Surface Mount PGA Connector Technology Enables Development of Custom Board to Board Connector System

THE CHALLENGE

A major electronics test equipment manufacturer produces a series of rear-end and engine testers for use in automotive design and development applications. Depending on the test functions required, users select a particular combination of purpose-built, socketed PC test boards, stack them, and plug the stack into the tester. This board-to-board connection approach offers great testing flexibility and results in a more compact test system configuration.

Initially, the tester manufacturer chose to use conventional FR-4 multi-layer test boards with plated through holes, solder preforms and high pin counts. However, these boards were relatively complex and costly to produce. Assembly was time-consuming; the board reject rate was unacceptable; and bad boards had to be scrapped instead of being reworked. Especially troublesome was an electrical "open" problem that sometimes occurred due to solder from the plated through holes in the upper board, and from preforms used on an adapter, running too far down the extended-length male pins which needed to plug into a socket on a lower PC board (see Fig. 1). It was apparent that a better, yet more economical, method was needed to achieve the desired yields of high quality stackable test PC boards.

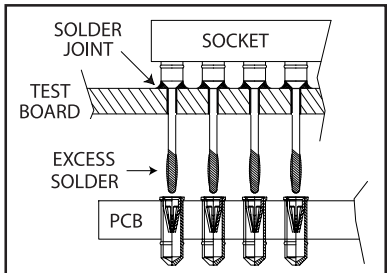
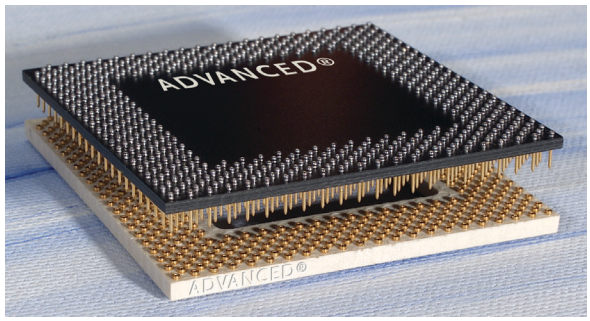


Fig. 1 – Solder wicking from the pasted through holes and solder preforms was causing electrical opens and required an extra cleaning process prior to reflow.

THE ADVANCED® SOLUTION

The solution devised by Advanced Interconnections (AIC) involved the innovative application of our patented BGA Socket Adapter System in an existing, molded PGA wafer. The result of combining our proven technologies was a surface mount, interstitial pin grid array (PGA) connector.



Innovative SMT Board to Board Connector in interstitial PGA pattern.

This custom SMT PGA Socket Adapter System:

- Enables the boards to be produced with fewer layers due to SMT design,
- Eliminates the need for plated through holes,
- Provides a corporate test board solution, and
- Allows for more efficient, cost-effective production.

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ADVANCED INTERCONNECTIONS
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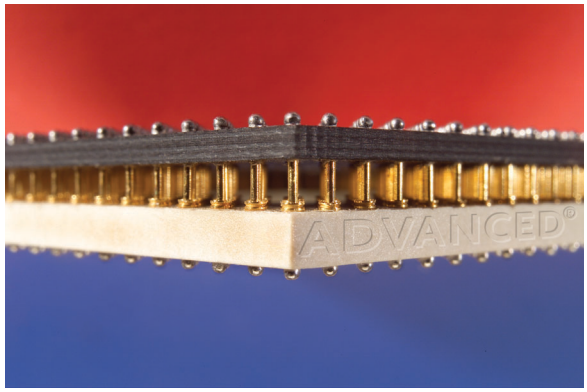
For this application, AIC employed a two-piece PGA connector system (an adaptation of a standard AIC design), comprised of a molded liquid crystal polymer (LCP) socket incorporating 3-finger low-force, gold-plated beryllium copper contacts, and an FR-4 adapter incorporating screw-machined, gold-plated brass pins. Both the socket and adapter feature our exclusive eutectic solder ball terminals for superior processing yields.

The socket and adapter are reflow soldered to the circuit board's surface mount pads using BGA solder balls. This alleviates the need for plated through holes, eliminates the electrical "open" problem that was formerly experienced due to solder running down the through hole pins, and also permits boards to be reworked if necessary without scrapping them.

AIC's use of surface mount PGA connectors to facilitate board-to-board connections has enabled the test system manufacturer to simplify assembly, reduce manufacturing costs, enhance product reliability, and increase the yield of good boards by as much as 20% compared to the original production method.



Both the socket and adapter feature our exclusive eutectic solder ball terminals for superior yields and conform to existing SMT processing profiles.

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