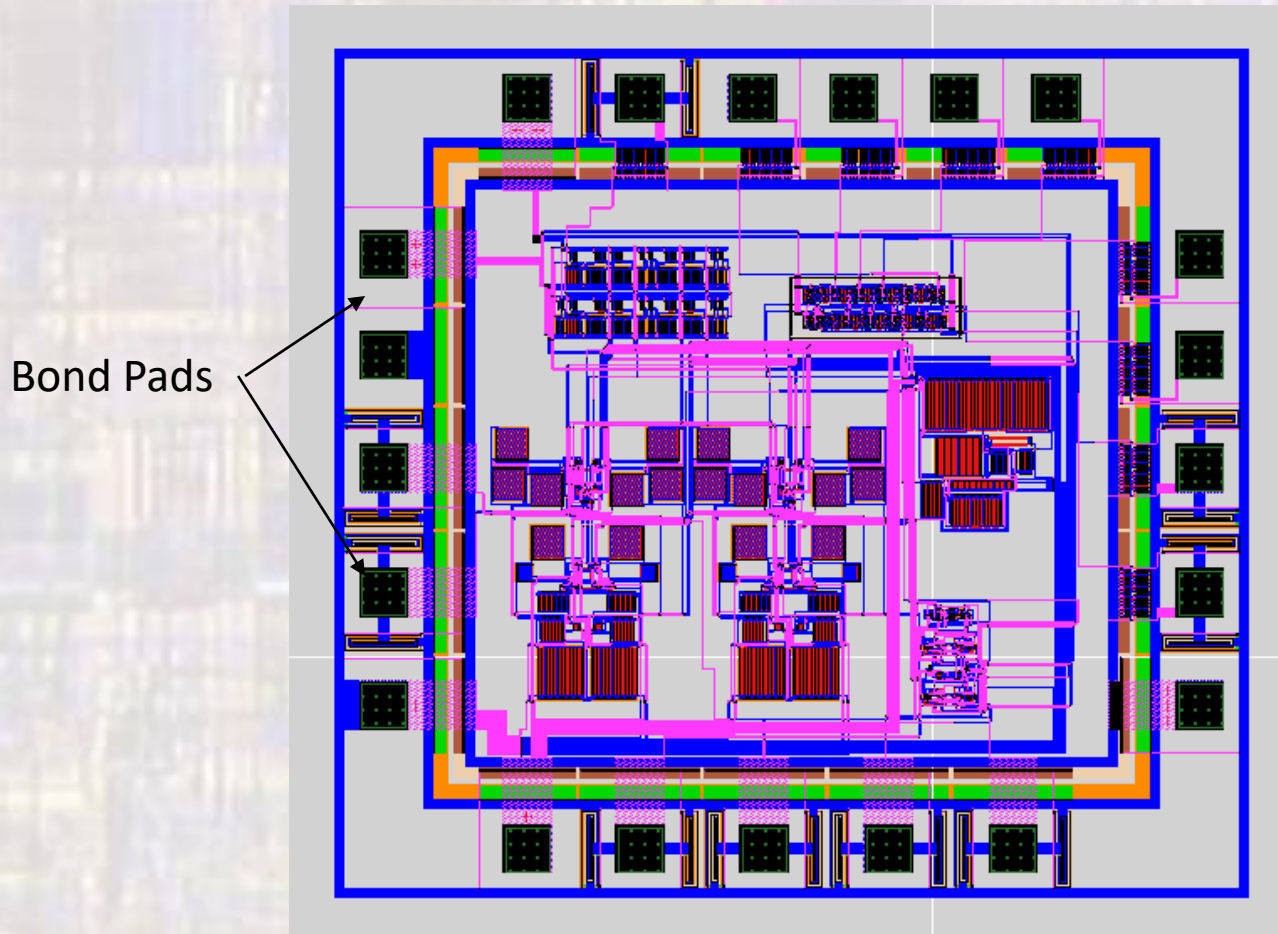


# Bond Pads

Last updated 3/29/19

# Bond Pads

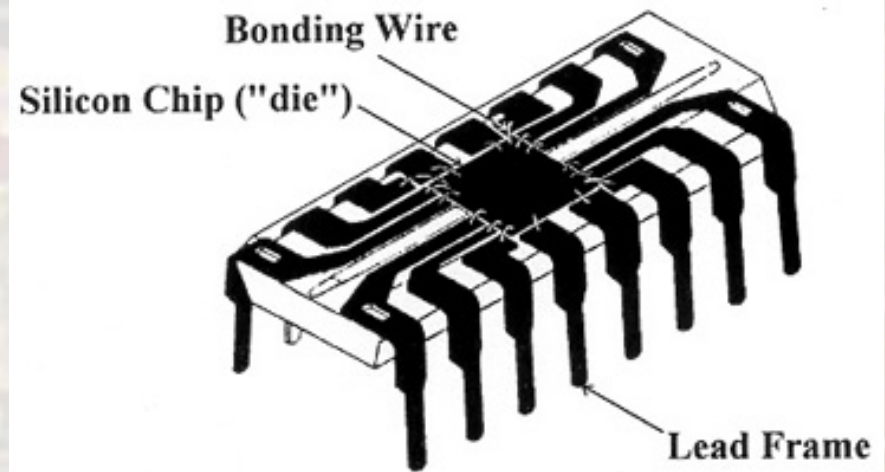
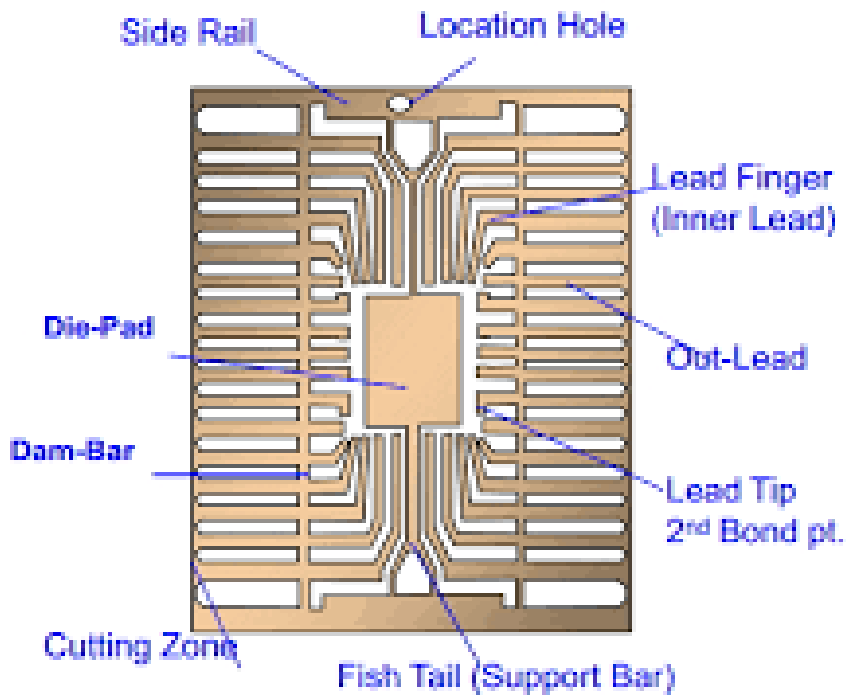
- Die Bond Pad
  - Connections from die to outside world



