High-speed pulsed laser diode



Overview

Design of High Peak Power Pulsed Laser Diode DriverA design guide is summarized from the derivations and analysis of the proposed laser diode driver. Accor.

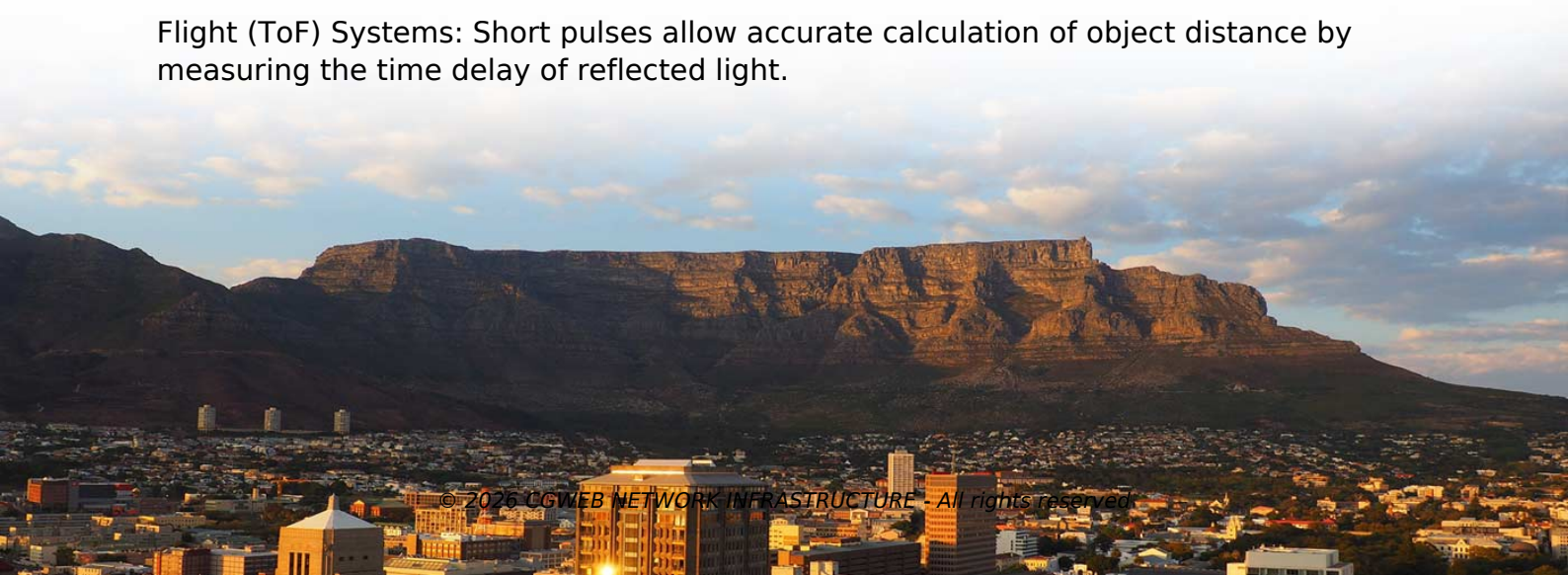
Key Takeaways

High-speed pulsed laser diodes generate nanosecond-range optical pulses with peak powers from tens to hundreds of watts, widely used in LiDAR, sensing, and high-speed optical applications. Key CharacteristicsHigh-speed pulsed laser diodes are designed to produce short optical pulses with durations typically ranging from 1 ns to 100 ns and peak powers from 50 W up to 350 W, depending on the wavelength and application. Repetition rates can reach 1 MHz to 10 MHz, enabling rapid data acquisition and high-resolution measurements.

These diodes often operate in the near-infrared range (e.g., 905 nm, 940 nm), which is common for LiDAR and time-of-flight (ToF) systems. ApplicationsLiDAR and 3D Sensing: Pulsed laser diodes are critical for autonomous vehicles, UAVs, and industrial robots, providing precise distance measurements and spatial recognition. High peak power and short pulse duration improve detection range and resolution.

Optical Time-of-

Flight (ToF) Systems: Short pulses allow accurate calculation of object distance by measuring the time delay of reflected light.



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High-

Speed Optical Communication and Sensing: Fast repetition rates and low jitter enable synchronization in optical networks and scientific instrumentation.

Performance and Efficiency

Modern high-speed pulsed laser diodes achieve high power-to-light conversion efficiency (up to 86%) and maintain uniform light intensity across the emission width. Advanced designs reduce temperature dependence of the laser wavelength, allowing narrower bandpass filters and extended detection ranges. Fiber-coupled modules with core diameters of 62.

5 µm to 105 µm are common, providing high brightness and ease of integration.

