

UNIT - II

Agenda

1. Components Types
2. Difference Between TH & SMD
3. SMD Package
4. SMD Components value Identification
5. IC Package Types
6. PCB Track Angle
7. 0 Ohm Resistor

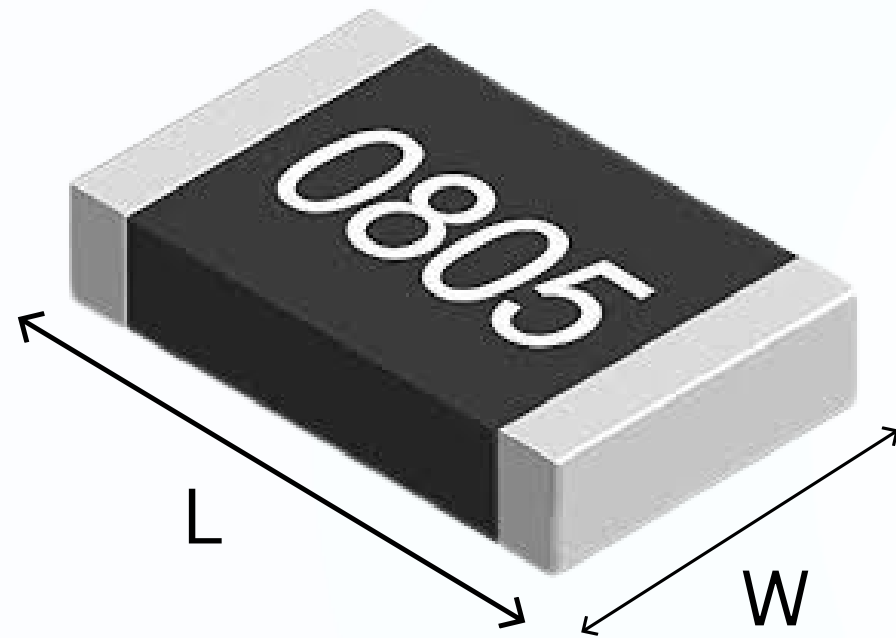
COMPONENTS Types

Aspect	Through-Hole (TH)	Surface-Mount Device (SMD)
Mounting Technique	Leads are inserted into holes drilled in the PCB and soldered to pads on the opposite side.	Components are mounted directly onto the PCB surface using solder.
Component Size	Larger and bulkier; requires more space on the PCB.	Smaller and compact; ideal for high-density designs.

COMPONENTS Types

Assembly Process	Requires manual soldering or wave soldering; slower and labor-intensive.	Assembled using automated machines, enabling faster production.
Mechanical Strength	Strong mechanical bond; ideal for applications under mechanical stress.	Mechanically weaker but sufficient for most consumer electronics.
Applications	Used in aerospace, automotive, industrial, and prototyping applications.	Common in compact devices like smartphones, laptops, and wearables.

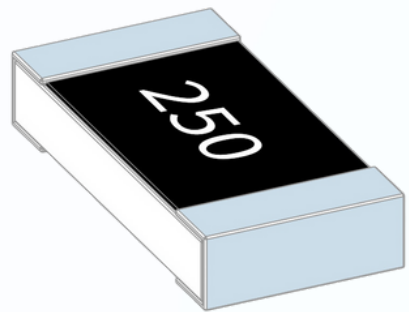
SMD Package Types



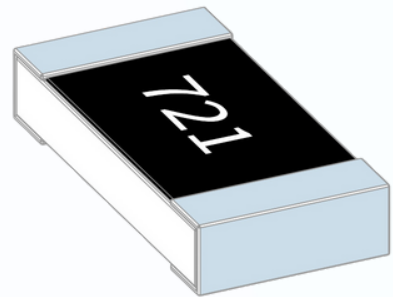
Package	Inches L x W	mm	Power
0201	0.024" x 0.012"	0.6mm x 0.3mm	0.05W (50mW)
0402	0.04" x 0.02"	1.0mm x 0.8mm	0.063W (63mW)
0603	0.063" x 0.031"	1.6mm x 0.8mm	0.1W
0805	0.08" x 0.05"	2.0mm x 1.25mm	0.125W
1206	0.126" x 0.063"	3.2mm x 1.6mm	0.25W
1210	0.12" x 0.10"	3.2mm x 2.6mm	0.5W
2020	0.20" x 0.20"	5.08mm x 5.08mm	1W

