IS31AP2031
Class-G Ceramic Audio Amplifier Evaluation Board Guide

Description

The IS31AP2031 is a Class-G, highly efficient Ceramic audio amplifier, ideal for use in mobile solutions. The device operates with an input voltage range of 2.7V to 4.5V, and it delivers 2W of high fidelity sound output. (Typical ratings with an 8.0Ω load). Selectable gain, first-line pulse, and automatic gain control (AGC) are features that work together to enable the device to output high quality sound. The evaluation board should allow for a simple demonstration of the ceramic amplifier's characteristics, notably its ability to deliver quality sound at an unbeatable price.

Features

- Operating voltage range: 2.7V - 4.5V
- 2.0W audio output power @
- (VCC=4.2V, RL=8Ω, THD+N=10%)
- 4 Selectable Gain Levels:
  (12dB, 16dB, 24dB, 27.5dB)
- Automatic Gain Control (AGC)
- First-line Pulse Control mode
- Pop-and-Click Suppression
- Thermal Overload Protection
- Short circuit Protection

Quick Start

Figure 1: IS31AP2031 Evaluation Board

Recommended Equipment

- 2.7V to 4.5V DC power supply
- Audio input source (media player, Audio In)
- 8Ω-rated speakers (minimum)

Absolute Maximum Ratings

- ≤4.5V DC power supply
- ≥8Ω Audio speaker

Caution: Do not exceed listed parameters; damage may be caused to the chip otherwise.

Procedures

The IS31AP2031 evaluation board is designed for demonstration and evaluation of the IC's broad spectrum of electrical and audible characteristics.

Caution: Before powering on, please ensure that all circuit components are safely assembled, with special attention to Audio input, output, and jumper.

1. If stereo, connect both ends of the speaker output to the OUT+ & OUT- terminals. If mono, connect to the AUDIO OUT terminal.
2. Connect the power supply's positive terminal to the board's VCC pin and the negative terminal to the GND. Alternatively, a DC supply may be directly connected to the DC IN pin.
3. If the input source is differential, the first jumper cap (CLOSE=SE) is disconnected, and the positive source input is connected to INP pin, with the negative connected to INN.
4. If the source is single-ended, first close jumper cap (CLOSE=SE), followed by the audio receiving terminal INN. The sound source to GND and demo board is connected to floating (INP); audio to the 3.5mm Block AUDIO IN also needs jumper to be in closed configuration.
5. Switch on the power to the DC power supply and audio input source to begin device evaluation.

EVB Ordering Information

Part Number	Temperature Range	IC Package
IS31AP2031-QFLS2-EB	-45°C to +80°C (Industrial)	QFN-20

Table 1: IS31AP2031 Evaluation Board Order Information

For additional information regarding ordering, pricing, and delivery, please contact ISSI at analog_mkt@issi.com or (408) 969-6600.

Device Operation

The device enables high level of sound fidelity output in part because of its low operating frequency. Lines are copper wire with 0.75mm diameter. Audio signal interference filters compensate for any distortions in input signal. The signal filters are situated close to the speaker and away from RF-sensitive components, specifically the boost converter, to minimize EMI. A cooling plate beneath the chip on the PCB facilitates efficient thermal dissipation. The capacitors are located near the OUT+ and OUT- pins. The recommended wire diameter specification is greater than or equal to 0.55mm.

Gain Selection

IS31AP2031 has four modes of operation; the configuration is done via the first-line pulse control SDB pin on the evaluation board. A 4-button switch allows for easy mode changing, and a signal lamp will indicate which mode is currently on. The default mode is 4: (gain of 27.5dB, and open the AGC), and additional operational information can be referenced in the IS31AP2031 datasheet.

