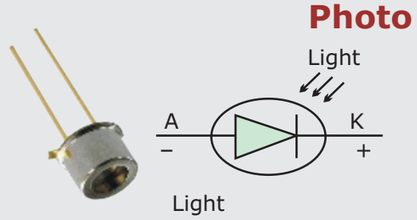
TESCA™

Tesca Technologies Pvt. Ltd.

Photo Sensor

Photo Diode



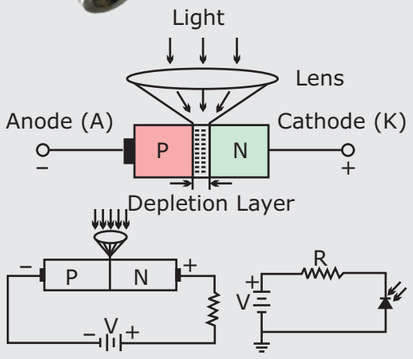


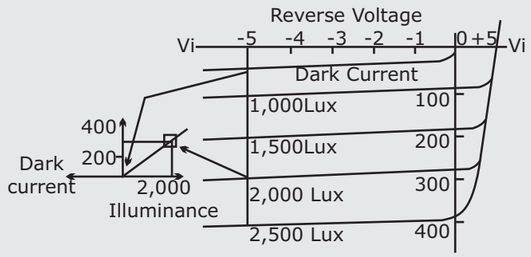
Photo junction devices are basically PN-Junction light sensors or detectors made from silicon semiconductor PN-junctions which are sensitive to light and which can detect both visible light and infrared light levels.

Photo diode light sensor is similar to that of a conventional PN-Junction diode except that the diodes outer casing is either transparent or has a clear lens to focus the light onto PN junction for increased sensitivity.

Semiconductor Materials

Silicon (Si): Low dark current, high speed, good sensitivity between roughly 400 and 1000 nm (best around 800-900nm)

Germanium (Ge): High dark current, slow speed due to large parasitic capacity, good sensitivity between roughly 900 and 1600nm (best around 1400-1500nm)

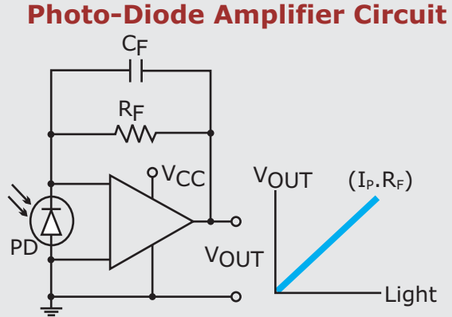


Indium Gallium Arsenide Phosphide (InGaAsP): low dark current, high speed, good sensitivity roughly between 1000 and 1350 nm (best around 1100-1300nm)
Indium Gallium Arsenide (InGaAs): Expensive, low dark current, high speed good sensitivity roughly between 900 and 1700nm (best around 1300-1600 nm)

Applications

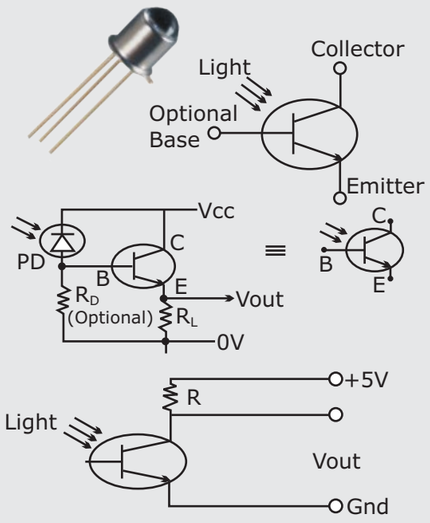
Commonly used in cameras, light meters, CD and DVD-ROM drives, TV remote controls, scanners, fax machines and copiers etc, and for fiber optic communications, burglar alarm motion detection circuits and numerous imaging, laser scanning and positioning systems etc.

Photo-Diode Amplifier Circuit



Working:
When light falls on Photo Diode (PD), reverse saturation current starts to flow according to the intensity of light. Current flows through operational amplifier and provide amplified operational output.

Photo Transistor

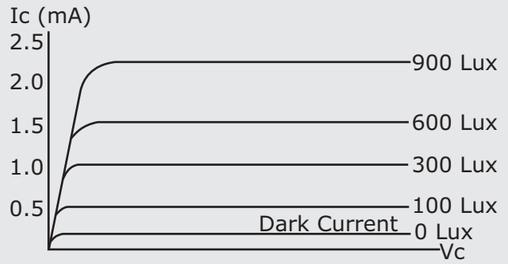


Phototransistor is basically a photodiode with amplification. The photo transistor light sensor has its Collector-base PN-junction reverse biased exposing it to the radiant light source.

Phototransistors operates in same manner as the photodiode except that they can provide current gain and are much more sensitive than the photodiode with currents are 50 to 100 times greater than that of the standard photodiode.

