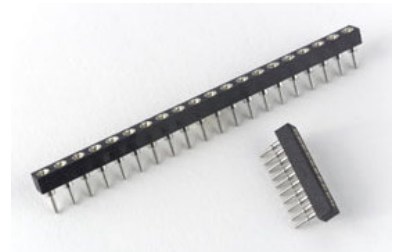
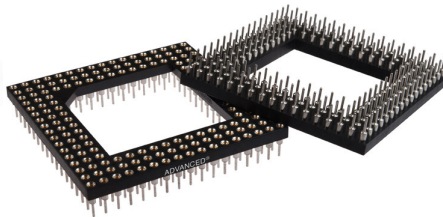
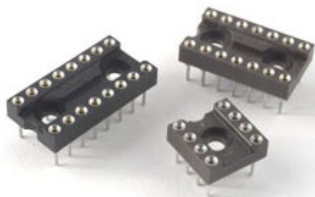




Test Report

RoHS Qualification
New High Temp. Molded LCP Insulators
PGA, DIP, SIP, and Board to Board Interconnect Product Families



Rev. 0, 8/18/05

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Approved: Glenn Goodman

1 Purpose:

To ensure process compatibility with the RoHS Directive* a design of experiments (DOE) was conducted to validate the solderability compliance of the new high temperature LCP molded material for the PGA, DIP, SIP, and Board to Board Interconnect product families. (*Refers to Directive 2002/95/EC “The restriction of the use of certain hazardous substances in electrical and electronic equipment.”)

2 Testing Summary:

The parts, made up of terminal assemblies and LCP wafers (insulators), were run through the testing listed below. Inspection, test parameters, and results are listed in Section 4.

- 1) Part Inspection
- 2) Subassembly / Part assembly
- 3) Board Attachment
- 4) Analysis (x-ray / cross section)

3 Components:

SK9399-G (Gold plated PCB)
SK9399-TL (Tin/Lead plated PCB)
3655GG (3655 Gold plated shell / 1427-1 Gold plated contact)
3655TG (3655 Tin/Lead plated shell / 1427-1 Gold plated contact)
3655MG (3655 Matte Tin plated shell / 1427-1 Gold plated contact)
3665-16R (Insulator)

4 Testing Requirements:

Plating Test Matrix

The terminals are configured with 3 types of plating for testing; Gold, Matte Tin, and Tin/Lead. These plating configurations were attached to the 2 types of boards; Gold and Tin/Lead using lead-free solder paste. (see matrix below)

Tin/Lead preform (1785-3) (Tin/lead oven profile – see Section 7)

3655GG: 24 on GG PCB / 24 on TL PCB

3655TG: 24 on GG PCB / 24 on TL PCB

3655MG: 24 on GG PCB / 24 on TL PCB

RoHS Survivability Test

All non-leaded material in the DOE has passed RoHS temperature requirements of 260°C peak for 40 seconds when measured on the top surface of the part, 2°C per second ramp and decline. Run 3 times; second and third run after ambient cool down.

Attributes monitored during-after test

- 1) Assembly non-conformities
- 2) Wafer geometry/dimensional variation or distortion
- 3) Solder reflow
- 4) Correct interface attachment

5 Testing Results:

Section 1: Inspection

- 1.) Incoming Quality inspection:
 - a) Parameters: All components must pass incoming inspection (print specification).
 - b) Resultant: All parts passed incoming quality inspection.

Section 2: Assembly

- 1.) Contact assembly
 - a) Parameters: Per normal manufacturing process; install contacts into terminal shells and press one block of each part number 3655GG / 3655TG / 3655MG.
 - b) Resultant: The parts were assembled by manufacturing.
- 2.) Inspect contact assemblies
 - a) Parameters: The parts were visually inspected for misalignment, skiving, non-populated, contact height, and configuration.
 - b) Resultant: The parts passed both print and visual inspection.
- 3.) Install terminals into the wafers: 8 wafers per assembly were fully loaded using standard manufacturing operations.
 - c) Parameters: Assemble 24 parts per normal manufacturing.
 - d) Resultant: The parts were assembled correctly per manufacturing procedures.
- 4.) Board assembly: Attach parts to PCBs (see Figures below)
 - a) Parameters: The parts were attached per the test matrix using sized through holes, lead-free solder paste, and the corresponding oven profile. (Section 7 for profile)
 - b) Resultant: The parts were attached by manufacturing.

