E2CoGaN: Wafer-level isolated BGA (2014)

Project

energy efficient conversion using GaN power devices :
Funding: ENIAC call 2012-1

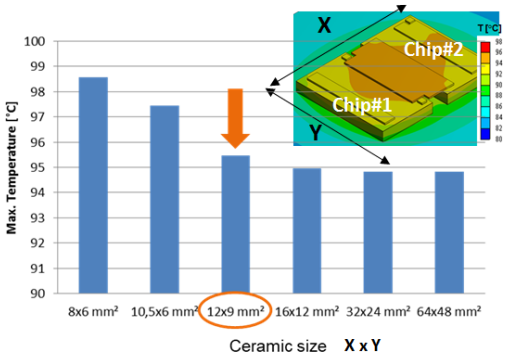
Wafer-level isolated BGA

- 2x GaN HEMTs on single AlN ceramic substrate
- 1-phase PV inverter with P_{out}=2300W
- switching frequency > 50kHz

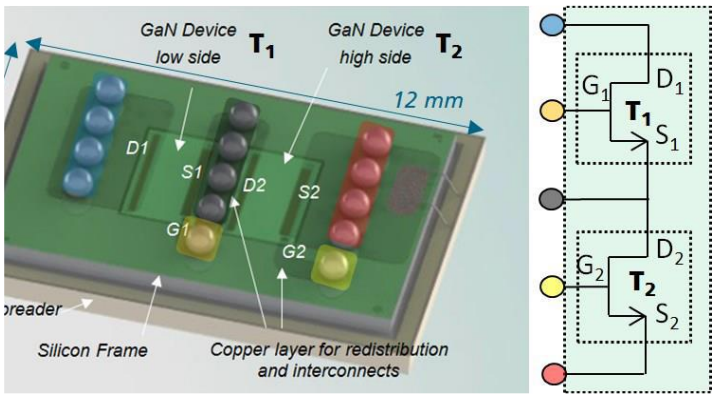
Performed tasks

- Concept work-out with wafer-level embedding team
- Static electrical design
- Demonstrator design (Altium)
- Final static electrical testing (static)
- Final tests

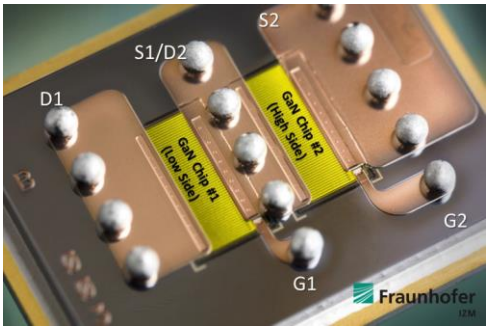
Best ceramic size estimation



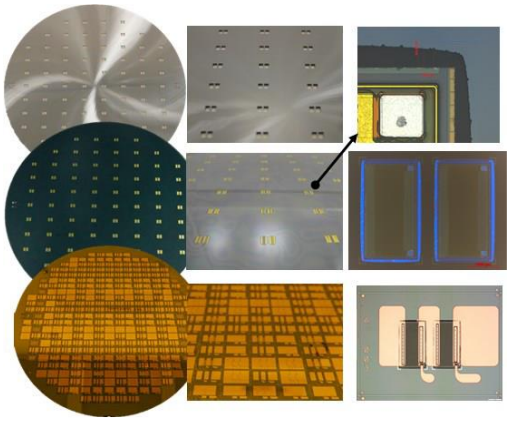
Structure of the half-bridge package



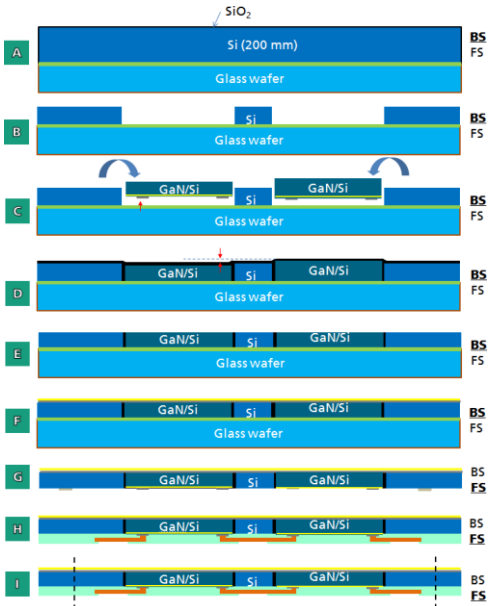
GaN half-bridge isolated BGA



Wafer Level Packaging with cavities (top), bare device embedding (middle), and thick copper front side (bottom)



Wafer Level Process flow overview



Source: [IEEE] C.-A. Manier, K. Klein, F. Wüst, R. Gernhardt, P. Cussac, S. Andzouana, R. Mitova, H. Oppermann, K.-D. Lang, "Wafer Level Embedding Technology for Packaging of Planar GaN Half-Bridge Module in High Power Density Conversion Applications.," PCIM Europe 2018; International Exhibition and Conference for Power Electronics, Intelligent Motion, Renewable Energy and Energy Management, Nuremberg, Germany, 2018, pp. 1-8.