Laser Diode Semiconductor Module



Overview

Laser Diodes, Modules | Optoelectronics | DigiKeyLaser Diodes and Modules are semiconductor devices that can emit a beam of high intensity focused radiatio.

Key Takeaways

A laser diode semiconductor module is a compact, electrically driven device that emits coherent light, available in various wavelengths, power levels, and packaging formats for industrial, scientific, and communication applications.

Overview

A laser diode is a semiconductor device similar to a light-emitting diode (LED) but capable of producing coherent light through stimulated emission at the diode junction. When electrical current passes through the doped p–n junction, electrons recombine with holes, emitting photons. The emitted light is coherent, directional, and can span wavelengths from ultraviolet (UV) to infrared (IR) depending on the semiconductor material used.

A laser diode module integrates the diode with additional components such as cooling systems, optics, and control electronics, providing a ready-to-use light source for various applications.

Types and Configurations

Single Emitters: Individual diodes suitable for precision applications or pumping fiber lasers. Laser Diode Bars and Arrays: Multiple diodes combined for higher power output, often used in industrial laser pumping or additive manufacturing.

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Fiber-

Coupled Modules: Laser diodes coupled into optical fibers for precise delivery of light in medical, defense, or scientific applications.

Narrow-

Linewidth Modules: Designed for high spectral purity and stability, ideal for coherent sensing, spectroscopy, and communication systems.

Wavelengths and Power

Laser diode modules cover a broad wavelength range from 405 nm to 2. 3 µm, with power outputs from less than 1 mW to several kilowatts in stacked or array configurations. Modules can be free-running or wavelength-locked, and some are optimized for high reliability in harsh environments, such as automotive LiDAR or industrial processing.

Applications

Industrial: Materials processing, plastics welding, additive manufacturing, and semiconductor wafer inspection. Scientific: Pumping solid-state or fiber lasers, spectroscopy, and precision measurement. Medical: Laser therapy, hair removal, and surgical applications.

Communication: Fiber-optic data transmission and optical sensing. Consumer and Commercial: Barcode scanners, laser pointers, CD/DVD/Blu-ray reading and writing, and general illumination with phosphor conversion.

Advantages

Compact and energy-efficient compared to traditional gas or solid-state lasers. High coherence and directionality for precise applications. Scalable power and wavelength options for diverse needs.

Integration with cooling and optics simplifies system design. In summary, laser diode semiconductor modules are versatile, high-performance light sources that combine the fundamental laser diode with packaging and control features, enabling applications across industrial, scientific, medical, and communication fields. Their modularity, wavelength flexibility, and power scalability make them essential components in modern photonics systems.

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Article Content

Laser Diodes, Modules | Optoelectronics | DigiKey

Laser Diodes, Modules Laser Diodes and Modules are semiconductor devices that can emit a beam of high intensity focused radiation, typically in the infrared, visible or ultraviolet wavelength ranges of the

Laser Diodes and Pump Modules

Whether it is diodes for extremely high reliability applications such as LiDAR pumping or high-power pump modules for industrial and security applications, or

Laser Diodes – semiconductor, gain, index guiding, high

Laser diodes are semiconductor lasers with a current-carrying p–n junction as the gain medium. They are the most important type of electrically pumped lasers.

Laser Diode Modules

A laser diode module is a package containing one or more laser diodes, typically combined with optics for beam shaping and electronics for power control and

High Power Lasers Diodes (10W ~ 1kW)

In summary, a laser diode is a semiconductor device made of two different materials. One is a P material and the other an N material. Common laser diode

Narrow-Linewidth Semiconductor Lasers

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Diode Laser Components | Coherent

Coherent Diode Laser Components offer a broad wavelength range with scalable power levels. Choose from single emitters, bars, stacks, or

Laser Diode Modules

Diode lasers are the most common type of laser and are used in multiple applications due to their small footprint and low cost. We offer laser diode

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ExpressLightwave LDI200 Semiconductor Laser Diode Driver

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Overview The ExpressLightwave LDI200 is a high-stability, compact constant-current driver module engineered specifically for the precise biasing of low-to-mid-power semiconductor laser diodes.

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

Eachwave EW-02 Fiber-Coupled Semiconductor Laser Module

Overview The Eachwave EW-02 Fiber-Coupled Semiconductor Laser Module is a precision-engineered optoelectronic source designed for integration into demanding optical measurement systems,

LPKF: High-volume precision processes for advanced semiconductor ...

LPKF delivers leading solutions for advanced semiconductor packaging, electronics and PCB manufacturing, plastic welding, and solar module scribing. High-performance systems from R&D to

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.

High Output Semiconductor Laser Diode: Evolution & 2033 Outlook

The High Output Semiconductor Laser Diode market is projected to reach $2.75 billion by 2034 with a 12.7% CAGR, driven by industrial automation. Gain market insights.

EEL M12 650nm Laser Diode AL52010001

The EEL M12 650nm Laser Diode is engineered for high precision and stable optical power output, featuring excellent heat dissipation and an integrated APC (Automatic Power Control) circuit.

Advanced Photonics Solutions

Driving the Future of Quantum Tech with indie''s Photonics Solutions indie''s advanced photonics technologies are accelerating the development of quantum applications. Their ultra-low-noise lasers,

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

Laser Diode Market Executive Summary The laser diode market sits at the center of modern photonics, enabling compact, efficient light sources for optical communications, sensing, industrial

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