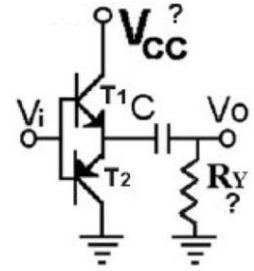


In the figure, a principle schematic of a class AB power amplifier is given. $V_{CEmax}=40V$, $I_{Cmax}=1A$ and $V_{CEsat}=0.2V$ is given for T1. $V_{CEmax}=30V$, $I_{Cmax}=1A$ and $V_{CEsat}=0.3V$ is given for T2.

a) For the maximum output power (P_{Lmax}) find R_L and V_{CC} . And for this case, find P_{Lmax} and the efficiency (η).

b) The transistors have been connected to the same heat-Sink the thermal resistance of which ($R_{th-hs-a}$) is $10\text{ }^{\circ}\text{C/W}$. For the transistors, $T_{jmax}=140\text{ }^{\circ}\text{C}$, $R_{th-j-c}=50\text{ }^{\circ}\text{C/W}$, $R_{th-c-hs}=5\text{ }^{\circ}\text{C/W}$ are given. The ambient temperature (T_a) is $30\text{ }^{\circ}\text{C}$. Is the heat-sink enough? If not, suggest one solution. (Note the this part will be solved for $V_{CC}=32\text{V}$ and $R_Y=16\Omega$.)



Şekil-1

01. $V_{CC} \Rightarrow V_{CE_{max}} + V_{CE_{sat}} = 30,24 +$
 $\searrow V_{CE_{max}} + V_{CE_{sat}} = 40,5V$

$$V_{CC} = 20,24 \quad I_{C_{max}} = I_{B_{max}} = 2A$$

$$R_{y, \text{opt}} = \frac{V_{cc}/2 - V_{CE, \text{sat}}}{I_A} = 140 \Omega //$$

$$P_{Y_{max}} = \frac{141^2}{2 \times 1} = 7,141$$

$$P_{oc\max} = V_{CC} \cdot I_{A\max} \cdot \frac{1}{\pi} \cong 9,6 \text{ W}$$

$$\eta_{\max} = \frac{7.4}{116} = 0.0637$$

$$b) \quad P_{Tmax} \approx \frac{P_{max}}{2} = 3W$$

$$P_{T1max} = P_{T2max} = 1,5 \text{ W}$$

$$T_{J1max} \approx T_{J2max} = 1.5 W_k (50 + 5) + 3 \times 10 + T_{amb}$$

$$\approx 142.5^\circ > 140^\circ$$

Rth not

The heat-sink is not enough. For the transistors, two separate heat-sink can be used;
 $T_{j1\max} = T_{j2\max} = 1.5W(50+5+10) + T_{a\max} = 127.5^\circ\text{C} < 140^\circ\text{C}$