# Bond Pads

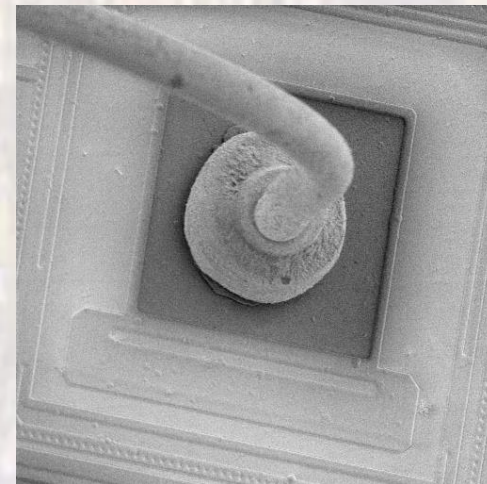
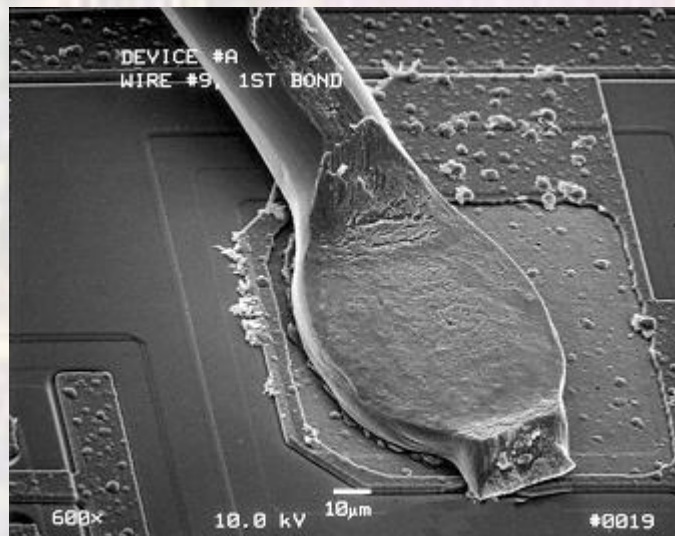
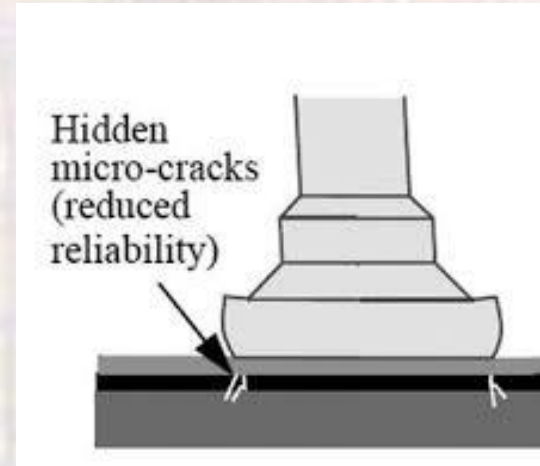
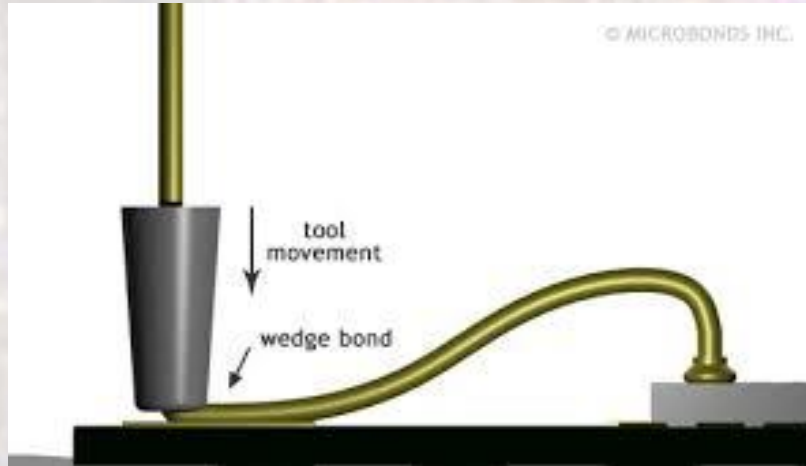
- Lead Frame

