

作业纸

课程名称: 模电

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5-5. 解: 1. $I_{om} = \frac{U_{om}}{R_L}$, $\therefore P_{o1} = \frac{U_{om}^2}{2R_L}$ $U_{om} = \frac{10}{\sqrt{2}} \times \sqrt{2} = 14.14V$

$\therefore P_o = 25W$

$P_{VCC} = \frac{V_{CC} U_{om}}{\pi R_L}$

$\eta = \frac{P_o}{P_{VCC}} \times 100\%$

$\eta = \frac{\pi U_{om}}{4 V_{CC}} = 74\%$

单管管耗 $P_T = \frac{1}{R_L} \left(\frac{V_{CC} U_{om}}{\pi} - \frac{U_{om}^2}{4} \right) = 4.38W$

2. $U_{CE0(ER)} > 2V_{CC} = 30V$

$I_{cm} > \frac{V_{CC}}{R_L} = 3.75A$

$(P_o)_m = \frac{1}{2} \frac{V_{CC}^2}{R_L}$

$P_{cm} > 0.2 (P_o)_m = 5.625W$

5-10. $U_{CE2} = \frac{V_{CC}}{2}$ 若实现 $U_{CE} = 5V$, 则 $U_{CE1} = U_{CE2} = 5V$, 则需调节 R_1 使 U_{B1} , U_{B2} 改变.
 \Rightarrow U_{CE1} , U_{CE2} , U_{CE1} 与 U_{CE2} 不变
 $U_{CE} = 5V$

2). $(P_o)_m = \frac{1}{2} \frac{(V_{CC} - U_{CE2})^2}{R_L} = \frac{1}{2} \cdot \frac{(5-1)^2}{16} W = 0.5W$

$(U_{om})_m = \frac{V_{CC} - U_{CE2}}{2} = 4V$
 $\eta = \frac{P_o}{P_{VCC}} \times 100\% = \frac{\pi}{4} \times \frac{4}{5} = 62.83\%$

3). 断开 R_1

$I_{C2} = I_{C1} = \beta \cdot \frac{V_{CC} - U_{BE2}}{R_3} = 179.17mA$

$P_{cm} = 200mW$

$U_{CE2} = 5V$

$P_C = I_C \cdot U_{CE} = 895.83mW > 200mW$

\therefore 晶体管不安全