

Appendix 2: Capacitors

Capacitors are manufactured in a number of types and are available in a limited selection of values. The tables below lists values that capacitor manufacturers commonly provide. All circuits used in the laboratory exercises specify capacitor values taken from this list.

Capacitors with values below 1 μF are marked with numbers similar to the color codes used for carbon resistors. The first two digits indicate a value in pF and the third digit indicates a power-of-ten multiplier. For example, a capacitor marked “104” is 100,000 pF or 0.1 μF .

Ceramic disk capacitors come in values ranging from 10 pF to 100,000 pF (0.1 μF) and voltage ratings from 25 to 500 Volts. The first two digits indicate a value (in pF) and the third digit indicates a power-of-ten multiplier. See Table H.5 for standard values and corresponding three-digit codes.

Plastic and metal-foil capacitors (mylar, polypropylene, polyester) come in values ranging from 1000 pF (0.001 μF) to 10 μF and voltage ratings from 50 to 500 Volts. Capacitors with values below 1,000,000 pF (1 μF) are marked with the first two digits indicating a value (in pF) and the third digit indicating a power-of-ten multiplier. Capacitors with values 1 μF and above are marked directly in μF .

TABLE H.5 STANDARD CERAMIC DISK AND PLASTIC/METAL FOIL CAPACITOR VALUES AND THEIR CORRESPONDING THREE-DIGIT CODES

First two code numbers	Third code number				
	0	1	2	3	4
10	10 pF	100 pF	1000 pF	0.01 μF	0.1 μF
12	12 pF	120 pF	1200 pF	0.012 μF	0.12 μF
15	15 pF	150 pF	1500 pF	0.015 μF	0.15 μF
18	18 pF	180 pF	1800 pF	0.018 μF	0.18 μF
22	22 pF	220 pF	2200 pF	0.022 μF	0.22 μF
27	27 pF	270 pF	2700 pF	0.027 μF	0.27 μF
33	33 pF	330 pF	3300 pF	0.033 μF	0.33 μF
39	39 pF	390 pF	3900 pF	0.039 μF	0.39 μF
47	47 pF	470 pF	4700 pF	0.047 μF	0.47 μF
56	56 pF	560 pF	5600 pF	0.056 μF	0.56 μF
68	68 pF	680 pF	6800 pF	0.068 μF	0.68 μF
82	82 pF	820 pF	8200 pF	0.082 μF	0.82 μF

Tantalum electrolytic capacitors are designed for use on printed-circuit boards and typically have values ranging from 1 μF to 330 μF and have voltage ratings typically from 6 to 50 volts. One lead is commonly marked + and must be used in the correct polarity or the capacitor may explode. Standard capacitance values are a subset of the values shown in Table H.5 (...12 μF , 15 μF , 22 μF , 33 μF , 47 μF , 68 μF , 100 μF , ...)

Aluminum electrolytic capacitors are used when very large values of capacitance are required, such as in power supplies. While the smaller sizes can be mounted on printed-circuit boards, the larger sizes consist of aluminum cans that require separate mechanical attachment. They have values ranging from 1 μF to 100,000 μF and have voltage ratings typically from 6 to 50 volts. One lead is commonly marked + and must be used in the correct polarity or the capacitor may explode. Standard capacitance values are a subset of the values shown in Table H.5 (...100 μF , 150 μF , 220 μF , 330 μF , 470 μF , 630 μF , 1000 μF , ...).