

Thermal Simulation of FCBGA Package with Heat Sink

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Abstract

In a modern IC design, the capability of predicting the temperature profile is critically important as well as cooling and related thermal problems are the principal challenges. To address these challenges, thermal analysis must be embedded within IC synthesis. This paper presents thermal analysis of the FCBGA chip with a 4mm×4mm×0.3mm silicon die. The silicon die dissipates heat flux of different power from 1W to 5W. The aluminium heat sink is provided for convective cooling over the chip. Epoxy glue layer is provided to attach the heat sink with a 4 layer FCBGA substrate. The results are analyzed in COMSOL Multiphysics® software by using the Heat Transfer Module. The heat sink provides the best thermal performance of FCBGA Chip package. The silicon die temperature is less than 325K for 2W power and analyzed temperature profile of the FCBGA heat sink.

Reference

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- 2) N. F. Dean and A. L. Gettings, "Experimental Testing of Thermal Interface Materials on Non-Planar Surfaces," Proceedings of 14th Annual IEEE Semiconductor Thermal Measurement and Management Symposium (SEMI-THERM), pp. 88-94, 1998.
- 3) C. Chiu et al., "Thermal Modeling and Experimental Validation of Thermal Interface Performance between Non-Flat Surfaces," Proceedings of 8th Intersociety Conference on Thermal Phenomena (ITHERM), IEEE, pp. 55-62, 2000.
- 4) G. L. Solbrekken et al., "The Development of a Tool to Predict Package Level Thermal Interface Material Performance," Proceedings of 8th Intersociety Conference on Thermal Phenomena (ITHERM), IEEE, pp. 48-54, 2000.

Figures used in the abstract

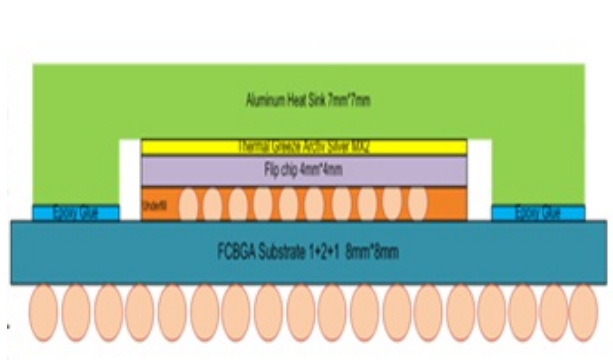


Figure 1: Package Construction.

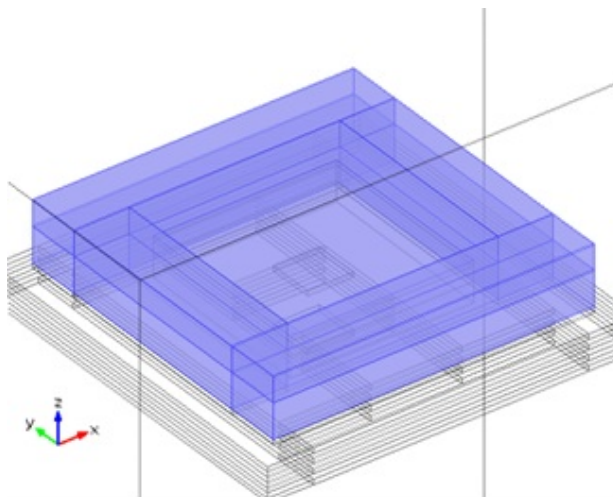


Figure 2: Drawing of the FCBGA model.

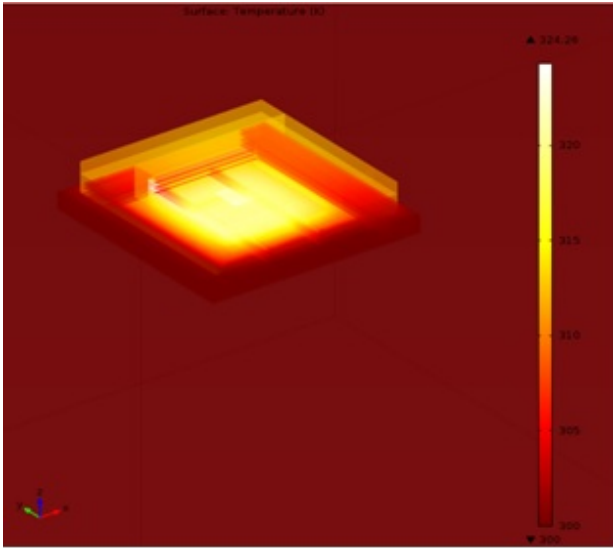


Figure 3: Temperature profile 2W power.

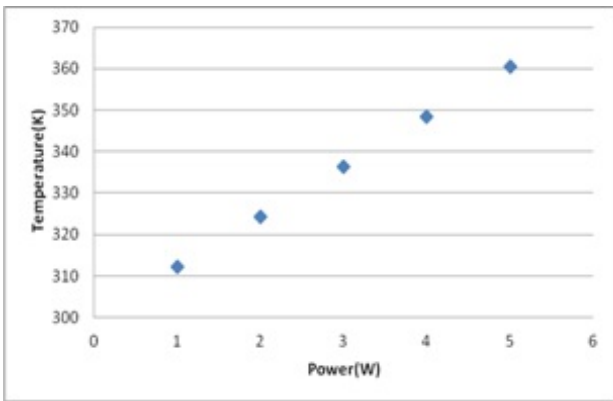


Figure 4: Power v/s Temperature.