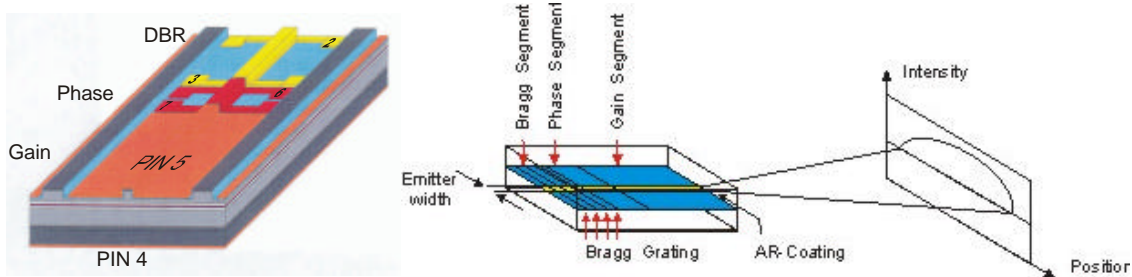


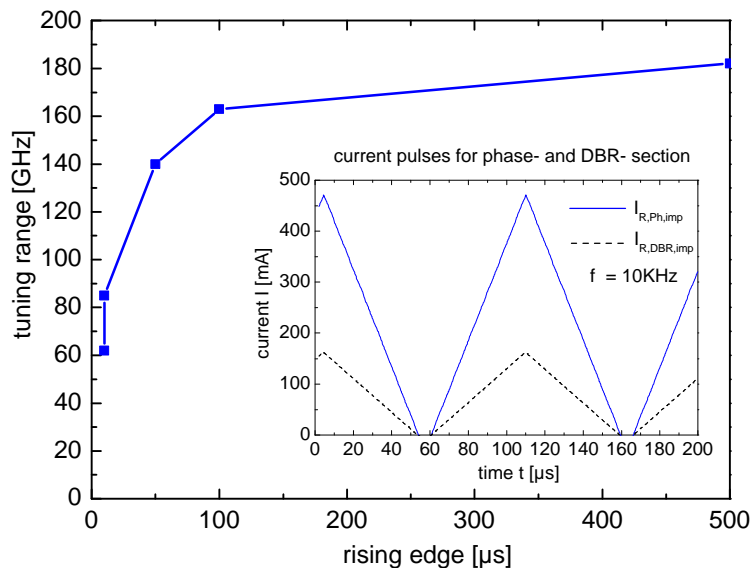
High Frequency Tuning of 1063nm and 1083nm DBR Diode Lasers

DBR lasers are tunable single mode diode laser devices. Their microscopic structure consists of three different chip segments.



The DBR segment is microscopic structured with a first order Bragg grating for providing the wavelength selection. The Gain segment provides the major optical gain of the laser device. The Phase segment is used for ensuring the phase matching between the DBR mode and the cavity modes of the laser chip. There are two different tuning methods for DBR lasers.

Thermal Tuning: The thermal tuning method bases on the idea that the optical length of diode lasers varies with the temperature of the laser chip. For applying this method, the DBR and the Phase segment offer two electrical contacts which enable the user to apply a heat current to the segment. A synchronous modulation of the Phase and the DBR segment with a current ratio of 1:2 allows a mode-hop free tuning of 200GHz.



The graphic shows the response function of the DBR laser for a triangular current modulation. With a modulation frequency of 1kHz, the mode-hop free tuning range is found to be 180GHz. With a modulation frequency of 5kHz, this values shrinks to 160GHz. Increasing the modulation frequency to 50kHz results in a reduction of the tuning range to 60GHz. This is approximately the limitation of the thermal modulation.

Document: <http://data.sacher-laser.com/techdocs/DBRMod.pdf>
 Note: Specification are subject to change without further notice



Electrical Modulation: The direct modulation of the injection current of the DBR segment enable significantly higher modulation frequencies. Since the electrical modulation coefficient is about a factor of 100 below the thermal modulation segment, the total wavelength scan is typically in the order of 2GHz .. 10GHz. The modulation speed is only limited by the impedance of the laser chip and the laser housing. Typical limitation values are in the order of 10MHz .. 500MHz, depending on the details of the setup.

Cheetah Laser System: The Sacher Lasertechnik Cheetah laser system offers both modulation methods for DBR diode lasers. The Pilot P500 laser driver is an ultra low noise laser driver which allows temperature control as well as laser current control. The Cheetah laser head offers three electrical modulation ports.

1. Gain Modulation:

The Gain segment is modulated via an internal bias tee up to 100MHz modulation frequency.

2. Phase Modulation;

The heating current of the Phase segment can be directly accessed via one SMA input connector. With internal connectors at the printed circuit board, the user may exchange from thermal modulation to a fast direct current modulation up to 100MHz.

3. DBR modulation:

The heating current of the DBR segment can be directly accessed via one SMA input connector. With internal connectors at the printed circuit board, the user may exchange from thermal modulation to a fast direct current modulation up to 100MHz.

In summary, the Cheetah laser system is a very flexible tool for operating DBR diodes in an easy and safe way.



Document: <http://data.sacher-laser.com/techdocs/DBRMod.pdf>
Note: Specification are subject to change without further notice

Sacher Lasertechnik GmbH
Hannah Arendt Str. 3-7
D-35037 Marburg, Germany

Tel.: +49 6421 305290
Fax: +49 6421 305299
Email: contact@sacher.de

Sacher Lasertechnik, LLC
5765 Equador Way
Buena Park, CA 90620, USA

Tel.: 1-714-670-7605
Fax: 1-714-670-7662
Email: sales@sacher-laser.com

