Discrete Semiconductors Handling and Storage Precautions

The majority of Discrete Semiconductors are rugged. Some, like FETs and Schottky's need special care to protect against electrostatic discharge (ESD) under Resources contains information relative to ESD considerations.

ESD

Parts classified as "Class 1" in terms of ESD sensitivity should be placed in dry nitrogen storage until required for usage. Perform manual handling of die by using sharp tweezers with excellent point alignments. Failure to use the correct tools, or using tweezers with improperly bent or mis-aligned points, can result in costly loss.

Plastic Parts

Plastic parts shall have appropriate classification labeling. Refer to JEP-A-113 for classification.

Transients

Transients can be generated by poor contact to the device under test (DUT) by test equipment, when an uncontrolled high voltage briefly is generated, or while trying to force a desired programmed level of test current. Therefore, precautions are necessary in test equipment selection or maintenance of electromechanical features; for example, test clip contacts where poor electrical continuity may occur. If the DUT has tarnished leads from prior high temperature testing, such as HTRB or burn-in operations, then leads should be cleaned before testing.

Lead Bending

Lead bending of axial leaded diodes, before insertion into a PC board, should not be done in such close proximity to the body to force a bend up to and into the body itself. This excessive "tight bend" may stress glass body diodes or transmit undesired forces internally into the active die element for plastic body diodes as well. This is less critical on double-slug glass diodes where the lead is welded or brazed to a larger diameter slug before entering a glass to metal seal region. In most examples, a 90-degree bend should be at least 1/8 inch or three lead diameters from the body, whichever is greater. Recommend that leads be supported adjacent to the body before the bend is made.

Soldering

Maximum soldering temperatures and times for diodes are typically 260°C for 10 seconds maximum. Solder profiles will generally be much lower and shorter in time than these maximums when using commonly used solders such as 63/37% Sn/Pb, 60/40% Sn/Pb, or 62/36/2% Sn/ Pb/Ag. Actual time and temperature is determined by overall thermal mass of PC boards and parts, along with considerations of other part sensitivity. For most through-hole axial lead diodes, the body does not directly see these temperature-time extremes; however, surface mount (SM) does. Common surface mounting processes used in the industry are accomplished by using convection or infrared belt furnace, vapor phase reflow, or wave soldering equipment. SM packages may be affixed temporarily to the circuit board with a fast curing adhesive system between package body and board (separate from the defined solderable footprint) to accommodate soldering. Where the body is suddenly exposed to soldering temperatures (such as in wave soldering), recommend a preheat step be included that is within 100 C of the final soldering temperature, to minimize thermal shock effects on the body of the part.

Coatings

If PC board level coatings are used after solder mounting, they should be carefully selected to avoid stressing parts, particularly glass body designs. When used, they should be silastic or pliable to minimize stresses that may be induced by differences in coefficient of expansion or other transmitted forces imparted from PC board flexure. Rigid epoxy coatings have, for example, been known to crack glass body parts including those board coatings applied in a relatively thin layer. This may be partly stimulated by stresses imparted on a part, when rigid coatings are placed in the narrow standoff relief space between the PC board and a glass body diode.