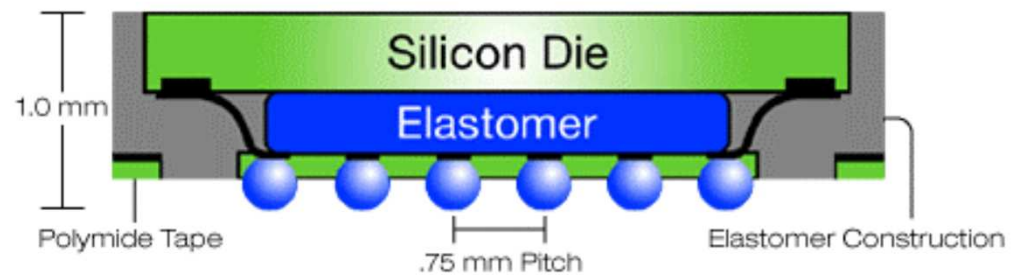
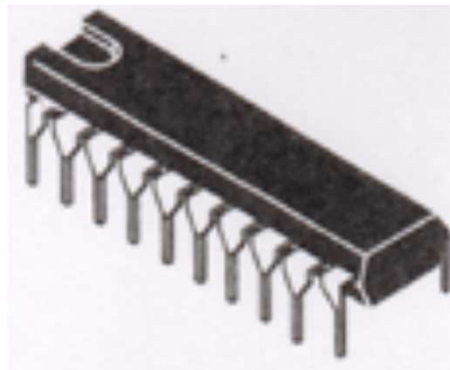


# ECGR4161/5196 – Lecture 12 – July 24, 2012

Today:

- Discussion - Exam
- Quiz 10
- Electronics parts



# Memory Details

---

Two basic kinds of volatile memory (RAM = Random Access Memory)

Static RAM (SRAM)

- fast, maintains data without power refresh

Dynamic RAM (DRAM)

- slower but denser, bit storage must be periodically refreshed



# Even More Memory Details

---

There are other types of “non-volatile” memory devices:

- ROM
- PROM
- EPROM
- EEPROM
- Flash

Can you think of other memory devices?



# Electronics Packaging

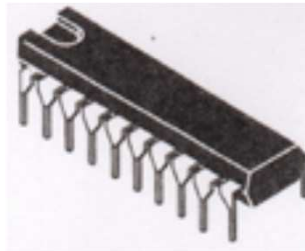
---

- There are several packaging technologies available that an engineer can use to create electronic devices.
- Some are suitable for inexpensive toys but not miniature consumer products, and some are suitable for miniature consumer products but not inexpensive toys.
- These packages have metal leads that are the conductive wire that connect electricity from the outside world to the silicon inside the package.
- Leads between packages are connected with small copper traces on a printed circuit board (PCB), and the package leads are soldered to the PCB.

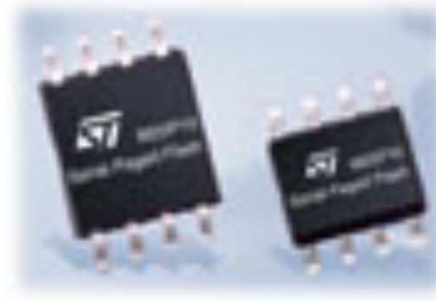


# Examples of Electronics Packages

Dual In-line Package (DIP) Older technology, requires the metal leads to go through a hole in the printed circuit board.

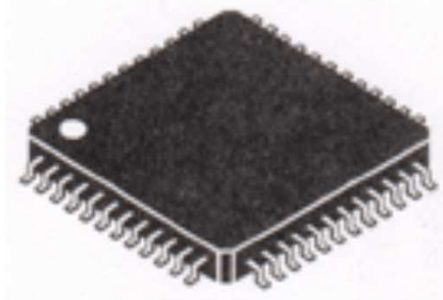


Dual Flat Pack (DFP) - A fairly recent technology, metal leads solder to the surface of the printed circuit board.

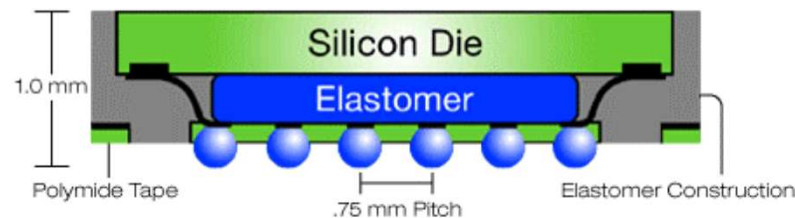
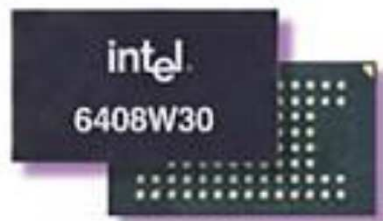


# Examples of Electronics Packages

Quad Flat Pack (QFP) - like the Dual Flat Pack, except here are metal leads are on four sides.



Ball Grid Array (BGA) - The connections to the component are on the bottom of the chip, and have balls of solder on these connections.



## Videos – PCB manufacture

---

<http://www.coe.uncc.edu/~jmconrad/StiquitoControlled/MandMTechStiquitoBoard1.MPG>

<http://www.coe.uncc.edu/~jmconrad/StiquitoControlled/MandMTechStiquitoBoard2.MPG>

