

Laser Diode Types and Materials



Article Overview

Laser diodes are primarily made from semiconductor materials such as gallium arsenide (GaAs), gallium nitride (GaN), and related compounds, with the choice of material determining the emitted wavelength and efficiency.

Common Semiconductor Materials

Laser diodes are semiconductor devices that generate coherent light through stimulated emission at a p-n junction. The semiconductor material used in the diode is critical because it determines the bandgap energy, which directly affects the wavelength of the emitted light . Common materials include:

- Gallium Arsenide (GaAs): Widely used for infrared (IR) laser diodes, particularly in telecommunications and CD/DVD applications .
- Gallium Arsenide Phosphide (GaAsP): Used for visible light emission, often in red laser diodes .
- Gallium Nitride (GaN): Suitable for blue and ultraviolet (UV) laser diodes, commonly used in high-density optical storage and solid-state lighting .
- Indium Gallium Arsenide (InGaAs): Often used for near-infrared applications, including fiber-optic communications .
- Aluminum Gallium Arsenide (AlGaAs): Frequently used in double heterostructure lasers to improve efficiency and electron confinement .

Material Properties and Laser Performance

The bandgap energy of the semiconductor determines the photon energy and thus...

Article Content

List of laser types

Wavelengths of commercially available lasers. Laser types with distinct laser lines are shown above the wavelength bar, while below

Laser Diode

The Laser Diode operates on the same basic principle as a Light Emitting Diode (LED) — the phenomenon of

Common Laser Types

Diode lasers are utilized in many applications including telecommunication, materials processing, bar code scanning, medical lasers,

Laser Diode Tutorial

Laser Diode Tutorial The purpose of this laser diode tutorial is to provide the information necessary to create a long lifetime, stable

Laser Diode Tutorial

The information contained within this tutorial will give all the general information necessary to create an excellent laser diode system.

Laser Diode and LED Physics

Laser diodes are typically made up of at least two different types of semiconductor materials, and the lasing action occurs at the

Laser diode

Laser diodes form a subset of the larger classification of semiconductor p - n junction diodes. Forward

Semiconductor Lasers - laser diodes

This article provides a comprehensive introduction to semiconductor lasers, which are solid-state lasers

Laser Diode

Laser diodes can use the same types of power source as LEDs provided these can deliver an adequate current intensity, ca. 40 mA.

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

This is a document on the fundamentals of laser diodes explains the characteristics of laser light, package structure,

Laser Diodes: The Technology Explained | Ushio

In terms of laser performance, laser diodes are characterised by low power consumption, high efficiency,

7 Common Types of Laser Diodes and Their Common Applications

Factories use diode lasers to mark metals, plastics, and ceramics. HeatSign's fiber laser diode systems, like the HS

Laser Diode : Construction, Types, Working & Its Applications

LASER Diode Construction The construction of a laser diode can be done using different materials like metal contact,

Laser Diodes: Definition, Types, and Applications

A laser diode is defined as a diode that can generate laser light when electrically pumped with current. It consists of a

Laser Diode

A Laser diode can generate a concentrated beam of laser light with similar wavelengths. This property makes laser beams very

Laser Diode

Laser diodes come in multiple types, such as Double Heterostructure, Quantum Well, SCH, and VCSEL, each

Laser Diodes - semiconductor, gain, index guiding, high power

The article details the many types, from small edge-emitting and surface-emitting diodes (VCSELs) to single-frequency lasers like

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

The two major types of circuits used to drive CW laser diodes are automatic power control (APC) and automatic

Diode laser vs CO₂ laser vs Fiber Laser: The Comparison Guide

Choosing the best laser for cutting and engraving depends on your materials, application goals, and performance

Contact Us

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