Lead-frame Structure



# Bond Pads

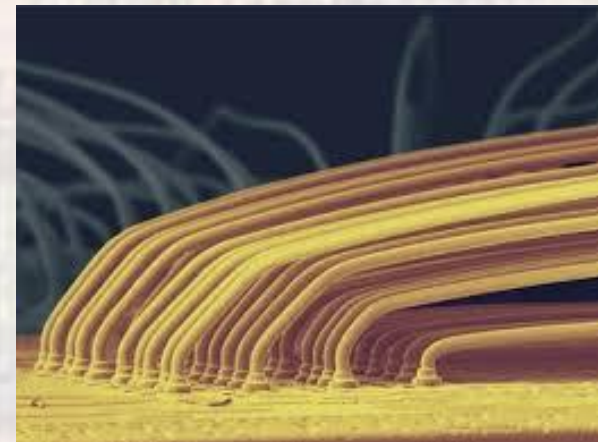
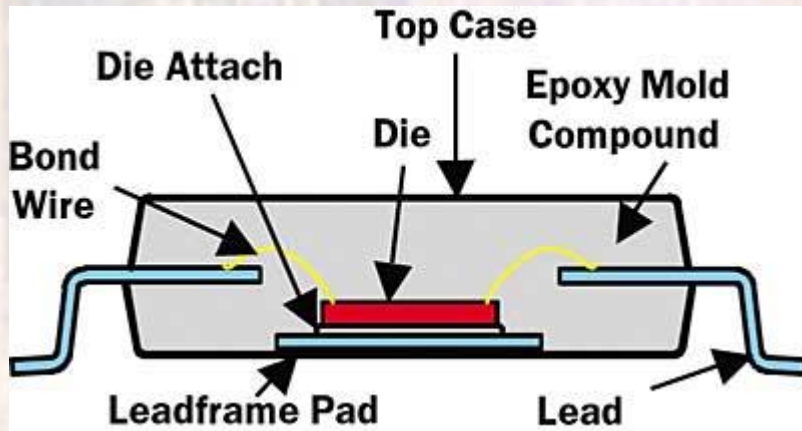
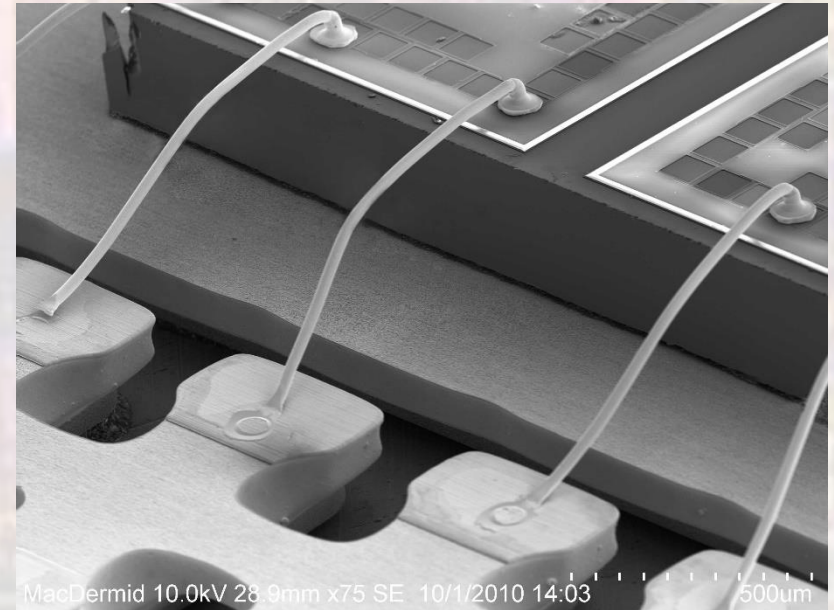
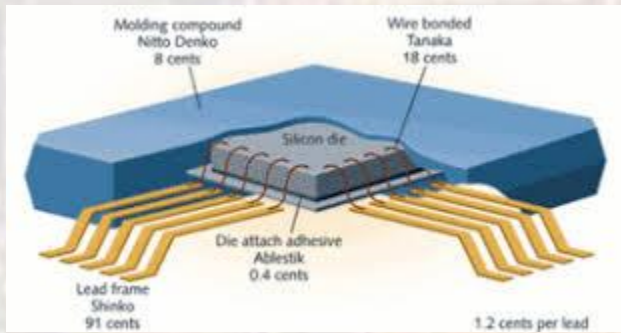
- Bond Wire





