Optocoupler-driven operational amplifier



Overview

LOC Series Linear Optocouplers This application note describes isolation amplifier design principles for the LOC Series linear optocoupler devices. It desc.

Key Takeaways

An optocoupler-driven operational amplifier uses an optocoupler to provide galvanic isolation while transferring a signal, with feedback from a photodiode ensuring linearity and accurate amplification.

Basic Concept

An optocoupler consists of an LED on the input side and a photodetector (phototransistor or photodiode) on the output side, separated by an optical barrier to provide electrical isolation. When current flows through the LED, it emits light that activates the photodetector, generating a proportional current on the output side. This allows DC or AC signals to be transmitted across isolated circuits without direct electrical connection.

Driving an Operational AmplifierIn an optocoupler-driven op-amp, the photodetector output is connected to the op-amp input, often in a feedback configuration. The IL300 optocoupler is a common example, where two PIN photodiodes are used: one for servo feedback and one for the output signal. The servo photodiode monitors the LED flux and adjusts the LED current to linearize the response, compensating for temperature variations and LED nonlinearity.

The output photodiode then produces a current that accurately tracks the input signal, which is fed into the op-amp to maintain precise amplification.

© 2026 CGWEB NETWORK INFRASTRUCTURE - All rights reserved

Key Features

Galvanic Isolation: The LED-photodiode barrier prevents high voltages or noise from affecting the op-amp input, protecting sensitive circuits. Linearity: Feedback from the servo photodiode ensures that the output current is proportional to the input signal, minimizing distortion. Bandwidth and Stability: Properly designed optocoupler-driven op-amps can achieve high common-mode rejection, wide bandwidth, and stable gain, suitable for industrial sensors, medical transducers, and isolated power supply feedback.

Applications: These circuits are used in isolated measurement systems, precision analog signal transmission, and situations where safety or noise immunity is critical.

Operational Summary

Input voltage drives the LED in the optocoupler.

LE

D light intensity is proportional to the input signal. Servo photodiode monitors LED flux and adjusts current to maintain linearity. Output photodiode generates a current proportional to the input.

Op-amp receives the photodiode current and amplifies it, providing an isolated, accurate output. This principle allows accurate, isolated signal amplification without the complexity of transformers or digital isolation schemes, making it ideal for precision analog applications.

Article Content

LOC Series Linear Optocouplers

This application note describes isolation amplifier design principles for the LOC Series linear optocoupler devices. It describes the circuit operation in photoconductive and photovoltaic modes and provides

Optoelectronic Feedback Control Techniques for Linear and Switch

This optical isolation amplifier uses an operational amplifier (U1) as an electro-optical servo amplifier that controls the LED current. The servo photodiode is operated in the photovoltaic mode and is zero

Precision Analog Isolation Amplifier Using HCNR201 Optocoupler

An operational amplifier (OP AMP) labeled as U3 is used with PD1 optocoupler to sense light intensity output from the optocoupler''s LED and automatically adjusts the current that flows

© 2026 CGWEB NETWORK INFRASTRUCTURE - All rights reserved

Microsoft Word

In this chapter we will discuss the basic operation of the op amp, one of the most common linear design building blocks. In section 1 the basic operation of the op amp will be discussed. We will concentrate

ADALM2000 Activity: Optocouplers | Analog Devices

In this activity, you will construct an optocoupler from an infrared LED and an NPN phototransistor. You will investigate the operation of an optocoupler-based analog isolation amplifier and floating current

IL300 Optocoupler Amplifier Design Guide | PDF | Amplifier ...

This 3 sentence summary provides the high level information about the document: The document discusses linear amplifier circuit designs using the IL300 optocoupler, covering its coupling

Optocoupler Tutorial and Optocoupler Application

This type of optocoupler configuration forms the basis of a very simple Solid State Relay application. It can be used to control any AC mains powered loads such as lamps, motors or resistive

Designing Linear Amplifiers Using the IL300 Optocoupler

It covers the IL300''s coupling specifications, and circuit topologies for photovoltaic and photoconductive amplifier design. Specific designs include unipolar and bipolar responding amplifiers. Both single

Designing Linear Amplifiers Using the IL300 Optocoupler Application ...

photoconductive amplifier design. Specific designs include unipolar and bipolar responding amplifiers. Both single ended and differential amplifier configurations are discussed.

Optocoupler_Feedback_Drive_Techniques_Using_the_UC3901_and_

OPTOCOUPLER FEEDBACK DRIVE TECHNIQUES USING THE UC 3901 AND UC3903 Numerous techniques and devices are available to the designers of optocoupler feedback circuits. The more

Activity: Optocouplers. [Analog Devices Wiki]

Activity: Optocouplers. Objective: In this activity you will construct an optocoupler from an infra-red LED and an NPN photo transistor. You will investigate the operation of an optocoupler based analog

Optocoupler Tutorial for Beginners

© 2026 CGWEB NETWORK INFRASTRUCTURE - All rights reserved

An optocoupler uses light to transfer signals from one circuit over to another. This guide shows you how they work and how to use them.

Optoelectronic Feedback Control Techniques for Linear and Switch

A DC coupler optical isolation amplifier using the new IL300 linear optocoupler is shown in figure 6. This optical isolation amplifier uses an operational amplifier (U1) as an electro-optical servo amplifier that

10 MBd High-Speed Optocoupler Design Guide

Figure 6 is a standard BJT optocoupler with a nominal input drive current of 10 mA and a nominal output load of 1 k . Figure 7 represents the output of a 10-MBd high speed device under similar conditions.

Optocoupler Application Note

Optocoupler Application Note Example of a High Voltage OP AMP Circuit Notes / Application Considerations • Complimentary transistor pair (Q1 and Q2) drives optocoupler LED''s producing

Optocoupler Circuits | Nuts & Volts Magazine

The Figure 14 circuit''s optocoupler phototransistor is wired between the input and ground of the driven (right-hand) TTL IC because a TTL input needs to be pulled down to below 800mV at 1.6mA to

Designing Linear Amplifiers Using the IL300 Optocoupler

Isolation amplifiers using the IL300 are not plagued with the drift problems associated with standard phototransistors. The following analysis will show how the servo operation of the IL300 eliminates the

Application Examples

INTRODUCTION Optocouplers are used to isolate signals for protection and safety between a safe and a potentially hazardous or electrically noisy environment. The interfacing of the optocoupler between

© 2026 CGWEB NETWORK INFRASTRUCTURE - All rights reserved

Contact Us

Continue your research online:

Website: https://cgweb.co.za
Technical inquiry: https://cgweb.co.za/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 CGWEB NETWORK INFRASTRUCTURE - All rights reserved