

Electrical and Electronic Drawing

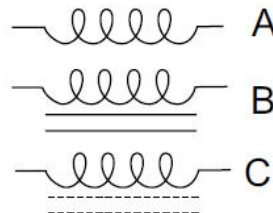
Electronic Components - Part 3

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Inductors

- A device that resists change in the current through the device.
- Inductors work on the principle that when a current flows in a coil of wire, a magnetic field is produced, which collapses when the current is stopped.
- The collapsing magnetic field produces an electromotive force which tries to maintain the current.

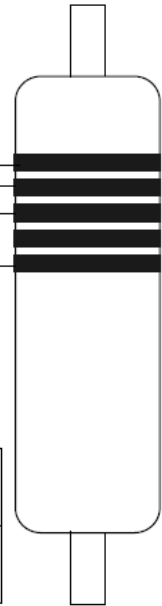
$$e = -L \frac{di}{dt}$$



Inductors

Inductor Band Colour Codes

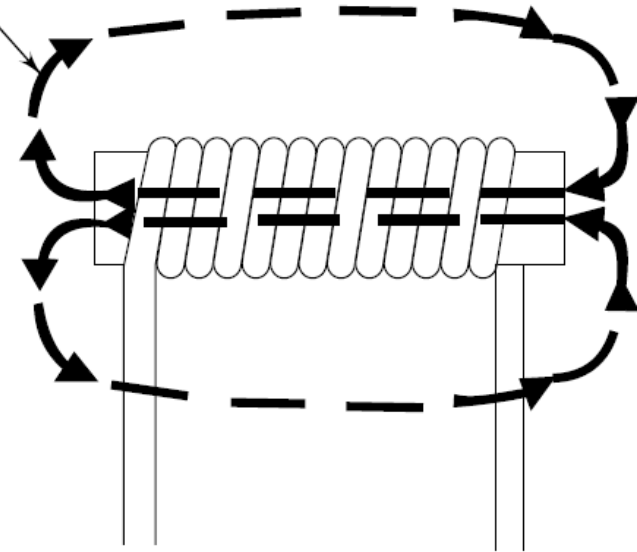
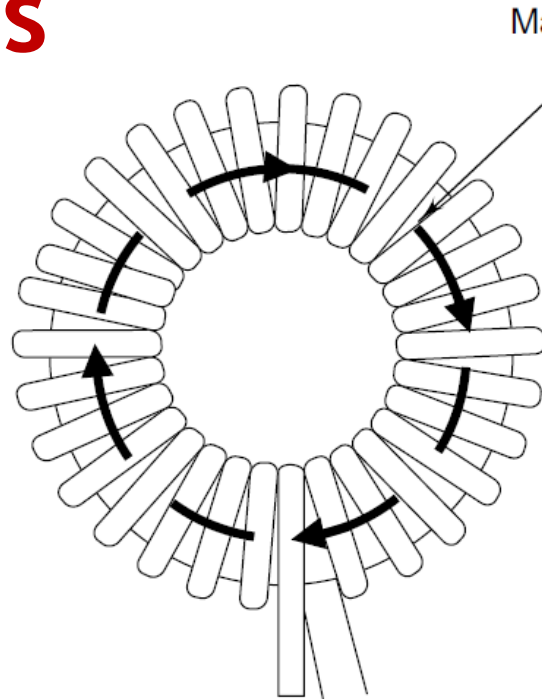
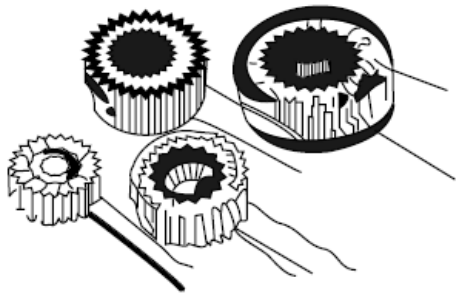
1 st Band (Value)	2 nd Band (Value)	3 rd Band (Multiplier)	4 th Band (tolerance)
Brown 1	Black 0	Black × 1 or no zeros	Red ± 2%
Red 2	Brown 1	Brown × 10 or +1 zero	Gold ± 5%
Orange 3	Red 2	Red × 100 or +2 zeros	Green ± 5%
Yellow 4	Orange 3	Orange × 1k or +3 zeros	Blue ± .25%
Green 5	Yellow 4	Yellow × 10k or +4 zeros	Violet ± .1%
Blue 6	Green 5	Green × 100k or +5 zeros	Gold ± 5%
Violet 7	Blue 6	Blue × 1m or +6 zeros	Silver ± 10%
Grey 8	Violet 7	Gold × .1	
White 9	Grey 8	Silver × .01	
	White 9		



