

# Electronic Components Active Devices

T. Thoen

# Active Devices

- Active Devices – typically differentiated from passive as:
  1. Made from a semi-conductor material:
    - Silicon (most common)
    - Germanium (older, not very common)
    - Others.... Gallium Arsenide (LED's)
  2. Provide Gain (amplification) or can switch signals (digital)

Three most common active devices: Diodes, Transistors,  
Integrated Circuits

# Diodes:

- Allow the flow of current in one direction



- Through hole  
(power)



- Signal  
(low current)



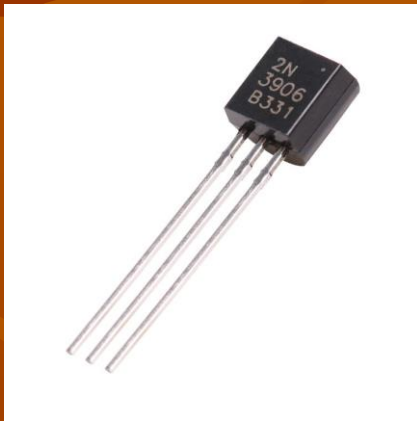
- Surface mount:

# Diodes

- Often numbered with the JEDEC (*Joint Electronic Devices Council*) system
- For example, power diodes:
- 1N4001
  - The “4” represents a current of 1 amp
  - The “001” represents a PIV rating of 50 volts
- 1N5404: 3 amps, 400 volts

# Transistors:

- Switch / Amplify signals



- Through hole package  
Small signal



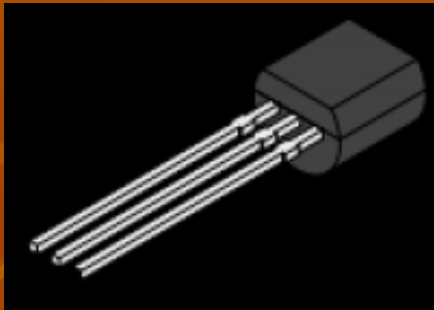
- Through hole package  
Power Transistor



- Surface mount

# Transistor Packages

- “TO” stands for Transistor Outline
- Typical through hole packages vary by power rating:



TO-92  
Low power



TO-220  
Medium power



TO-3  
High Power

# TO-92 / TO-220

- Watch out for pin numbering – not consistent!
- Example: 2N3904 – common transistor part number (P/N)
- To find out specific information we need to look at the data sheet of the component.

# “TO”?? Watch out!!

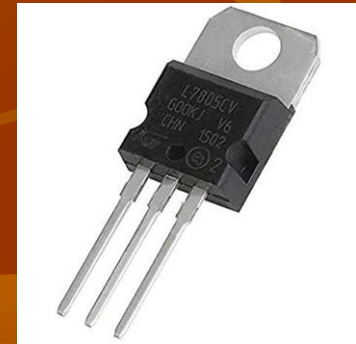
- Do all TO packages contain transistors??
- NO! Can also package resistors, diodes or other devices.
- Check part number to verify.



Resistor



Diode

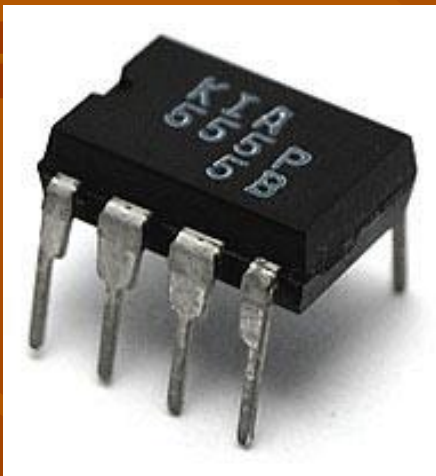


I.C.



# Integrated Circuits:

- Many components packaged in a single device: Lots of different applications! (we'll get into these later...)



- Through hole (DIP)



Surface mount: LOTS of different package types

# IC's – what categories?

- Digital
  - Basic Logic Gates
  - Microcontrollers
- Linear
  - Op-amps – used to amplify or condition signals
  - Voltage Regulators – keep voltage constant
  - Comparators – compare two voltages