- Mode A: Gain = 12.0 dB, AGC = ON
- Mode B: Gain = 16.0 dB, AGC = ON
- Mode C: Gain = 24.0 dB, AGC = ON
- Mode D: Gain = 27.5 dB, AGC = ON

High-pass filter

The input resistance (RINN1) and input capacitance (CINN1), as seen in Figure 2's Schematic, constitute a high-pass filter with a specific cut-off frequency, denoted by "f_c" . For modes A and B, the cut-off frequency is determined by solving equation (1).

$$\mathbf{f_C = \{2\,\pi[(R_{RIN1}) + 30K\Omega] \times C_{CIN1}\}^{-1}} \quad (1)$$

For modes C and D, the cut-off frequency can be found by using the following equation (2).

$$\mathbf{f_C = \{2\,\pi[(R_{RIN1}) + 5K\Omega] \times C_{CIN1}\}^{-1}} \quad (2)$$

The input capacitance plays a critical role in the level of bass present at the device outputs.

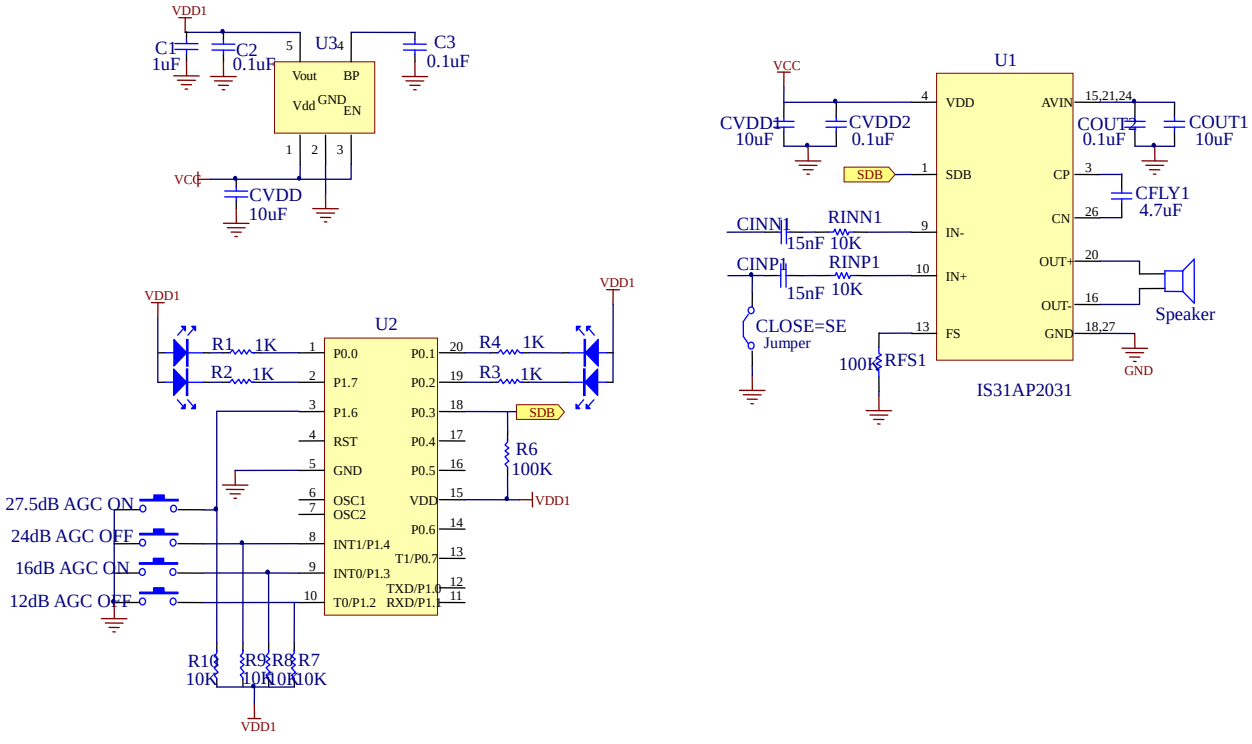

Figure 2: IS31AP2031 Evaluation Board Circuit Schematic

Bill of Materials

Name	Symbol	Description	Qty	Supplier	Part No.
Capacitor	CVDD,CVDD1,COUT1	10.0μF±10% 10V	3	-	-
Capacitor	CVDD2,COUT2	0.1μF±10% 10V	2	-	-
Capacitor	CINN1,CINP1	15nF±10%,10V	2	-	-
Resistor	RINN1,RINP1	10kΩ±5%	2	-	-
Resistor	RFS1	100kΩ±5%	1	-	-
Capacitor	CFLY1	4.7μF±10%	1	-	-
Audio Amplifier	U1	Class-G Ceramic	1	ISSI	IS31AP2031-QFLS2-TR