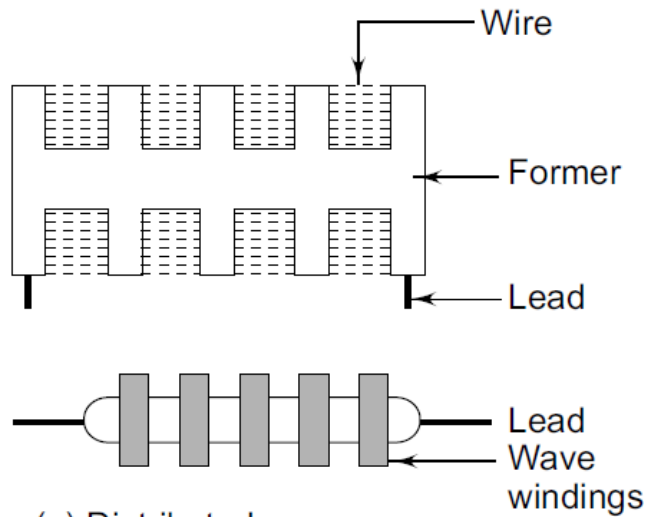
Inductors

- The primary use of an inductor is filtering.
 - High current inductors wound around a large core are used in power supply filters
 - Low current air core inductors are used in signal filters
- Basic components of an inductor are the former (or bobbin), winding wire (with or without separating material) and the core material
 - Bobbins are normally made of moulded plastic
 - Winding is usually enamelled copper wire
 - Core material can be laminated steel, powdered iron or ferrite – Shape also varies