SMD RESISTER

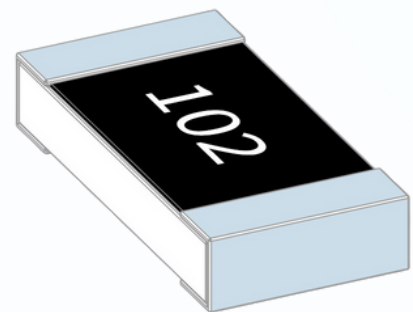
3 Digit Value



$$25 \times 10^0 = 25 \times 1 = 25 \Omega$$

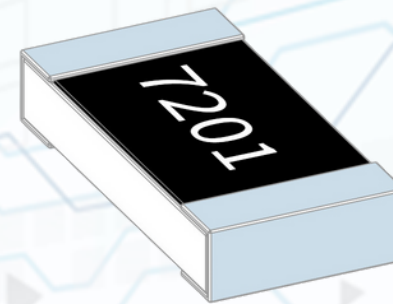


$$72 \times 10^1 = 72 \times 10 = 720 \Omega$$

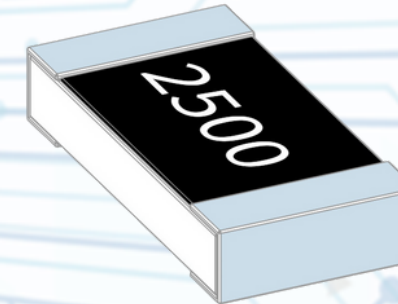


$$10 \times 10^2 = 10 \times 100 = 1k\Omega$$

4 Digit Value



$$720 \times 10^1 = 720 \times 10 = 7.2k\Omega$$



$$250 \times 10^0 = 250 \times 1 = 250 \Omega$$

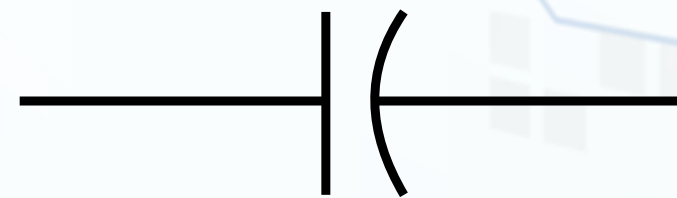
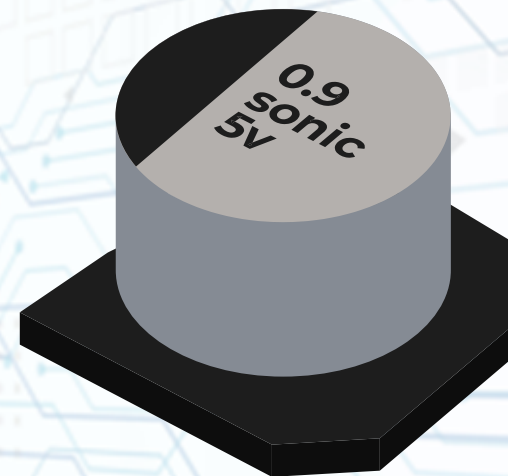
SMD

[Reshttps://www.electricaltechnology.org/2013/07/how-to-calculate-or-find-value-of-smd.html](https://www.electricaltechnology.org/2013/07/how-to-calculate-or-find-value-of-smd.html)istor Value Calculator

