

## How to handle LD-PD'S laser diodes

Essentially, a laser diode itself is tough. Under correct handling and operation it can live for more than 10 years. But under incorrect handling it is very fragile. The present leaflet will show you the correct handling of laser diodes.

### 1. Avoid electrical surge

A laser diode is weak against an electrical surge. An electrical surge shortens the laser's life expectancy depending on the surge strength. The laser life may be shortened to 5 years, 2 years, or 1 year and in some cases, instant death. If a laser dies after one year of operation nobody may remember that a surge was applied a year ago. In order to avoid electrical surges:

- A) Put on wrist bands on both your wrists and ground the wrist bands.
- B) Your working bench should be covered with a conductive material (metal or conductive sheet), which should be grounded.
- C) Your floor should also be covered with a grounded conductive sheet.

At the instant of powering on/off of the electrical power supply a surge may attack the laser diode. The output voltage should be set to zero before power is switched on, and also it should be set to zero before switching off.

### 2. Carrying a laser diode

After opening the package when you pick up the laser diode or carry the laser diode it should be noted that you should hold the rectangular metal package and also the fiber connector with both hands. Do not hold the boot, it is the base of the fiber. Because the metal package is heavy, when you hold the boot a strong force may be exerted at the interface between the package and the boot causing a deformation that results in faulty optical coupling between the laser chip and the fiber, no light will be available from the fiber.

### 3. Fixing a laser diode

The laser diode should be fixed on a metal base for the purpose of an efficient heat escape. Be sure that the metal base is completely flat. When the base is concave or when a smallest protrusion exists, the laser package is deformed resulting in faulty optical coupling between the laser chip and the fiber.

When tightening screw maximum care should be taken so that the screwdriver does not touch the boot, if it touches the boot it will receive a strong force again causing faulty optical coupling between the laser chip and the fiber.

### 4. Soldering

An electric soldering iron connected to an AC power supply may give a surge to the laser diode. Even if the soldering iron is operated by batteries, a heated tip is said to be charged and hence it can give a surge. So when soldering be sure that the soldering iron tip is grounded. Soldering should be done within 250, 10 seconds.

### **5. Avoid mis-wiring**

It sometimes occurs if you mistake the polarity of the TE cooler, its temperature becomes uncontrollable. The laser chip temperature can be high enough so as to melt the solder that fixed the laser chip to a heat sink. The result is miserable as you can expect.

The laser diode chip itself has a polarity; monitor photodiode also. Care should be taken to avoid mis-wiring.

### **6. Ground equipments**

Power supply, TE cooler controller and other equipments that will be electrically connected to laser diode should be grounded in order to avoid a surge.

### **7. Control the TE cooler**

When the TE cooler inside the laser is not connected to a temperature controller circuit it works as a thermal insulator. This leads to laser failure due to high heat. So the TE cooler should always be controlled while the laser is in operation.

### **8. Avoid mechanical shock and vibration**

Laser diodes have passed mechanical shock tests and vibration tests according to Belcor's test standards. But maximum care should be taken not to give mechanical shocks and vibrations to laser diodes. They will surely cause faulty optical coupling between the laser chip and the fiber.

## **Most frequent failures that are claimed from customers are listed below together with possible causes.**

1. No emission from the fiber and V-I curve is leaky in 1V/1mA range.

In most cases the pn junction of the laser diode chip has been destroyed by an electrical surge or due to an excessive electric current. In this case there is no output from the monitor photodiode. The repair is impossible.

2. No emission or weak emission from the fiber, V-I curve is normal and the monitor photodiode gives an output.

The laser diode itself is alive, but there is faulty optical coupling between the laser chip and the fiber. Or the fiber pigtail is broken. The repair is impossible.