Negative Control Dimming Module Circuit Diagram



Overview

The presented circuits are a universal motor drive, and a light dimmer operating from the 110/240 V mains.

Key Takeaways

A negative control dimming module typically uses a current-sinking 0-10V input to adjust light output, where 0V corresponds to full dimming and 10V to full brightness.

Overview

A negative control dimming module operates by sinking current from the LED driver's 0-10V control line. In this configuration, the LED driver acts as a voltage source, and the dimmer reduces the voltage by drawing current, effectively dimming the light. This is common in commercial LED systems where the dimmer is designed to pull the control voltage down to adjust brightness.

Basic Circuit ComponentsLED Driver (Voltage Source): Provides a constant 0-10V output for dimming control. Control Input (Dimmer Module): Connects to the +DIM and –DIM lines of the driver.

Current-

Sinking Element: Typically a MOSFET or transistor that pulls the +DIM line toward 0V.

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Potentiometer or DA

C: Provides adjustable control voltage to the gate/base of the MOSFET. Resistors: Limit current and set the dimming curve. Optional Microcontroller: For digital control, zero-cross detection, or PWM-based dimming.

Example Negative Control CircuitCodeCopy+12V (from driver) ----+----+DIM | R1 | Potentiometer | Gate of N-MOSFET |GND ----------+---- -DIM Operation: The MOSFET acts as a current sink. When the potentiometer is adjusted, it changes the gate voltage, controlling how much current is drawn from the +DIM line. At maximum sink (gate fully on), the voltage at +DIM approaches 0V, dimming the light to minimum.

At minimum sink (gate off), +DIM remains near 10V, giving full brightness.

Advanced Considerations

Microcontroller Integration: Using an MCU (e.g., STM32 series) allows precise dimming curves, touch or push-button interfaces, and zero-cross detection for AC loads.

Triac-

Based Negative Control: For AC dimming, a triac can be triggered in a phase-cut configuration, with the MCU controlling the gate in a negative logic manner. Wire Length and Resistance: Long control wires can introduce voltage drops; ensure the dimmer can sink sufficient current to maintain proper dimming levels. Safety: Always isolate AC mains from low-voltage control circuitry and follow proper insulation and grounding practices.

Summary

A negative control dimming module uses a current-sinking approach to reduce the 0-10V control voltage from the LED driver, dimming the light. The core components include a MOSFET or transistor, resistors, and a potentiometer or MCU for control. This setup is widely used in commercial LED systems and can be adapted for both analog and digital dimming applications.

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Article Content

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The function of the negative control dimming module

The positive wire is connected to the dimming control output of the dimmer switch or control system, while the negative wire is connected to the common or ground terminal of the ballast or driver.

Dimmer circuit using SCR

We put the parts includes S2, LDR, and RA-33K, 1/2W or RB to the AC dimmer circuit. Turn-on a switch-S2, this circuit becomes the automatic light switch circuit.

0-10 V Control Topology APP NOTE (048587)

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For the control, it is the shape of the curve plotted using the commanded % of light from the system (for example, the dimmer''s slider position) against the output voltage on the 0-10 V line.

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To grab these points, we have to use a zero crossing detector. The figure-2 demonstrates the schematic diagram of the whole circuit. R1, R2, IC1 , D1, and C3 build the zero crossing

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Dimming Techniques for Switched-Mode LED Drivers

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Two popular methods for dimming LEDs in switched-mode driver circuits exist: Pulse-Width Modulation (PWM) dimming and analog dimming. Both methods control the time-averaged current through the

Dimmer-Control

PRODUCT DESCRIPTION Remotely controlled light dimming module is designed to work with various types of light sources. It may be connected to two-wire or three-wire configuration so it can operate

DC Dimmer Circuit: A Comprehensive Guide

A DC dimmer circuit allows you to control the brightness of a light or adjust the speed of a motor in direct current (DC) applications. Unlike AC dimmers that work with alternating current, DC

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