

POWER SUPPLY RIPPLE VOLTAGE CALCULATION

Load Current $I_L = 100 \text{ mA}$; $R_L \sim 160 \Omega$;
 $C = 1000 \mu\text{F}$; $V_{\text{rms}} = 12 \text{ v}$

$$\tau = RC = 160 \times 1000 \times 10^{-6} = 160 \text{ ms} \gg 8.3 \text{ ms}$$

$$60 \text{ Hz} = 16.6 \text{ ms}$$

$$120 \text{ Hz} = 8.3 \text{ ms}$$

$$i_C = C \frac{dV}{dt} \text{ or, for this approximation: } i_C = C \frac{\Delta V}{\Delta t}.$$

Solve for $\Delta V = \frac{i \Delta t}{C}$, where $\Delta V =$ ripple voltage, v_r .

$$v_r = \frac{0.1 \text{ A} \times 8.3 \text{ ms}}{1000 \mu\text{F}} = \frac{0.1 \times 8.3 \times 10^{-3}}{10^{-3}}; v_r = 0.83 \text{ volt}$$

$$V_{\text{DCMAX}} = 1.4 \times 12 \text{ v} = 16.8 \text{ v}$$

$$V_{\text{DCMIN}} = 16.8 \text{ v} - 0.83 \text{ v} = 16.0 \text{ v}$$

$$V_{\text{DCAVE}} = [16.8 - 16.0]/2 = 16.4 \text{ v}$$

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