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Surface Insulation Resistance (SIR) Testing

Results of Independent Testing for Best Inc.
BGA Stencil Repair Rework Samples
Solder Paste Reattachment

Purpose

Compare the Surface Insulation Resistance of reworked BGA test samples made with standard solder balls and solder paste only reattachment and samples made including the StencilQuick™ product from Best Inc. with the solder balls and solder paste reattachment.

Discussion

Samples were prepared using BGA Daisy Chain Test Chips from Amkor with 484 I/O and pads at a 1.0 mm pitch. The daisy chain test cards are a single sided FR4 material with 1 oz. copper and a HASL finish. The card pad size is .025 with a 1mm pitch. As the BGA is configured, two patterns of the Daisy Chain run adjacent to a third common pattern. Insulation resistance measurements were made from each of the individual patterns to the common. Each of the sample boards contains four devices. This gives a total of 8 measurements per board. With two different boards and two different BGA attachment techniques gives a total of 16 total measurements for the testing. Only 15 total measurements could be made due to a short between one of the daisy chain patterns and common on the non-StencilQuik™ test card.

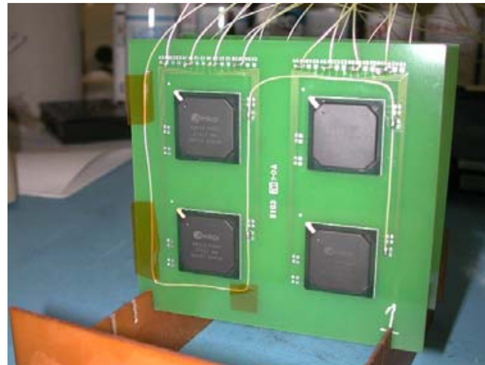
Board number two used the Best Inc. stencil rework technique (StencilQuck™, BETA version) and Board number one used no stencil. The stencil is a polyimide film with aperatures corresponding to the BGA pads. A high temperature pressure sensitive Acrylic adhesive is used to attach it to the board. The thickness of the adhesive is .004 inch and the film thickness is .004 inch for a total of .008 inch.

For assembly of Board two, the polyimide film stencil is placed on the test cards with the BGA pads exposed through openings in the film. Solder Paste (Alpha Omnix 5000) is then applied to each aperture opening, filling the aperture opening. . Excess solder paste is removed from the top surface of the stencil. The balled test BGA (.025

diameter / Sn63/Pb37 Ball) is placed on the stenciled card and reflowed using a standard already-developed profile.

Board one where no StencilQuck™ is used follows the same steps except for the application of the solder paste. The Solder Paste is applied by using a stainless steel handheld squeegee and rolling solder paste into the aperture openings of the miniature .010inch thick stencilThe BGA is then placed on the circuit board. Both card types were reflowed using the standard profile with a maximum temperature of 220 deg. C.

Surface Insulation resistance measurements as documented in the Telecordia (Bellcore) NEBS standard GR-78, Issue 1, Section 13.1.3 were perfromed. Initial room ambient measurements were made and was followed by a 24 hour unbiased soak at 35 deg. C and 85 % RH. Another set of measurements was done at this time. This was finally followed by a 96 hour soak at 35 deg. C / 85 % RH with a 50 Vdc bias between the patterns and common. Final measurements were made while under soak and bias removed.



Wired test board

Test Boards in Chamber

Results

An average of the measurements for each board was computed. The sample with the stencil had 8 measurements while the sample without the stencil had only 7 due to a short between one daisy chain pattern and the common.
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Initial Measurements

With Stencil	2.0 x 10^10 ohms
Without Stencil	8.5 x 10^10 ohms

After Soak

With Stencil	2.1 x 10^9 ohms
Without Stencil	4.0 x 10^9 ohms

After Soak and Bias

With Stencil	2.6 x 10^9 ohms
Without Stencil	5.4 x 10^9 ohms

The Insulation Resistance is marginally lower for the samples using Stencil Quick. The reason for this is not understood. Each of the individual measurements showed the same trend as reflected in the averages.

This information is based on data and tests we believe to be accurate and intended for use by persons with adequate technical skill. Use of this information is beyond the control of AG Communication Systems. Information and test results are relevant only to the items submitted for testing.

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