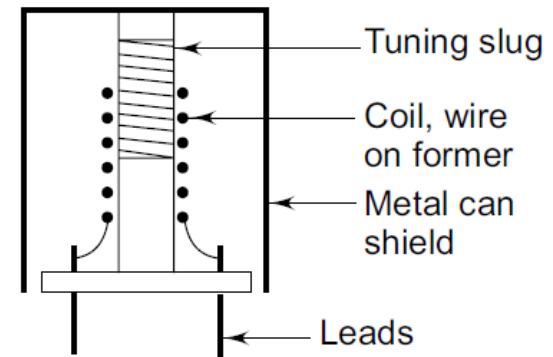
Inductors



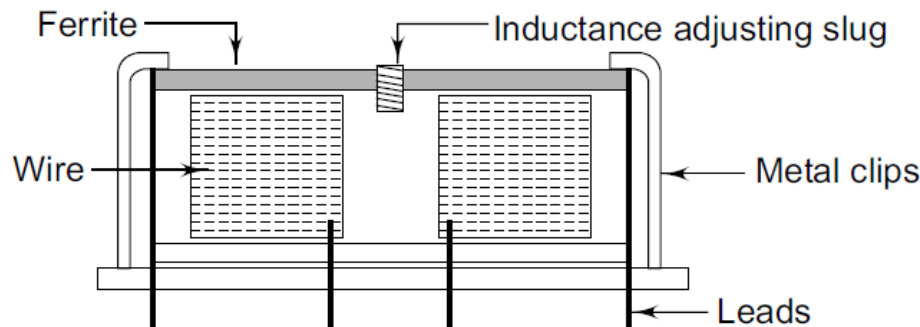
Inductors



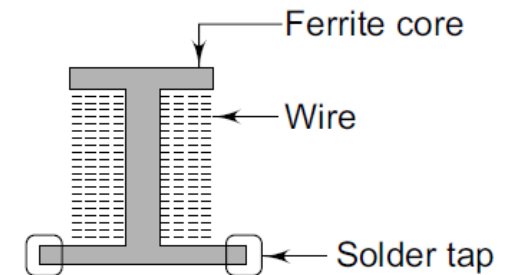
(a) Distributed



(b) Radio frequency coil



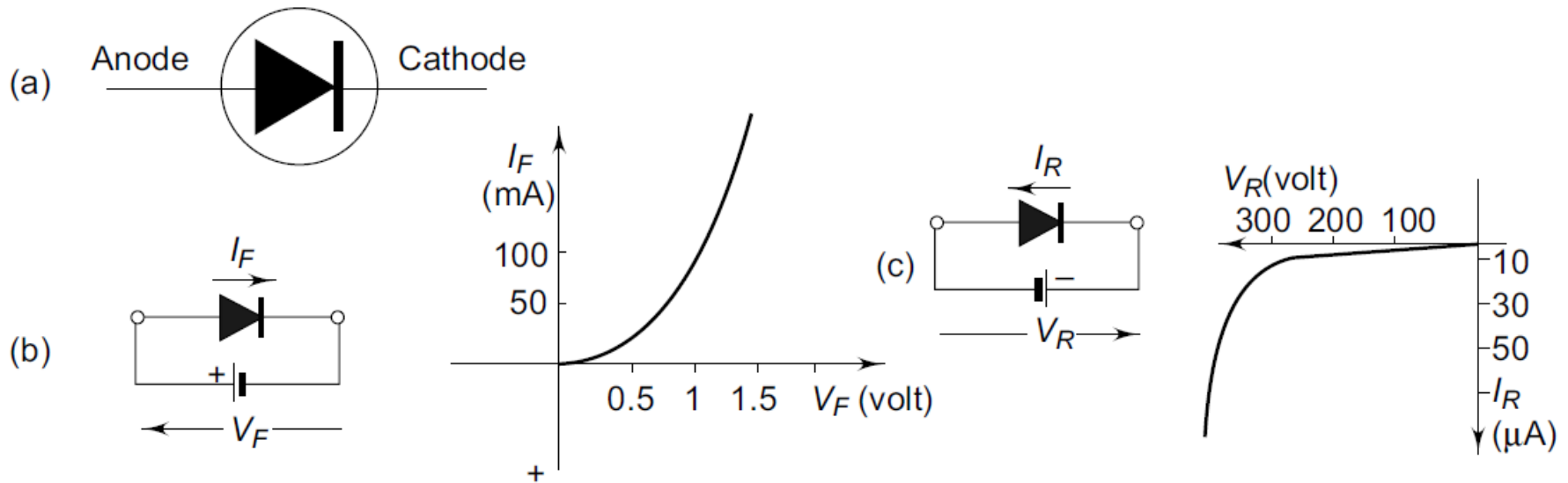
(c) Cup or core system



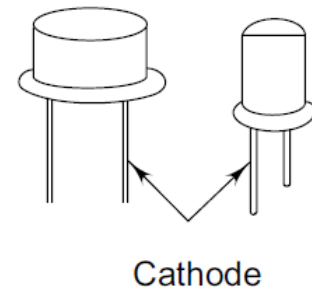
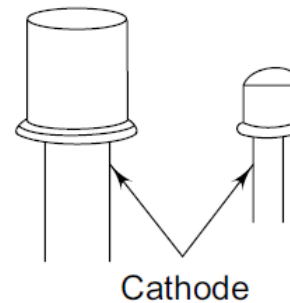
