Thermal Package Characterization

Amkor Technology offers advanced thermal test measurement capability and state-of-the-art modeling capabilities supporting all major electronic packaging styles.

Amkor Proprietary Data Acquisition Software:

- Enhanced throughput and flexibility
- Automatic control and test capability
- Measure MCMs with up to 4 chips
- Heat spreader and heat sink analysis
- Perform system level measurements

Wind Tunnel Facility:

Amkor's closed loop wind tunnel is capable of controlling airflow from 50 to 1600 LPM and air temperature from 18 °C to 65 °C. The tunnel spatial uniformity of velocity is ±1% of the mean value. The test section is 12x12 inches with a contraction area of 6.5:1. Up to three boards can be tested simultaneously. A data acquisition and control system provides automated testing over a preset range of flow rate and power levels. Steady state convergence tests, based on die level temperature, are used before stepping to the next power/flow condition. Data are retrieved automatically and stored in an Access database filing system.

Theta JC and Theta JB Facility:

Cold plate facilities are available for measuring Theta JC and Theta JB.

Test Boards:

Amkor maintains a library of JEDEC standard leaded and array format 1S0P and 1S2P test boards. Custom board design capabilities are also available.

Thermal Test Reports:

Amkor amassed over 100 thermal test reports covering a wide array of packages ranging from power application packages such as a PSOP3, leaded packages such as LQFP, exposed pad packages such as MLF®s and array packages such as PBGA. Thermal data includes Theta JA over a range of power levels at flow velocities from 0.0 to 2.5m/s. Psi JT, Psi JB and Theta JC data are available in many of the thermal reports.

Quick Thermal Calculators:

Quick thermal calculators are available for many package styles. Immediate thermal resistance estimations are available using a Web interface.

Parametric Models:

Turnkey thermal models are also available using Ansys' parametric modeling capabilities. Fewer geometrical details are considered but the models are fully automated. Typical accuracy is 90% or higher.

Detailed Models:

Amkor employs advanced thermal modeling techniques using finite element analysis (FEA). A CAD-based modeling approach developed at Amkor has consistently shown a 95% accuracy level when compared against test data. Individual details such as traces, vias, solder balls, etc. are explicitly modeled.

Custom Thermal Solutions:

Custom thermal solutions are available at Amkor to optimize component level designs. This may include laminate or leadframe design optimization, material property evaluation and board layout analyses.

Computation Fluid Dynamic (CFD) Model:

CFD models are used to more closely predict package performance in custom environments. This includes local flow conditions, system packaging and thermal interaction between neighboring components.

Compact Thermal Models:

Compact thermal models are available for predicting system level performance. They are developed to provide "boundary condition independent" peak die temperature predictions.