Laser diode inside the optical drive



Overview

ROHM offers laser diodes (LDs) for Light Detection and Ranging (LiDAR). This application note will introduce ROHM''s LD line-up and show how to design the drive circuits of ROHM LDs.

Key Takeaways

A laser diode in an optical drive emits a focused, coherent light beam that reads and writes data on discs, with its performance controlled by precise current regulation and temperature management.

Function in Optical Drives

In optical drives such as CD, DVD, and Blu-ray players, the laser diode (LD) serves as the light source that interacts with the disc surface. The diode emits a coherent, narrow-wavelength beam that reflects off the disc's pits and lands, allowing the drive's photodetector to read digital data. For writing, the laser intensity is modulated to alter the disc's surface, encoding information.

Types and Wavelengths

Optical drives use different laser diodes depending on the disc type: CDs: Infrared laser (~780 nm)DVDs: Red laser (~650 nm)Blu-ray: Blue-violet laser (~405 nm) The wavelength determines the data density and the ability to focus on smaller pits, enabling higher storage capacity.



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Electrical Characteristics and Drive Circuits

Laser diodes are current-driven devices, meaning their optical output is directly proportional to the forward current. To maintain stable operation and prevent damage: Constant current sources are used to regulate the diode current. Auto Power Control (APC) circuits monitor the diode's output via a built-in photodiode, adjusting current to maintain consistent optical power despite temperature changes.

Temperature management is critical, as optical output decreases with rising temperature, and excessive current can permanently damage the diode. Driver circuits may include high-speed transistors, op-amps, or dedicated laser driver ICs to support modulation for reading/writing data and to provide protection against overcurrent or voltage spikes.

Safety and Handling

Laser diodes are sensitive to static electricity, overcurrent, and heat. Proper handling, mounting, and thermal management are essential to ensure long-term reliability. In optical drives, the diode is typically mounted with a heat sink and controlled by a driver circuit that prevents overdriving.

Summary

The laser diode is the core component of an optical drive, converting electrical energy into a precise light beam for reading and writing data. Its performance depends on wavelength, optical power, current regulation, and temperature control, all managed by specialized driver circuits to ensure safe, stable, and accurate operation.

Article Content

Laser Diode Drive Circuit Design Method and Spice Model

ROHM offers laser diodes (LDs) for Light Detection and Ranging (LiDAR). This application note will introduce ROHM''s LD line-up and show how to design the drive circuits of ROHM LDs.

The Optical World Inside a Laser Diode

Although small in size, its internal optical design is complex. This article will briefly introduce the optical components inside a laser diode and their working principles. Although laser diodes and ordinary

An Introduction to Laser Diodes

Learn about the laser diode, including package types, applications, drive circuitry, and some laser diode specifications.

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Harvesting a Laser Diode From an Optical Drive

Harvesting a Laser Diode From an Optical Drive: Have you ever wondered how powerful that tiny little laser is in your CD, DVD, or BluRay drive/burner? Well now you can. Let''s take one apart and get it

Laser diode

While initial diode laser research was conducted on simple P–N diodes, all modern lasers use the double-hetero-structure implementation, where the carriers and the photons are confined in order to

Laser Diodes – semiconductor, gain, index guiding, high

Most laser diodes (LDs) are built as edge-emitting lasers, where the laser resonator is formed by coated or uncoated end facets (cleaved edges) of the

Driving circuit examples of laser diodes

At same time, reference voltage V2 is generated by zenner diode and volume. OP2 always control the base current for output transistor so that it is always V1=V2 and constant current flows into LD.

The Role of Laser Diodes in DVD and Blu-ray Drives

Discover how laser diodes are crucial components in the functionality of optical drives such as DVD and Blu-ray players for data reading.

Mastering Laser Diodes: Principles, Structure, Driver

A complete engineering guide to laser diode fundamentals. Explore the working principle, heterostructure design, essential driver circuits, thermal

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The blue laser diode in optical disk drive technology

The above images show a blue laser diode, the first a photograph of an actual blue laser diode, magnified about five times. The drawing has external components labelled, and shows scale –

Laser Diode Characteristics, Precautions for Use and Drive Circuit ...

Laser diodes (LD) are semiconductor devices that convert electrical energy into high-power optical energy. These devices are currently used in the fields of telecommunications and

Laser diodes from CD-RW drives can cut and burn!

Laser diodes from CD-RW drives can cut and burn! Everyone certainly knows laser pointers. You can have a lot of fun with them. On the other hand the pointer only

Optical Disk Drives: Parts and Working Explained

Optical disk drives are still used in desktops and laptops. Here you can learn about the various parts of optical drive and how it works.

Powerful laser diodes from DVD-RW drive

Warning! Laser diodes from DVD-RW drive are emitting visible and invisible laser radiation and they are extremely dangerous! Their light can permanently damage the eyes. You must never look into the

Laser diode

Laser diodes are the most common type of lasers produced, with a wide range of uses that include fiber-optic communications, barcode readers, laser pointers, CD / DVD / Blu-ray disc reading/recording,

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