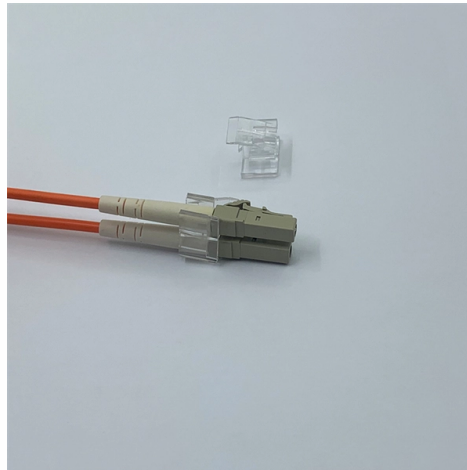


Regulated power supply formed by optocoupler



AI Overview

An optocoupler enables isolated feedback in a regulated power supply, allowing the output voltage to be controlled while maintaining electrical isolation between the primary and secondary circuits. How It Works In isolated power supplies, such as switch-mode power supplies (SMPS) or linear supplies, the optocoupler transmits feedback from the secondary (output) side to the primary (input) side without a direct electrical connection, ensuring safety and noise immunity. The secondary side monitors the output voltage using a precision shunt regulator (e.g., TL431 or LT1431) and a resistor divider. Any deviation from the desired voltage causes the shunt regulator to adjust the current through the optocoupler's LED. The LED emits light proportional to the current, which is detected by a phototransistor on the primary side. The phototransistor converts the light back into an electrical signal that modulates the PWM controller's duty cycle, forming a closed-loop feedback system that stabilizes the output voltage under varying load and input conditions. Key Design Considerations Current Transfer Ratio (CTR): The phototransistor's output current is proportional to the LED input current, defined by the CTR. Variations in CTR due to temperature, bias, or aging can affect regulation accuracy. Biasing: Proper LED current and phototransistor setup are critical to maintain loop stability and transient response. Loop Compensation: The feedback loop often includes compensation networks to prevent oscillations and ensure fast response to load changes. Isolation and Safety: Optocouplers provide galvanic isolation, meeting safety standards and protecting low-voltage circuits from high-voltage hazards. Practical Implementation A typical configuration pairs the optocoupler with a secondary-side error amplifier. The error amplifier senses the output voltage and drives the optocoupler LED. On the pr...

Article Content

Optoelectronic Feedback Control Techniques for Linear and Switch

Specifically, it will cover control techniques using standard phototransistors and a new family of linear optocouplers. National and international safety agencies require a supply's output to be isolated and

Using Opto Couplers

Designing Optocoupler Interfaces The main purpose of an optocoupler interface is to completely isolate the input circuit from the output circuit, which normally means there will be two completely separate

Opto-emulators improve reliability for isolated DC/DC

Typically, the limiting factor in the bandwidth of an isolated power supply is the bandwidth of the optocoupler. This bandwidth is limited by the

Optocoupler

Optocoupler Designer's Guide About This Designer's Guide Agilent Technologies optocouplers can be used in an array of isolation applications ranging from power supply and motor control circuits to data

Design Tutorial: Power-supply optocoupler basics

A clear understanding of these basics helps prevent noisy feedback, poor regulation, loop instability, and isolation or reliability problems in practical power-supply designs.

Understanding Optocoupler Biasing for Stable Isolated SMPS Feedback

This article explains how to correctly bias optocouplers—covering LED current, current transfer ratio (CTR), and phototransistor setup—to keep your power supply accurate, stable, and

ANP113 | Feedback loop compensation of a current-mode Flyback

Application Notes Feedback loop compensation of a current-mode Flyback converter with optocoupler ANP113 by Eleazar Falco 01. INTRODUCTION AND THEORETICAL BACKGROUND

Design Tutorial: Power-supply optocoupler basics

The use of an optocoupler also acts to break ground loops, and this functionality is valuable in eliminating common-mode noise, especially for systems working at the higher operating

Design Tutorial: Power-supply optocoupler basics

The most common device used in power-supply feedback is a phototransistor optocoupler. Inside the package, an infrared LED faces a phototransistor across an insulating gap.

Optocouplers in Switching Power Supplies

The most widely used insulation for optocouplers in switch-mode power supply is reinforced insulation (class II). The following information enables the designer to understand the safety aspects, the basic

Design Tutorial: Power-supply optocoupler basics

An optocoupler-isolated power supply is often the safest and most practical way to go when it comes to performance and protection. Here's the basics on today's LED/photodetector

Isolated power conversion: making the case for secondary-side control

All regulated power supplies require a feedback link from the output to control the power stage. When isolation is necessary, designers traditionally use

The function and connection of optocoupler in switching power supply

The function and connection of optocoupler in switching power supply Commonly used optocoupler models for feedback include TLP521, PC817, etc. Taking TLP521 as an example, this

Optocoupler_Feedback_Drive_Techniques_Using_the_UC3901_and_

In addition to the simple regulation of output voltage, several other housekeeping functions can be performed on the secondary side of the power supply - all with a single integrated controller. Fault

Optocoupler Feedback in Isolated Power Supplies: Analysis & Design

Analysis and control design of isolated power supplies using optocoupler feedback. Loop gain analysis, TL431 limitations, and design guidelines.

Design Tutorial: Power-supply optocoupler basics

Power-supply designs that run the optocoupler LED continuously near its maximum rating may regulate correctly when new but drift, lose transient margin, or fail startup and load

Regulated Power Supply: What are they? (Plus Circuit Diagram)

What is a Regulated Power Supply? A regulated power supply transforms unregulated AC (Alternating Current) into a stable DC (Direct Current). It guarantees consistent output despite

Don't Let Your Feedback Loop Fall Flat: Bias Your ...

Selecting an optocoupler with an appropriate and tightly specified CTR ensures consistent loop gain, even under temperature variations and aging. Together, these design

switch mode power supply

I often see this in practical SMPS designs. An optocoupler & voltage reference pair is used for informing the controller section about the output voltage level. However, when I read the

switch mode power supply

Many low power offline supplies use PSR flybacks. I'm also not sure that PSR provides better efficiency. In some cases, they need a clamp diode on the output that wastes power at light or

Effect of Optocoupler Parameter Variations on the Control ...

Isolated power supplies with secondary-side regulation need a feedback path to the primary side across the galvanic isolation. Very common is the use of an optocoupler in the feedback

Design Tutorial: Power-supply optocoupler basics

The main value of the optocoupler is that it carries an analog control signal across the barrier with low cost, small size, and compatibility with high-volume power-supply controllers. It also allows the

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