

Experiment 3 : V-I characteristics of Gunn Diode

Aim

To study V-I characteristics of Gunn Diode

Apparatus required

- Gunn oscillator
- Gun power supply
- Isolator
- PIN modulator
- Variable attenuator
- Frequency meter
- Detector mount
- Wave guide stands
- Cables and accessories.

Theory

The Gunn Oscillator is based on negative differential conductivity effect in bulk semiconductors, which has two conduction bands minima separated by an energy gap (greater than thermal agitation energies). A disturbance at the cathode gives rise to high field region, which travels towards the anode. When this high field domain reaches the anode, it disappears and another domain is formed at the cathode and starts moving towards anode and so on. The time required for domain to travel from cathode to anode (transit time) gives oscillation frequency.

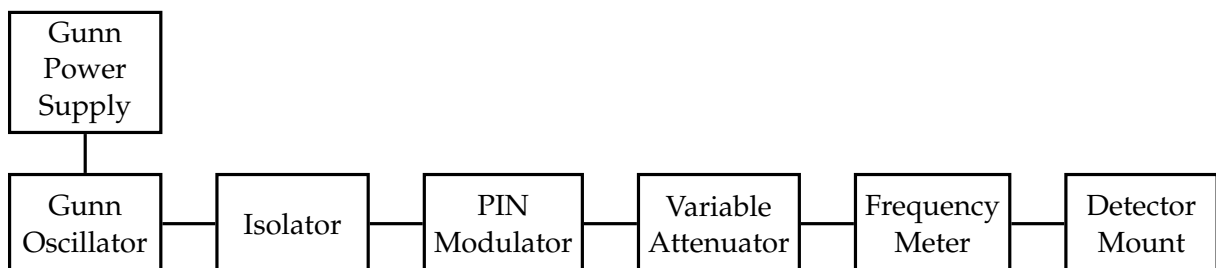
In a Gunn Oscillator, the Gunn diode is placed in a resonant cavity. In this case the Oscillation frequency is determined by cavity dimension than by diode itself.

Although Gunn oscillator can be amplitude modulated with the bias voltage. We have used separate PIN modulator through PIN diode for square wave modulation.

A measure of the square wave modulation capability is the modulation depth i.e. the output ratio between, 'ON and 'OFF state.

Procedure

1. Set up the components and equipments as shown in figure:



2. Keep the control knob of Gunn Power Supply as shown:
 - Gunn bias knob : fully anti- clockwise
 - PIN bias knob : fully anti- clockwise
 - PIN Mod frequency : mid position
3. Switch ON the Gunn power supply
4. Vary the Gunn bias from minimum to maximum.
5. Measure the Gunn diode voltage and current(do not keep in the maximum current position)