

BGA Reballing

In the current economic environment, the ability to reuse ball grid array (BGA) components that have failed due to solder defects may be an efficient way for electronics manufacturers to reduce costs. Cost may not be the only driving factor in the decision to engage in this recycling practice. The increasing demands placed upon the complexity of microprocessors and integrated circuits (ICs) has decreased the availability of some components, and increased their lead time. Because of this, reballing may provide a means to meet schedule, reduce rework turn-around time, and give a manufacturer a decisive advantage over other companies in an ever increasingly competitive market. This article will discuss the process of reballing BGA components (Figure 1), examining preparation (the preform method, the screen method), and cleaning and bake-out.

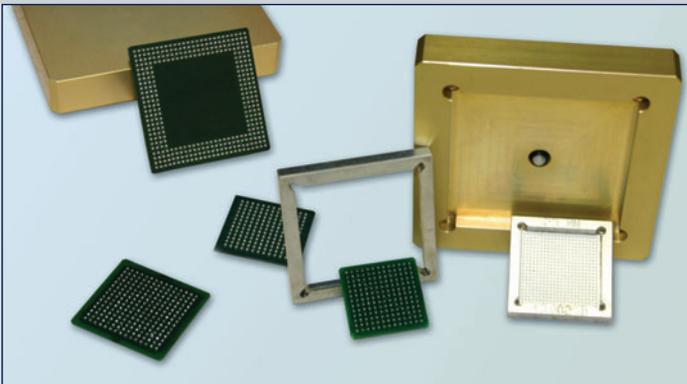


Figure 1: Various BGAs

Before attempting to reball a BGA, consider the solder alloy. Lead-free components require a different reflow profile from those using a tin/lead alloy. Also consult the manufacturer's data sheet for precautions regarding component moisture sensitivity and limitations on the number of reflows cycles the component can tolerate. Repeated reflow cycles may void a component's warranty.

Preparation

The first step in reballing a BGA is to remove the old solder from the component lands. The use of a wide blade soldering iron tip works

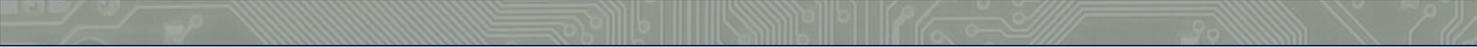
best. With the application of flux and solder braid, the wide blade tip can be drawn across the component surface allowing the residual solder to be wicked off of the component lands and into the solder braid. Care must be taken to avoid downward pressure on the component for fear of damaging the lands. After the excess solder has been removed, clean off any remaining flux residue using a solvent that is chemically matched to the type of flux. Isopropyl alcohol (IPA) can be used with most common resin type fluxes. If an aqueous cleaning system is used in conjunction with a low residue or no-clean flux, be certain to match the saponifier with the flux chemistry.

Preform Method

One method of successful reballing is the preform method. This employs a solder preform used in conjunction with a simple frame that matches the BGA component's outside dimensions. The preform is constructed with precisely spaced solder balls sandwiched between a cardboard laminate that has been saturated with a water-soluble flux. Once the component has been properly prepared, place the preform into the frame with the ball-side facing up, apply some water-soluble flux paste to the lands of the component and then set the component into the frame on top of the preform. Now you need only reflow the frame, using convective heat to wet the solder balls to the component lands. Once the component cools, the cardboard laminate can be removed and the component cleaned using deionized water. Many electronics manufacturers have found this to be an efficient way to reclaim components that would otherwise have been discarded and the wide variety of preform shapes and sizes make this method of recycling highly effective.

Screen Method

The screen method employs a screen stencil of non-solderable material. You begin by applying tacky (paste) flux to the properly prepared component lands. You then place the component in a specialized fixture (the fixture should match the outer dimensions of the component). Set the screen stencil over the component lands ensuring that the holes in the screen line up with the component lands. Then place individual solder balls on top of the screen and move



them about so they fall into the holes of the screen which are already aligned with the lands. Take care that all holes are filled and that no excess balls can roll about within the fixture. Now simply reflow the entire fixture allowing the solder balls to wet to the component lands.

Cleaning and Bake-Out

After reballing is complete, the manner in which the component is cleaned is dependent upon the type of flux used during the process. Isopropyl alcohol may be used as a solvent with resin/rosin based flux (a test method may need to be developed to ensure no residue is left behind). When using preforms however, deionized water must be used to clean the component, because the laminate comes pre-saturated with water-soluble flux. Although the preform method is quite efficient, it requires an additional step. It is necessary to perform a bake-out cycle of the component prior to use because of possible water absorption by the component. Consult the manufacturer's data sheet for recommendations on moisture removal from BGA components.

When properly employed, the practice of reballing can save money and time for a manufacturer and therefore a thorough understanding of the benefits of this process can be a valuable investment of time and resources. For more information, please contact the helpline at 610.362.1320 or via email at helpline@aciusa.org.

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