

200 mm GaN Process Line

Application-specific GaN power devices for fabless companies and researchers

Example of quasi-vertical GaN power devices

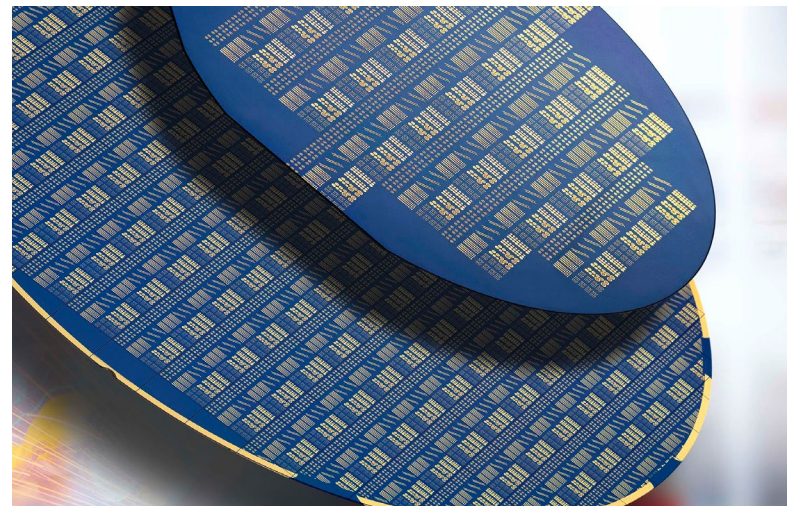
The excellent physical properties of Gallium Nitride based power semiconductor devices allow to move a step forward beyond the limitations of silicon-based devices.

The Fraunhofer ISIT is focusing on vertical GaN power devices, especially on advanced transistor and diode concepts with blocking voltages of some 100 V and switching speeds down to the ns range. The application specific chip designs and processes are facilitated by professional simulation software. The dedicated wafer equipment at ISIT allows the processing of bulk-GaN material with limited wafer diameter as well as 8" GaN-on-Si EPI wafers and the subsequent electrical characterization. As the GaN process line is integrated in a professional MEMS clean room, novel fabrication approaches and unconventional materials can be utilized to explore innovative device and integration concepts.

GaN HEMT and vertical device structures

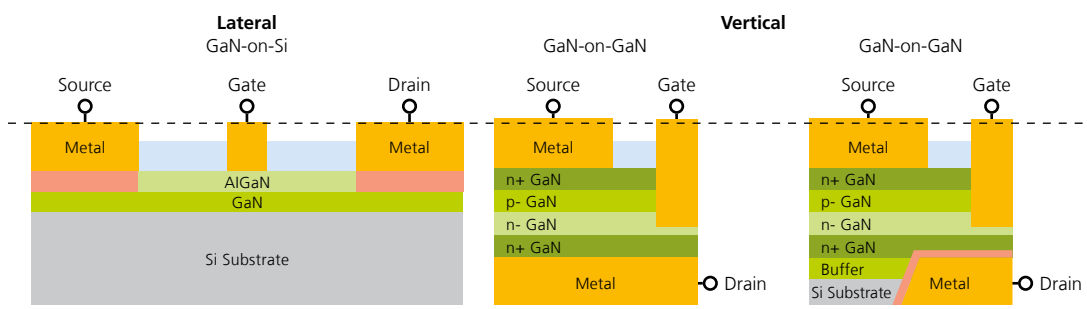
Fabrication capabilities for 48 V, 200 V and 650 V power devices on commercially available GaN-on-Si substrates. Typical gate widths are 0.5-1 μm for depletion-mode HEMTs. Vertical devices are based on trench-MOSFET technology. The backside contacts for vertical devices are created by GaN membrane processing.

Exemplary test structures for in-line process verification



GaN technology and device platform

- 200 V diode and transistor process line
- 200 mm GaN-on-Si processes and process equipment
- Front and back side contacting methods for bulk-GaN wafers and GaN-on-Si wafers
- Process and device simulation as well as testing and device reliability



Schematic GaN device structures with indicated current paths

Innovative Power Devices

Customized GaN power semiconductor devices
and passives made in Northern Germany

What we can do for you @Fraunhofer ISIT

GaN processing technology and device platform

- Application-specific development of diodes and transistors
- Adaptation and optimization of devices according to customer requirements
- Proof of concept fabrication on 200 mm process line
- Process and device simulation, testing and device reliability

Integrated micro-inductors with magnetic core by PowderMEMS technology

- Customized integrated inductors on PCB and silicon
- Integrated solutions with power devices
- Simulation-based design and combined cooling system

Fraunhofer Institute for Silicon Technology ISIT

Fraunhoferstrasse 1
25524 Itzehoe, Germany
www.isit.fraunhofer.de

Michael Mensing
Power Electronics | Head of
the Advanced Devices Group

[michael.mensing@
isit.fraunhofer.de](mailto:michael.mensing@isit.fraunhofer.de)
+494821 / 17 1416

