



ANALYSIS OF FAILURE MECHANISMS

- Statistical analysis
- Package decapsulation
- Removal of soft gel
- Micro sections
- Scanning acoustic microscopy (SAM)
- Surface scan
- Lock-in thermography (LIT)
- Scanning electron microscopy (SEM)
- Elementary analysis (by EDX)
- Focused ion beam (FIB)
- Partial discharge

LIFETIME MODELING

- Physical and empirical
- Gate oxide reliability
- Electromigration

CONTACT

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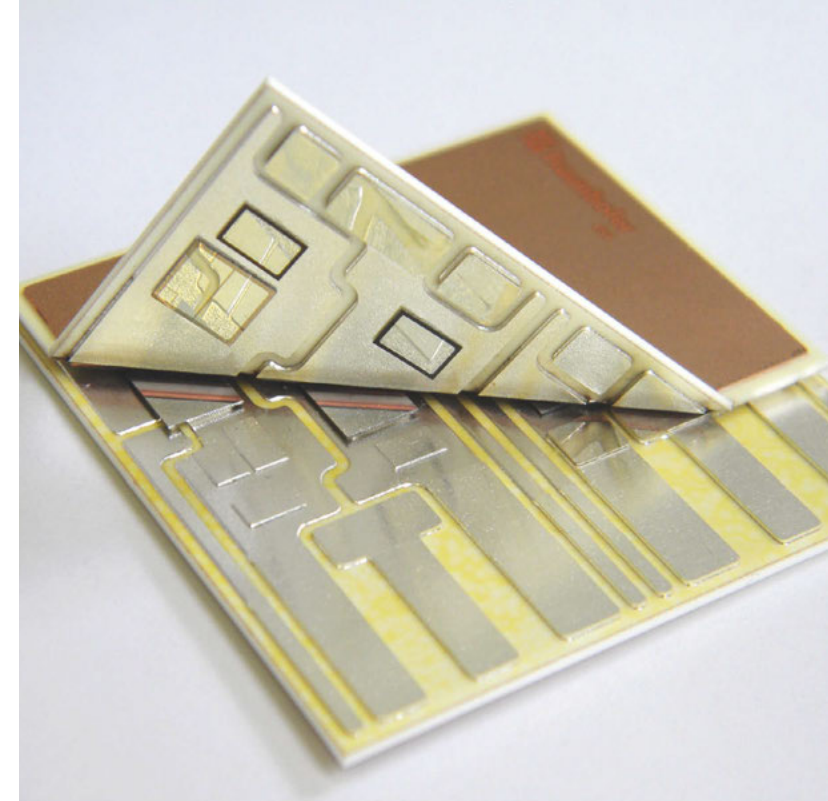
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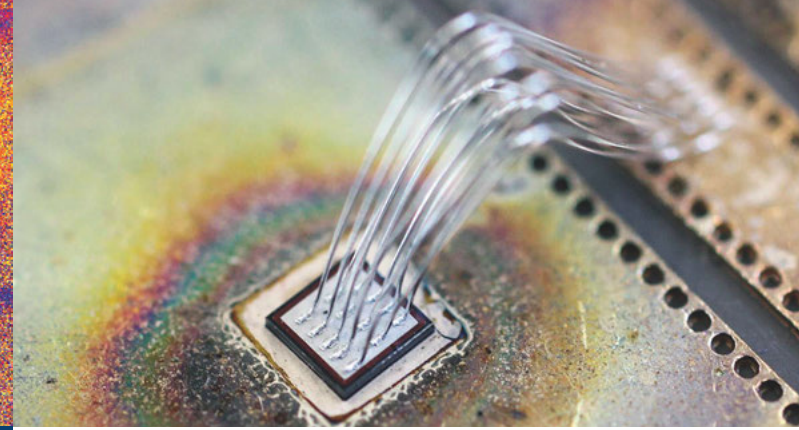
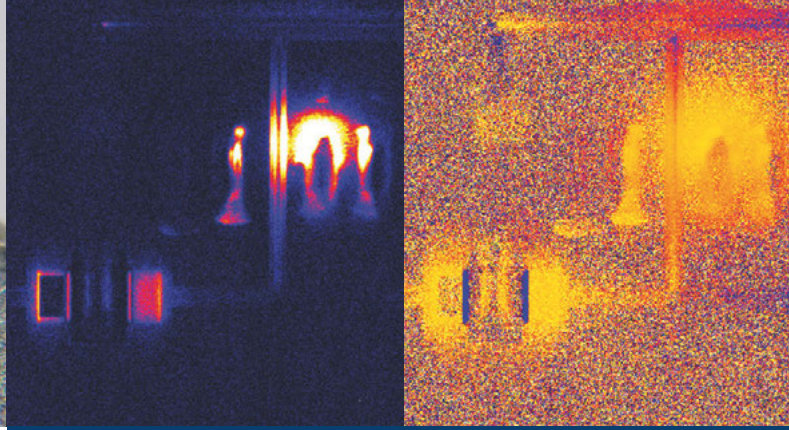
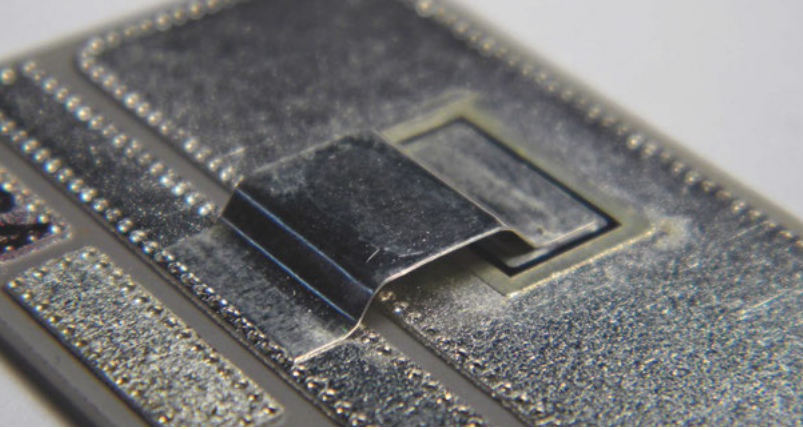
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Cover page:
Example for double-sided cooling of silver-sintered semiconductor devices

