

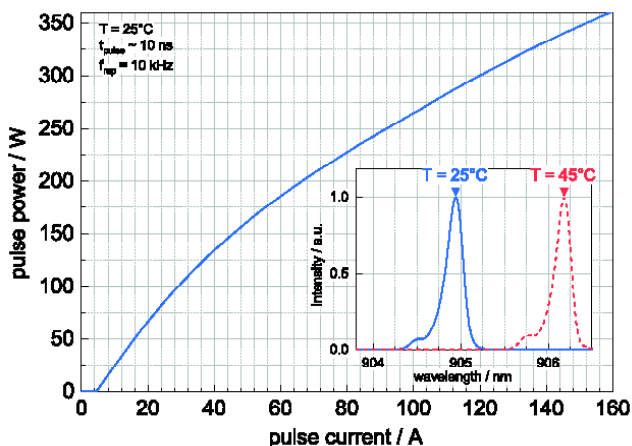
High-power pulse laser demonstrator for LiDAR applications

Lasers generating short optical pulses with widths in the range from 200 ps to 150 ns are key components for a broad range of applications including LiDAR (Light Detection and Ranging) used, e.g., for autonomous driving, 3D object detection, laser scanning (airborne, satellite, and terrestrial) as well as fluorescence spectroscopy and micro-machining systems.

FBH's high-power pulse laser demonstrators feature on-chip wavelength-stabilized lasers with multiple active regions. These lasers are integrated jointly with optimized high pulse current electronic drivers in a butterfly housing with plug-and-play control electronics and thus ideally suited for 3D object detection. The tailored design of both diode lasers and optimized electronic drivers are core competencies of the FBH. The pulse sources are optimized for high pulse current, short optical pulse width, high repetition rate, and high power efficiency.

Specifications

- lasers with 3 or 5 epitaxially stacked active regions
- laser driver with 2 parallel hybrid circuits (GaN transistor in final stage, current pulses up to 120 A)
- separate control of pulse amplitude & frequency
- current & optical pulse width: 3 ns or 10 ns
- pulse power: 20 W for RW or 360 W for BA laser
- wavelength: 905 nm
- with integrated DBR grating: spectral bandwidth <0.3 nm & temperature-dependent wavelength shift ~0.06 nm/K
- temperature range: 25° C – 45° C
- integrated beam shaping with optics



- Optical pulse power vs. driver pulse current for a DBR laser with 5 active regions. Inset: Optical spectrum at 80 A at 100 kHz.



- FBH high-power pulsed laser source as plug-and-play solution.

Applications

- autonomous driving
- 3D object detection
- laser scanning (airborne, satellite, and terrestrial)
- fluorescence spectroscopy
- micro-machining systems

Profile

Ferdinand-Braun-Institut (FBH) researches electronic and optical components, modules, and systems based on compound semiconductors. It develops light sources from the near-infrared to the UV spectral range: high-power diode lasers, UV light sources, and hybrid laser systems. Moreover, it manufactures high-frequency devices and circuits for communications, power electronics, and sensor technology. In the field of quantum technologies, FBH translates laboratory-scale proof-of-concept experiments into robust, application-ready systems. Further applications range from medical technology, materials processing and sensors to optical communications in space. In close cooperation with industry, its research results lead to cutting-edge products.

FBH is a member of the Leibniz Association and part of Research Fab Microelectronics Germany (FMD).