# Bond Pads

- Bond Wire



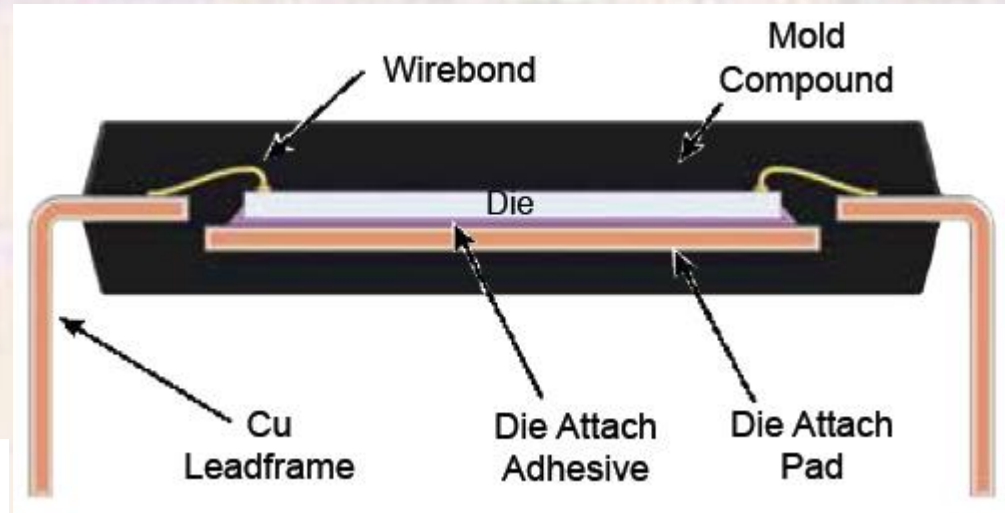
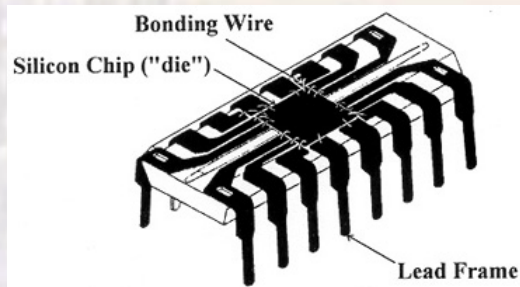
# Packaging

