

6. Give one reason for your choice of the type of capacitor to be used in the following applications: (a) 80- μ F capacitance for a circuit where one side is positive and the applied voltage never exceeds 150 V; (b) 1.5-pF capacitance for an rf circuit where the required voltage rating is less than 500 V; (c) 5- μ F capacitance for an audio circuit where the required voltage rating is less than 25 V.
7. Give the capacitance value of six-dot mica capacitors color-coded as follows: (a) black, red, green, brown, black, black; (b) white, green, brown, black, silver, brown; (c) brown, green, black, red, gold, blue.
8. Draw a diagram showing the fewest number of 400-V, 2- μ F capacitors needed for a combination rated at 800 V with 2- μ F total capacitance.
9. Suppose you are given two identical uncharged capacitors. One is charged to 50 V and connected across the uncharged capacitor. Why will the voltage across both capacitors then be 25 V?
10. Describe briefly how you would check a 0.05- μ F capacitor with an ohmmeter. State the ohmmeter indications when the capacitor is good, short-circuited, or open.
11. Define the following: (a) leakage resistance; (b) dielectric absorption; (c) equivalent series resistance.
12. Give two comparisons between the electric field in a capacitor and the magnetic field in a coil.
13. Give three types of troubles in capacitors.
14. When a capacitor discharges, why is its discharge current in the direction opposite from the charging current?
15. Compare the features of aluminum and tantalum electrolytic capacitors.
16. Why can plastic film be used instead of paper for capacitors?
17. What two factors determine the breakdown voltage rating of a capacitor?

