Recommendations for Soldering T-1 3/4 Plastic Encapsulated Discrete Components

Plastic encapsulated components such as T-1 3/4 LEDs and phototransistors are very sensitive to soldering techniques. The body is molded around a copper lead frame using an optical grade epoxy. Because of the need for optical transmissivity, the epoxy cannot be manufactured using the fillers and additives that allow epoxies to withstand the high temperatures found in IC packages.

The copper lead frame is an excellent material for both heat and electrical conductivity. This property provides benefits such as higher allowable forward currents (therefore higher output power), which are more easily formed and bent. There is also a major disadvantage in that the heat from soldering operations is conducted inside the plastic body .

This combination of the relatively low temperature softening point of the plastic and the high temperatures required for successful solder joints makes the leads susceptible to movement inside the encapsulant. If the cathode lead is moved at the gold bond wire (.001" dia.)/cathode lead interconnect point, then there can be an open caused by a wire bond break. This can be detected in some cases immediately; in other cases the device will open intermittently or fail in operation.

The precautions that substantially reduce this failure mechanism, in their order of importance, are:

Solder Iron

1. The overwhelming cause of failure is lead movement inside the encapsulating epoxy at the gold bond wire/cathode lead interconnect. The force exerted by the iron while the epoxy is plasticized is the critical control parameter. The smaller the force, the less likely a solder-induced open will occur. In no case should the iron exert more than 20 grams weight on the leads.

2. Keep soldering temperature as low as possible; 260°C is the maximum allowable.

3. Keep soldering time as low as possible; 5 seconds is the maximum allowable.

4. Solder as far from the package as possible. In no case should the solder joint be closer than 1/16" to the epoxy.

5. Keep leads at full length when possible and trim after soldering.

6. There are several recommended procedures or tools that can aid in the precautions listed above.

a) Use a heat sink between the plastic body and the solder iron.

b) Clamp the device leads next to the plastic body to prevent lead movement.

c) Load the solder onto the iron prior to making contact in order to reduce contact time.

d) Insure devices have not been stored for a long time in an oxidizing environment. Oxidized leads are not a severe problem, but can occur. If leads show signs of oxidation, they can be cleaned without damage to the plastic. Please call for directions.

e) If devices are to be inserted into PCB holes, insure the holes are at the nominal device lead spacing so there is no stress or spring tension on the leads during solder.

Flow Soldering

1. As long as leads are not under any stress or spring tension, 260°C for ten seconds maximum will not induce failures.

2. If units need to have formed leads prior to soldering, insure forming forces the lead spacing to match the PCB hole spacing.

3. If possible, leave leads intact until after flow solder, then clip them.

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