



# Test Report

**RoHS Qualification**  
**High Temp. Molded LCP Insulator**  
**B2B<sup>®</sup> Connector and 1.00mm Pitch BGA Socket Product Families**

**Rev. 0, 9/06/05**

**By: Scott O'Connell**

**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 molded LCP material used in the B2B® Connector and 1.00mm Pitch BGA Socket 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)  
4891-7 (Tin-Lead solder sphere)  
8128-7 (Lead-free solder sphere)  
BB300-783GG/BB300-794GG  
    7500-300R - insulator  
    7804GG1 – terminal  
        (7804G shell / 1427-1G contact)  
BA300-741G/BA300-795G  
    6234-300R – insulator  
    5103-2G - terminal

---

## 4 Testing Requirements:

---

### Plating Test Matrix

The terminals are plated with Gold and attached to the 2 types of boards, Gold and Tin/Lead, using Tin/Lead solder spheres and lead-free solder spheres. (see matrix below)

#### **Tin/Lead solder sphere (Tin/Lead oven profile – see section 7)**

BB300-783GG: 6 on GG PCB / 6 on TL PCB

BA300-741G: 6 on GG PCB / 6 on TL PCB

#### **Lead-free solder sphere (lead-free oven profile – see section 7)**

BB300-794GG-B: 6 on GG PCB / 6 on TL PCB

BA300-795G-B: 6 on GG PCB / 6 on TL PCB

### RoHS Survivability Test

All non-lead 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: Measurement**

- 1) Baseline data on the flatness and hole true position of the wafers.
  - a) Parameters: All wafers must pass print specification for flatness (0.003) and true position.
  - b) Resultant: All parts passed specifications.

**Section 3: Assembly**

- 1.) Install terminals into wafers (per matrix)
  - a) Parameters: Per normal manufacturing process; assemble terminals and contacts into the wafer.
  - b) Resultant: The parts were assembled correctly by manufacturing.
- 2.) Inspect terminal assemblies
  - a) Parameters: The parts were visually inspected for misalignment, skiving, non-populated, contact height, wafer cracking around hole, and configuration.
  - b) Resultant: The parts passed both print and visual inspection.
- 3.) Attach solder spheres to parts (per matrix)
  - a) Parameters: Solder spheres were attached using normal manufacturing process.
  - b) Resultant: The solder spheres were attached by manufacturing.
- 4.) Inspect parts after solder sphere attach
  - a) Parameters: Solder spheres were visually inspected for reflow, sink marks, and other non-conformities.
  - b) Resultant: The solder spheres passed visual inspection.
- 5.) Measure flatness and true position on the assembly with solder spheres
  - a) Parameters: All wafers must pass print specification for flatness (0.006) and true position.
  - b) Resultant: All parts passed specifications.

**Section 4: Cross Section**

- 1) Cross section 1 part from each group
  - a) Parameters: Cross-sectioned parts through center of terminal.
  - b) Resultant: The parts were cross-sectioned correctly.
- 2) Inspect cross-sectioned parts
  - a) Parameters: The parts were visually inspected under a scope looking for solder non-conformities (wicking, poor attach, grain structure, voids, etc.).
  - b) Resultant: The parts passed inspection.

**Section 5: Board Attach**

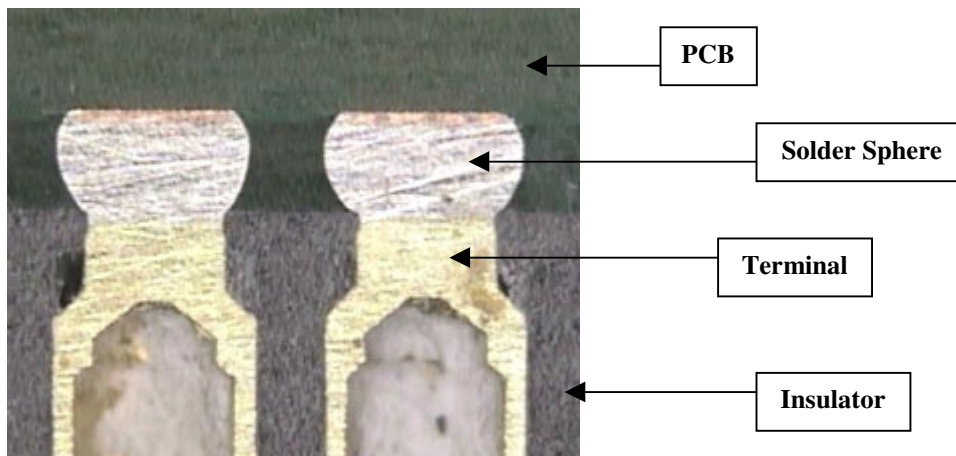
- 1) Board assembly: Attach parts to PCBs
  - a) Parameters: The parts were attached per the test matrix. (Section 7 for profile)
  - b) Resultant: The parts were attached by manufacturing.
  
