

Laser Diode Heatsink



Overview

Laser Diode Heat Sinks & Mounts (ALL TOP BRANDS)What is a Laser Diode Heat Sink?

A high quality laser diode heat sink, also referred to as a mount, is typi.

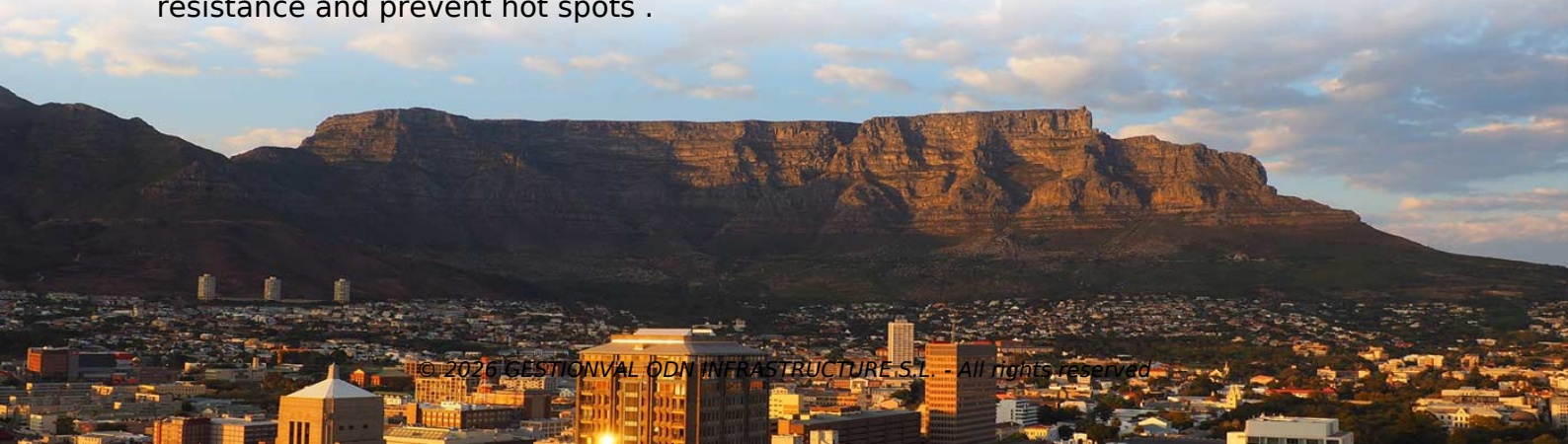
Key Takeaways

Laser diode heatsinks are essential for maintaining safe operating temperatures, available in passive and active designs using materials like aluminum or copper to efficiently dissipate heat.Purpose and Importance

Laser diodes are highly sensitive to temperature, and overheating can permanently damage the diode or reduce its lifetime. A heatsink's primary function is to keep the laser diode below its maximum specified temperature, ensuring stable performance and longevity . Proper thermal management is as critical as the power supply in laser diode systems .

Materials and Construction

High-quality heatsinks are typically made from anodized aluminum, copper, or nickel-plated copper. Copper offers superior thermal conductivity, while aluminum provides a lightweight and cost-effective solution . Some advanced designs incorporate copper heat-dissipate tubes soldered into a nickel-plated mounting plate to minimize thermal resistance and prevent hot spots .



Cooling Methods

- **Passive Cooling:** Heat is conducted from the laser diode into the heatsink and dissipated into ambient air. Passive designs may include high-density fins and airflow ducts to improve heat transfer efficiency .
- **Active Cooling:** Incorporates a Peltier (TEC) cooler or fan-assisted airflow to actively remove heat from the diode. Active cooling is often used for high-power lasers or applications requiring precise temperature control .

Thermal Interface and Monitoring

A well-designed heatsink often includes a thermal interface material or phase-change material to reduce thermal resistance between the diode and the heatsink. Many active systems also integrate temperature sensors to monitor the diode's case temperature and maintain it within safe limits .

Performance Considerations

- **Thermal Resistance:** Low thermal resistance (e.g., $0.04\text{ }^{\circ}\text{C/W}$) ensures minimal temperature rise for a given power input, critical for high-power applications .
- **Power Handling:** Some heatsinks can dissipate up to 300 W of heat with minimal temperature rise, suitable for high-power laser diode bars .
- **Design Variants:** Options include open or enclosed designs, single-laser-bar or multi-bar packages, and compatibility with optical elements like microlenses or diffractive optical elements .

Commercial Options

Several manufacturers offer laser diode heatsinks and mounts:

- **Laser Diode Control:** Offers anodized aluminum and copper mounts with passive or active cooling options .
- **RPMC Lasers:** Provides high-power JOLD-Open heatsinks for 760–1070 nm laser diodes, supporting up to 300 W CW with passive cooling .
- **Arroyo Instruments:** Offers LaserMount and TECMount series with integrated Peltier control and fan-assisted cooling for medium to high-power lasers .
- **Laser Diode Source:** HS-004 assembly with nickel-plated mounting plate and copper heat-dissipate tubes, capable of precise heat management for high-power applications .
- **eBay:** A marketplace for various laser diode heatsinks at competitive prices .

Summary

When selecting a heatsink for a laser diode, consider:

- Power rating of the laser and required thermal dissipation
- Cooling method (passive vs active)

- Material (copper for high conductivity, aluminum for lightweight)
 - Thermal interface and monitoring for precise temperature control
 - Form factor and compatibility with your laser diode package and optical setup
- Choosing the right heatsink ensures safe operation, optimal performance, and extended lifetime of your laser diode system.

Article Content

Heat Sink COOL30

The heat sink COOL30 was designed for temperature stabilization of high power laser diodes and laser arrays of about 30W optical

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

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