CET246 Electronic Design Automation

Classifying Components

David J. Broderick, Ph.D.

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Central Connecticut State University

Introduction

As we bridge the gap between electrical and physical construction, components can be classified by:

1. Electrical characteristics
2. Physical package

Electrical Classifications

Passive vs Active

A passive device:

1. contributes no power gain (amplification) to a circuit or system
2. no control action
3. does not require any input other than a signal to perform its function

Passive vs Active

An active device:

1. are capable of controlling voltages or current
2. can create a switching action in the circuit
3. can amplify or interpret a signal

Discrete vs Integrated

Discrete component: A component packaged with one or two functional elements

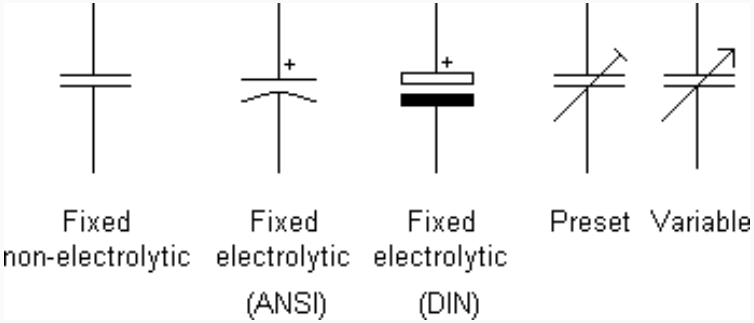
Integrated circuit: A combination of several interconnected discrete components packaged in a single case to perform multiple functions

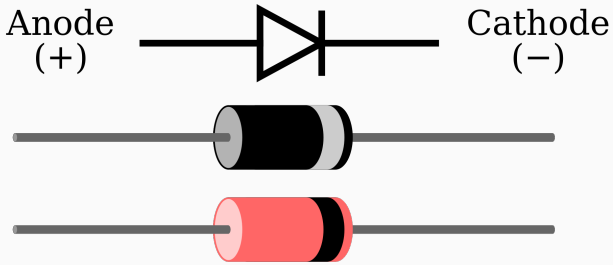
Polarized Components

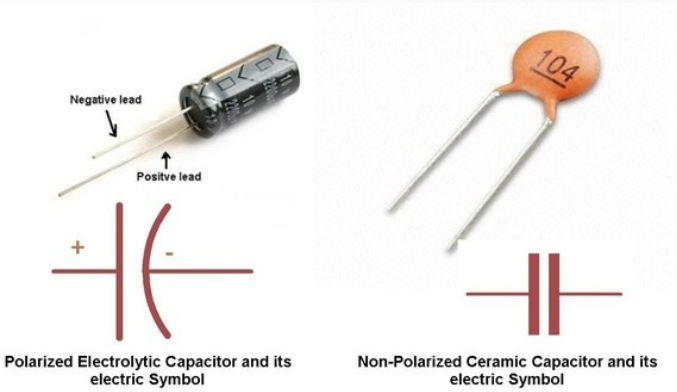
Polarized components have leads marked with positive and negative polarity.

Most notable:

1. Capacitors
2. Diodes







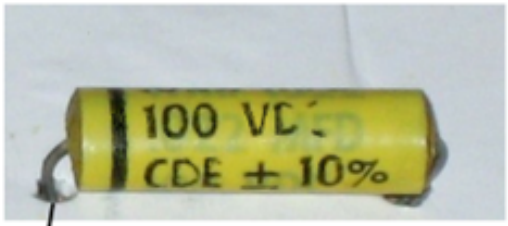
Polarized Components

Capacitor Polarization Markings:

Aluminum: - lead

Crimp is at + end.

Longer lead is +.



Lead attached to outer foil.

