

Reworkable Edgebond Adhesive Dramatically Enhances Board Level Reliability of Area Array Packages

October 12, 2015

EAST HANOVER, NJ – A new approach to enhancing the board level reliability of area array packages was presented at the recent SMTA International, an industry-leading conference on electronics assembly and advanced packaging. John McMahon, et. al. presented work, performed at Celestica, that demonstrates that a reworkable edgebond adhesive, manufactured by Zymet, takes a 55-mm LTCC CBGA out to over 3000 cycles of 0°C to 100°C cycling without failure, a dramatic improvement over a non-reinforced component.

In one comparison, a 47.5-mm CBGA with 2115 I/O's had a nominal 4% failure rate (B4%) of 1170 cycles. With the reworkable edgebond adhesive, no failures were encountered at 3517 cycles, end of test. Unsurprisingly, a larger 50-mm CBGA with 2303 I/O's, without adhesive, had a lower B4% of 850 cycles. Using the reworkable edgebond adhesive on a 55-mm CBGA with 2892 I/O's, no failures were encountered at 3010 cycles, also end of test.

CBGA's made from LTCC, which has a coefficient of thermal expansion of 12 ppm/C, incur a considerable amount of stress when assembled on an organic board. However, Mr. McMahon states that "use of a modern (reworkable) edgebond material can significantly increase chamber cycling life by a factor of 3X or more". In addition to extensive life-testing and failure analysis, Celestica also developed a precise dispensing process, as illustrated in Figure 1. And, it also confirmed the adhesive's reworkability, having developed and refined a rework process.

The benefits of using a reworkable edgebond adhesive, over a reworkable underfill, to enhance the board level reliability of BGA's and other area array components such as WLP's, WLCSP's, CSP's, POP's, and QFN's, are significant. No board preheat and dwell time are needed for capillary flow. The risks of underfill voids and flux-underfill incompatibilities are eliminated. And, when performing rework, there is no need to remove underfill residues from the entire footprint of the package, virtually eliminating the risk of pad damage.

Celestica is a global EMS dedicated to delivering end-to-end product lifecycle solutions. Through its simplified global operations network and information technology platform, it delivers informed, flexible solutions to its partners, enabling them to succeed in the markets they serve.

Zymet, founded in 1986, is a global supplier of electronic and electronic adhesives and encapsulants, and is pleased to have contributed to the work. In addition to reworkable underfills and reworkable edgebond adhesives, its products include die-attach adhesives, substrate-attach adhesives, thermally conductive adhesives, and UV curable encapsulants.

Requests for information regarding Celestica's global electronics manufacturing and development services, may be submitted by email to contactus@celestica.com. Requests for information regarding reworkable edgebond adhesives, may be submitted by email to info@zymet.com



Figure 1. Edgebonded CBGA, courtesy of Celestica, Inc.