

Service Offers

Apart from the research work done in semiconductor and micro systems technology, ISIT offers many processing, qualification, and test steps as a service for our industrial customers. Many years of experience with electronic assemblies enables the engineers to elaborate solutions in packaging processes, in manufacturing quality evaluation, in reliability and lifetime testing, as well as in failure and damage analysis. Within research projects, the design and production of application specific power devices (MOSFETs, IGBTs) has been accomplished.

Further Institute Highlights are:

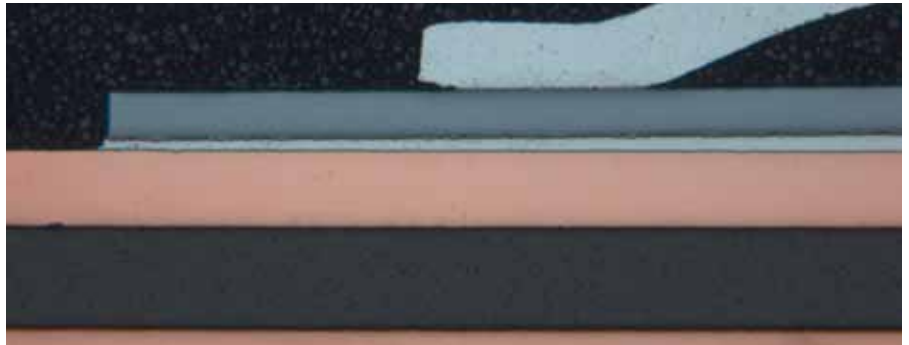
- Semiconductor production line in cooperation with Vishay Siliconix Itzehoe GmbH
- IC Technology
- Micro systems - MEMS
- EN ISO 9001:2008 certified quality management system



Lead frame power module with ISIT MOSFETs (NELE), ready to be epoxy moulded

Packaging Technology

Conventional and advanced packaging technologies are available, e.g. paste



Metallographic cross section of a power module assembly

printing, component or die placement, and reflow soldering (vapour phase, vacuum). Soldering process development can be done by in-situ x-ray observation of the melting process even with vacuum applied. Semiconductor chip top connections are made by large wire bonding, but new assembly concepts are evaluated with wafer level chip size packages (WLCSP) or with modified metallisations, e.g. by wafer level NiAu plating on the standard Al metallisation.

Quality and Reliability

Static and dynamic electrical measurements confirm data sheet values,

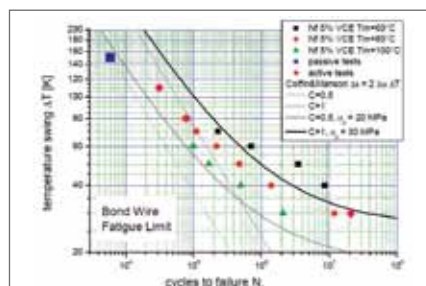
e.g. break through voltage, on resistance, stationary and transient thermal resistances. Several power cycling test benches (current up to 2 kA) are available for reliability testing.

A dedicated power supply allows testing of photo voltaic inverters (solar panel and field simulation) and IR thermography (Lock-In) is used to reveal hot spots.

Analysis is done by x-ray inspection, scanning acoustic microscopy, scanning electron microscopy, as well as by metallographic cross sections.

Modelling

Modelling of thermal performance (thermal resistance, stationary and transient) has been applied to assemblies and cooling units (air, water). Modelling of the thermo-mechanical behaviour of assemblies and the damage mechanisms evaluates critical loads and allows the prediction of lifetime due to creep and fatigue.



Power module reliability, experiment and model prediction