Driver Considerations

Efficient operation requires specialized driver circuits, often using D-mode GaN HEMTs or similar high-speed transistors to generate nanosecond pulses with precise timing. Key design factors include minimizing parasitic capacitance, optimizing bypass capacitors, and ensuring low-jitter triggering for consistent pulse generation. Embedded pulse delay generators and software interfaces (LabVIEW, Python, DLLs) are often included for synchronization and control.

Wavelength and Module OptionsHigh-speed pulsed laser diodes are available across a wide range of wavelengths from 405 nm to 1470 nm, with specific models optimized for LiDAR (905 nm, 940 nm, 1470 nm),. Modules can be configured for single emitters, bars, or arrays, depending on the required optical power and application. SummaryHigh-speed pulsed laser diodes combine short pulse duration, high peak power, and fast repetition rates to enable precise, high-resolution optical measurements.

They are widely used in LiDAR, 3D sensing, and high-speed optical systems, with advanced driver circuits and fiber-coupled modules enhancing performance, efficiency, and integration flexibility.

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Article Content

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

High power pulsed laser diode up to 350 W nanosecond pulses

This high power pulse laser diode generates nanosecond range optical pulses out of a multimode fiber. It includes a synchronization tool to generate any pulse or burst configuration for LIDAR, laser diode

High speed Laser diode driver

This high speed driver with integrated TEC controller delivers precision nanosecond pulses via an on-board AWG. Compatible with Butterfly and TO-packages, it offers a versatile and cost-effective

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

A fast pulsed laser diode (PLD-100W-M) was selected as the load to verify if the driver is capable of generating high-speed pulse stably. The laser diode supports a maximum peak laser

EPC9156 – 30 V, 10 A High Current Pulsed Laser Diode

The EPC9156 development board is primarily intended to drive laser diodes with short, high current pulses. Capabilities include minimum pulse widths of < 2 ns,

High-Power-High-Speed Pulsed Laser Diode

Designed to offer an optimized solution for the generation of high peak power nanosecond precision pulses at visible or infra-red wavelengths such at 450, 785, 808, 830, 905, 915, 980, 1064 or 1470 nm.

High Output Laser Diodes

High Output Laser Diodes Infrared high-power lasers deliver high peak output with pulse lighting, making them Ideal for use as light sources for distance measurement.

High-Performance Pulsed Diode Lasers for Advanced

Explore high-performance pulsed laser modules for defense, aerospace, lithography, metrology, and advanced research. Designed for precision and reliability, our ILC

Short-Pulse Lasers & High-Speed Laser Drivers

The basis of these laser systems are our optimized gain-switched diode lasers. To achieve pulse widths in the ns range and peak output powers up to 100 W, these

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Pulsed Laser Diodes

Pulsed laser diodes have their roots in military applications. They are ideally suited to rangefinding thanks to their short pulse widths and high output

Top 10 Laser Welding Machine Brands for Precision and Efficiency

Brand selection determines service life, beam quality, and application fit. This guide ranks 10 global and regional laser welding machine brands by technology ownership, power range,

ActionLasers DAJA DJ6 Portable Diode Laser Engraver CNC Cutting

Highlights at a glance High-Speed DIY Wood Cutter: Effortlessly engrave and cut wood, plastics, glass, and metals. 3W Laser Engraving Machine: Powerful laser for precise and detailed logos and

Buy Ortur LU2-4 SF 5W laser module with delivery

Laser Module Ortur LU2-4 SF 5W for precise engraving and cutting! Power: 5W, Precision: 0.01 mm, Blue Diode ★ Delivery across Ukraine. Check it out!

Laser Material Compatibility Chart: What Can Lasers Cut?

See what CO2, diode, fiber, and UV lasers can actually cut, engrave, or mark across 48 materials. Honest compatibility guide before you buy the wrong machine.

2026 Advancements in 808nm Diode Lasers

The 808nm diode laser technology targets melanin in hair follicles. It removes unwanted hair well while keeping discomfort low. High Peak Power + Short Pulse Width Diode Laser In the past, diode lasers

Evolase LDM-PS/NS-XXX-GHz-Burst Multi-Channel Ultra-Short Pulse Laser ...

Overview The Evolase LDM-PS/NS-XXX-GHz-Burst is a modular, multi-channel ultra-short pulse laser source engineered for precision timing-critical applications in semiconductor metrology, quantum

High power pulsed laser diode up to 350 W nanosecond

This high power pulsed laser diode generates nanosecond range optical pulses out of a multimode fiber. It includes a synchronization tool.

Global GaN Laser Diodes Market Size, Industry Share, Trends

These technological breakthroughs directly impact the laser diode''s operational lifespan and reliability, making them suitable for demanding applications like aerospace, defense, and high

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