

# NC-SMQ<sup>®</sup>92J Solder Paste

## TEST REPORT FOR:

INDIUM CORPORATION of AMERICA  
1676 Lincoln Avenue  
Utica, NY 13503

Attn: Ross Berntson

## DATE IN:

December 16, 1998

## P/O #:

35746

## SUBMISSION IDENTIFICATION:

Three (3) specimens were tested in accordance with Bellcore GR-78-CORE, Issue 1, paragraph 14.4 for Surface Insulation Resistance. The samples were identified as Q92J. Three (3) control specimens identified as control were tested with the Indium specimens.

## APPROVED:

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Renee J. Michalkiewicz  
Laboratory Director



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## SURFACE INSULATION RESISTANCE

### REFERENCE:

GR-78-CORE, paragraphs 14.4 thru 14.4.6 (amended) and Table 14-3.

### REQUIREMENT:

The average insulation resistance of the coated samples after 24 or 96 hours shall not be less than the minimum specified

Process Stage	Minimum Average Insulation Resistance (Test Patterns)
Inner Signal Layers of MLBs	1.0 X 10 <sup>10</sup> ohms; Immediately before lamination, i.e., after oxide application
Bare PWBs Before Solder Mask	1.0 X 10 <sup>10</sup> ohms; Immediately before solder mask application
Completed PWBs After Solder Application	7.0 X 10 <sup>9</sup> ohms; After solder application process (e.g., HASL) .
Assembled PWBs (With Solder Mask)	7.0 X 10 <sup>9</sup> ohms; After normal production soldering and cleaning processes.
Assembled PWBs (Without Solder Mask Before Conformal Coating)	1.0 X 10 <sup>10</sup> ohms; Immediately before conformal coating

The average insulation resistance ( $IR_{avg}$ ) is calculated from the following equation:

$$IR_{avg} = 10^{\left\{ \frac{1}{N} \sum_1^N \log IR_i \right\}}$$

where: N = Number of test points (12 nominal) and  
 $IR_i$  = Individual insulation resistance measurements.

No individual insulation resistance value may be more than a factor of 10 below the specified  $IR_{min}$ . Where an assignable cause of low resistance, which is properly attributable to the laminate itself or to the process used to produce the PWB, can be found, then such a value can be excluded from calculating the average value provided that at least 30 test points are included in the average. Such assignable causes include:



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- Contamination on the insulating surface of the board such as lint, solder splines, or water droplets from the conditioning chamber.
- Incompletely etched patterns that decrease the insulating space between conductors by more than the amount allowed in the appropriate design requirements drawing.
- Scratched, cracked, or obviously damaged insulation between conductors.

### METHOD:

The one lot of three test coupons was prepared by Indium Corporation of America.

Teflon coated wires were attached to the terminal areas of the coupons with RMA flux cored solder wire. Aluminum foil was used to protect the test patterns from flux spitting during the soldering process. The flux residues were not removed from the terminal areas.

The test coupons were placed at least 1/2 inch apart, approximately in the center of a temperature/humidity chamber. The coupons were oriented such that the test patterns were parallel to the chamber air flow. The terminal wires were dressed away from the test patterns and routed to the outside of the chamber.

The chamber door was closed and the temperature was set to 35°C and 85% minimum relative humidity.

After 24 hours, the insulation resistance was measured using 50 volts DC. Measurements were taken between terminals 1 and 2, 2 and 3, 3 and 4, and 4 and 5 of each test pattern. Measurements were made with the patterns under test conditions. The same procedure was used at 48, 72 and 96 hours.

The test results were averaged using the formula set forth in the requirements section, above.



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## RESULTS:

Specimens	Average Insulation Resistance(ohms) (24 hrs)	Average Insulation Resistance(ohms) (48 hrs)	Average Insulation Resistance(ohms) (72 hrs)	Average Insulation Resistance(ohms) (96 hrs)
Q92J	4.98 X 10 <sup>11</sup>	1.76 X 10 <sup>12</sup>	3.57 X 10 <sup>12</sup>	3.09 X 10 <sup>12</sup>
CONTROL	6.50 X 10 <sup>10</sup>	3.62 X 10 <sup>11</sup>	3.70 X 10 <sup>11</sup>	1.75 X 10 <sup>12</sup>

Q92J met the specified requirements after 24 and 96 hours of temperature and humidity exposure.

See attached data sheets for actual measurements.

Trace Laboratories-East certifies that the test equipment used complies with the calibration requirements of ISO 10012-1, ANSI/NCSL Z540-1-1994, and MIL-STD-45662A and that the data contained in this report is accurate within the tolerance limitation of this equipment.

All test procedures detailed within this report are complete. The results in this report relate only to those items tested. If any additional information or clarification of this report is required, please contact us. This test report shall not be reproduced except in full, without the written approval of Trace Laboratories-East.

Thank you for selecting Trace Laboratories-East for your testing requirements.

## PRINCIPAL ANALYST:

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Electronics Engineer



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