

# Laser Diode

## (Technical Note)



## Introduction



Laser diode is a semiconductor device similar to a light-emitting diode (LED) that emits a small intense focused beam of visible red light. It uses p-n junction to emit coherent light in which all the waves are at the same frequency and phase. The light produced by the laser diode uses a process called “Light Amplification by Stimulated Emission of Radiation”, abbreviated and commonly known as LASER.

It is dangerous to shine the laser into someone's eye.



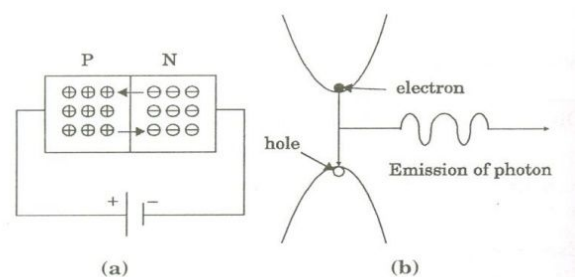
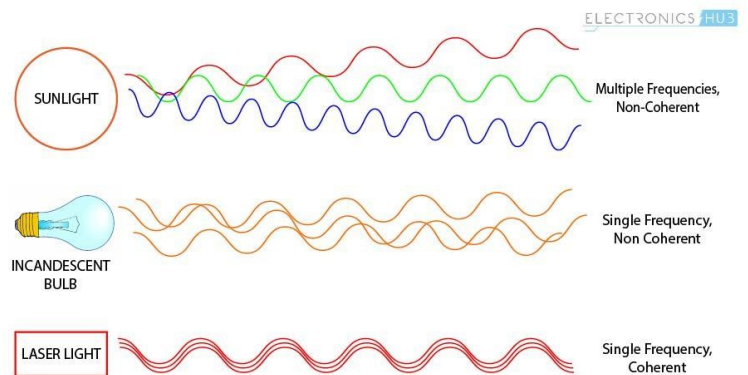
## Scientific Fact and Applications

An important component in laser diodes is the p-n junction, which is the combination of p-type and n-type semiconductors.

A diode is said to be forward biased when the positive and negative terminal of a battery is connected to the p-type and n-type semiconductors, respectively. When a p-n junction diode is forward biased, the electrons from n-region and the holes from the p-region cross the junction and recombine with each other. During this recombination process, light radiation, or photons, is released. The emitted photons in turn further stimulates electrons-holes recombination. This results in stimulated emission that ultimately produces laser.

## Application

There is a wide range of laser diode uses that include fiber optic communications, barcode readers, laser pointers, CD/DVD/Blu-ray disc reading/recording, laser printing, laser scanning and light beam illumination.



## References:

- <https://www.electronicshub.org/laser-diode-working-structure-types-uses/>
- [http://www.brainkart.com/article/Semiconductor-Diode-laser--Principle.-Construction.-Working.-Characteristics.--Advantages.-Disadvantages-and-Applications\\_6886/](http://www.brainkart.com/article/Semiconductor-Diode-laser--Principle.-Construction.-Working.-Characteristics.--Advantages.-Disadvantages-and-Applications_6886/)

# Laser Diode

## (Application Note)

### Project

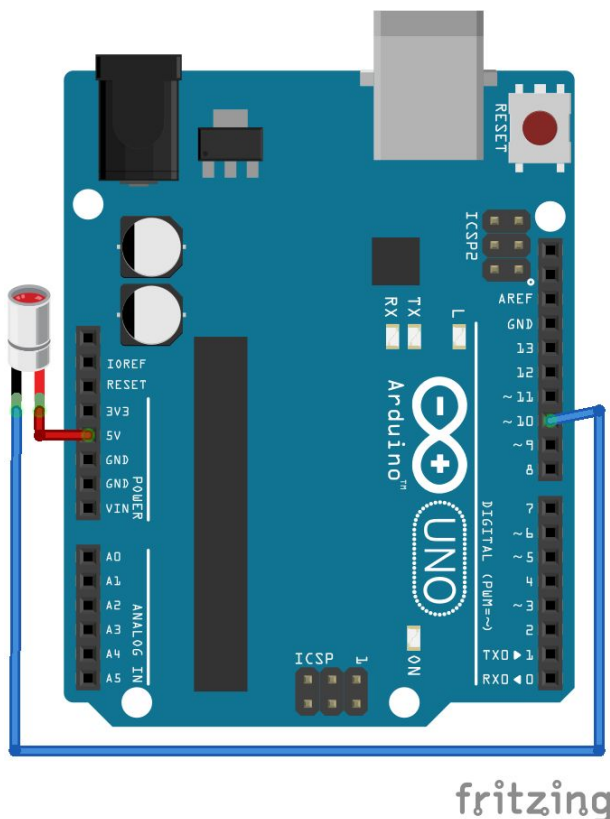
To control a laser beam by turning a laser diode on and off and varying the brightness.



### Procedure

1. Connect red wire of laser diode to VCC of the Arduino.
2. Connect blue wire of laser diode to the 10th pin of the Arduino.
3. Upload the code. You should see the laser diode blinking in red, then changes in its intensity.

### Schematic



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### Challenge Yourself

1. Turn on laser diode when it is dark by using a LDR.
2. Make SOS Morse signal by using laser diode.

### Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
Laser Diode	EDD-00001-A	1

### Code

```

/* Set pin to use*/
int laserPin = 10;

void setup()
{
    /*Set pin as OUTPUT*/
    pinMode (laserPin, OUTPUT);
}

void loop()
{
    digitalWrite (laserPin, HIGH);
    /*Turn on the laser diode for 0.5
seconds*/
    delay(500);
    /* Turn off the laser diode for 0.5
seconds*/
    digitalWrite (laserPin, LOW);
    delay(500);

    /* Increase intensity slowly*/
    /* Set variable i as integer*/
    int i;
    i = 0;
    /* 0-255 is the PWM range for
Arduino */
    while ( i <= 255 )
    {
        analogWrite(laserPin, i );
        delay(50);
        i = i + 5;
    }
}

```