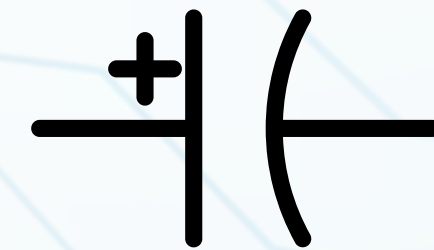
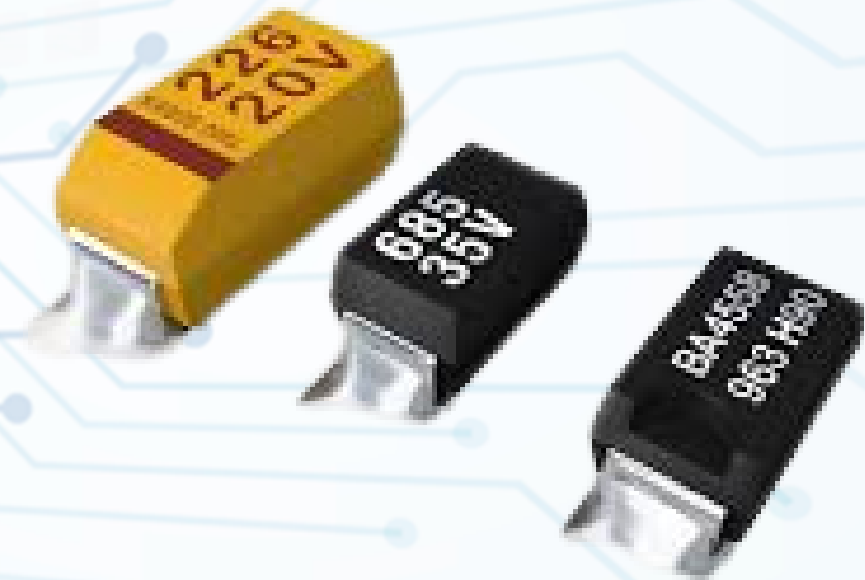
#enthutech®