- TO – Transistor Outline



# Packaging

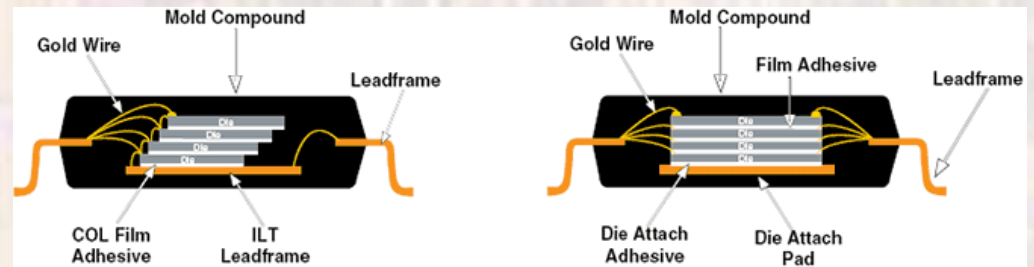
- PDIP – Plastic Dual Inline Package





# Packaging

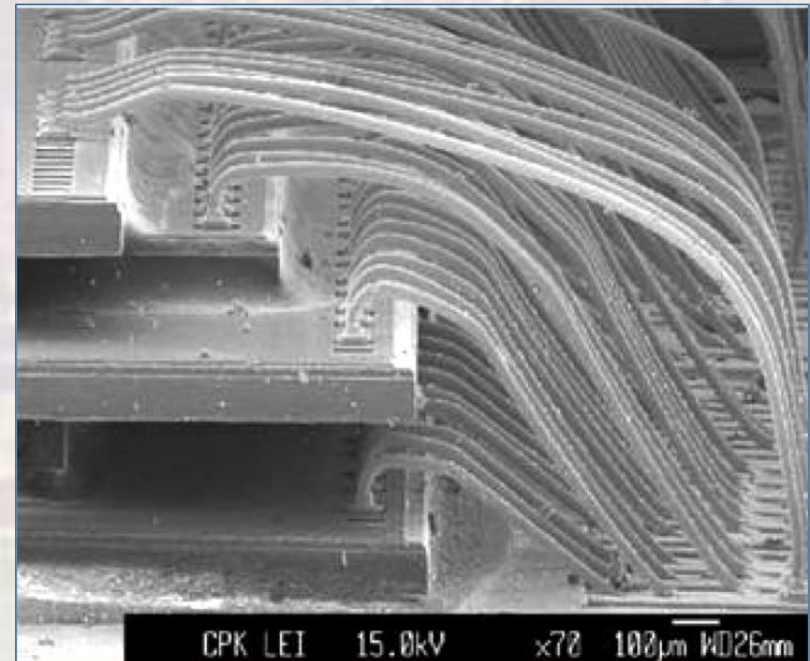
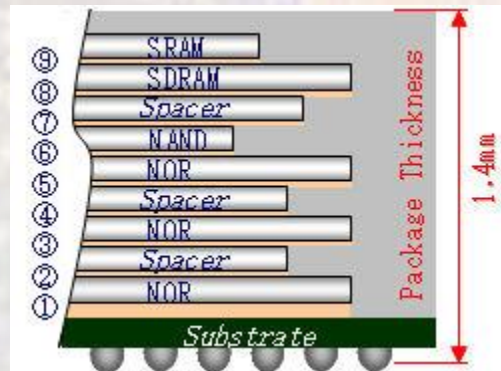
- TSOP – Thin Small Outline





