Robost Design for the Mechanical Reliability of a 3-D Stacked Module Package

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Abstract

This paper proposes a method for assessing the mechanical reliability assessments and design opinnizatloil of a stacked module package (‘SIP). Two geometrical parameters—-the flip—chip c/ic thickness and the substrate thickness, and three material parameters—the polvinude option, the under/li? material, and the hunip material, are used to perfi)rmn (lie parametric studies and factorial design. ‘The !hree—dinensional Jlnfle clenieni a,ialvsis (F1-l) consists of global and local mnodels using i/ic sub—modeling technique. i/us two—stage mnodehng approach is capable f deternilning the interfacial siresses, bunip stress, and lou—k stress. For inierfiicia? stresses, i/ic shear stress (lomflinates and is con.cistent ii’ itli the ohseru’ ation fromnfielci data/or under/Ill delamination. In addition to the inie’ rfacial stresses, the hump stress and low—k stress are bonded together to forni a mnulti—ohjectii’ e function enabling design opimuzation. The desirability of each sub—objective is set to he the mmnhmmuzalion Therefore the best parametric comnhmalion can he obtained in ot (Icr 10 enhance the IP ,,iechanica/ re/jab i/ui through 2 3factorial designs.

Keyword：Mechanical reliability, stacked module package, finite element analysis, factorial design.