SMD CAPACITOR

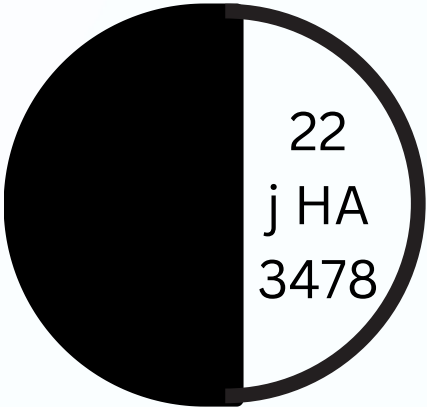
ALUMINIUM CAPACITOR



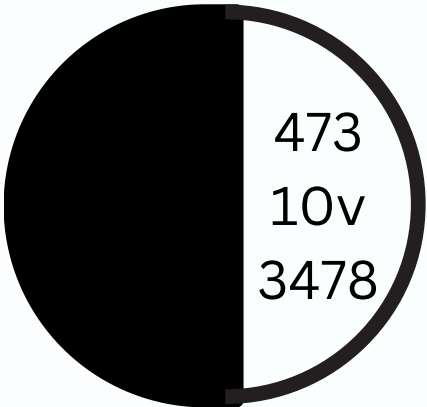
TANTALUM CAPACITOR



ALUMINUM CAPACITOR



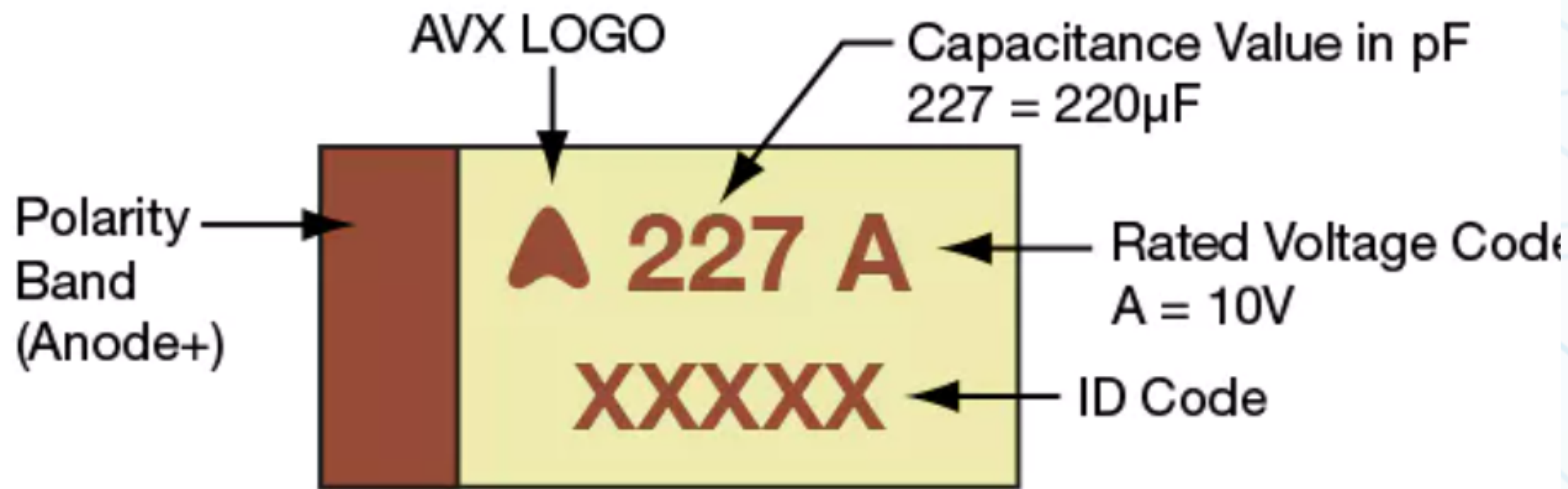
22uf
j = Voltage
HA = Series



47000 pf
47nf (/1000)
0.47uf

j	6.3V
A	10V
C	16
E	25
V	35

TANTALUM CAPACITOR



SMD Inductor



$$22 \times 10^0 = 22 \times 1 = 22\mu\text{H}$$



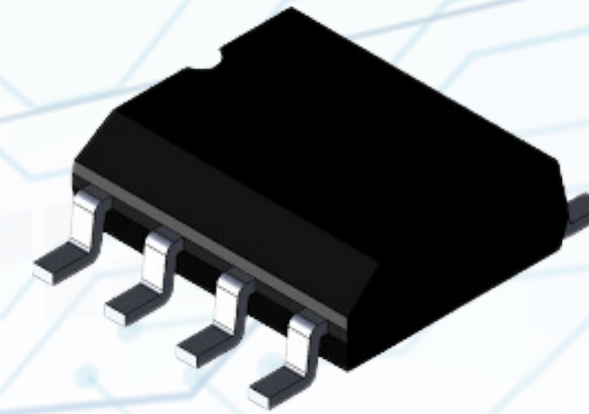
$$1.0 = 1\mu\text{H}$$

SMD IC PACKAGE

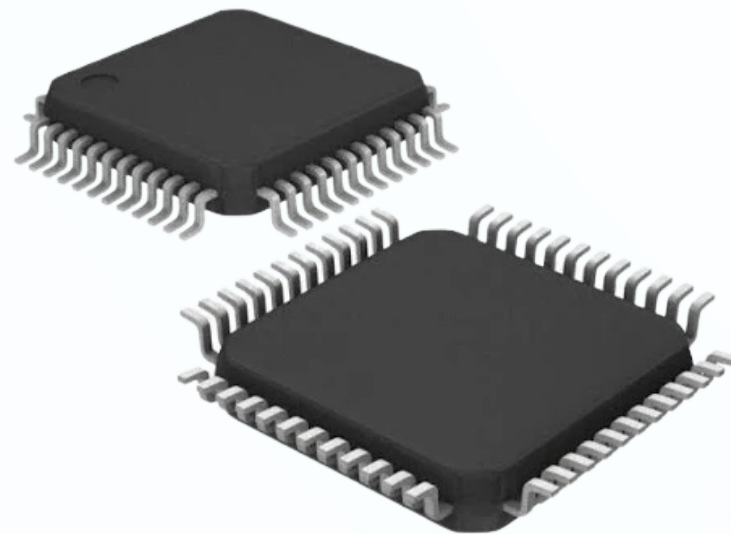
Dual In Package (DIP)