Tantalum: + lead

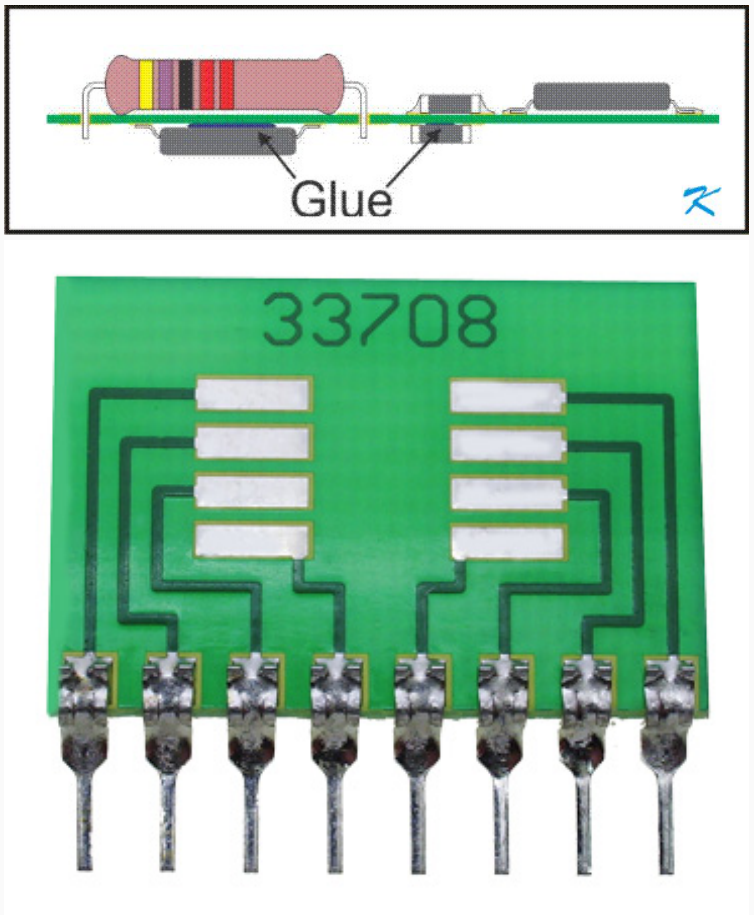
Non-polarized capacitors.