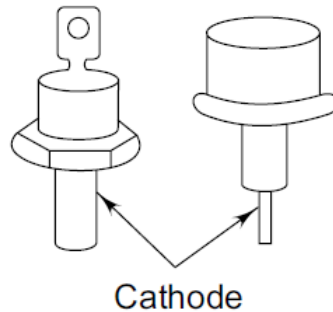
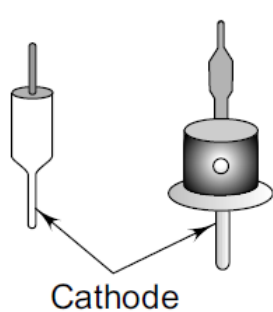
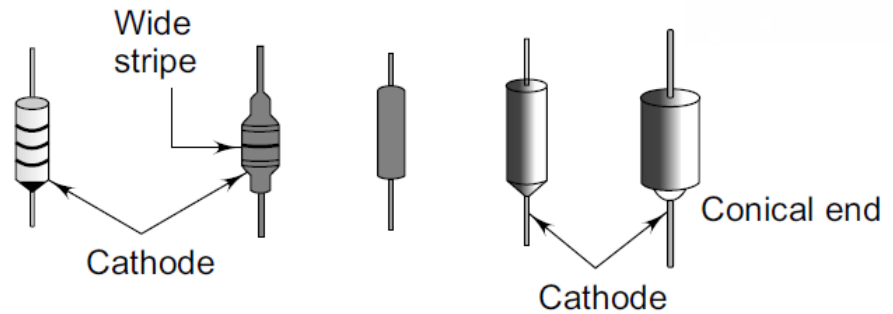
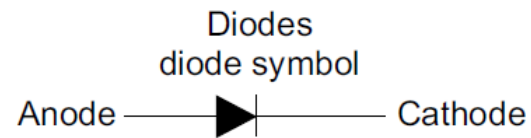
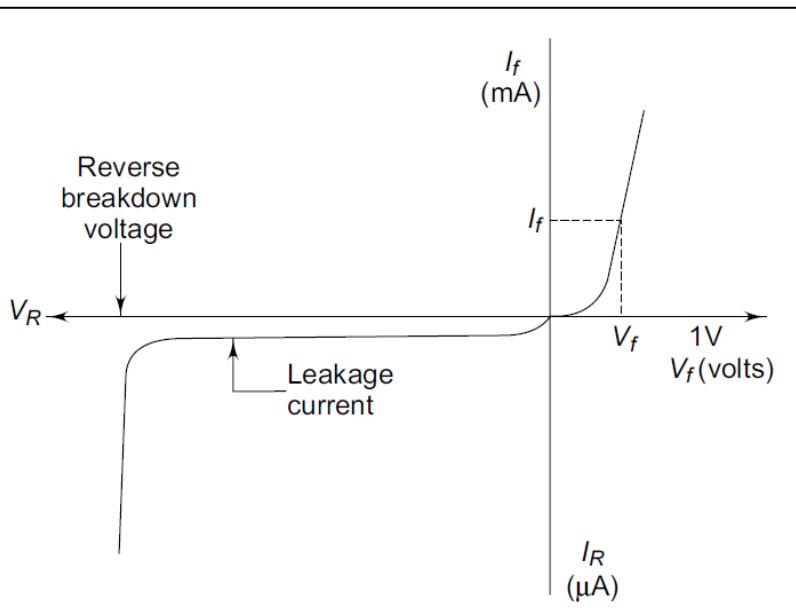
(d) Surface mount

Diodes

- A diode is an active component made of semiconductor material through which the current flows more easily in one direction than in the other

