

The Future of Solder Joint Encapsulant

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Abstract

Solder joint encapsulant adhesives have been successfully used for many years by major electronics manufacturers to enhance the strength of solder joints. These products have proven to strengthen solder joints 5-10x over traditional methods, and have greatly improved thermal cycling during the soldering process as well as the drop performance in the finished products. The use of solder joint encapsulant adhesives can eliminate the need for underfill materials and the underfill process altogether, thus simplifying rework which results in a lower cost of ownership. Solder joint strength, however continues to be a problematic issue with increased package on package and system on package miniaturization.

Research tests were performed to compare the solder joint strength using flux in nitrogen reflow process versus solder joint encapsulant in air reflow process. Using flux in nitrogen the top PoP had a solder joint height of 11.85 mil with 0.9 mil warpage and 5.25% solder voids. In comparison, using solder joint encapsulant in air, the PoP had a solder joint height of 11.33 mil with 0.8 mil warpage and 2.93% solder voids. The pull strength of solder joint was 71 N using flux compared to 352 N using the solder joint encapsulant. The first thermal cycling failure was increased from 495 cycles using underfill to around 5000 cycles using the solder joint encapsulant. From the data it is evident that solder joint encapsulant provides a very promising solution for solder joint strength in the evolution of miniaturized electronic packaging. In this presentation we are going to discuss the details and future of solder joint encapsulant adhesives.