The Institute for Interconnecting and Packaging Electronic Circuits
2215 Sanders Road • Northbrook, IL 60062-6135

IPC-TM-650
TEST METHODS MANUAL

Number	
2.1.1.1	
Subject	
Microsectioning, Ceramic Substrate	
Date	Revision
12/87	
Originating Task Group	
N/A	

1.0 Scope This procedure describes the preparation of metallographic specimens containing ceramic components mounted on printed wiring boards or ceramic substrates. This procedure must be carefully followed to minimize ceramic chunking and to maintain a flat surface.

2.0 Applicable Documents None

3.0 Apparatus The following is a suggested list of equipment and supplies.

- Low speed diamond saw
- Vacuum impregnation equipment
- Metallographic polisher
- Epoxy resin potting compound. Selection of an epoxy resin with a low exothermic reaction is critical when mounting solder joint specimens to prevent microstructural changes induced by resin cure.
- Specimen mounting plate
- Molding rings
- Metal bonded diamond discs: 0.70 micron, 0.45 micron, 0.30 micron
- Diamond paste lubricant
- Diamond paste 3 micron
- 0.5 micron aluminum oxide powder
- Texmet cloth (or equal)
- Micro cloth
- Ultrasonic bath system

4.0 Test

4.1 Preparation of Specimen

4.1.1 Cut specimen close to desired area of observation using a low speed diamond saw.

4.1.2 After cutting specimen, clean using chlorothene.

4.1.3 Mount the specimen on a flat plate in conjunction with a bakelite ring.

4.1.4 Mix the epoxy resin according to manufacturer's instructions.

4.1.5 Evacuate the epoxy resin to remove air induced by mixing.

4.1.6 Pour just enough epoxy resin in bakelite ring to cover specimen. Evacuate for 3 to 5 minutes to assure sufficient fill and adhesion.

4.1.7 Fill sample ring to top with epoxy resin and cure per manufacturer's instructions.

4.2 Micropolishing

4.2.1 Rough grind the specimen to within 1.3 mm [0.05 inch] of desired location using a 70 micron diamond wheel with water lubricant at low speed (550 rpm).

4.2.2 Ultrasonic clean the specimen using detergent and water.

4.2.3 Grind to desired location using a 45 micron diamond wheel with water lubricant at low speed (550 rpm).

4.2.4 Ultrasonic clean the specimen using detergent and water.

4.2.5 Grind for 1-2 minutes using a 30 micron diamond wheel with a water lubricant at low speed (550 rpm).

4.2.6 Ultrasonic clean the specimen using detergent and water.

4.2.7 Rough polish the specimen using a metallographic polisher in conjunction with Texmet (or equal) cloth and 3 micron diamond paste lubricated with an oil base fluid. Polish for 30-40 minutes using heavy pressure and fast speed setting.

4.2.8 Final polish on metallographic polisher using 0.5 micron aluminum oxide in conjunction with microcloth lubricated with water. Polish for approximately 2 minutes using light pressure and medium speed setting.

4.2.9 Ultrasonic clean sample in water. Wipe sample with a water soaked cotton ball and dry.

5.0 Evaluation

5.1 Set the magnification at 100 x minimum and perform visual and plating thickness of at least three plated-through hole sections.

5.2 Total surface copper thickness can also be determined on the same specimen cross-section. Plating thickness determination shall not be determined at nodules, voids, cracks, or irregular and thin platings.

5.3 Record average plating thickness determinations and quality of the plating.

6.0 ***Note:*** Metallographic equipment and supplies vary, therefore it is recommended that variations to this procedure should be agreed on between supplier and user.