

Wide Input PSU = LM5022 (ref design PMP7760)
FLYBACK MODE



Input: 17V to 375V AC or DC

Output: 7V/0.8A & 12V/1.8A (main output)

Considerations: $f_{sw} = 70\text{kHz}$, $\eta = 75\%$, $\text{Max } D = 90\%$, CCM of operation

$$\text{Design: Turns Ratio} = \frac{N_p}{N_s} = \frac{D_{\max}}{1 - D_{\max}} \times \frac{V_{in \min}}{V_{out} + V_f}$$

$$= \frac{0.9}{0.1} \times \frac{17}{12.7} = 12.04 \approx \underline{\underline{12}}$$

$$I_{pri \text{ rms}} = \frac{P_o}{\eta \cdot V_{in \min} \cdot pf} = \frac{27.2}{0.75 \times 17 \times 0.6} = 3.55 \text{ A}$$

$$I_{sec \text{ avg}} = \frac{P_o}{V_o} = \frac{27.2}{12} = 2.27 \text{ A}$$

$$L_{sec} = \frac{(V_o + V_f)(1 - D_{\max})}{\Delta I_{sec} \cdot f_{sw}} = \frac{12.7 \times 0.1}{9.07 \times 70\text{k}} = 0.002 \text{ mH}$$

$$\text{where } \Delta I_{sec} = \frac{I_{o \max} \times 0.4}{(1 - D_{\max})} = \frac{2.27 \times 0.4}{0.1} = 9.07$$

$$L_{pri} = L_{sec} \left(\frac{N_p}{N_s}\right)^2 = 0.002 \times 12^2 = 0.288 \text{ mH} = \underline{\underline{288 \mu\text{H}}}$$

$$\text{min } N_p > \frac{100 I_{pk} L_{pri}}{B_{sat} \times A_e}, \quad I_{pk} \text{ in A, } L_{pri} \text{ in } \mu\text{H, } B_{sat} \text{ in Gauss}$$

$\& A_e \text{ in cm}^2$. ϵ_r ~~2507~~ ³⁰⁰⁷ core/bobbin is

$$> \frac{100 \times 4.74 \times 288}{3000 \times 0.6}$$

considered with A_e of 50.8 mm^2
(0.600 cm^2)

$$I_{pk} = 2 \times I_{avg} = 4.74 \text{ A}$$

$$> 76 \text{ turns}$$

$$I_{avg} = \frac{P_o}{\eta V_{in \min} D_{\max}} = 2.37 \text{ A}$$

$$\text{If } N_p = 84 \text{ turns, } N_s = \frac{84}{12} = 7 \text{ turns}$$

$$\text{the } 7\text{V sec} = 4 \text{ turns, } N_{Bias}(18\text{V}) = 10 \text{ turns}$$