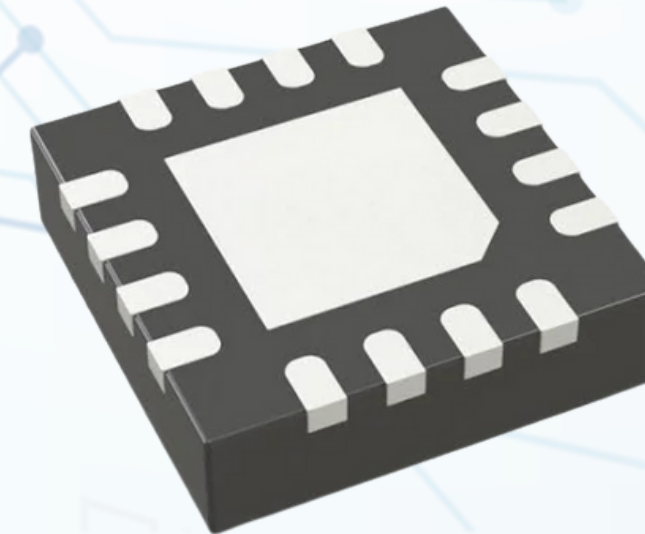
Small Outline Package (SOP)



Quad Flat Package (QFP)

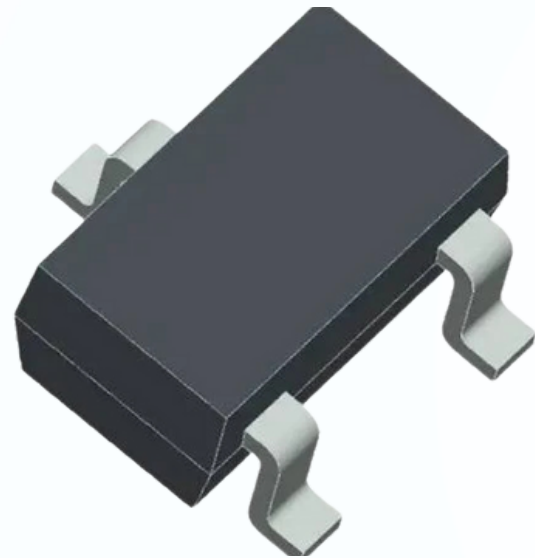


Quad Flat No-Leads (QFN)

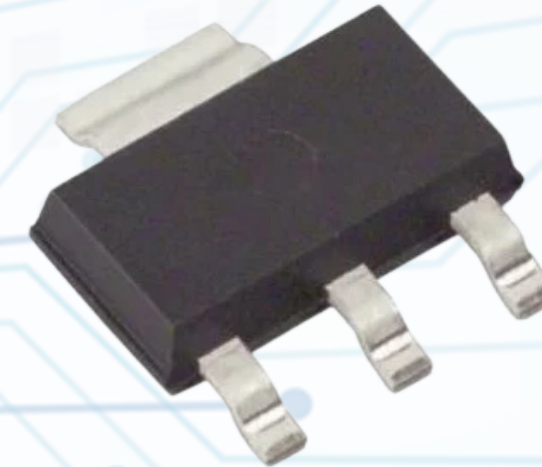


SMD IC PACKAGE

**Small Outline Transistor
(SOT-23)**

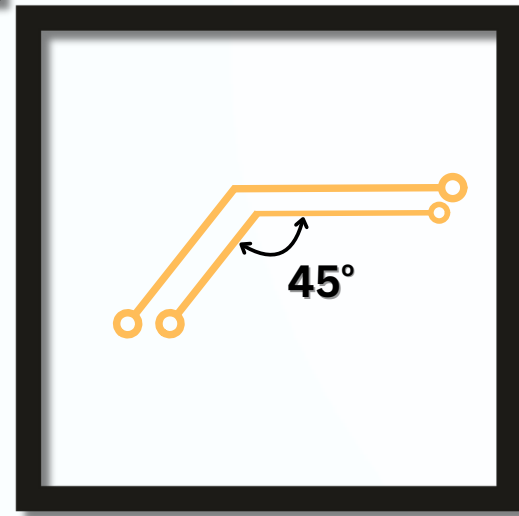
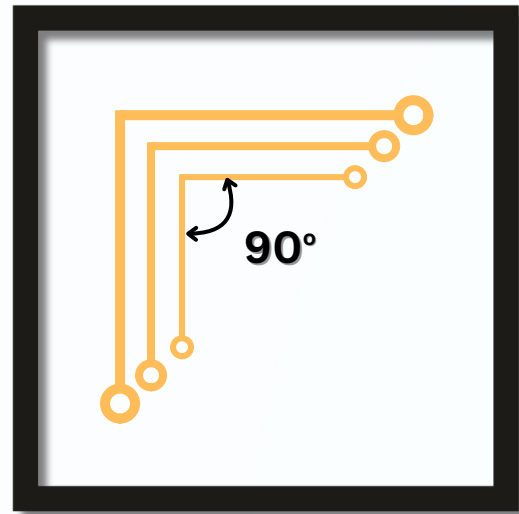


