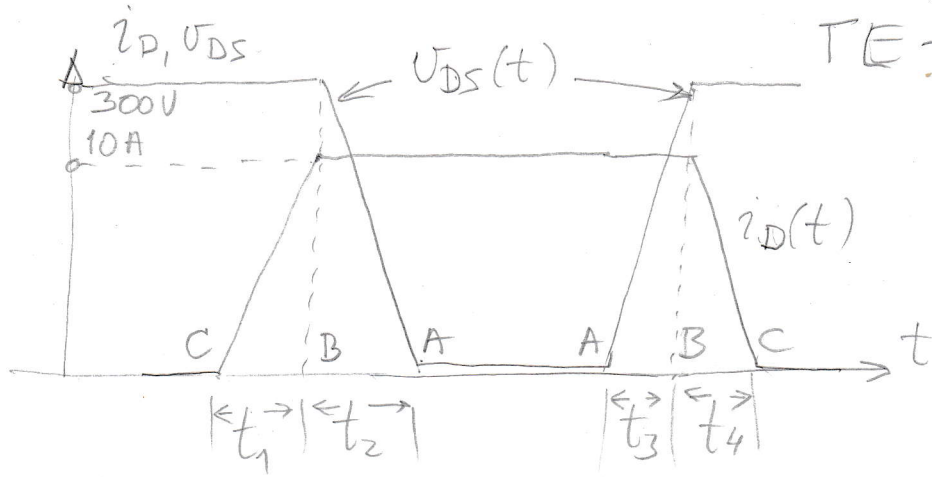


1.



$$t_1 = \frac{10A}{100A/\mu s} = 0,1 \mu s ;$$

$$W_1 = \frac{1}{2} t_1 \cdot 10A \cdot 300V = 150 \mu J$$

$$t_2 = \frac{300}{1000} \mu s = 0,3 \mu s ;$$

$$W_2 = \frac{1}{2} t_2 \cdot 10A \cdot 300V = 450 \mu J$$

$$t_3 = \frac{300}{1000} \mu s = 0,3 \mu s$$

$$W_3 = 450 \mu J$$

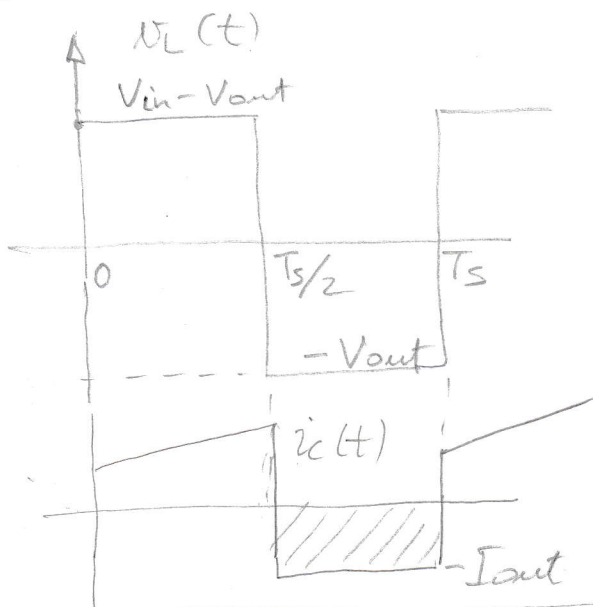
$$t_4 = \frac{10}{100} \mu s = 0,1 \mu s$$

$$W_4 = 150 \mu J$$

$$W = W_1 + W_2 + W_3 + W_4 = 1,2 mJ$$

$$P = W \cdot f_s = 1,2 \cdot 10^{-3} \cdot 50 \cdot 10^3 = \underline{\underline{60W}}$$

2.



$$V_{in} = 30V$$

$$V_{out} = 30 \cdot D = 15V ; I_{out} = \frac{V_{out}}{1,5} = 10A$$

$$\Delta I_L = \frac{\int V_L dt}{L} = \frac{15}{2f_s L} \Rightarrow$$

$$L = \frac{15}{2f_s \cdot \Delta I_L} = \frac{15}{2 \cdot 50 \cdot 10^3 \cdot 1} = \underline{\underline{150 \mu H}}$$

$$\Delta Q = I_{out} \cdot \frac{T_s}{2} = 10A \cdot 10 \mu s = 100 \mu C$$

$$\Delta V = 0,01 \cdot V_{out} = 150 mV$$

$$\Delta V = \frac{\Delta Q}{C} \Rightarrow C = \frac{\Delta Q}{\Delta V} = \frac{100 \mu C}{150 mV} = \underline{\underline{666 \mu F}}$$

$$3) P_{out} = V_{out} \cdot I_{out} \cdot \cos \varphi = 230 \cdot 10 \cdot \cos 40^\circ = \underline{\underline{1,762 kW}}$$

$$P_{in} = \frac{P_{out}}{\eta} = \frac{1762}{0,85} = 2073W$$

$$P_{in} = V_{in} \cdot I_{in} \Rightarrow I_{in} = \frac{P_{in}}{V_{in}}$$

$$I_{in} = \frac{2073}{400} = \underline{\underline{5,18 A}}$$