How to Determine the Capacitance Value of a Capacitor by its Markings

1. Reading capacitors requires for you to have the following information:
    a. Printed information from the capacitor
    b. Type of capacitor
2. If the printing from the capacitor has the complete, obvious value on it, like 3,300 mF you are home free and don't have to think any more. That is typical only for large valued capacitors with lots of space for printing. Some tantalum capacitors have this as well, though, and they aren't so big. In general, it helps to know what type of capacitor you have so that you can at least figure out about how large the value should be.
3. Capacitors don't use color to indicate value, instead they use a three-digit number code imprinted on the body of the capacitor. However, these numbers are used in the exact same manner as the three bands on a resistor to indicate the value in microfarads or picofarads.
4. The marking has three significant numbers digits.
    a. Use the first two digits of the number and multiply them by 10 to the power indicated by the third digit.
        i. Formula: (## x 10^{x} = picofarads (pF)
            1. Example: 100 is 10 x 10^{0} = 10 PF
            2. Example: 104 is 10 x 10^{4} = 100,000 PF (100,000 picofarads is the same as 0.1 MF, which is a common value).
            3. Example: 336 is 33 x 10^{6} = 33,000,000 PF or 33 mF
        ii. Values below 10 pF use an "R" in place of decimal point.
            1. Example: 8R2 is 8 point 2 = 8.2 picofarads pF
5. The table below shows the correspondence between the markings and the capacitor value in picofarads, nanofarads, and microfarads.

CODE	pF	nF	mF		CODE	pF	nF	mF
1R0	1				226			22
1R2	1.2				270	27		
1R5	1.5				271	270		0.0003
1R8	1.8				272	2,700	2.7	0.0027
2R2	2.2				273	27,000	27	0.027
2R7	2.7				274	270,000	270	0.27
3R3	3.3				275		2,700	2.7
3R9	3.9				330	33		
4R7	4.7				331	330		0.0003
5R6	5.6				332	3,300	3.3	0.0033
6R8	6.8				333	33,000	33	0.033
8R2	8.2				334	330,000	330	0.33
100	10				335		3,300	3.3
101	100		0.0001		336			33

CODE	pF	nF	mF		CODE	pF	nF	mF
102	1,000	1	0.001		390	39		
103	10,000	10	0.01		391	390		0.0004
104	100,000	100	0.1		392	3,900	3.9	0.0039
105		1,000	1		393	39,000	39	0.039
106			10		394	390,000	390	0.39
107			100		470	47		
120	12				471	470		0.0005
121	120		0.0001		472	4,700	4.7	0.0047
122	1,200	1.2	0.0012		473	47,000	47	0.047
123	12,000	12	0.012		474	470,000	470	0.47
124	120,000	120	0.12		475		4,700	4.7
150	15				476			47
151	150		0.0002		560	56		
152	1,500	1.5	0.0015		561	560		0.0006
153	15,000	15	0.015		562	5,600	5.6	0.0056
154	150,000	150	0.15		563	56,000	56	0.056
155		1,500	1.5		564	560,000	560	0.56
157			150		680	68		
180	18				681	680		0.0007
181	180		0.0002		682	6,800	6.8	0.0068
182	1,800	1.8	0.0018		683	68,000	68	0.068
183	18,000	18	0.018		684	680,000	680	0.68
184	180,000	180	0.18		685			6.8
220	22				686			68
221	220		0.0002		820	82		
222	2,200	2.2	0.0022		821	820		0.0008
223	22,000	22	0.022		822	8,200	8.2	0.0082
224	220,000	220	0.22		823	82,000	82	0.082
225		2,200	2.2		824	820,000	820	0.82

6. **Table of typical ranges of values for different types of capacitors:**

Type of capacitor	Typical range of values	Working Voltage Range
Ceramic:		
	1pF - 47nF	50V - 6KV
Silver Mica:		
Single Layer		
	1pF - 47nF	50V - 6KV
Multilayer or Stacked		
C0G/NP0	10pF - 27nF	50V – 200V
X7R	1nF - 580nF	50V – 200V
Z5U	1nF - 2.2mF	50V, 100V
Metallized Film:		
Polyester	1nF – 15mF	50V - 1500V
Polycarbonate	100pF – 15mF	63V - 1000V
Polypropylene	100pF – 10mF	63V - 2000V
Polystyrene	10pF - 47nF	30V - 630V
Metallized paper	1nF - 0.47uF	250VAC
Electrolytic:		
Aluminum Oxide	.1mF – 68,000mF	Up to 450V
Tantalum Bead	0.1mF – 150mF	6.3V - 35V