

# IS31AP2005 CLASS-D AUDIO AMPLIFIER

## DESCRIPTION

The IS31AP2005 demo board is a fully assembled and tested PCB that uses the IS31AP2005 Class-D power amplifier to drive an 8Ω or 4Ω speaker in portable audio applications. 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 2.6W into a 4Ω speaker at 5V.

## FEATURES

- Supply voltage range from 2.7V to 5.5V
- Delivers 2.6W into a 4Ω speaker at 5V supply (THD+N=10%)
- Delivers 1.8W into an 8Ω speaker at 5V supply (THD+N=10%)
- Available in MSOP-8 and DFN-8 packages

## QUICK START

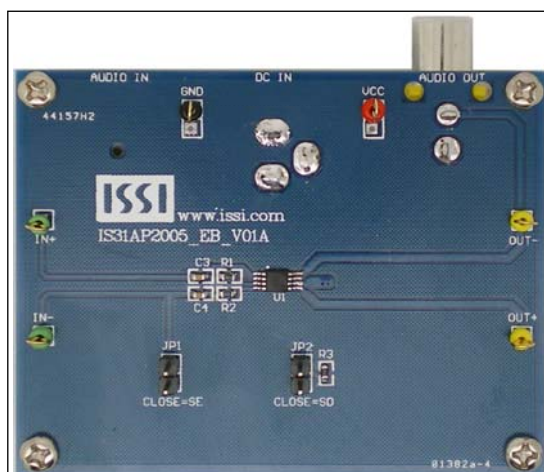


Figure 1: Photo of IS31AP2005 Evaluation Board

## 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 IS31AP2005 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 a 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           |
|--------------------|----------------------------|-------------------|
| IS31AP2005-SLS2-EB | -40°C ~ +85°C (Industrial) | MSOP-8, Lead-free |

Table 1: Ordering Information

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

## IS31AP2005 CLASS-D AUDIO AMPLIFIER

### DETAILED DESCRIPTION

The IS31AP2005 demo board features the IS31AP2005 Class-D power amplifier IC, designed to drive speaker impedance of 4Ω or larger.

### CUSTOMIZING THE GAIN

The IS31AP2005 demo board is shipped with a gain of 18.4dB and is set by resistors  $R_1$  ( $R_1$ ,  $R_2$ ). Change resistors  $R_1$  and  $R_2$  to reconfigure the gain of the board. Gain determined in Equation (1) and refer to IS31AP2005 data sheet for more detail.

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

### HIGH-PASS FILTER

The input capacitors  $C_1$  ( $C_3$ ,  $C_4$ ) and input resistors  $R_1$  ( $R_1$ ,  $R_2$ ) form a high-pass filter with the corner frequency,  $f_c$  determined in Equation (2).

$$f_c = \frac{1}{(2\pi R_I C_I)} \quad (2)$$

### SHUTDOWN MODE

Jumper (JP2) controls the shutdown pin of the IS31AP2005 IC. Connect the shunt across pin 1 and 2 of the jumper (JP2) to enter the shutdown mode of the board.

