

Keysight Technologies

# Beam Lead Diode Bonding and Handling Procedures

Application Note

## 1.0 ESD Considerations

A beam lead diode can be destroyed electrically by a static (or other) discharge through the device. It must therefore be handled so these effects cannot occur. Normal electrostatic discharge (ESD) preventive measures should be incorporated into all aspects of the storage, handling, and assembly of these devices.

Specific measures to be taken should include:

- Anti-static storage trays and boxes if the diodes are kept in other than the Keysight Technologies, Inc. supplied shipping containers
- Grounded mats at work stations
- Ground straps for operators
- Static eliminators on compressed gas nozzles
- Common grounding of equipment, mats, straps, etc
- Wire bonding sequence should be designed to eliminate static discharges through chip

In addition to ESD prevention measures, assembly equipment should be inspected for any power line transients that may couple into equipment that comes in contact with diodes.

## 2.0 Storage

Under normal circumstances, storage of beam lead diodes in supplied waffle/gel packs is sufficient. In particularly dusty or chemically hazardous environments, storage in an inert atmosphere desiccator is advised.

## 3.0 Handling

In order to avoid damage to beam lead devices, particular care must be exercised during inspection, testing, and assembly. Although the beam lead diode is designed to have exceptional lead strength, its small size and delicate nature requires that special handling techniques be observed so that the devices will not be mechanically or electrically damaged. A vacuum pickup is recommended for picking up beam lead devices, particularly larger ones, e.g., quads. Care must be exercised to assure that the vacuum opening of the needle is sufficiently small to avoid passage of the device through the opening. A #27 tip is recommended for picking up single beam lead devices. A 20X magnification is needed for precise positioning of the tip on the device. Where a vacuum pickup is not used, a sharpened wooden Q-tip dipped in isopropyl alcohol is often used to handle beam lead devices.

## 4.0 Cleaning

For organic contamination use a warm rinse of trichloroethane followed by a cold rinse in acetone and methanol. Dry under infrared heat lamp for 5–10 minutes on clean filter paper. Freon degreaser may replace trichloroethane for light organic contamination.

- Ultrasonic cleaning is not recommended.
- Acid solvents should not be used.

## 5.0 Bonding

See *Beam Lead Attachment Methods* - Application Note, publication number 5091-9074E for a general description of the various methods for attaching beam lead diodes to both hard and soft substrates.

### Thermocompression

See *The Handling and Bonding of Beam Lead Devices Made Easy* - Application Note, publication number 5953-4435. This method is good for hard substrates only.

### Wobble

This method picks up the device, places it on the substrate and forms a thermocompression bond all in one operation. This is described in MIL-STD-883, Method 2017 and is intended for hard substrates only.

Equipment specifically designed for beam lead wobble bonding is available from KULICKE and SOFFA in Horsham, PA.

### Ultrasonic

Not recommend.

### Resistance Welding or Parallel-GAP Welding

To make welding on soft substrates easier, a low pressure welding head is recommended. Suitable equipment is available from HUGHES, Industrial Products Division in Carlsbad, CA. For more information, see *See Beam Lead Diode Bonding to Soft Substrates* - Application Note, publication number 5954-2227.

### Epoxy

With solvent free, low resistivity epoxies (available from ABLES-TIK in Gardena, CA, MICON in Lexington, MA, and many others) and improvements in dispensing equipment, the quality of epoxy bonds is sufficient for many applications. Equipment is available from ADVANCED SEMICONDUCTOR MATERIALS AMERICA, INC., Assembly Products Group in Chandler, AZ (Automatic), and WEST BOND in Orange, CA (Manual).

### Reflow

Refer to *See Beam Lead Attachment Methods* - Application Note, publication number 5091-9074E. For additional information and support email: [mmic\\_helpline@keysight.com](mailto:mmic_helpline@keysight.com).



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