

The Laser diode laboration

Preparation

The laboration is intended to give practical knowledge about diode lasers.

We will measure the input-output characteristics, polarisation, wavelength and physical dimensions of the aperture. The data sheets are attached.

Solve questions F1 – F8 with use of the datasheets.

The laser diode is an electrostatically sensitive component. When a low voltage is applied in the forward direction a current is starting to flow which is going to give a recombination in the pn-junction under emission of photons. To adjust the current three resistors are placed in series with the diode. The first one is there to set the current approximately right. The second one is adjustable so the current can be varied. Finally a third resistance of 10 Ohms is placed in series. The voltage drop over this resistance is measured with a volt meter and the actual current can then be easily calculated.

Preparation questions.

F1. Which is the highest current the laser can be exposed to?

F2. Which is the typical threshold current for a typical laser?

F3. Which is the recommended current?

F4. Which is the highest power from the laser?

F5. How long can we expect this laser to live under "normal" use?

F6. What current should we use to get 3 mW of output power?

F7. Draw a circuit consisting of a battery (5V), a series resistance and the diode. Determine the series resistance for an output power of 3 mW. (Assume a voltage drop over the diode of 0.3V)

F8. What is the laser wavelength?

The photo detektor

We will use a Si- photodetector with a spectral sensitivity according to the datasheet. It is giving a current proportional to the input power.

F9. Explain the spectral sensitivity and give it for our case.

In the experimental setup we measure the signal as a voltage, i.e. the current through a resistance (ses datasheet for example). For the power measurement the signal should be coupled to the oscilloscope over a 50 Ω resistance.