

Virtual Prototyping of LED Chip Scale Packaging Using Computational Fluid Dynamic and Finite Element Method

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Abstract : LED technology has been evolving aggressively in recent years from incandescent bulb during older days to as small as chip scale package. It will continue to stay bright in future. As such, there is tremendous pressure to stay competitive in the market by optimizing products to next level of performance and reliability with the shortest time to market. This changes the conventional way of product design and development to virtual prototyping by means of Computer Aided Engineering (CAE). It comprises of the deployment of Finite Element Method (FEM) and Computational Fluid Dynamic (CFD). FEM accelerates the investigation for early detection of failures such as crack, improve the thermal performance of system and enhance solder joint reliability. CFD helps to simulate the flow pattern of molding material as a function of different temperature, molding parameters settings to evaluate failures like voids and displacement. This paper will briefly discuss the procedures and applications of FEM in thermal stress, solder joint reliability and CFD of compression molding in LED CSP. Integration of virtual prototyping in product development had greatly reduced the time to market. Many successful achievements with minimized number of evaluation iterations required in the scope of material, process setting, and package architecture variant have been materialized with this approach.

Keywords : LED, chip scale packaging (CSP), computational fluid dynamic (CFD), virtual prototyping

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