Reverse resistance of laser diode



Overview

Negative differential resistance in InP/AlGaInAs laser diodes under. We investigate the negative differential resistance (NDR) in InP/AlGaInAs laser diod.

Key Takeaways

The reverse resistance of a laser diode is very high, typically in the megaohm range, allowing only a tiny leakage current to flow under reverse bias.

Understanding Reverse Resistance

Reverse resistance refers to the opposition a diode offers to current when a reverse voltage is applied across its p-n junction. In a laser diode, this resistance is not infinite, but it is extremely large compared to the forward resistance, often in the order of megaohms. Only a small leakage current flows due to minority carriers in the semiconductor material.

Practical Implications for Laser Diodes

Laser diodes are designed primarily for forward operation, where electrons and holes recombine to emit coherent light. Applying a reverse voltage beyond the maximum admissible reverse bias (specified in the datasheet) can damage the diode permanently. The high reverse resistance ensures that under normal reverse bias conditions, the diode draws negligible current, protecting it from thermal runaway or electrical overstress.

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Key Points

Magnitude: Reverse resistance is very high, typically several megaohms, much larger than forward resistance. Leakage Current: A small current flows due to minority carriers; this is normal and expected. Breakdown Risk: Exceeding the rated reverse voltage can lead to breakdown and permanent damage.

Comparison: For silicon laser diodes, the reverse-to-forward resistance ratio can be around 100,000: 1, while for germanium it is about 40,000: 1. In summary, the reverse resistance of a laser diode ensures minimal current flow under reverse bias, protecting the device, but care must be taken not to exceed the specified reverse voltage to avoid damage.

Article Content

Negative differential resistance in InP/AlGaInAs laser diodes under ...

We investigate the negative differential resistance (NDR) in InP/AlGaInAs laser diodes under continuous current stress. Experiments conducted on 1550 nm distributed feedback (DFB)

Diode Resistance

Under reverse biasing, the diode offers a very large resistance to the electric current. This resistance is called the reverse resistance. In reverse bias,

Diode resistance

Reverse resistance is the resistance offered by the p-n junction diode when it is reverse biased. When reverse biased voltage is applied to the p-n junction diode, the width of depletion region increases.

Lecture (10) Diode Resistance

A tunnel diode or Esaki diode is a type of semiconductor that is capable of very fast operation, well into the microwave frequency region, made possible by the use of the quantum mechanical effect called

Technical note / Si photodiodes

This is an AC light detection circuit [Figure 3-16] that uses load resistance RL to convert the photocurrent from a low-capacitance Si PIN photodiode (with a reverse voltage applied) to a voltage,

Lecture 20

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Looking back at our equations, we find R st > R leads to: ab. Our conclusion is that we will have net optical gain, i.e., more stimulated emission than absorption, when we have the quasi-Fermi levels

Resistance of a Diode

Under the Reverse biased condition, the opposition offered by the diode to the reverse current is known as Reverse Resistance. Ideally, the reverse resistance

Laser Diodes

Attaching a protective diode makes it possible to control the reverse surge voltage and stabilize the voltage to almost 0 V even after the surge voltage is generated.

Laser Diode Characteristics, Precautions for Use and Drive Circuit ...

Laser diodes (LD) are semiconductor devices that convert electrical energy into high-power optical energy. These devices are currently used in the fields of telecommunications and

Laser Diodes

A laser diode generates some heat at the junction points with a long time of electric current like general semiconductors. As a result, the temperature of the element increases. Without an enough heat

Parameter Overview of Laser Diodes by Dr. Kamran S. Mobarhan

Dynamic Series Resistance: The series resistance of the laser diode is typically determined through calculating the derivative of the voltage versus injection current characteristic curve of the device.

Guide to Electrical and Electronics Symbols (80+)

Laser Diode: Emits a focused, coherent light beam, used in optical systems. Zener Diode: Allows current to flow in reverse when a specific voltage is exceeded, often used for voltage

A Brief Introduction to Laser Diodes

A Brief Introduction to Laser Diodes This definitely won''t do for a course, but if you''re not familiar with laser diodes, this might be a good place to start. I am deliberately light on the equations and details

Chapter 1 Laser Diode Basics

Laser diodes are unique compared with other types of lasers. A little background knowledge of laser diodes will be helpful for the readers to understand the contents of this book. We will only briefly

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CHAPTER 4: LASER DIODE DRIVER

CHAPTER 4: LASER DIODE DRIVER The laser source consists of a laser diode, a driver to operate the diode, and a power supply.

Biasing & Modulating Laser Diodes

The circuit allows for ''soft'' turn on of the laser diode via the 10 ohm resistor and 100 uf capacitor on the input of the 7805 regulator. A 1N4007 diode is provided to prevent reverse bias. The diode was

Resistance of a Diode

Resistance of a Diode In practice, no diode is an Ideal diode, this means neither it acts as a perfect conductor when forward biased nor it acts as an insulator when it is reverse biased. In other words,

Laser Diode Driver Basics and Design Fundamentals

Laser diodes are highly susceptible to damage from forward and reverse voltage surges and transients, and they require a special set of specifically designed electronic control elements.

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