IALP 2011 – Electronic Components

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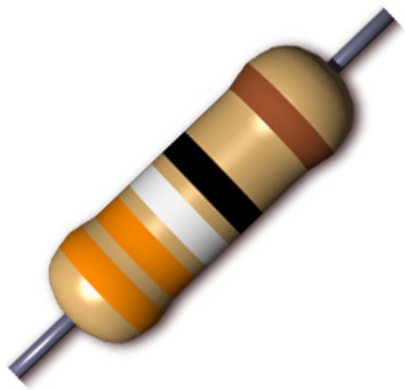
MIEET 1º ano

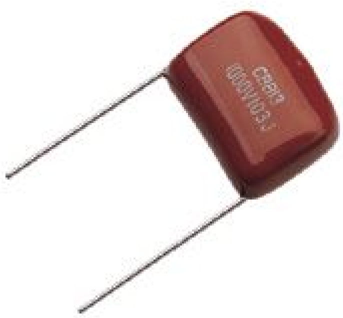
Electronic components all look alike for the electronic nitwit. However, the true electronic engineer can determine in a jiffy what the component is and moreover, what nominal value it has. A resistor is characterized in mere milliseconds by a trained engineer.
The most simple component is probably the resistor, but there are millions more. The most often used are shown here below.



☐ Resistor

☐ Electrolytic capacitor

☐ Ceramic capacitor

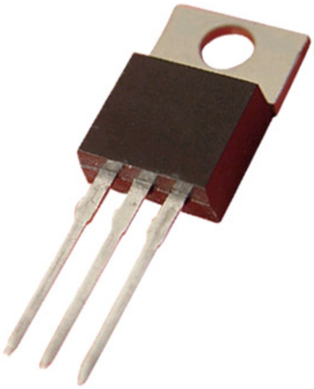


☐ Polypropylene capacitor

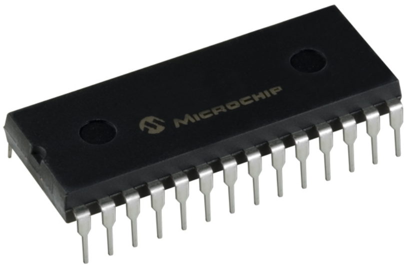
☐ Ceramic capacitor

☐ (Signal) transistor

☐ Power transistor

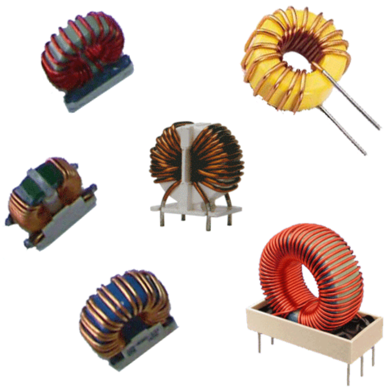


☐ Power transistor



☐ Integrated circuit

☐ Inductors



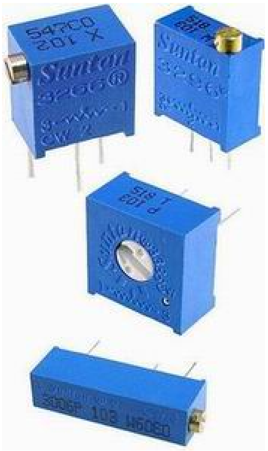
☐ Inductors

☐ Diode

☐ Diode

☐ (Light emitting) diodes

☐ Potentiometer



☐ Potentiometers

☐ Fuse

☐ Car fuses

☐ Connectors

☐ Batteries

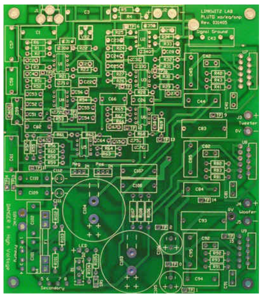
☐ Car battery

☐ Button batteries

☐ (Portable) computer battery

☐ Computer cooling fan

☐ Heat dissipater



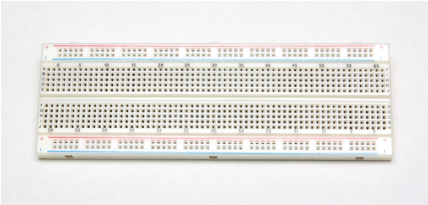
☐ Printed circuit board (PCB)

☐ Light bulb

☐ Power supply

☐ Multimeter

☐ Function generator



☐ Breadboard

☐ Oscilloscope

☐ Cables

Exercise
1) Find the above elements in the laboratory.

It is of course relevant to know what the nominal value is of each component. They may look similar from the outside, yet, a resistance of 1 Ω has a completely different effect in a circuit than a 1 MΩ resistance. Some components have their value printed on the outside. However, some components are too small or have non-flat surfaces that inhibit printing on it. For these components color coding schemes have been invented. The Figure below shows the color coding standard for resistances. Hey consists of rings of colors. The first two or three rings give the value, the next ring is the multiplier and the last one or two the tolerance (the error tolerated by the factory) and temperature coefficient or failure rate. As an example, a resistance with 4 red rings means that the factory tried to produce a 22 x (100 Ω) = 2.2 kΩ resistance and the last red ring indicates that the real value might be about 2% off. (If we buy millions of these resistances they will follow a standard distribution with 2% standard deviation).

Not all values of resistances are available. Popular series are the following: Every decade (factor 10) is divided into 12 more-or-less equal steps (factors). A step between two adjacent values thus becomes $\sqrt[12]{10}$ = 1.2112. In other words, every resistance is about 21% bigger than its predecessor. A decade thus becomes for example

1 Ω	1.2 Ω	1.5 Ω	1.8 Ω	2.2 Ω	2.7 Ω	3.3 Ω	3.9 Ω	4.7 Ω	5.6 Ω	6.8 Ω	8.2 Ω	10 Ω

Exercise
2) Look for a complete decade 1 kΩ – 10 kΩ. 3) Take a handful of resistances and sort them back into the boxes.