

Pulsed Semiconductor Laser Diode



AI Overview

Pulsed semiconductor laser diodes are designed to emit short, high-intensity light pulses with low duty cycles, enabling high peak powers for applications like LiDAR, range finding, and industrial sensing.

Overview A pulsed semiconductor laser diode is a type of electrically pumped laser in which a semiconductor p-n or p-i-n junction generates light when electrons and holes recombine, releasing photons. Unlike continuous-wave (CW) laser diodes, pulsed diodes are specifically designed to handle short, intense pulses that temporarily exceed the normal operating power without damaging the device. Typical pulse durations range from 2 ns to 200 ns, with repetition rates in the kHz to MHz range, depending on the application.

Key Characteristics

- Peak Power:** Pulsed diodes can achieve very high peak powers, from a few watts up to hundreds of watts, depending on pulse width and diode design.
- Duty Cycle:** To prevent overheating, the duty cycle is kept very low, often around 0.1%, meaning the diode is off most of the time between pulses.
- Pulse Duration:** Short pulses (nanoseconds) allow high instantaneous power while maintaining device longevity.
- Emitter Design:** Stripe width and emitter length influence peak power and lifetime; longer emitters or reduced power can significantly extend operational life.
- Driver Requirements:** High-speed switching transistors and low-inductance circuits are required to deliver tens of amperes in nanosecond pulses.
- Packaging and Wavelengths** Pulsed laser diodes are available in various packages, including SMD, hermetically sealed metal cans (TO-18, TO-56), and specialized high-volume configurations. Common wavelengths include 905 nm and 1550 nm, with 1550 nm being eye-safe and widely used in LiDAR and military applications. Multi-stack or single-cavity chips allow higher peak powers, with some devices achieving up to 58 W in short pulses.
- Applications** **LiDAR and Range Finding:** Pulsed diodes provide precise distance measurements by emitting short pulses and detecting reflections. **Industri...**

Article Content

High-repetition-frequency high-power pulsed laser diode driver

Here we propose a high-repetition-frequency high-power pulse power supply for laser diode driving by using frequency synthesis technique. This technique generates a high repetition

Global Nanosecond Pulsed Semiconductor Laser Market Set to

The Nanosecond Pulsed Semiconductor Laser market is poised for remarkable growth, projected to achieve a CAGR of 14.4% from 2026 to 2033.

Picosecond Diode Lasers – mode-locked, gain

Diode lasers generate picosecond pulses with mode-locking or gain-switching, suitable for high repetition rate pulse trains or pulses on demand.

Industry Breakdown: Diode-pumped Solid-state Lasers for Semiconductor ...

The Diode-pumped Solid-state Lasers (DPSSL) for semiconductor applications are witnessing significant trends driven by advancements in technology, demand for precision manufacturing, and growing ...

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High Stability Diode Laser Source Connet uses single longitudinal mode semiconductor lasers such as DFB, DBR and DM, together with a low noise and

Design of High Peak Power Pulsed Laser Diode Driver

A design guide is summarized from the derivations and analysis of the proposed laser diode driver.

Design of Nanosecond Pulse Laser Diode Array Driver

This article proposes a nanosecond-level pulsed laser diode array drive circuit to address the laser drive issue at the laser emission end of a solid

Global Leader in Materials, Networking, and Lasers

KINTEX Exhibition Center 1, Goyang, South Korea Discover Coherent at LASER KOREA 2026, Asia's leading exhibition for laser and photonics technologies.

Home | Hamamatsu Photonics

The official website of Hamamatsu Corporation whose mission is to advance science and industry through photonic technologies. Our products include optical sensors

List of laser types

Wavelengths of commercially available lasers. Laser types with distinct laser lines are shown above the wavelength bar, while below are shown lasers that can emit in a wavelength range. The height of the

Pulsed Laser Diodes & Arrays

Excelitas offers a wide variety of single channel and array variants of pulsed laser diodes. With central wavelengths at 905 nm and 1550 nm, and packages ranging

Pulsed Laser Diodes

Find the right laser diode with just a few clicks. Just select your specifications in the search mask and you get an instant overview of all the laser diodes that meet

Global 405nm Single Frequency Laser Market Size, Share, Growth

Global 405nm Single Frequency Laser Market Size By Application (Medical Applications, Industrial Applications), By Component Type (Laser Diodes, Optical Components), By End-user

Distributed Feedback Lasers – Buyer's Guide & Suppliers

This buyer's guide for distributed feedback lasers provides technical background, comparison of major types, selection criteria, and an overview of suppliers.

Design of High Peak Power Pulsed Laser Diode Driver

A design guide is summarized from the derivations and analysis of the proposed laser diode driver. According to the design guide, we selected the capacitor, resistor, and diode

6 W 320 nm ultraviolet pulse laser based on intracavity

For the first time, we realized 360 nm ultraviolet (UV) pulse laser by intracavity frequency doubling of a diode-pumped Q-switched Pr: YLF laser. An

Microphotons CVD-167 High-Power Pulsed Laser Diode, 905 nm, 100

Overview The Microphotons CVD-167 is a high-reliability, hermetically sealed pulsed laser diode engineered for demanding time-of-flight (ToF), LIDAR, and active illumination applications requiring

Lasers: Understanding the Basics

Other lasers, like Nd or Yb diode-pumped solid-state (DPSS) lasers, lend themselves to be operated both in CW or pulsed operation. Other lasers, like

Semiconductor Laser Diode Driver Industry Research Report 2026

The report also focuses on the competitive landscape of the global Semiconductor Laser Diode Driver market, and introduces in detail the market share, industry ranking, competitor

Aluminum Gallium Indium Phosphide Semiconductor Consumption

Samsung leads with its integrated approach to consumer electronics and semiconductor solutions, emphasizing high-efficiency laser diodes and LEDs. LG Innotek focuses on display and

48 Laser Diode Manufacturers in 2026

48 Laser Diode Manufacturers in 2026 This section provides an overview for laser diodes as well as their applications and principles. Also, please take a look at the list of 48 laser diode manufacturers and

1550nm Pulsed Semiconductor Laser Diodes

As the industry leader in advanced photonic solutions, Excelitas offers next generation lasers including our 1550 nm Pulsed Semiconductor laser diodes.

High-Performance Pulsed Diode Lasers for Advanced

The ILC Pulser series represents a versatile and high-performance lineup of pulsed laser diode modules, purpose-built for advanced applications across

Sales Projections and Analysis in the Laser Diodes and Direct Diode ...

Laser diodes are semiconductor devices that emit coherent light when current flows through them, while direct diode lasers are specialized laser diodes that can emit high-quality laser light for ...

Evolase PLD-NS-GSS Gain-Switching Suppression Short-Pulse Laser Diode ...

Unlike conventional pulsed drivers, the PLD-NS-GSS incorporates an integrated gain-switching suppression mechanism—achieved via dynamic bias current modulation—that actively mitigates

Laser diodes: stacks, bars & arrays | MEETOPTICS Academy

Laser diode bars, also known as laser diode arrays, comprise multiple single emitters, laid out side-by-side on a single substrate.

Laser Diode Market by Type, Doping Material, Technology, Mode of ...

The laser diode market is entering a higher-value phase shaped by bandwidth demand, intelligent sensing, industrial precision, medical miniaturization, defense modernization, and the

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