

## **Numerical prediction of CPU-Socket Solder Joint Reliability during Shock**

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This paper proposes a systematic simulation methodology for effectively predicting the solder joint reliability (SJR) of CPU-Socket during shock. The methodology is developed using the SMT PGA 604 socket, a MP Server (Xeon®) socket. Three main challenges in the prediction of SJR of sockets are complex socket/contact shape; proper risk assessment metrology selection and reasonable correlation with the available experimental results. This paper proposes a Contact Isolation Method (CIM) which allows contacts with complicated geometry to be simplified to limited degrees of freedom and at the same time maintains 90% of the original structural response in terms of 3-D stiffnesses when proper connection/BCs with socket housing walls are prescribed. Metrology is selected to link the modeling capability with experimental technique and the validity of the modeling prediction is validated by comparison against experimental data. In addition, efforts are made to investigate various modeling techniques/modeling inputs such as different element types; full model vs. half model; point mass vs. spherical mass; various boundary conditions and various shock events etc. Lastly a cohesive element method is recommended if we want to examine the inter-metallic crack initial as well as propagation at solder joints interfaces.