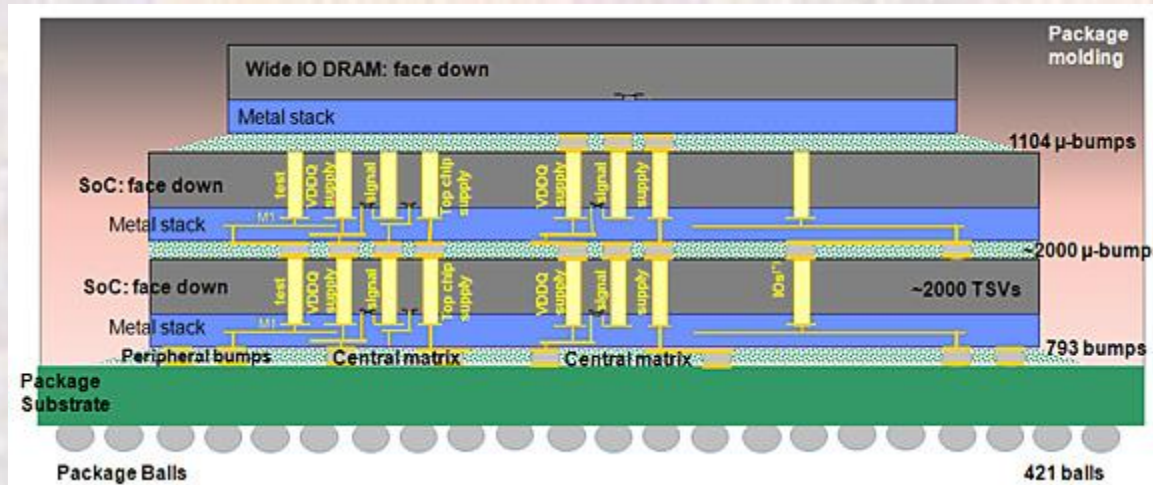
# Packaging

- Stacked Package



# Packaging

- Silicon Through Vias



# Bond Pads

- ESD Protection

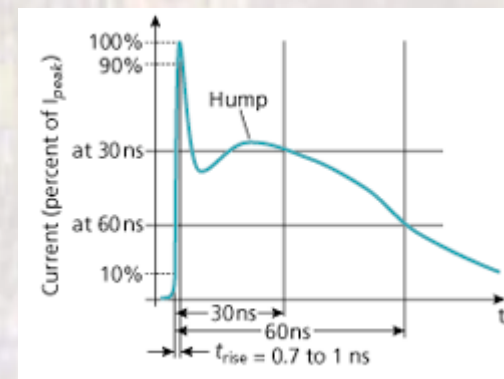
- Circuit boards can be subjected to thousands of volts of static electricity (charge)

- Human interaction
- Machine to machine

- This excessive voltage can be transferred to any pin or combination of pins on the IC package

- This is then transferred to the silicon

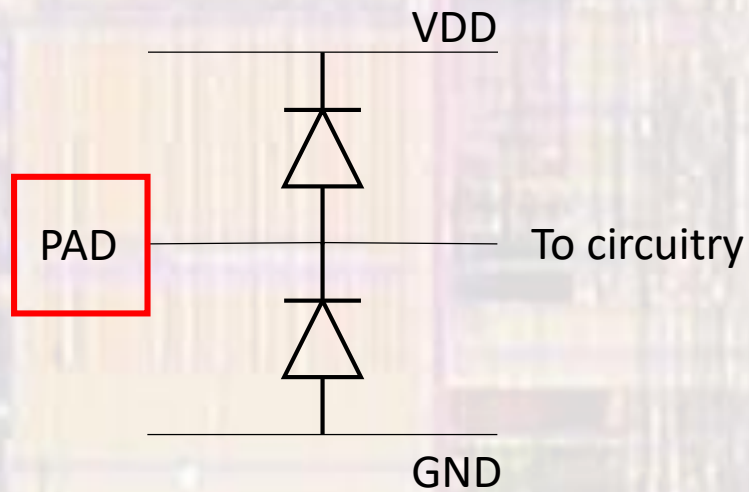
- Tens/hundreds/thousands of volts can destroy the small circuits/structures in the silicon





# Bond Pads

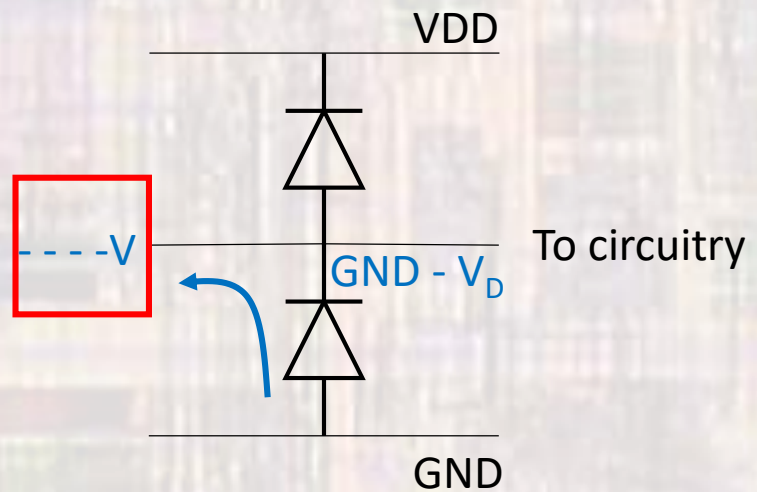
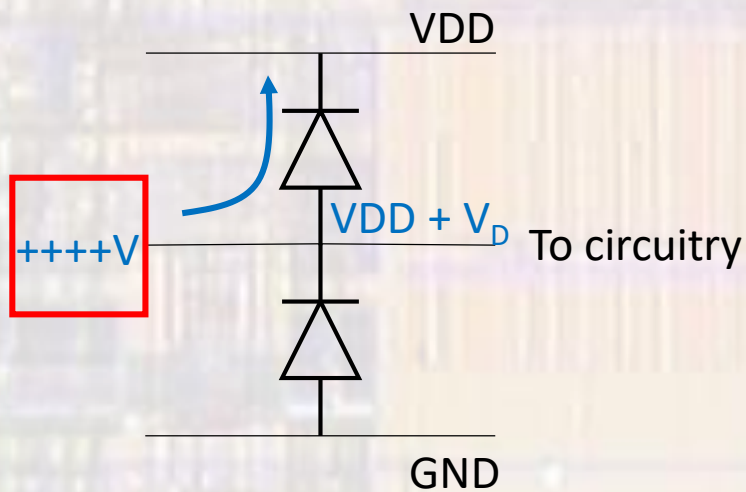
- ESD Protection
  - Basic input circuit





