

## Reading Capacitor Codes

Large capacitors have the value printed plainly on them, such as 10uF (Ten Micro Farads) but smaller disk types along with plastic film types often have just two or three numbers on them. For example, the bias-decoupling capacitors that we use in ECE 2 are often 0.1uF ceramic capacitors, and those are marked "104K". What does that mean?

The first key point is that the unit of capacitance is usually taken to be pico-Farads ( $10^{-12}$  F). The three numbers represent a code that is somewhat similar to the resistor code. The first two are the 1<sup>st</sup> and 2<sup>nd</sup> significant digits and the third is a multiplier. Most of the time the last digit tells you how many zeros to write after the first two digits, but the standard (EIA standard RS-198) has some peculiarities.

Third digit	Multiplier (this times the first two digits gives you the value in Pico-Farads)
0	1
1	10
2	100
3	1,000
4	10,000
5	100,000
6 not used	
7 not used	
8	.01
9	.1

So the "104K" device means 10+4 zeroes (in pF), so 100,000pF, which is the same as 100nF or 0.1uF.

Similarly a capacitor marked 103 means a 10,000pF capacitor, or 0.01 uF.

The last letter is a tolerance code as shown in the table below. So "K" means +/- 10%.

Letter symbol	Tolerance of capacitor
D	+/- 0.5 pF
F	+/- 1%
G	+/- 2%
H	+/- 3%
J	+/- 5%
K	+/- 10%
M	+/- 20%
P	+100% , -0%
Z	+80% , -20%