Leibniz Ferdinand Braun Institut

Ferdinand-Braun-Institut gGmbH
Leibniz-Institut für Höchstfrequenztechnik
Gustav-Kirchhoff-Straße 4, 12489 Berlin
www.fbh-berlin.de

Contact
Dr. Oliver Hilt
oliver.hilt@fbh-berlin.de
+49.30.6392-2791

400 V/10 A high-speed GaN half-bridge module

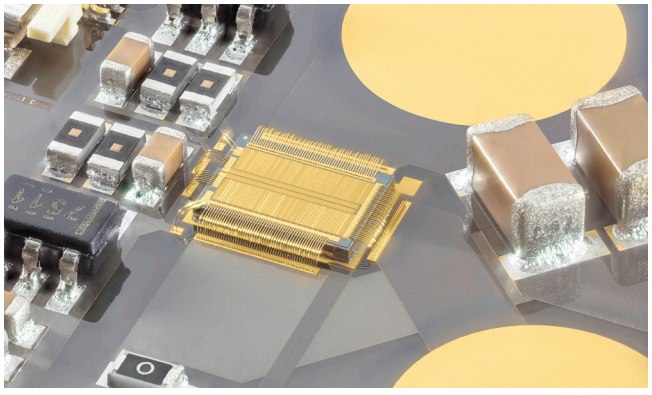
The Ferdinand-Braun-Institut has developed a 400 V/10 A GaN half-bridge module for compact and efficient power converters operating at high switching frequencies up to the MHz range. Recent layout and technology optimizations resulted in an ~45 % reduction of the module's size. In a hybrid integration approach, 600 V normally-off GaN transistor chips are assembled on an AlN substrate with two high-current metal layers. The AlN platform supports die and wire bonding for the transistors as well as SMD soldering of gate driver ICs and DC-link capacitors. The two stacked metal layers allow for a particularly small power loop with less than 3.0 nH parasitic stray inductance and a very small gate loop for fast and clean turn-on and turn-off switching transients with slopes > 100 V/ns. The AlN substrate serves as electrically insulating heat sink with low thermal impedance.

Advantages

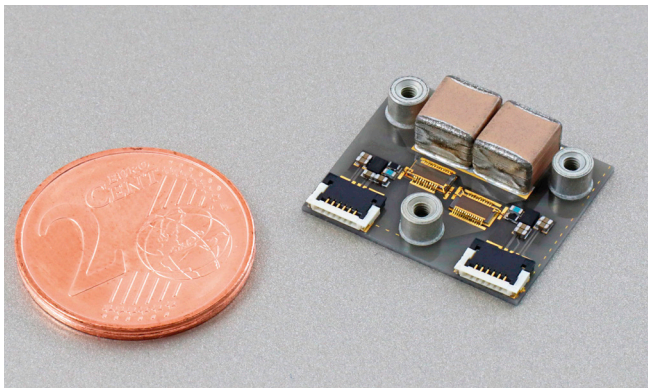
- Low inductance power module
- Integrated Si-based gate drivers
- Fast switching transients
- Very low thermal impedance due to AlN substrate
- Normally-off GaN transistors with reverse conductance capability
- MHz-range switching frequencies

Applications

- Half-bridge power module
- Hard switching
- High frequency power converter
- Small and lightweight DC-DC power converter
- Battery charger



Detailed view with gate driver IC and DC-link capacitors close to monolithically integrated GaN half-bridge chip.



400 V/10 A half-bridge module with two 170 mΩ GaN transistor chips. The AlN substrate also supports the two gate drivers and the DC-link capacitors.

Specifications

- 600 V breakdown strength
- 400 V/10 A hard switching
- 2 kW output power
- 170 mΩ GaN power transistors
- Size: 1.93 x 1.61 cm^2

Profile

The Ferdinand-Braun-Institut, Leibniz-Institut fuer Hoechstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. In the field of III-V electronics, it manufactures high-frequency devices and circuits for communications, power electronics, and sensor technology. Moreover, FBH develops light sources from the visible to the UV spectral range: high-power diode lasers, UV light sources, and hybrid laser systems. Applications range from medical technology, materials processing and sensors to optical communications in space and integrated quantum technology. In close cooperation with industry, its research results lead to cutting-edge products.

The institute has a staff of 350 employees, is a member of the Leibniz Association and part of Research Fab Microelectronics Germany (FMD).