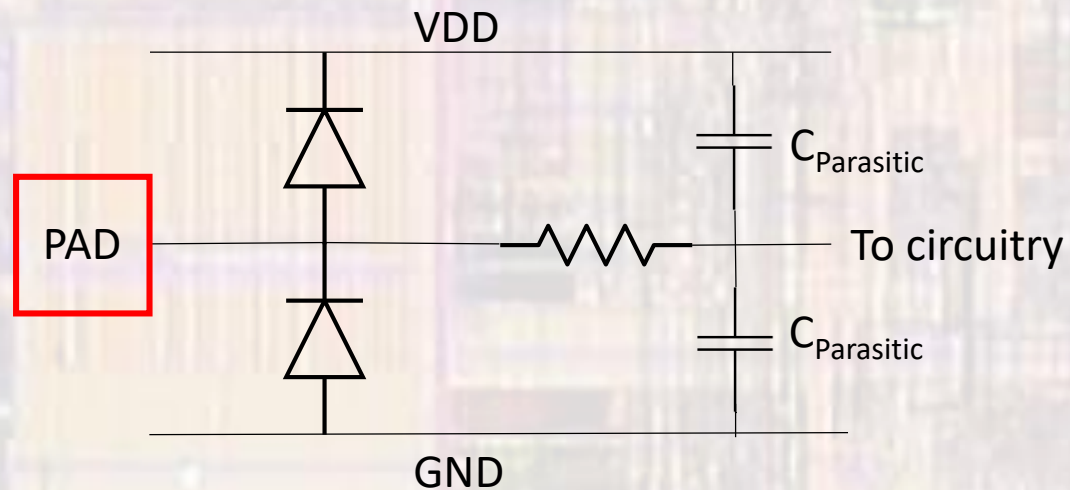
# Bond Pads

- ESD Protection
  - Basic input circuit
    - Limits internal voltages to supplies  $\pm V_D$



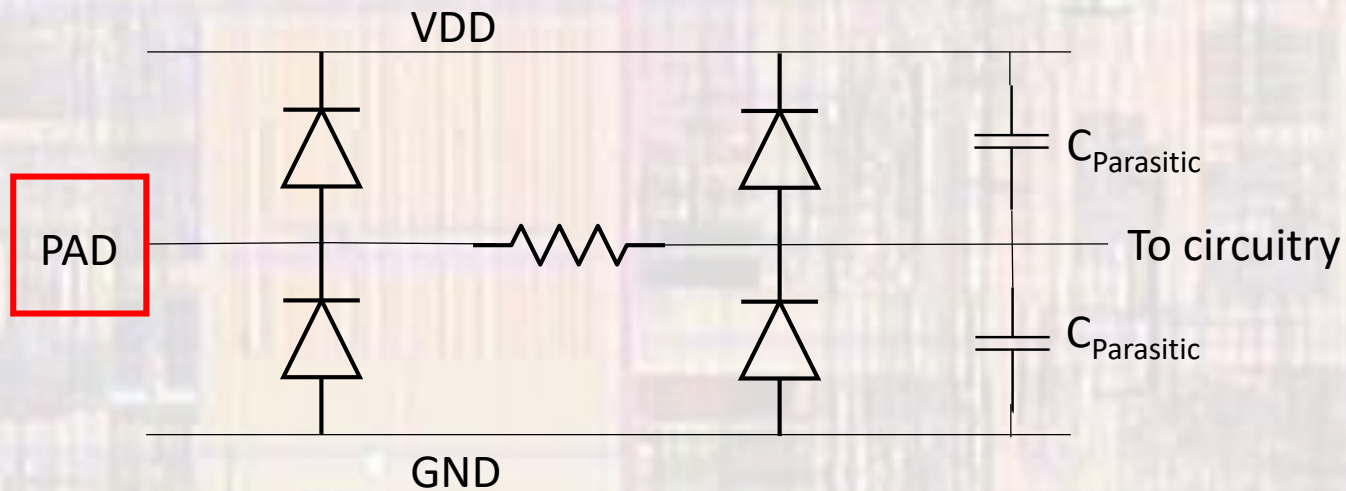
# Bond Pads

- ESD Protection
  - Better input circuit
    - Low Pass Filter the voltage signal