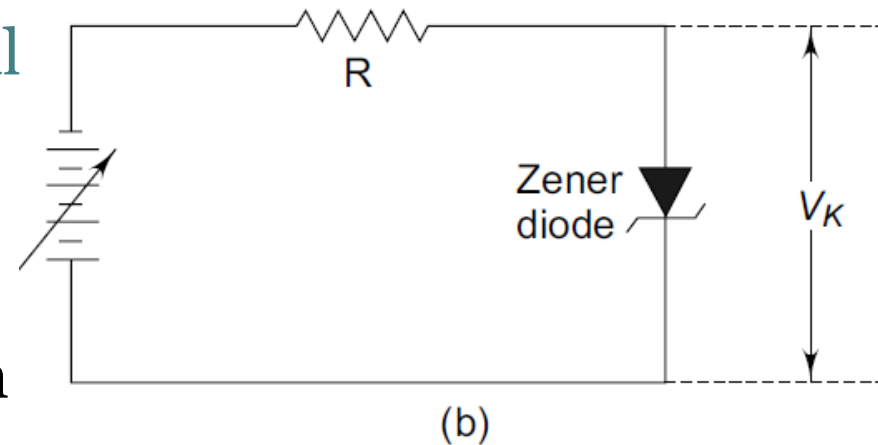
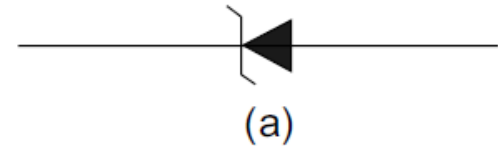


Diodes



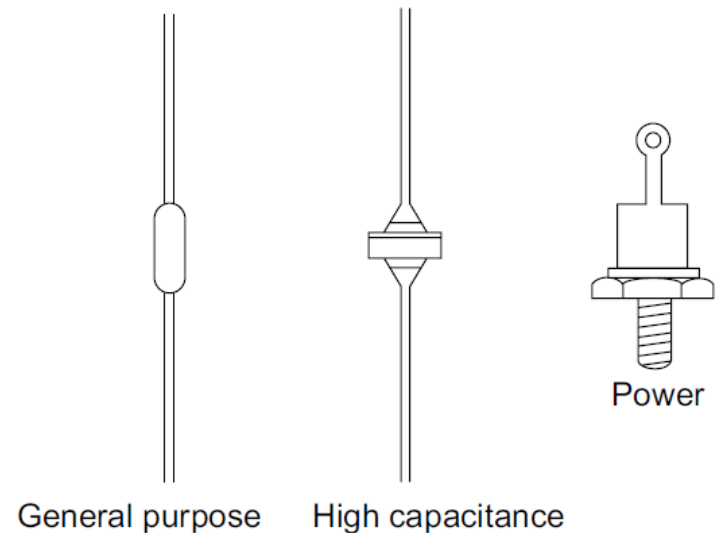
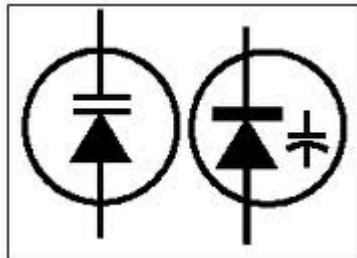
Zener Diodes

- Breakdown avalanche or the Zener voltage
 - Range from 1 volt to several hundred volts
 - Behaves like a voltage source in the Zener region
- Distinguish Zener diode from a general purpose diode by being usually labelled with its specified breakdown voltage



