

Selected Answers to HW #10

Include explanatory text and intermediate calculations in your solutions. You will not receive credit for merely repeating an answer given here without supporting work.

If an answer is not provided below, it is because either the solution is trivial or disclosure of the answer would give away too much of the solution.

Although some effort has been made to ensure that there are no errors in the answers below, some might nevertheless appear because of the rush to post them. Please let me know as soon as possible if you discover an apparent error.

1. a. CCM-DCM boundary defined by $T_{off} > T_{on} \frac{\sqrt{K'}}{1-\sqrt{K'}}$, where $K' = \frac{2L}{R_L T_{on}}$;

$$\text{In DCM, } \frac{V_O}{V_{IN}} = \frac{1 + \sqrt{1 + \frac{2R_L T_{on}^2}{L(T_{on} + T_{off})}}}{2}$$

b. $L = 900 \mu\text{H}$; $C = 1.0 \mu\text{F}$

c. $400 \text{ Hz} < f_s < 40 \text{ kHz}$

2. a. $\frac{V}{V_g} = -\frac{D}{\frac{R_L}{(1-D)R} + 1 - D} = -\left(\frac{D}{1-D}\right) \frac{1}{1 + \frac{R_L}{(1-D)^2 R}}$

b. $\eta = \frac{1}{1 + \frac{R_L}{(1-D)^2 R}}$

3. $T_{Amax} = 97 \text{ }^\circ\text{C}$