

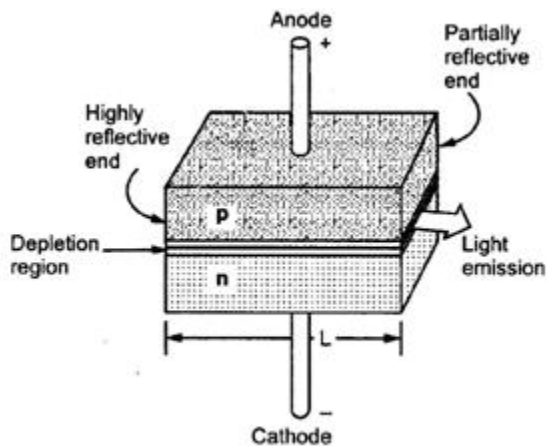
LASER DIODE

The term laser stands for light amplification by stimulated emission of radiation. Laser light is monochromatic, which means that it consists of a single colour and not a mixture of colours. Laser light is referred to as coherent light which means that a light with a single wavelength. This is opposite to the incoherent light,

which has wide band of wavelengths. The light emitted by LED is an incoherent light whereas light emitted by laser diode is a coherent light.

Construction and Symbol

The Fig shows the symbol and basic construction of laser diode. It consists of pn junction formed by two doped gallium arsenide layers. The two ends of the structure are flat and parallel with one end mirrored and one partially reflective. The length (L) of the junction is precisely related to the wavelength of the light to be emitted.



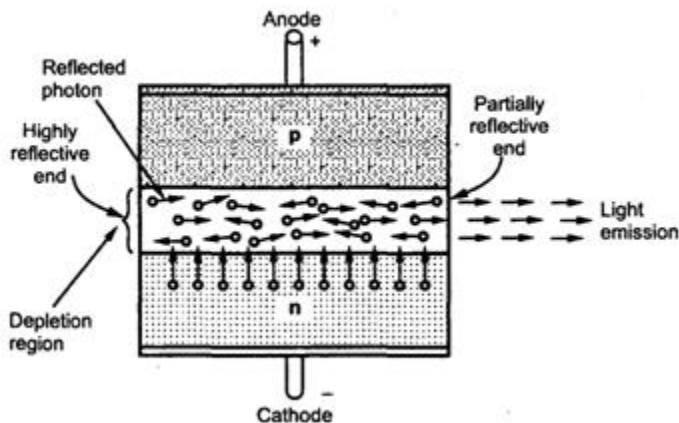
(b) Construction of laser diode



(a) Symbol

Operation

The operation of laser diode is illustrated in the Fig. When the p-n junction is forward biased by an external voltage source, the electrons move through the junction and recombine as in an ordinary diode. When electrons recombine with holes, photons are released. These photons strike atoms, causing more photons to be released.



As the forward bias current is increased, more electrons enter the depletion region and cause more photons to be emitted. Eventually some of the photons that are randomly drifting within the depletion region strike the reflected surfaces perpendicularly, so that they are reflected back along their original path. These reflected photons are then reflected back again from the other end of the junction.

This movement of photons from one end to another end continues for thousands of times. During this movement photons strike more atoms and release additional photons due to the avalanche effect. This activity of reflection and generation of increasing number of photons results in a very intense beam of laser light which is formed by the photons that pass through the partially reflective end of the pn junction. Each photon produced in the above explained emission process is identical to the other photons in energy level, phase relationship, and frequency. Thus emission process gives a intense beam of laser light with a single wavelength. To produce a beam of laser light it is necessary to have a current through the laser diode above certain threshold level. The current below threshold level forces diode to behave as LED, emitting incoherent light

Source : <http://mediatoget.blogspot.in/2011/09/laser-diode.html>