Table 2: Bill of Materials. Please refer to schematic and device datasheet for more information.

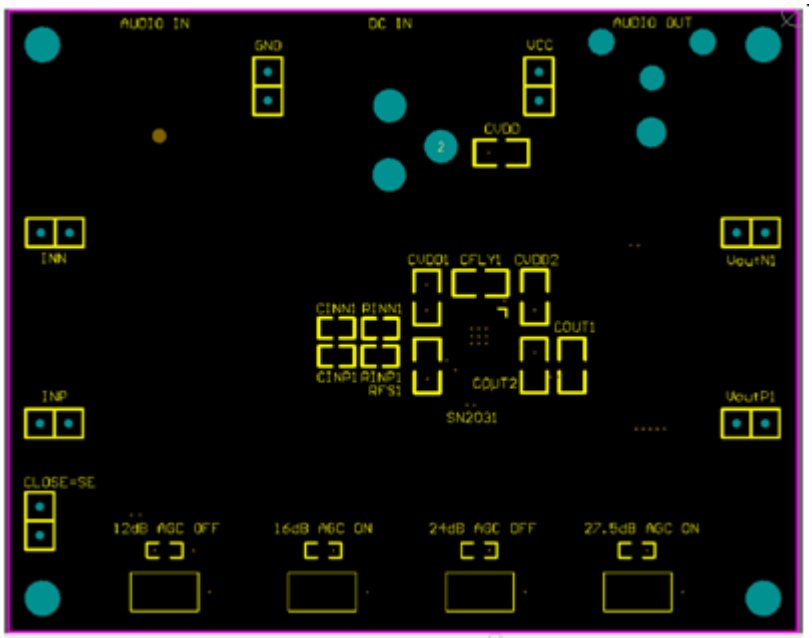

Figure 3: PCB Component Placement Guide- Topside

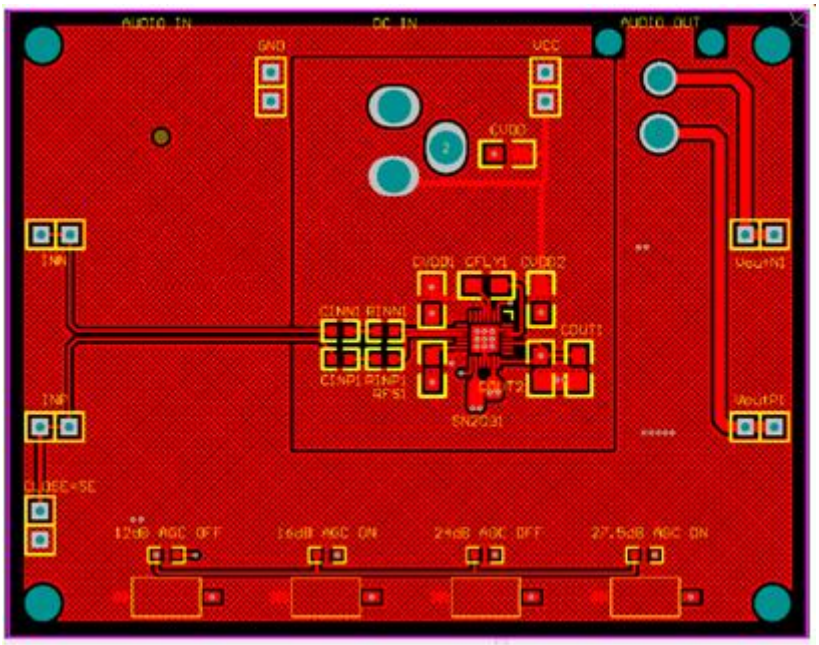