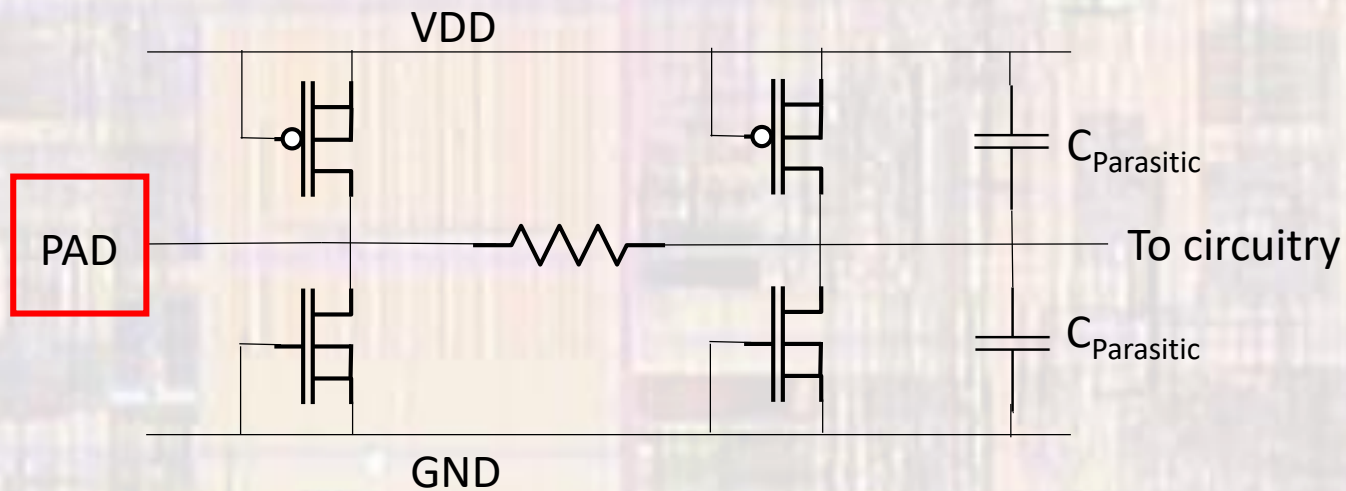
# Bond Pads

- ESD Protection
  - Even better input circuit
    - Low Pass Filter the voltage signal
    - Secondary clamp circuit



# Bond Pads

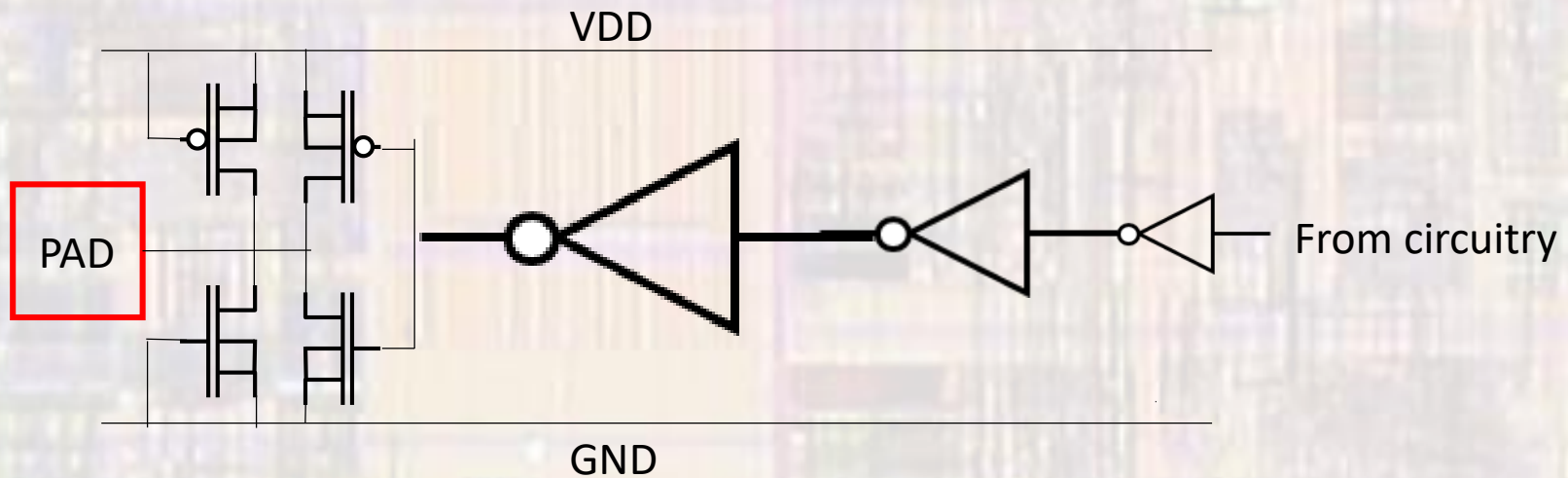
- ESD Protection
  - Even better input circuit
    - Low Pass Filter the voltage signal
    - Secondary clamp circuit





# Bond Pads

- ESD Protection
  - Output circuit
    - Can't have the resistor



# Bond Pads

- ESD Protection
  - I/O Pad