Semiconductor Materials

Germanium and Silicon, Gallium and Arsenide for higher efficiency levels.



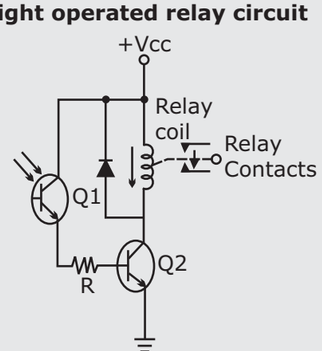
Advantages of Phototransistor

- Produce a higher current than photodiode.
- Produce a high voltage, that photo-resistor.
- Very fast and are capable of providing nearly instantaneous output.
- Relatively inexpensive, simple, and small enough.

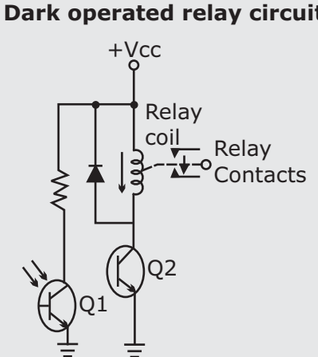
Applications

Punch-card readers, computer logic circuitry, lighting control, level indication relays, counting systems, IR detectors.

Light operated relay circuit



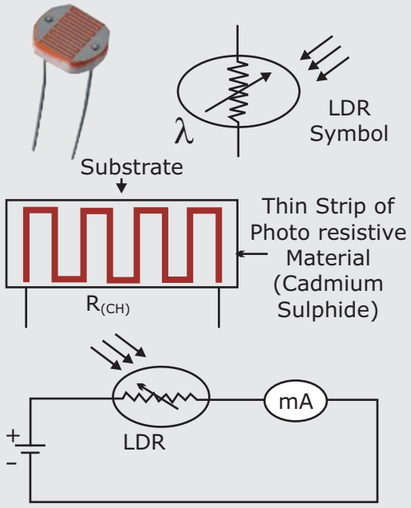
Dark operated relay circuit



Working

When light falls on the base of transistor Q1, current starts to flow through RB and hence base current flow in transistor Q2. Transistor Q2 starts conducting and energizes the relay which is connected to load to switch ON or OFF.

Light Dependent Resistor

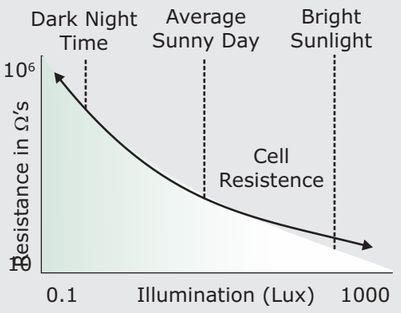


A Photoconductive light sensor does not produce electricity but simply changes its resistance when subjected to light energy. Photo resistors use light energy to control the flow of electrons.

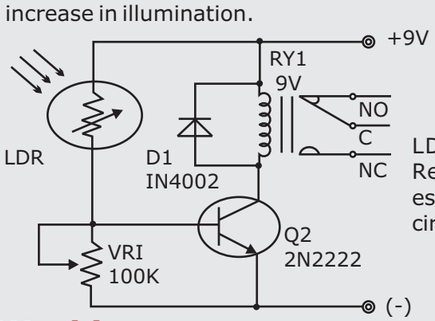
The commonly used photoconductive cell is called the Light Dependent Resistor or LDR. LDR changes its electrical resistance from several thousand ohms in the dark to only a few hundred ohms when light falls upon it.

Materials Used

Lead Sulphide (Pbs), Lead Selenide (PbSe), Indium Antimonide (InSb) which detect light in the infra-red range with the most commonly used of all photo resistive light sensors being Cadmium Sulphide (Cds). Cadmium Sulphide is used for LDR because its spectral response curve closely matches that of human eye. It has a peak sensitivity wavelength (λ) of 560 nm to 600nm in the visible spectral range.



Cadmium Sulphide changes its electrical resistance from several thousand ohms in the dark to only a few hundred ohms when light falls upon it. Its conductivity increase with a decrease in resistance for increase in illumination.



LDRs or light Dependent Resistors are very useful especially in light/dark sensor circuits.

Working

Light Dependent Resistor (LDR) provides maximum resistance in dark. As the light intensity increases, resistance of LDR decreases and hence current starts to flow through LDR. These current flows through the transistor Q2 and makes in to start conduct. IC current flows through the relay making it to be energize for switching devices in ON or OFF condition.

33504
Digital Trainer

36184
Semi-Conductor Devices Characteristics

36185
Discrete Component Trainer

36212
Opto electronic devices characteristics

36274
Photo Transistor Trainer

43032
Computer Interface Trainer

52004
Optical Transducers Trainer

52085
Sensor Trainer Board

IT-2013, Ramchandrapura Indl. Area, Sitapura Extension, Jaipur-302022, India. Ph: +91-9829132777; +91-9413330765; Email: info@tesca.in; Web: www.tesca.in