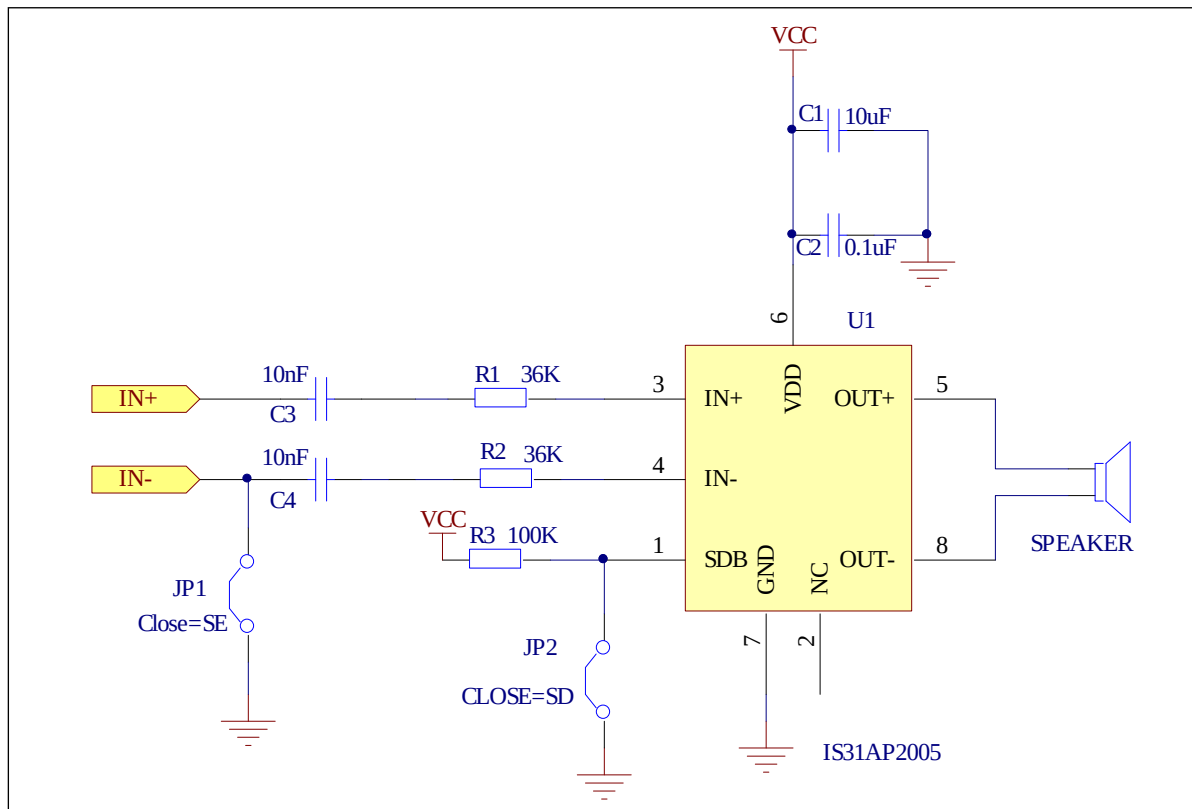


Figure 2: IS31AP2005 Application Circuit

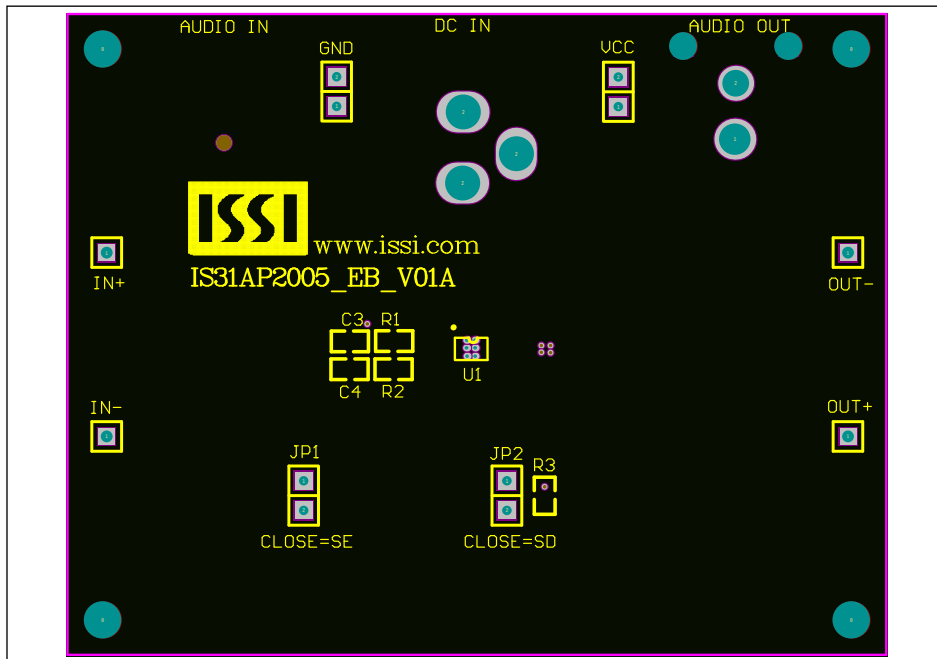
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### BILL OF MATERIALS