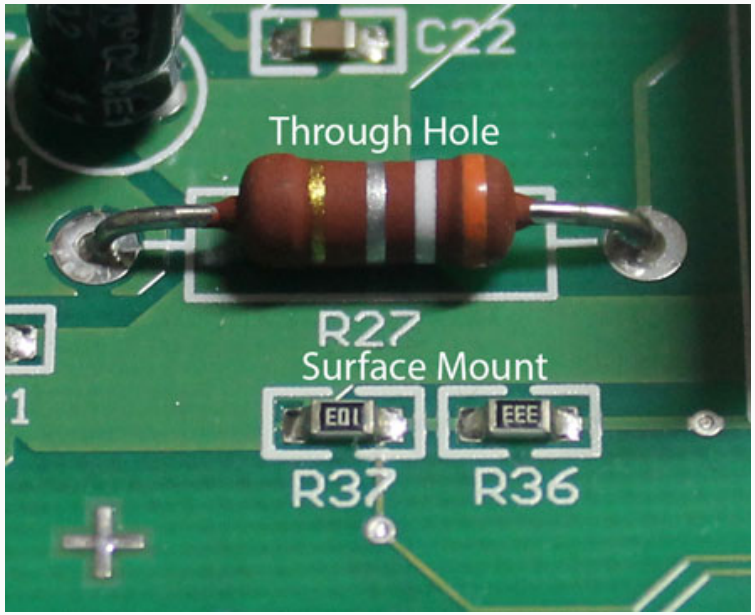
Package Classifications

THT vs SMT

THT - Through-hole Technology

SMT - Surface-mount Technology

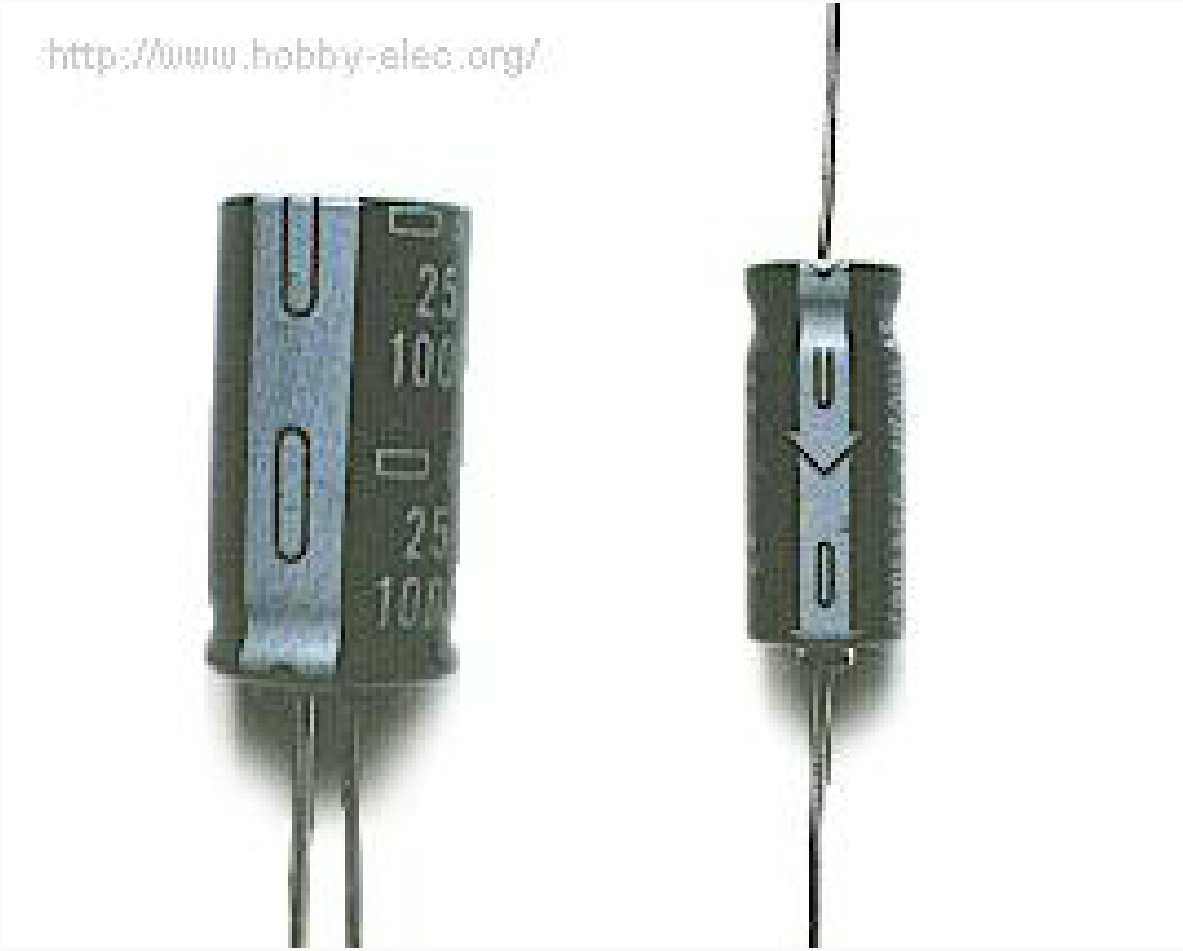




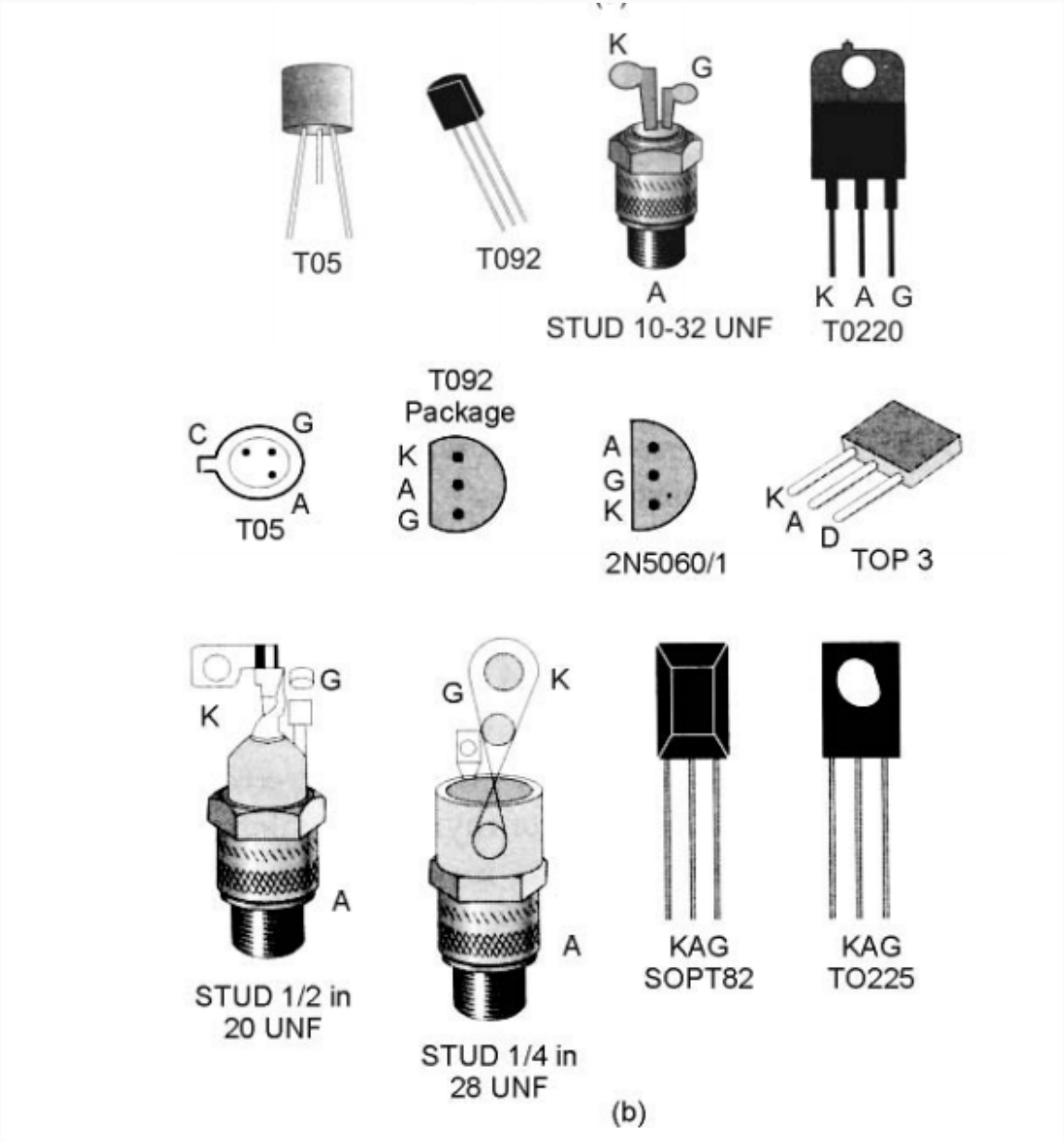