**Small Outline Transistor
(SOT-223)**



#enthutech®

PCB Track Angle



In Printed Circuit Board (PCB) design, track angle rotation refers to the orientation and angular placement of copper traces that connect components on the board. Properly managing these angles is crucial for both electrical performance and manufacturability.

PCB Track Angle

45-Degree Routing

Using 45° angles for track rotation is the preferred industry standard as it reduces abrupt direction changes.

Benefits of 45° angles:

- Improved signal integrity by reducing reflections.
- Easier etching during manufacturing.
- Enhanced electromagnetic compatibility (EMC).

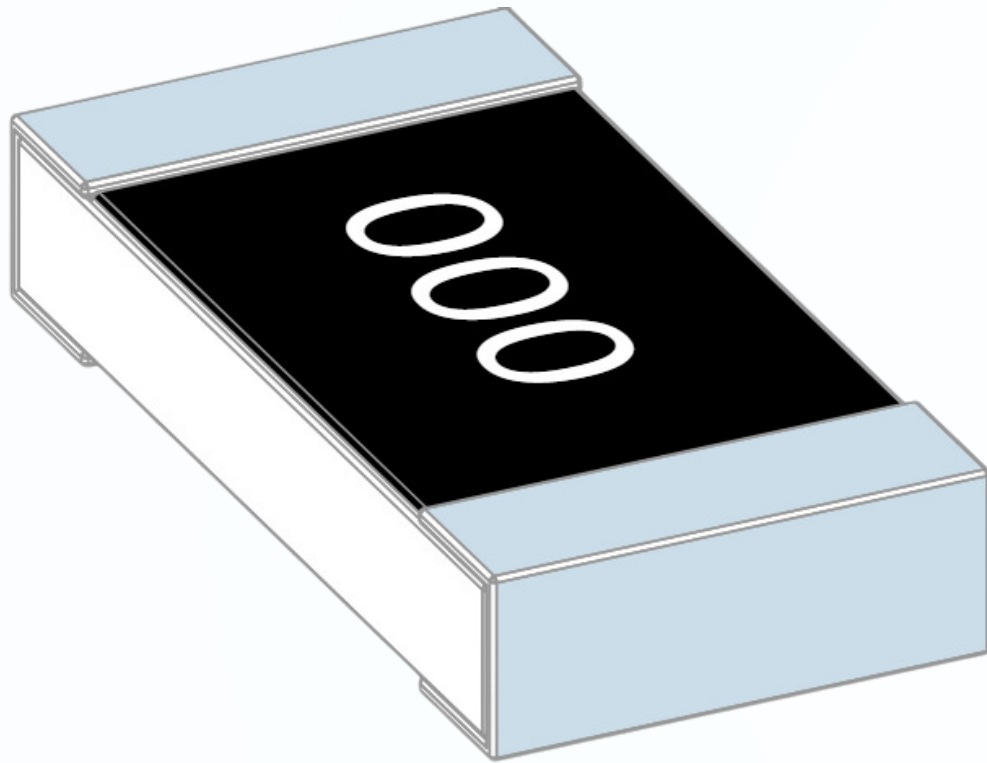
PCB Track Angle

Avoiding 90-Degree Angles

While 90° angles are still used, they are typically avoided in high-speed designs because:

- **Signal Integrity Issues:** Sharp corners can cause impedance discontinuities, leading to reflections and signal degradation.
- **Manufacturing Defects:** Acid traps may form in the sharp corners, leading to under-etching.
- **Thermal Management Problems:** Heat dissipation in sharp corners may be less effective.

