LED failures may be attributed to certain irregularities either at the manufacturer Symptoms: Can be seen using appropriate visual inspection techniques. Usually shows up looking like a parallel resistance on curve tracer VI characteristics (Voltage- Current), i.e., current starts to flow at low bias voltage, whereas the healthy junction shows little current flow until the bias is near the threshold for the material, usually between 1.1 and 1.8 Volts for LEDs.

Causes: The manufacturer is using too much die attach material if this happens. However, the problem is aggravated by high temperatures and pulse energy levels.

Cures: Get vendor to control process properly. Reduce drive levels and/or temperature.

Following are some precautions to be taken during manufacture and use of LEDs:

(1) Lead Forming

- At least 3mm from the base of the epoxy bulb should be kept when formin g lead s.

- Do not use the base of the lead frame as a fulcrum during lead forming.

- Lead forming should be done before soldering.

- Because the stress at the base may damage the characteristics or it may break t he LEDs. Do not apply any bending stress to the base of the lead.

-When mounting the LEDs onto a PCB the holes on the circuit board should be exactly aligned with the leads of the LEDs. Stress at the leads should be avoided during mounting of the LEDs on to the PCB as this causes damage to the epoxy resin leading to degradation of the LEDs.

(2) Storage

- The LEDs should be stored at 30 C or less and 70% RH or less after being shipped. Storage life is about 3 months.

If the LEDs are to be stored for more then 3 months, they can be stored for a year in a sealed container with nitrogen atmosphere and moisture absorbent material.

- Rapid transitions in ambient temperature, especially, in high humidity environments where condensation can occur should be avoided.

(3) Static Electricity

- Static electricity or surge voltage damages the LEDs.

It is recommended that a wristband or an anti-electrostatic glove be used w hen handling LEDs.

- All devices, equipment and machinery must be properly grounded.

It is recommended that measures be taken to avoid surge voltage to the eq uipment that mounts LEDs.

- Damaged LEDs exhibit some unusual characteristics such as increase in current leak, decrease in forward voltage, LEDs not lighting at low current etc.

Criteria: VF>2.0V at IF=0.5mA

(4) Heat Generation

- Thermal design of the end product is of most importance. Heat generation of the ED is to be considered while designing the system.

- The thermal resistance of the circuit board, density of LEDs and other components on the board affects the co-efficient of temperature increase per input electric power. Heat generation must be lowered and should be well maintained within the limits specified.

-The operating current should be decided after considering the ambient maximum temperature of the LEDs.

(5) Cleaning

- It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. In case of other solvents, it needs to be confirmed whether t he solvents will dissolve the resin or not. Freon solvents should not be used to clean the LEDs because of worldwide regulations.

- Do not clean LEDs using ultrasonic vibrations. When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and assembly condition.

Before cleaning, a pre-test should be done to check whether any damage would occur to the LEDs.

(6) Safety Guidelines for the human eye

- In 1993, the International Electric Committee (IEC) issued a standard con