Axial vs Radial

Axis: an imaginary line about which a body rotates.

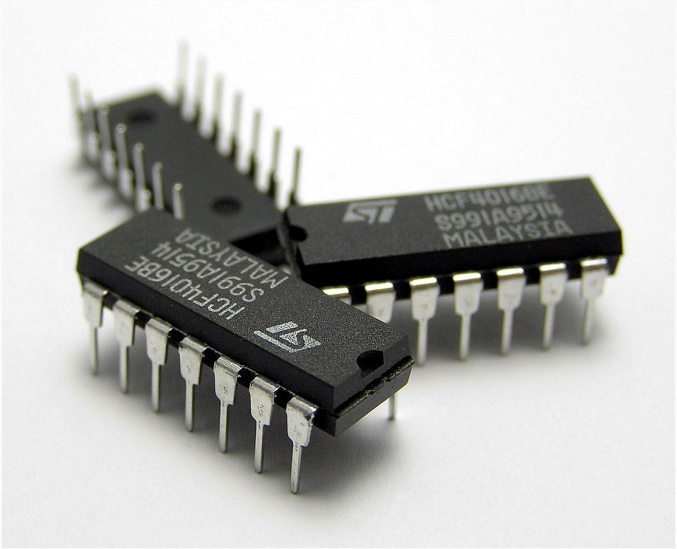
Radius: a straight line from the center to the circumference of a circle or sphere.