0 Ohm RESISTOR

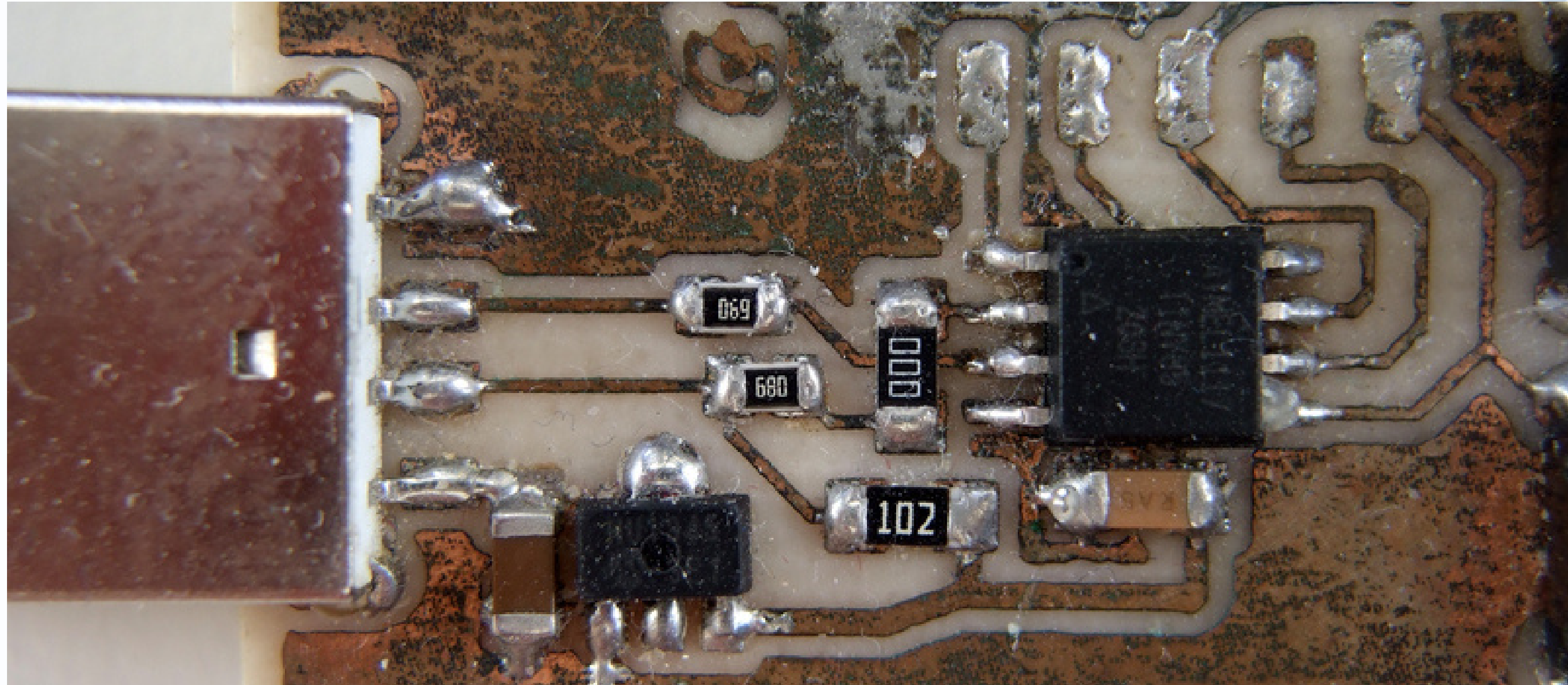


Replacing jumpers: Zero ohm resistors can replace jumpers to enable connections on a PCB.

Routing single layer boards: Zero ohm resistors can route a single layer board without making holes.

#enthutech®

0 Ohm Resistor



#enthutech®



Thank You

#enthutech®