TECHNOLOGIES FOR POWER ELECTRONICS





DEVICE TECHNOLOGIES

- Passive and active devices for power electronics
- New materials for passive devices
- Silicon and silicon carbide pilot lines
- Post-metallization of off-the-shelf wafers
- Diffusion simulation
- Electric field simulation

JOINING TECHNOLOGIES

- Soldering for standard and high-temperature applications
 - Vapor-phase vacuum soldering system
 - Formic-acid-activated IR vacuum reflow
- Silver sintering with enhanced automatic die placer with servopress
 - Single and double sided
 - Multichip power modules
- Wire bonding of different materials and diameters with automatic bonders

CHARACTERIZATION

- Dynamic switching performance
- Static device properties
- Leakage current management
- High speed imaging
- Infrared imaging
- Thermal resistance measurement (R_{th})
- Thermal impedance measurement (Z_{th})
- Nanoindentation
- Differential scanning calorimetry (DSC)
- Thermogravimetric analysis (TGA)

POWER MODULES

- Conceptual investigations
- Design for electrical, thermal, mechanical, and lifetime constraints
- Heat spreading
- Manufacturing and packaging
- Electrical and thermal simulation

ACCELERATED AGING

- Passive temperature cycling via air in two-chamber shock oven: Temperature range from -80 °C to +300 °C
- Passive temperature cycling tests for liquid cooled power electronic systems: Temperature range from -25 °C to +90 °C
- Active power cycling
 - Up to 20 devices in one test
 - Wide range of cycling time
 - Heating current up to 2000 A
 - Heating voltage up to 35 V
 - Heating and cooling power up to 20 kW
 - Coolant temperatures from -60 °C to +150 °C possible
 - Test procedures from constant temperature swing (scientific), constant heating power to constant heating current (application oriented)
- Mechanical vibration
- Environmental tests for power modules and passive components (like H3TRB and others)
 - Temperature
 - Humidity
 - AC and DC voltage