- 2) Inspection of board attachment
  - a) Parameters: The parts were visually inspected for correct attachment looking at placement and solder reflow.
  - b) Resultant: The parts passed visual inspection.

**Section 6: Board Attach Inspection:**

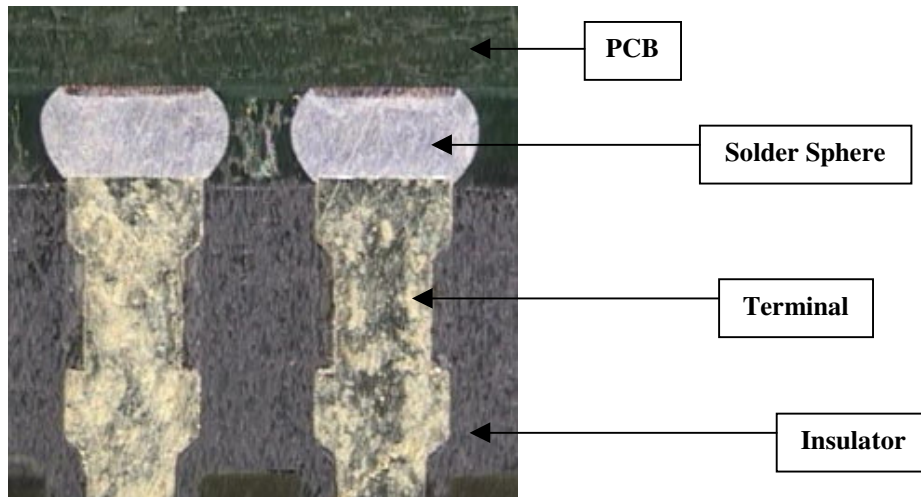
- 1) X-ray the attached parts
  - a) Parameters: X-ray one part from each group, visually inspecting for any solder non-conformities.
  - b) Resultant: The parts were x-rayed correctly and no defects were found.
  
- 2) Cross section parts: (see **Figures 1-4 below**)
  - a) Parameters: Cross section 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. Example: Gold terminal on a Gold board with Tin/Lead solder sphere vs. Gold terminal on a Gold board with lead-free solder sphere show the same characteristics.

**Figures 1-4 Cross Section of board assembly**

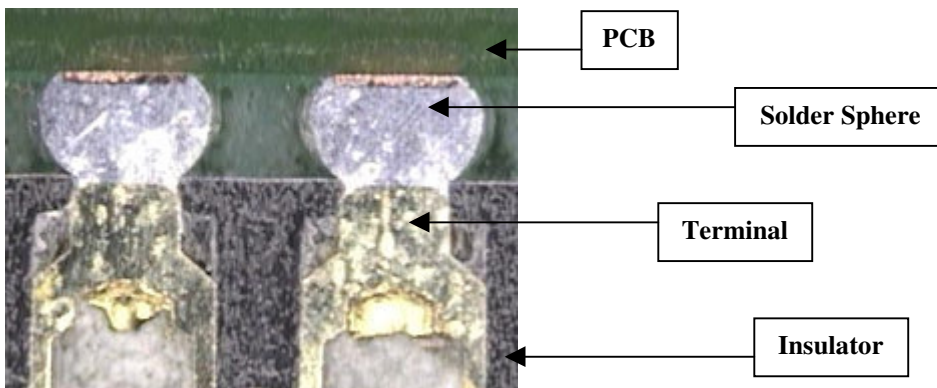
- (1) BB300-783GG with Tin/Lead solder sphere on a Gold plated PCB



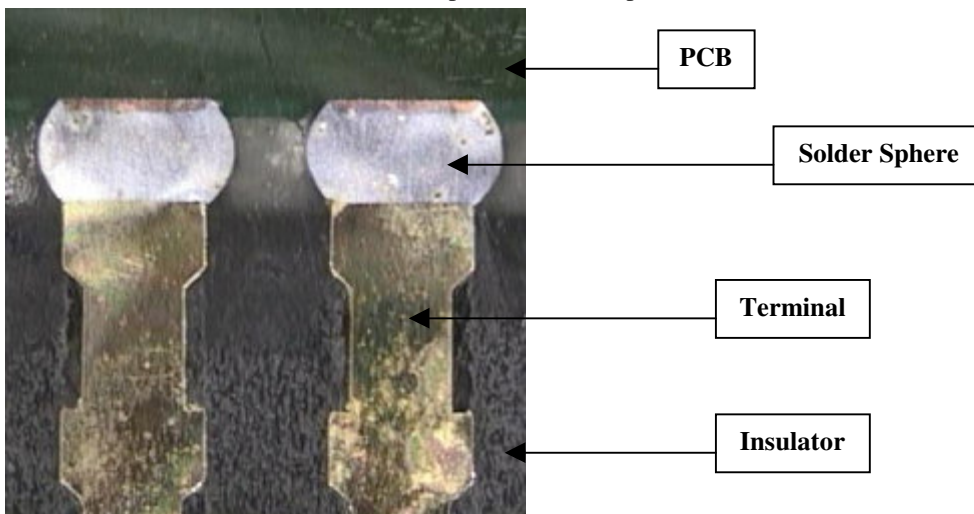
(2) BA300-741G with Tin/Lead solder sphere on a Gold plated PCB



