HiPoSwitch – WP4

Device process development and technology transfer

- 100 mΩ normally-off generation 2 transistors with up to 600 V breakdown strength manufactured and shipped to partners
- Dynamic R_{ON} increase significantly reduced due to GaN:Fe-buffer
- Generation 2 test devices based on GaN:C-buffer, GaN:Fe-buffer and AlGaN-buffer distributed to partners for dynamic performance and reliability characterization
- Generation 3 devices with new 70 mΩ layout and reduced pararsitic capacitances and new FP design have finished FE processing
- New source-connected FP design with step-SiN_x passivation gives no additional off-state leakage

Process modules for high volume manufacturing

- Contamination analysis on the Si-based technology tools and equipments has been performed
- Si-fab compatible Au-free ohmic contact module with 0.25 Ωmm contact resistance developed by IFAT
- Ohmic contact metal etching selective to the passivation layer (10:1) has beeen introduced
- Ion implantation for device isolation was optimized

Technology for quasi-vertical devices

- Process module for low-resistive interconnect between front-side contact and Si-substrate developed
- Bonding-over-active area without device degradation achieved

Benchmarkng Si vs. SiC substrates

- Thermal resistance of GaN-layer plus substrate stack has been determined for SiC substrates and for Si substrates

Publications

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[3] J. Würfl, O. Hilt, E. Bahat-Treidel, R. Zhytnytska, P. Kotara, O. Krüger, F. Brunner, M. Weyers, "Breakdown and Dynamic Effects in GaN Power Switching Devices", 40th International Sym-posium on Compound Semiconductors (ISCS), Kobe, Japan, May 19-23 (2013).

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[8] J. Würfl, "Overview on Project ‘GaN-Based Normally-Off High Power Switching Transistors for Efficient Power Converters’ (HIPOSWITCH)", 37th Workshop on Compound Semiconductor Devices and Integrated Circuits (WOCSDICE), Warnemünde, Germany, May 26-29, ISBN 978-3-00-041435-0, p. 55 (2013).

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