Fig. 1 & 2 - Picture of board assembly - top view (Matte Tin terminal – Gold PCB)

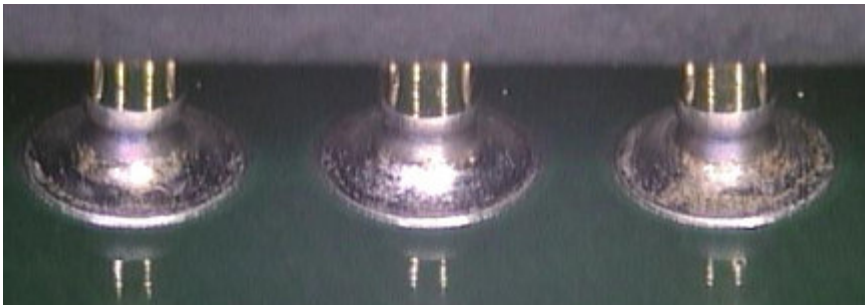
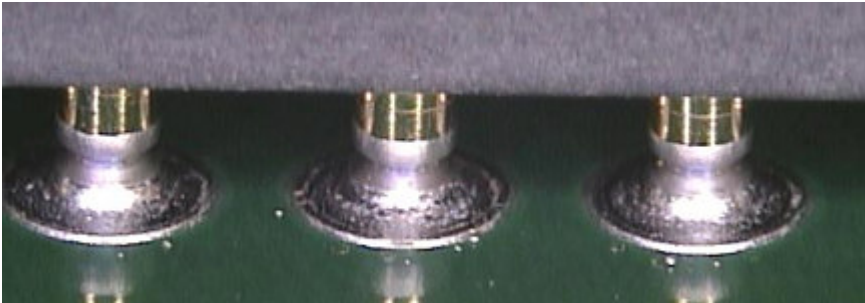


Fig. 3 & 4 - Picture of board assembly – bottom veiw (Matte Tin terminal – Gold PCB)

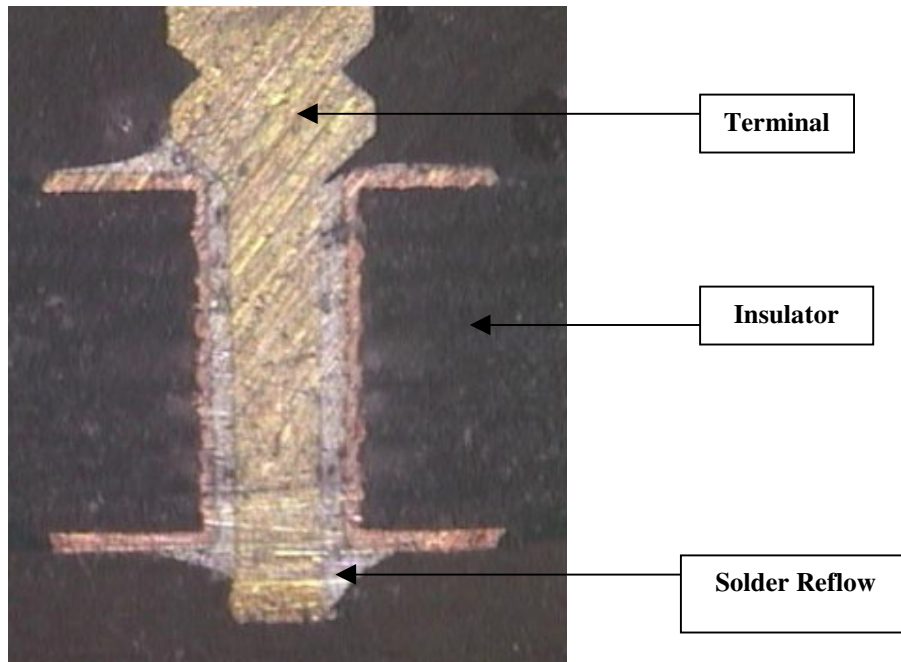
- 5.) Inspection of board attachment
 - a) Parameters: The parts were visually inspected for correct attachment looking at placement and solder reflow.
 - b) Resultant: The parts passed visual inspection.