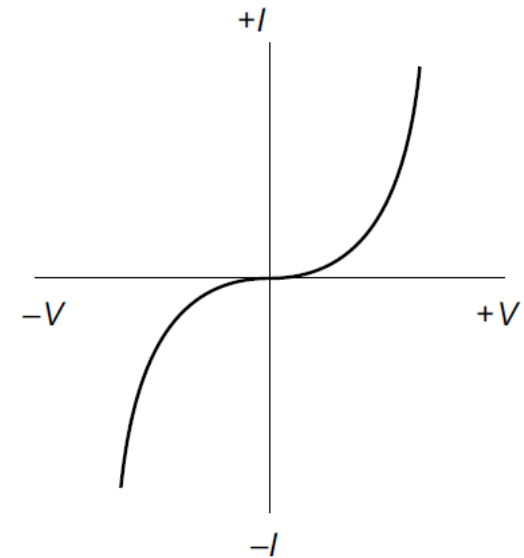
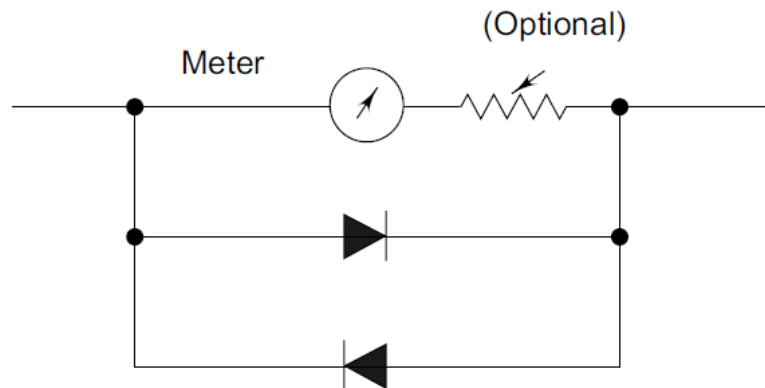
Varactor Diode

- Silicon diode that works as a variable capacitor in response to a range of reverse voltage values
 - Nominal capacitance values ranging from 1 to 500 pF
 - Maximum rated operating voltages from 10 to 100 volts



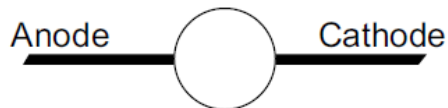
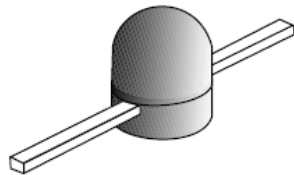
Varistor

- Semiconductor device having voltage-dependent non-linear resistance that drops as applied voltage is increased
- Symmetrical varistor arrangements are used in meter protection circuits

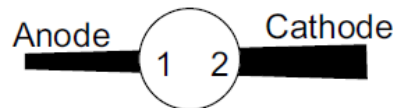
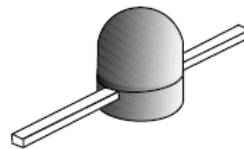


Light Emitting Diodes (LEDs)

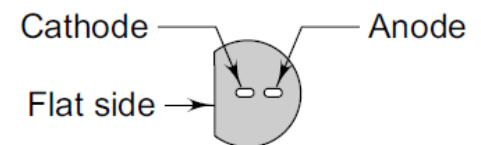
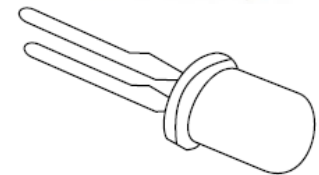
- A LED is basically a p-n junction that emits light when forward biased
 - Difference colors and shapes



(Cathode identified by small plastic protrusion)



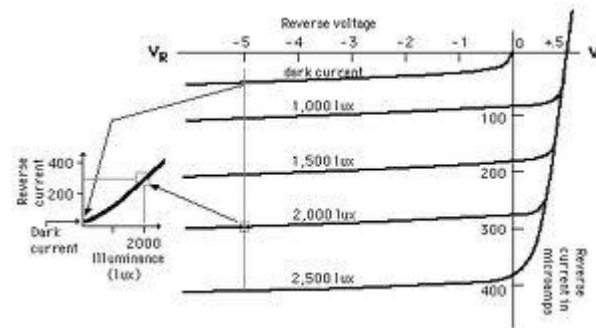
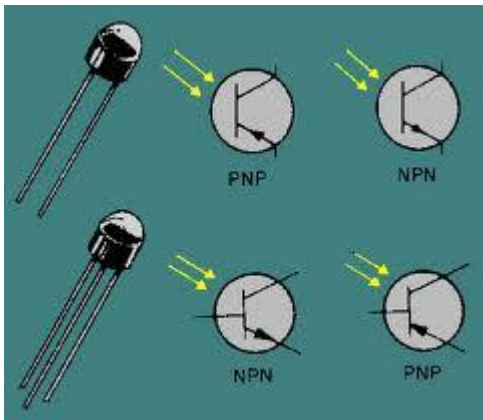
(Cathode identified by larger lead)



