CORNELL DUBILIER

ENERGIZING IDEAS

Capacitor Formulas

CAPACITORS IN PARALLEL

$$C_T = C_1 + C_2 + C_3 + \ldots$$

CAPACITORS IN SERIES

$$C_T = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \ldots}$$

CAPACITIVE REACTANCE

$$X_2 = \frac{1}{2\pi f C}$$

CHARGE ACROSS A CAPACITOR

$$Q = CV$$

ENERGY STORED IN A CAPACITOR

$$J = \frac{1}{2} CV^2$$

EQUIVALENT SERIES RESISTANCE

$$ESR = DF \bullet X_c = \frac{DF}{2\pi f C}$$

IMPEDANCE

$$Z = \sqrt{(ESR)^2 + (X_L - X_c)^2}$$

PEAK CURRENT

$$I = C \frac{dv}{dt}$$

POWER LOSS IN A CAPACITOR

$$P = (I_{AC})^2 ESR + I_{DC} V$$
$$= (V_{AC})^2 2\pi f CDF + I_{DC} V$$

SELF RESONANT FREQUENCY

$$f = \frac{1}{2\pi\sqrt{LC}}$$

TEMPERATURE RISE WITHIN A CAPACITOR

$$\Delta t = \frac{P}{\beta A}$$

$$\Delta t \leq 10°C$$

$$\beta = .001 \frac{W}{cm^2 \bullet C°}$$

CAPACITOR VOLTAGE DURING CHARGE

$$Vc = V(l - e^x) \quad X = \frac{\tau}{RC}$$

CAPACITOR VOLTAGE DURING DISCHARGE

$$Vc = Ve^x \quad X = \frac{\tau}{RC}$$