

What voltage should be applied to a laser diode



Overview

Voltage used by a Laser Diode Typically, the voltage that appears with red and infrared wavelength diodes is between 1.5V Laser Diode Characteristics, Prec.

Key Takeaways

Laser diodes typically require a forward voltage between 1.5V and 3V for red and infrared diodes, and above 5V for green, blue, and ultraviolet diodes. Forward Voltage

The forward voltage of a laser diode is the voltage that appears across the diode when it is conducting current to produce laser light. This voltage depends primarily on the wavelength of the diode: red and infrared diodes usually operate between 1.5V and 3V, while shorter-wavelength diodes such as green, blue, and ultraviolet often require voltages above 5V due to the higher energy of emitted photons (ProPhotonix) . The exact voltage also varies with the specific diode type, materials, and operating current (Electronics Notes) .

Current and Voltage Relationship

Laser diodes are current-driven devices, meaning the optical output is directly related to the current flowing through the diode. The forward voltage is logarithmically related to the current, so exceeding the safe voltage without current limiting can cause the diode to draw excessive current, potentially damaging the reflective surfaces and rendering the diode unusable (ProPhotonix) . Therefore, a constant-current driver is preferred over a constant-voltage source to ensure safe operation.

Reverse Voltage Sensitivity

Laser diodes are extremely sensitive to reverse voltage, which can be as low as 2V. Applying reverse voltage can permanently damage the diode, so precautions such as static protection and proper driver circuit design are essential (ProPhotonix) .

Practical Considerations

- Always consult the datasheet for the specific laser diode to determine the exact forward voltage at the recommended operating current and temperature.
- The operating voltage may vary slightly with temperature, but the current is the primary parameter to control for consistent optical output (Electronics Notes) .
- Use a laser diode driver with current limiting and voltage protection to prevent overcurrent and reverse voltage damage (Laser Focus World) . In summary, the voltage required for a laser diode depends on its wavelength and design, with red/IR diodes typically needing 1.5–3V and shorter-wavelength diodes requiring over 5V, while safe operation relies on controlling the current rather than applying a fixed voltage.

Article Content

Laser Diode Driver Compliance Voltage Calculator

Calculate the required compliance voltage for your laser diode driver. Estimate cable voltage drop and power loss to ensure your

Laser diodes require the right power source

A laser diode bar emitting 6 W at 1870 nm--a desirable wavelength for solid-state laser pumping and some medical applications but

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