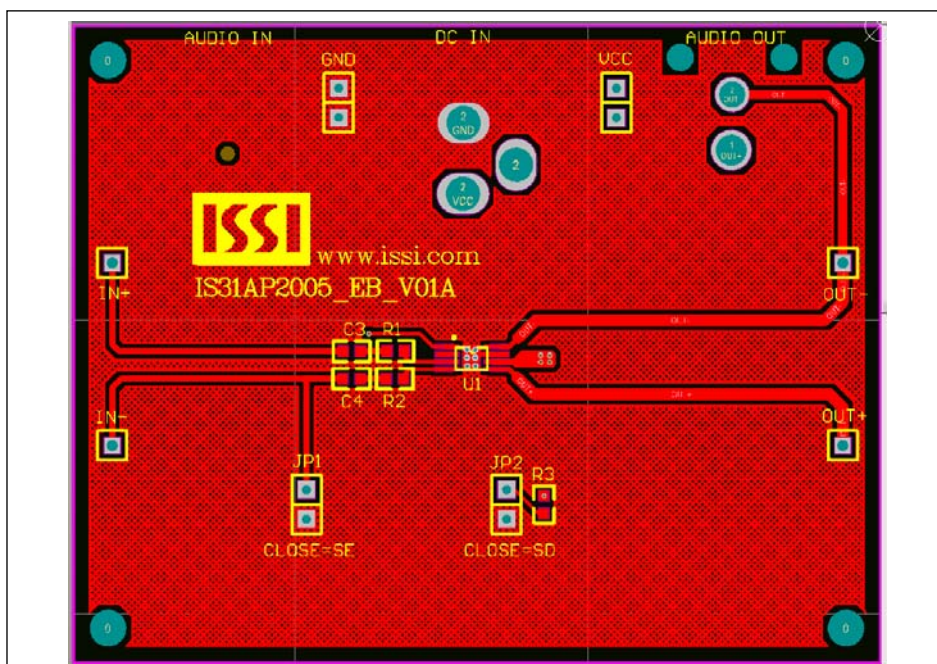
| Name      | Symbol    | Description              | Qty | Supplier | Part No.          |
|-----------|-----------|--------------------------|-----|----------|-------------------|
| Amplifier | U1        | Class- D power amplifier | 1   | Lumissil | IS31AP2005        |
| Resistor  | R1,R2     | RES,36k,1/16W,±1%,SMD    | 2   | Yageo    | RC0603FR-0720KL   |
| 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,0.1µF,50V,±10%,SMD   | 1   | Yageo    | CC0603KKX7R9BB104 |
| Capacitor | C3,C4     | CAP,0.1µF,50V,±10%,SMD   | 2   | Yageo    | CC0603KKX7R9BB104 |
| 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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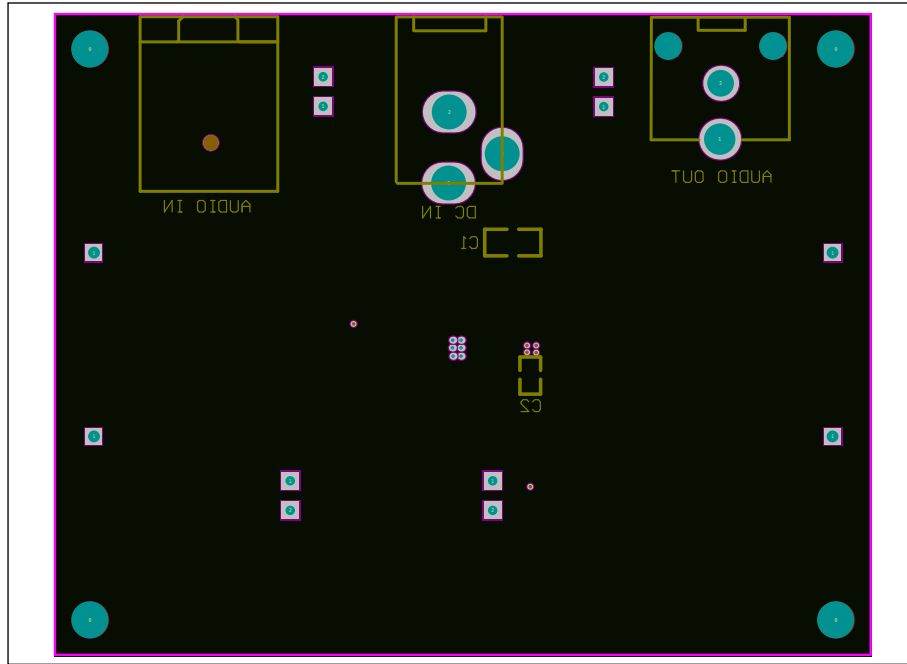


**Figure 3: Board Component Placement Guide - Top Layer**

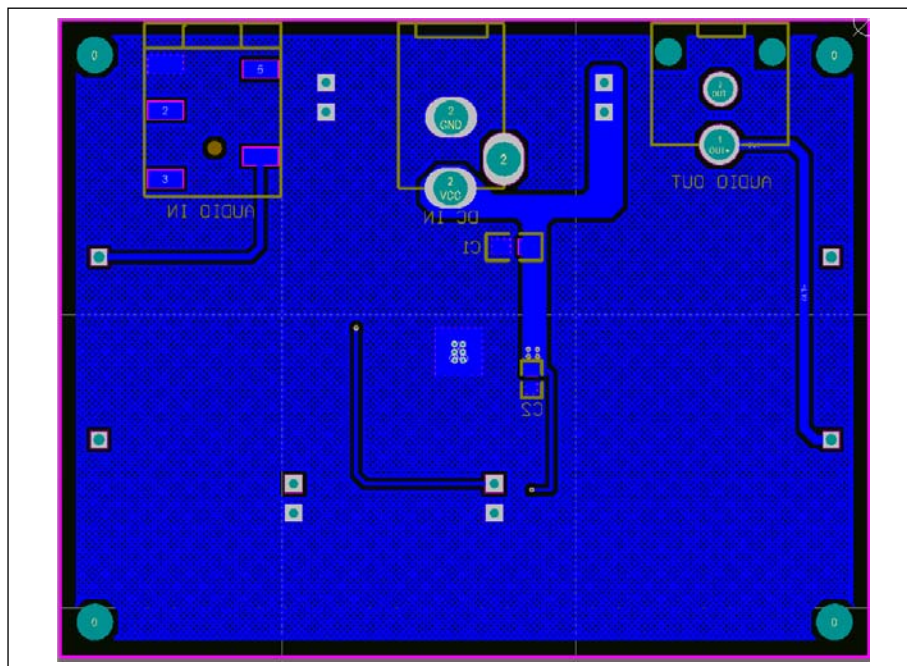


**Figure 4: Board PCB Layout - Top Layer**

## IS31AP2005 CLASS-D AUDIO AMPLIFIER



**Figure 5: Board Component Placement Guide - Bottom Layer**



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

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