Problems

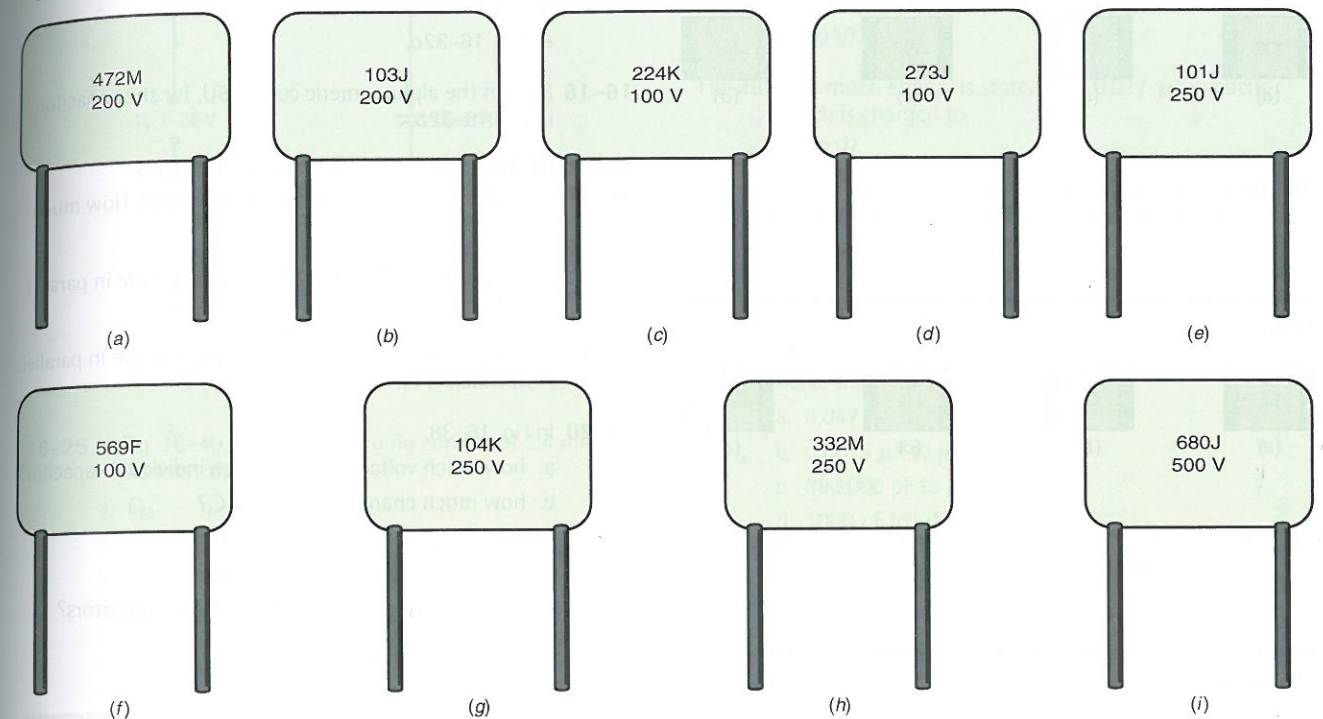
SECTION 16-3 THE FARAD UNIT OF CAPACITANCE

- 16-1 Calculate the amount of charge, Q , stored by a capacitor if
 - a. $C = 10 \mu\text{F}$ and $V = 5 \text{ V}$.
 - b. $C = 1 \mu\text{F}$ and $V = 25 \text{ V}$.
 - c. $C = 0.01 \mu\text{F}$ and $V = 150 \text{ V}$.
 - d. $C = 0.22 \mu\text{F}$ and $V = 50 \text{ V}$.
 - e. $C = 680 \text{ pF}$ and $V = 200 \text{ V}$.
 - f. $C = 47 \text{ pF}$ and $V = 3 \text{ kV}$.
- 16-2 How much charge, Q , is stored by a 0.05- μ F capacitor if the voltage across the plates equals
 - a. 10 V?
 - b. 40 V?
 - c. 300 V?
 - d. 500 V?
 - e. 1 kV?
- 16-3 How much voltage exists across the plates of a 200- μ F capacitor if a constant current of 5 mA charges it for
 - a. 100 ms?
 - b. 250 ms?
 - c. 0.5 s?
 - d. 2 s?
 - e. 3 s?
- 16-4 Determine the voltage, V , across a capacitor if
 - a. $Q = 2.5 \mu\text{C}$ and $C = 0.01 \mu\text{F}$.
 - b. $Q = 49.5 \text{ nC}$ and $C = 330 \text{ pF}$.
 - c. $Q = 10 \text{ mC}$ and $C = 1,000 \mu\text{F}$.
 - d. $Q = 500 \mu\text{C}$ and $C = 0.5 \mu\text{F}$.
 - e. $Q = 188 \text{ nC}$ and $C = 0.0047 \mu\text{F}$.
 - f. $Q = 75 \text{ nC}$ and $C = 0.015 \mu\text{F}$.
- 16-5 Determine the capacitance, C , of a capacitor if
 - a. $Q = 15 \mu\text{C}$ and $V = 1 \text{ V}$.
 - b. $Q = 15 \mu\text{C}$ and $V = 30 \text{ V}$.
 - c. $Q = 100 \mu\text{C}$ and $V = 25 \text{ V}$.
 - d. $Q = 3.3 \mu\text{C}$ and $V = 15 \text{ V}$.
 - e. $Q = 0.12 \mu\text{C}$ and $V = 120 \text{ V}$.
 - f. $Q = 100 \mu\text{C}$ and $V = 2.5 \text{ kV}$.
- 16-6 List the physical factors that affect the capacitance, C , of a capacitor.
- 16-7 Calculate the capacitance, C , of a capacitor for each set of physical characteristics listed.
 - a. $A = 0.1 \text{ cm}^2$, $d = 0.005 \text{ cm}$, $K_e = 1$.
 - b. $A = 0.05 \text{ cm}^2$, $d = 0.001 \text{ cm}$, $K_e = 500$.
 - c. $A = 0.1 \text{ cm}^2$, $d = 1 \times 10^{-5} \text{ cm}$, $K_e = 50$.
 - d. $A = 1 \text{ cm}^2$, $d = 5 \times 10^{-6} \text{ cm}$, $K_e = 6$.

SECTION 16-6 CAPACITOR CODING

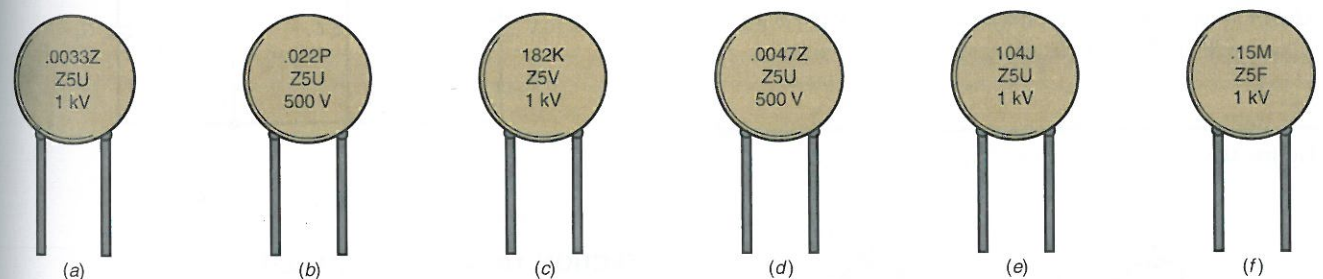
16-8 Determine the capacitance and tolerance of each of the capacitors shown in Fig. 16-31.

Figure 16-31



16-9 Determine the capacitance and tolerance of each of the capacitors shown in Fig. 16-32.

Figure 16-32



16-10 Determine the capacitance and tolerance of each of the capacitors shown in Fig. 16-33.

Figure 16-33