(3) BB300-794GG with lead-free solder sphere on a Gold plated PCB



(4) BA300-795G with lead-free solder sphere on a Gold plated PCB

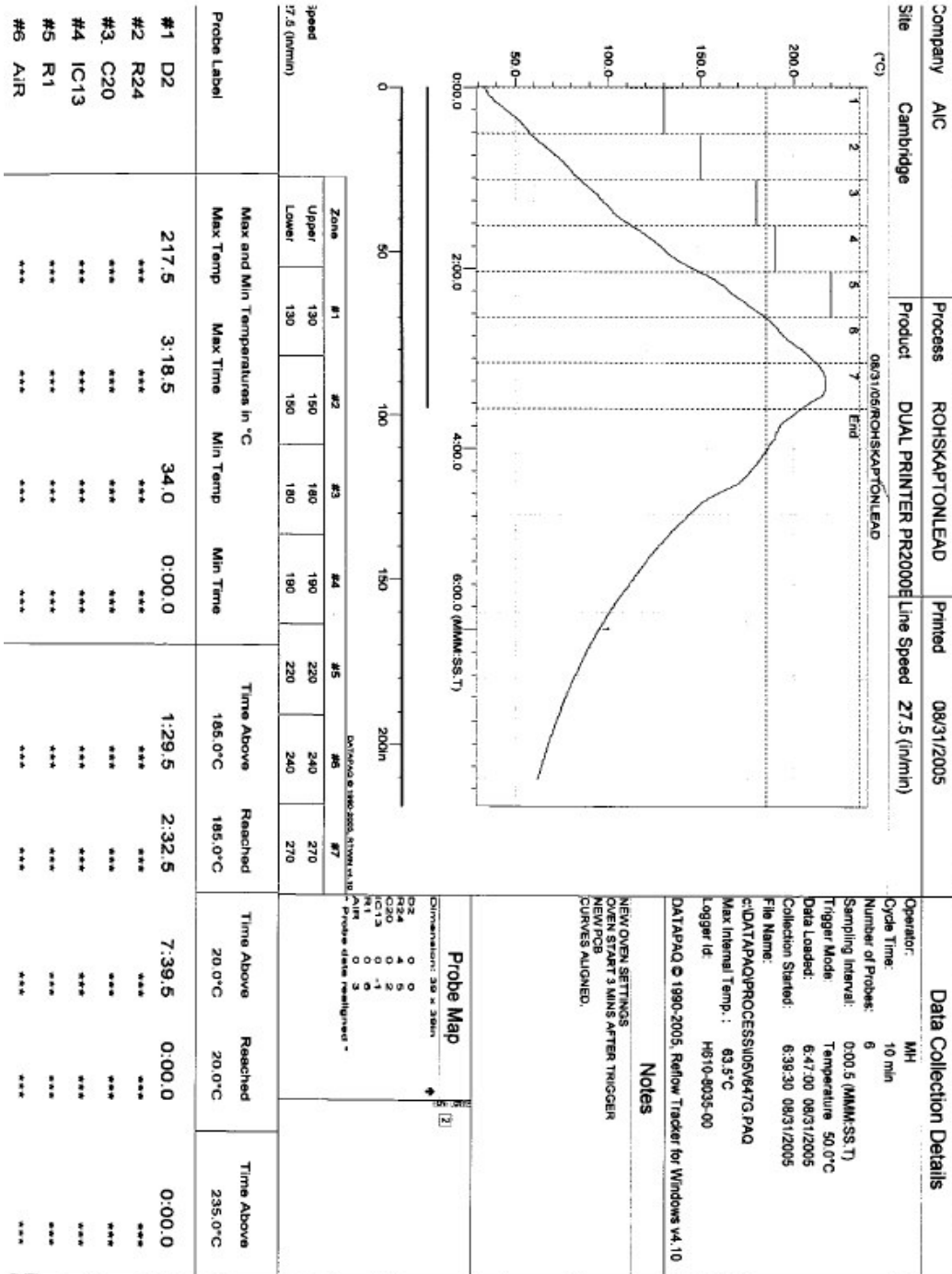


## 6 Conclusion:

The high temp. molded LCP insulators for the B2B® Connector and 1.00mm Pitch BGA Socket Product Families has been approved by engineering for use in lead-free applications meeting RoHS standards.

## 7 Oven Profile:

### Tin/Lead Profile



**Lead-Free Profile**

