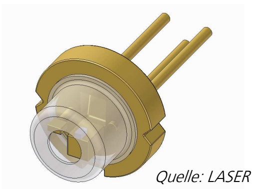
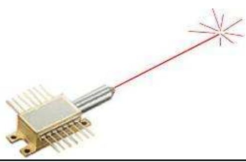
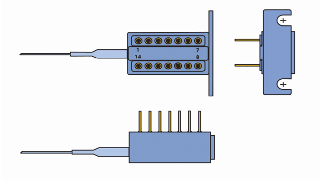
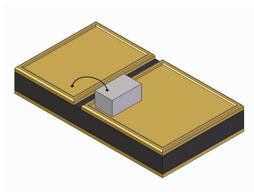
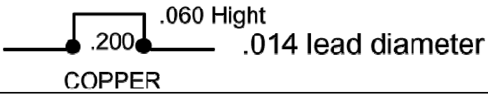
Application Note # 02: Impedance of Laser Diodes Indutive Behaviour

Related Products: LDP-AV, LDP-V, LDP-CL.

The parasitic stray inductive behaviour is the most important influence on the pulse rise time. The output voltage of the driver must be able to charge the stray inductance, thus resulting in slower current rise times.
The following table shows the stray inductance of commonly used laser diode packages.

#	Package Drawing	Package Style	Package Inductance
1	 *Quelle: LASER COMPONENTS GmbH*	8-32 coaxial	12 nH *
2	 *Quelle: LASER COMPONENTS GmbH*	10-32 coaxial	11 nH *
3	 *Quelle: LASER COMPONENTS GmbH*	TO-5 2-lead	9.6 nH *
4	 *Quelle: LASER COMPONENTS GmbH*	TO 52	5.6 … 6.8 nH *
5	 *Quelle: LASER COMPONENTS GmbH*	CD 9mm	5.2 … 6.8 nH *
6		Butterfly	22 nH **
7	 Dip 14 Leads out top	DIP 14 leaded	15.7 nH

8		Long Horn 14 Pin	6.4 nH**
9	 *Quelle: Bookham*	Maxi-Chip and similar	2,6 nH**
10	 *Quelle: LASER COMPONENTS GmbH*	Y-Package	1.6 nH *
11		Lead-loop	5.0 nH ***
12		Lead-loop	3.6 nH ***
13		Lead-loop	1.56 nH ***

With a known stray inductance the fastest possible rise time can be roughly estimated with the following Rule of thumb:

$$T_{rise} \text{ in ns} = \frac{L_{stray\ Laser\ Diode} \text{ in nH} \cdot I_{\text{Peak}} \text{ in A}}{U_{\text{max of } Laser\ Driver} \text{ in V} \cdot 0.9}$$

E.g. Using a LDP-V 50100 and a „10-32 coaxial" (#2):

$$T_{rise} = \frac{11 \text{ nH} \cdot 50 \text{ A}}{100 \text{ V} \cdot 0.9} \geq 6.11 \text{ ns}$$

* Manufacturers values. Refer to www.lasercomponents.com for detailed information and package drawings
** Measured values
*** Calculated values