Section 3: Board Attach Inspection:

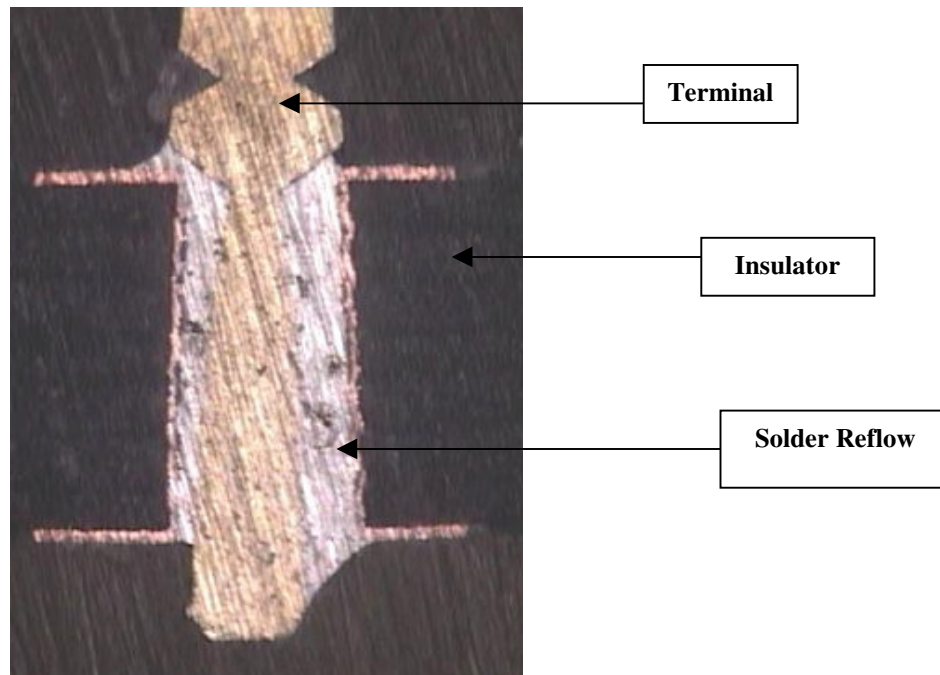
- 1) X-ray the attached parts.
 - a) Parameters: X-ray 30 terminal assemblies from each group, visually inspecting for any solder non-conformities.
 - b) Resultant: The parts were x-rayed correctly and no defects were found.
- 2) Cross section parts: (see Fig. 5 below)
 - a) Parameters: Cross section parts from each group. Section through the middle of the terminal.
 - b) Resultant: The parts were sectioned correctly.
- 3) Inspection of cross-sectioned parts
 - a) Parameters: Visual inspection of the cross-sectioned parts, looking for correct solder reflow (attachment).
 - b) Resultant: The parts show a good attach between the terminal and board. All the plating variations showed good attachment.

Figure 5 - Cross Section of board assembly

(1) Matte Tin / Gold terminal assembly on Gold board



(2) Matte Tin / Gold terminal assembly on Tin/Lead board



6 Conclusion:

The new high temperature molded LCP insulator in PGA, DIP, SIP, and Board to Board Interconnect product families has been approved by engineering for use in lead-free applications meeting RoHS standards.

7 Oven Profile:

Lead-Free Profile

