



## LOW-COST, COMPACT LASER WITH NS PULSE DURATION FOR MOBILE USE

### Task

Fraunhofer ILT is developing a pulsed laser beam source for use in mobile laser-emission spectroscopy. The application profile specified a particular size, high stability and low manufacturing costs. The aim was to develop a compact, pulsed laser with high beam quality and repetition rates in the kHz range. Furthermore, the expected annual production costs should be less than € 1000 per piece at a batch size of 1000 pieces.

### Method

The size and the energy management of mobile systems are of crucial importance for mobile systems. Usually, they contain pulsed lasers with active Q-switches such as a Pockels cell. These Q-switches require complex control electronics with high-voltage power supply and are, therefore, not suitable for low-cost handsets. For this reason, an active Q-switch will be exchanged for a passive Q-switch. Crystal-based passive Q-switches such as Cr:YAG consist of optical crystals whose transparency is dependent on intensity. This eliminates the burden on the supply- and control electronics of the Q-switch.

To reduce costs, Fraunhofer ILT has relied upon inexpensive standard components available on the market. Furthermore, the number of optical elements has been reduced to a minimum, e.g. by placing a resonator directly on the laser crystal. In addition, single-source emitter modules are used as the pump source.

### Results

It was possible to construct a passive Q-switched solid state laser with a repetition rate of 1 kHz and a pulse energy of 0.7 mJ in single mode operation. Both pulse bursts and continuous pulse sequences can be generated. At a pulse duration of approx. 5 ns, the pulse peak power is about 140 kW.

### Applications

The laser developed here is suitable as an excitation source in mobile laser emission spectroscopy. In addition, it can also be used in marking applications requiring high quality such as for the identification of semi-finished products in production processes or for thin-film processing.

### Contact

Benjamin Erben M.Sc.  
Telephone +49 241 8906-657  
benjamin.erben@ilt.fraunhofer.de

Dipl.-Phys. Marco Höfer  
Telephone +49 241 8906-128  
marco.hoefer@ilt.fraunhofer.de

1 *Passive Q-switched laser.*