Common Discrete Packages

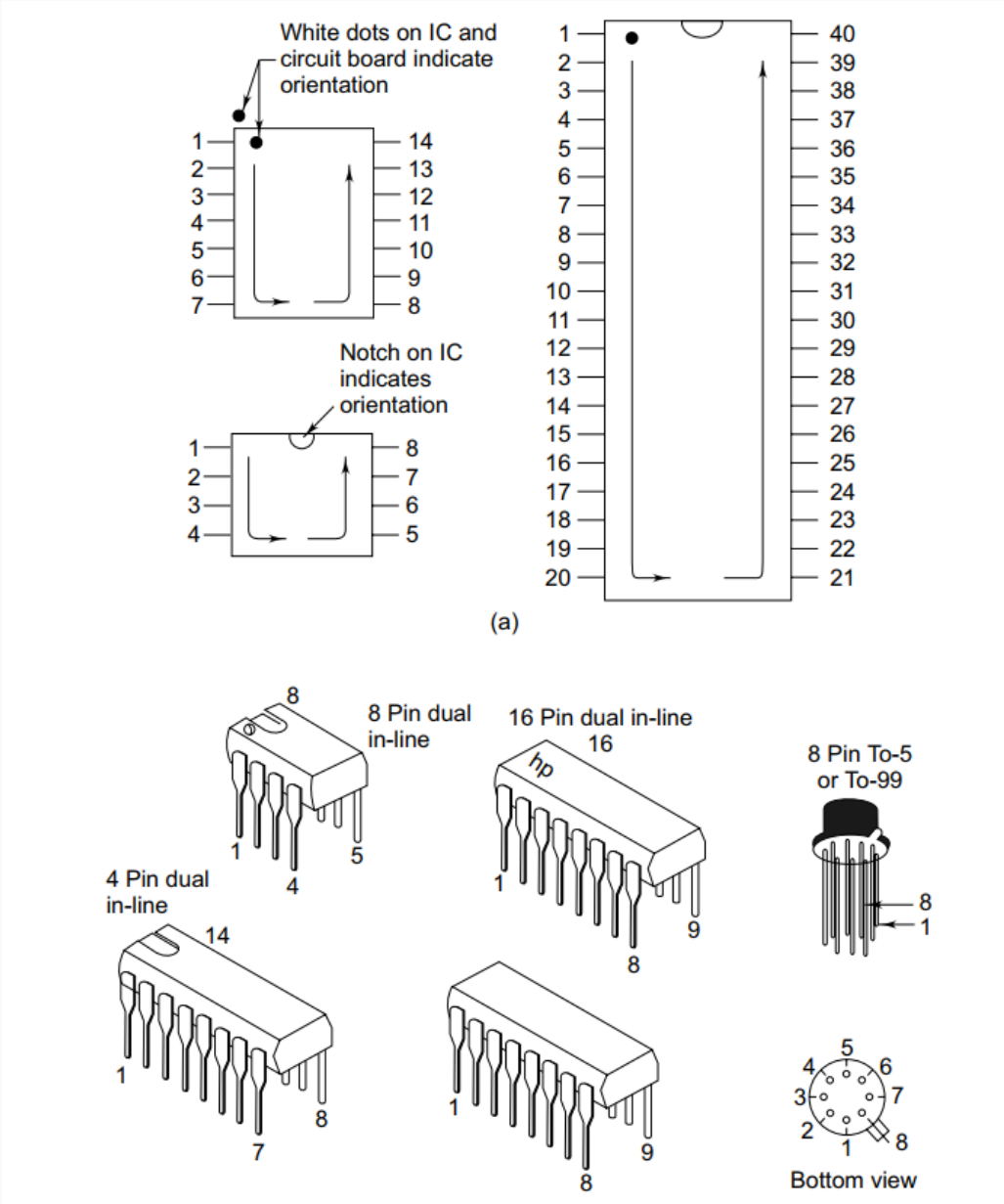


Common Integrated Packages

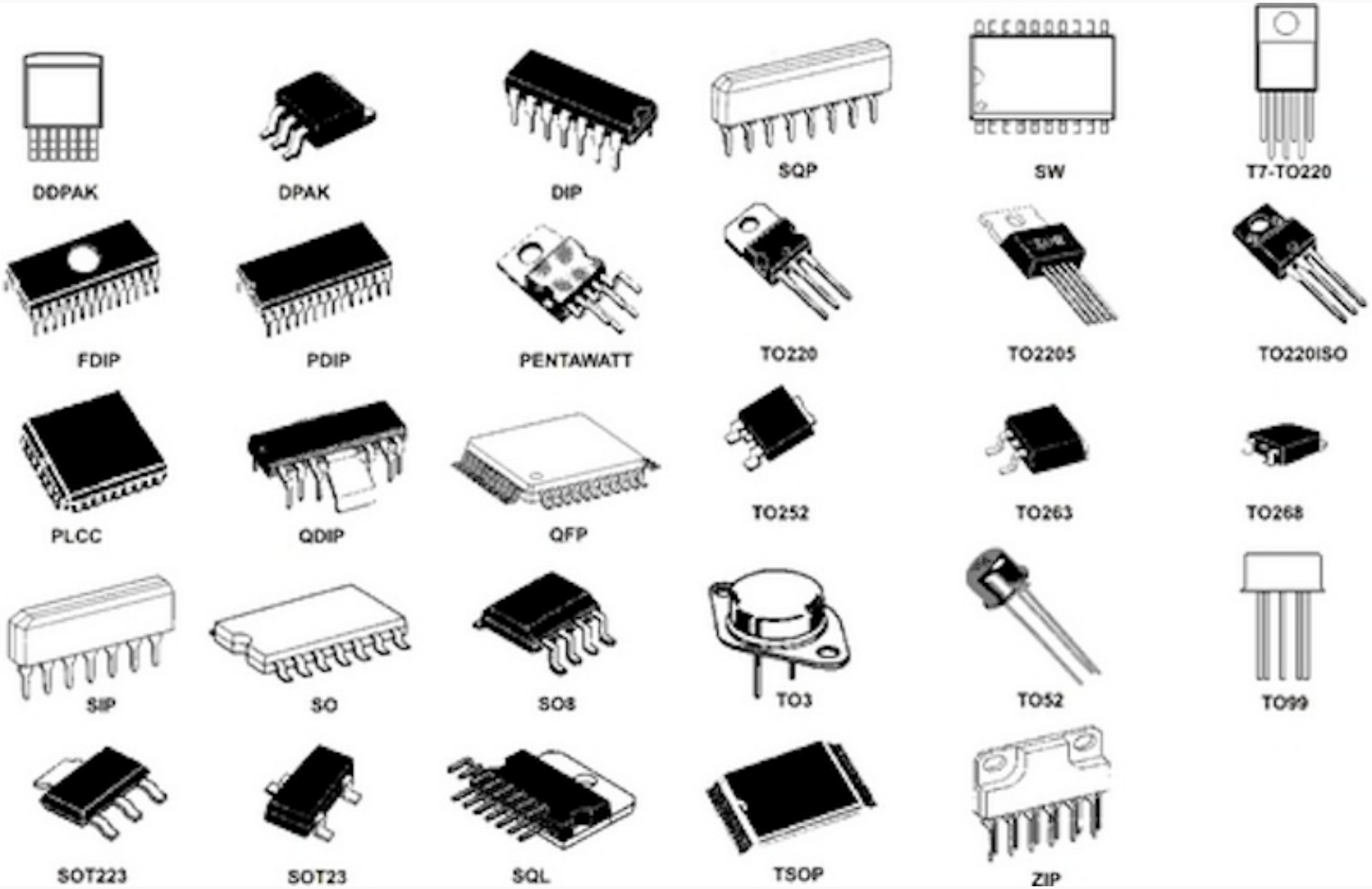


Dual Inline Package (DIP)

Common Integrated Packages



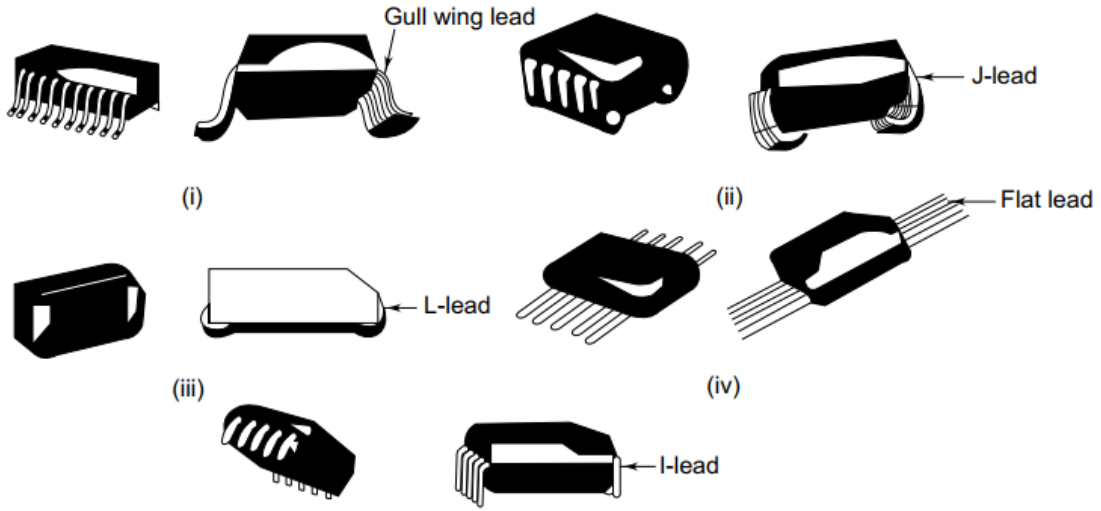
Common Integrated Packages



Common Integrated Packages

Type	Drawing	Components
Gull-wing		SOIC QEP TSOP
J-lead		PLCC SOJ
Ball		BGA Chip Scale Flip Chip (Bump)
Metallized Terminations		Capacitors Resistors Ferrites

Fig. 2.79 SMD lead styles



Ball Grid Arrays