

How to adjust the audio amplification of an optocoupler



Overview

Using Opto Couplers Because the CTR of an optocoupler can be expected to reduce over time, it is common practice to choose a value for I F somewhat Optocou.

Key Takeaways

The audio amplification of an optocoupler can be adjusted primarily by selecting the appropriate input LED bias and output load resistor, and optionally using feedback for linearity. Input LED Bias

To control the output amplitude, the LED driving current must be properly biased. In audio applications, the LED should operate in its linear region, where the AC audio signal modulates the LED current without driving the optocoupler into saturation or cutoff. This ensures that the phototransistor or photodiode output accurately follows the input signal. A DC bias is applied to the LED so that the audio signal can vary the current around this operating point .

Output Load Resistor

The load resistor (R_L) connected to the phototransistor or photodiode output directly affects the output signal amplitude. A higher load resistor increases the output voltage swing, effectively amplifying the signal, but it also reduces bandwidth, limiting high-frequency response. Conversely, a lower resistor improves bandwidth but reduces amplitude. Choosing R_L is a compromise between desired gain and frequency response .

Feedback for Linearity

For specialized audio optocouplers like the IL300, a second photodiode provides feedback to the LED, which stabilizes the current transfer ratio (CTR) and improves linearity. This feedback mechanism reduces distortion caused by temperature changes or LED aging, allowing for more consistent audio amplification over time .

Phototransistor Configuration

The phototransistor can be configured in common emitter, common collector (emitter follower), or photodiode mode. Using the base as a photodiode reduces Miller capacitance, increasing bandwidth but lowering output amplitude. The choice of configuration also affects the achievable gain and frequency response .

Practical Tips

- Ensure the LED is biased so the audio signal does not push the optocoupler into saturation.
- Adjust the load resistor to balance amplitude and bandwidth.
- Consider using optocouplers with feedback for high-fidelity audio applications.
- For general-purpose optocouplers like the 4N25, linear operation is limited, so expect lower output amplitude and narrower bandwidth compared to specialized audio optocouplers . By carefully setting the LED bias, load resistor, and feedback, you can effectively control the audio amplification of an optocoupler while maintaining signal fidelity.

Article Content

Optoelectronic Feedback Control Techniques for Linear and

A DC coupler optical isolation amplifier using the new IL300 linear optocoupler is shown in figure 6. This optical isolation amplifier

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