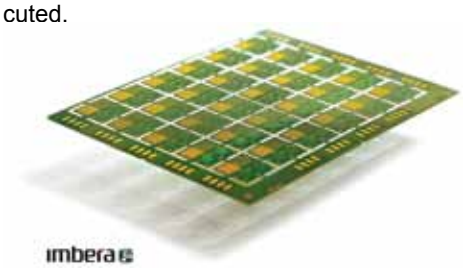
FloTHERM® and *T3Ster*® Help Imbera Develop New Integrated Module Board (IMB) Technology

T3Ster®

Design Challenge

Imbera Electronics Oy has developed a novel Integrated Module Board (IMB) technology which integrates active components into electronic modules and high density printed circuit boards. The IMB process combines PCB manufacturing, component packaging, and assembly into a single manufacturing process. All interconnections between the IC and substrate are processed simultaneously.

The thermal properties of the totally new technology were challenging to define. There is no standard for defining the thermal resistance of the PCB in which the IC is embedded. In addition, IMB technology is constantly developing and it is applied to several product areas within a variety of customer projects. Due to a totally new electronic packaging approach, the thermal characterization challenges are obvious, and due to tight time schedules, extensive prototype runs can not be executed.

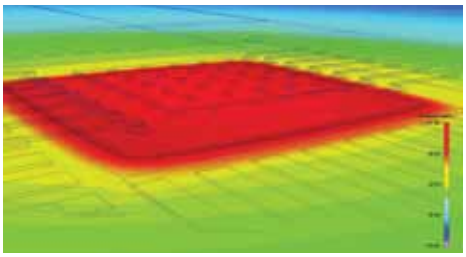


IMB modules (ICs embedded in PCB) in panel.

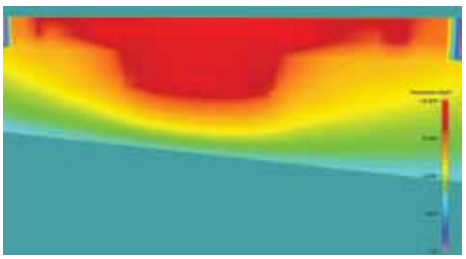
Solution and Benefits

Two types of IMB structures, a BGA type module and an IC embedded in the mother board, were modeled with FloTHERM in the JEDEC standard still-air test environment. The extensive simulation rounds were verified by measurements using MicReD thermal test equipment *T3Ster*. The embedded IC applications can not be tested according to standards (because no standards yet exist) but the measurements were useful to support the modeling results. Simulations gave fundamental information about the thermal behavior of the structure – several thermal enhancement methods could be tested with minor effort saving time and money, and the heat flow paths and blocks of the structure were detected. Regarding customer projects, thermal modeling is an effective solution for optimizing the thermal enhancement methods for each application. The IMB technology enables various methods for keeping the product operating temperature at an optimal level. As important as it is to remove heat efficiently from critical areas it is also essential not to "over design". FloTHERM enables the optimization of thermal design without over-design.

The BGA type IMB module (8x8 mm^2 module with 4x4 mm^2 thermal test chip) mounted on the JEDEC thermal test board.



The BGA type IMB module (8x8 mm^2 module with 4x4 mm^2 thermal test chip) mounted on the JEDEC thermal test board for measurement by *T3Ster.*



The temperature distribution of the cross-section of the BGA type IMB module (8x8 mm^2 module with 4x4 mm^2 IC) mounted on the JEDEC test PCB. Modeled with FloTHERM.

Customer Testimonial

"When working with new technology, modern structures and materials, and customer projects in different application areas, the need to define thermal requirements quickly is a necessity. Our typical product is composed of a substrate (mother board or module) in which ICs are embedded. Adequate thermal enhancement must be determined in the early design phase. Using FloTHERM as part of the design process is a good solution for us. Many of our customers have the same software, so the exchange of models is straight forward."

Tanja Karila,
Thermal Specialist,
Imbera Electronics Oy,
Espoo, Finland

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