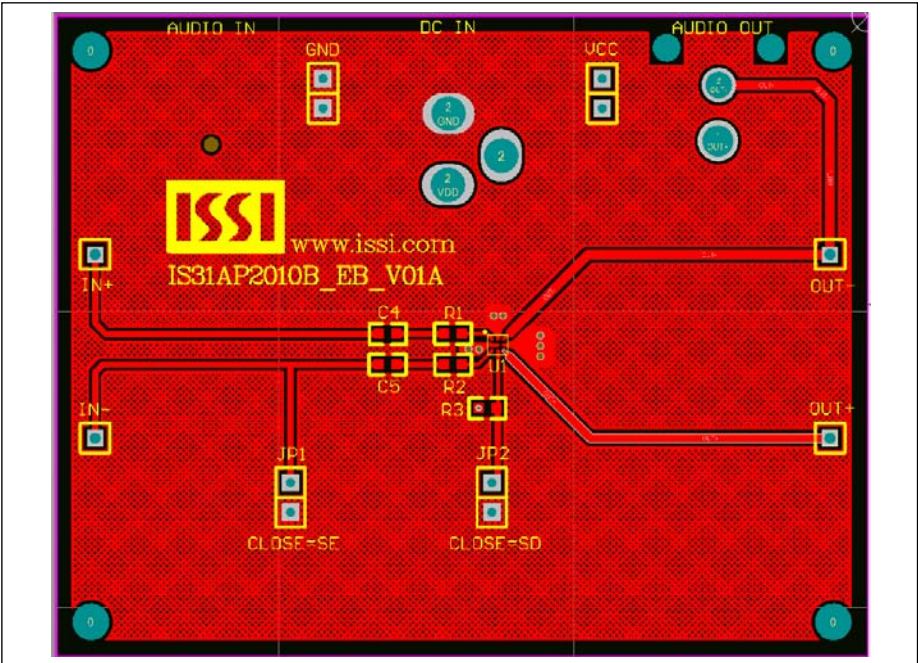
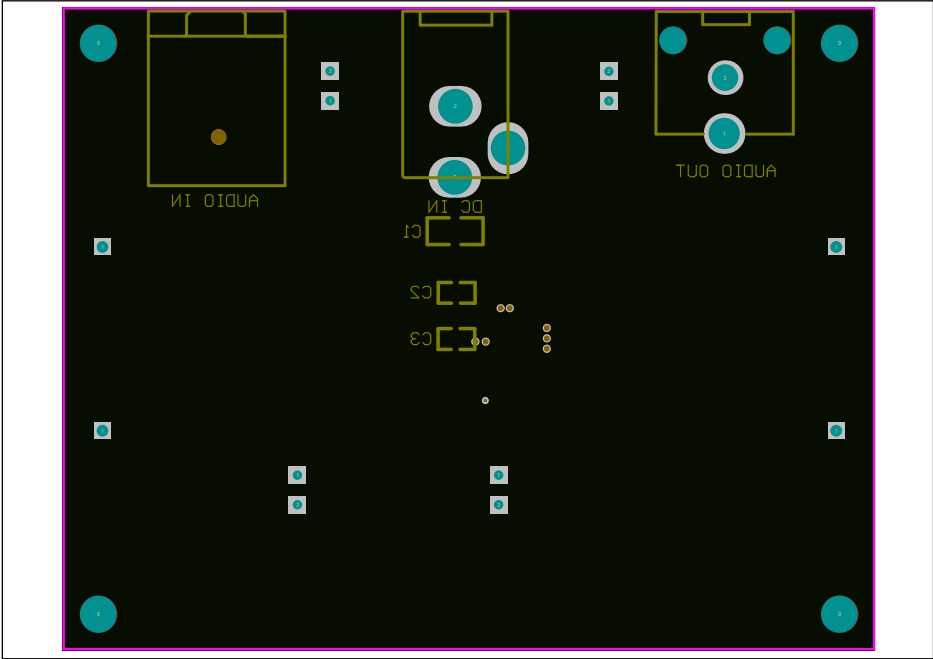
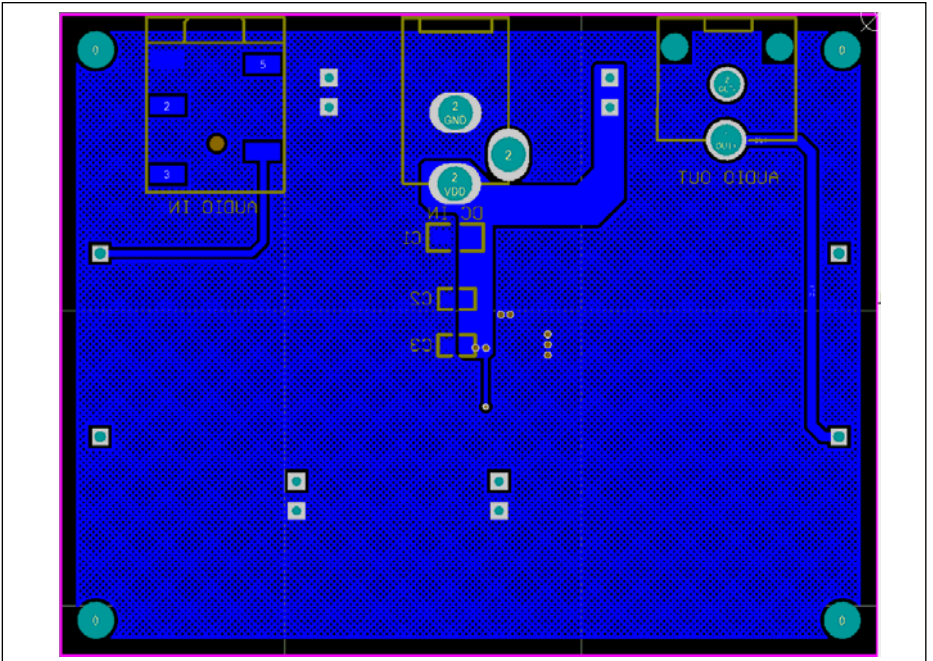


Figure 4: Board PCB Layout - Top Layer

**IS31AP2010B 3W@5.0V MONO FILTER-LESS CLASS-D  
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**Figure 5: Board Component Placement Guide - Bottom Layer**



**Figure 6: Board PCB Layout - Bottom Layer**

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