Figure 4: PCB Layout- Topside

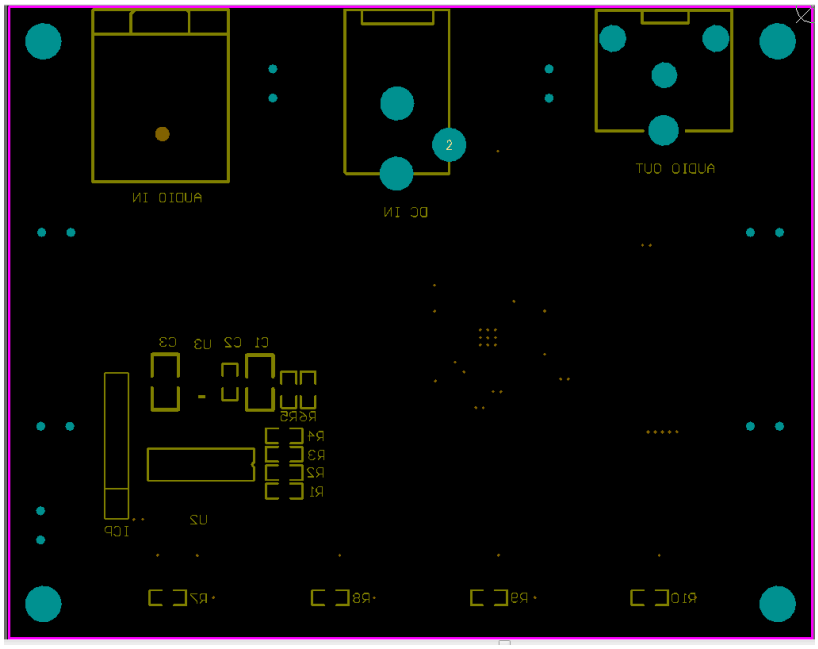

Figure 5: PCB Layout- Underside

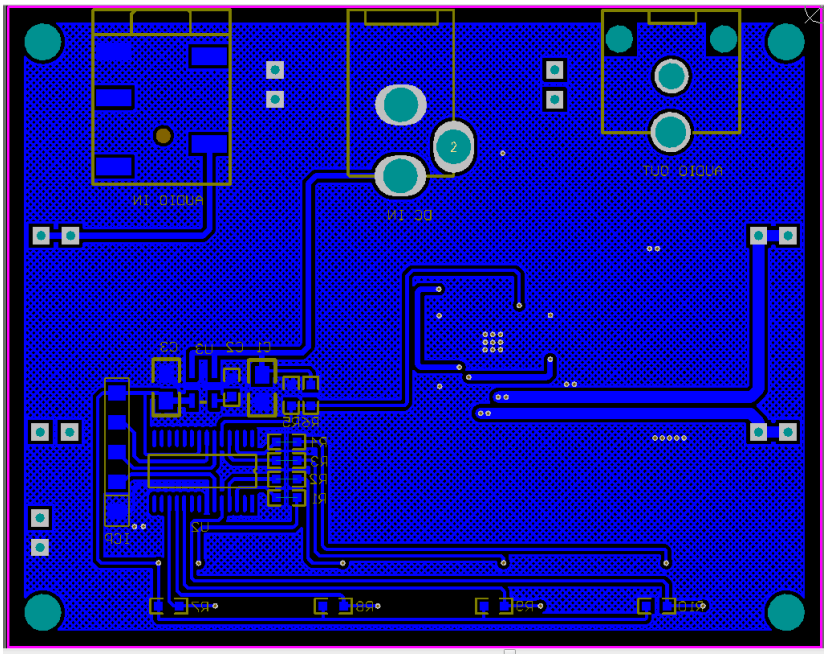

Figure 6: PCB Component Placement Guide- Underside