(Cathode identified by flat on side of case)

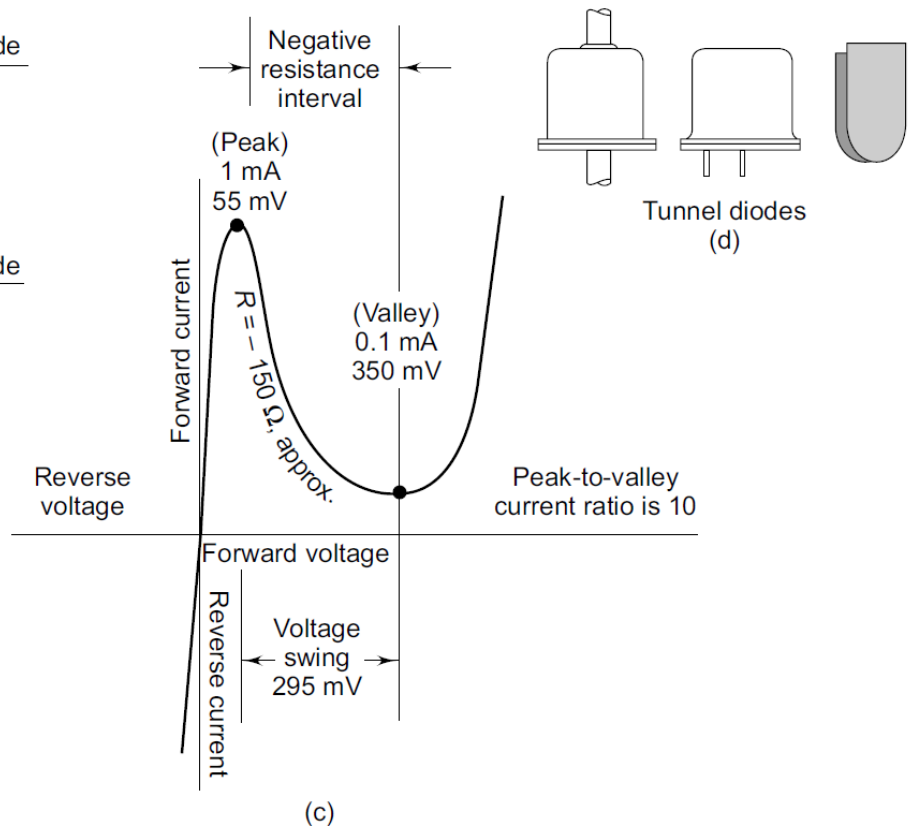
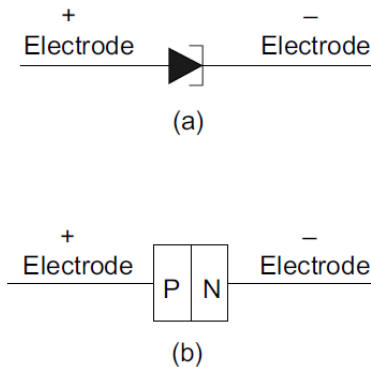
Photodiode

- A photodiode is a solid state device, similar to a conventional diode, except that when light falls on it, it causes the device to conduct
 - Practically an open circuit in darkness, but conducts a substantial amount of current when exposed to light.



Tunnel Diode (TD)

- A tunnel diode is a p-n junction which exhibits a negative resistance interval



Assignments

- Visit Digikey Corp. web site (www.digikey.com) and select sample 10 inductor values for different types/packages discussed in this lecture. Also, repeat for diodes. Report the specifications (including catalog page number and picture) of each and include your comments about the cost of different types.