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Surface Insulation Resistance (SIR) Testing

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

Purpose

Compare the Surface Insulation Resistance of reworked BGA Test samples made with standard solder balls using a flux only reattachment and samples made including the StencilQuik™ product from Best Inc. with solder balls using a flux only reattachment.

Discussion

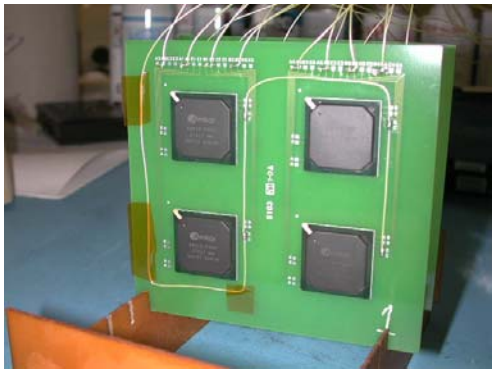
Samples were made up with BGA Daisy Chain Test Chips from Amkor with 484 I/O and pads at a 1.0 mm pitch. The daisy chain test cards are a single sided FR4 material with 1 oz. Copper and a HASL finish. The card pad size is .025 with a 1mm pitch. As the BGA is configured, two patterns of the Daisy Chain 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 a total of 16 measurements were made for this test.

Board number one used the Best Inc. stencil rework technique (StencilQuick™) and Board number two used no stencil. The stencil is a polyimide film with apertures corresponding to the BGA pad locations. A high temperature pressure sensitive silicone adhesive is used to attach it to the board. The thickness of the adhesive is .002 inch and the film thickness is .004 inch for a total of .006 inch.

For assembly of Board one, the polyimide film stencil is placed on the test cards with the BGA pads exposed through openings in the film. “Tack” flux (Alpha Ultra Print 78) is then applied to each aperture opening. The balled test BGA (.025 diameter / Sn63/Pb37 Ball) is placed on the stenciled card and reflowed using a stored profile on a area array rework system.

Board two, where no Stencil Quick is used, follows the same steps except for the application of the flux. The flux is applied liberally to the circuit board land patterns with a cotton tip applicator and then the BGA is placed on the circuit board. Both card types were reflowed using the same 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 was performed. 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

Results

An average of the 8 measurements for each board was computed.

Initial Measurements

With Stencil	1.0 x 10^12 ohms
Without Stencil	2.9 x 10^10 ohms

After Soak

With Stencil	9.3 x 10^9 ohms
Without Stencil	7.7 x 10^8 ohms

After Soak and Bias

With Stencil	1.1 x 10^10 ohms
Without Stencil	2.8 x 10^9 ohms

In each case the Insulation Resistance is higher for the samples using the stencil. Each of the individual measurements also 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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