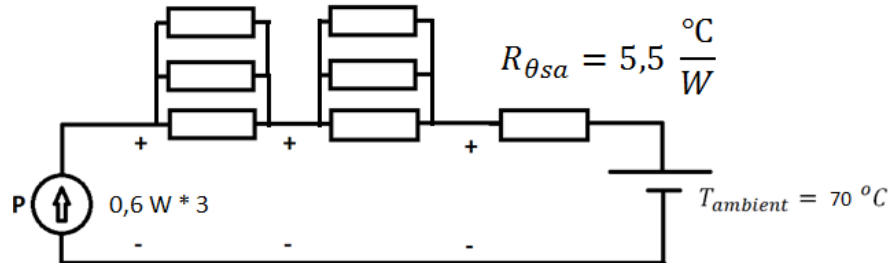


## Heat calculations

$P_{\text{handling}} = 50 \text{ W}$  (60 W to be safe);  $12 - 15 \text{ V} \rightarrow 18 \text{ V}$  (to be safe);  $i_d = 60\text{W}/18\text{V} = 3,3 \text{ A} \rightarrow 5 \text{ A}$  (to be safe)  
Since it is desired to have 3 MOSFETs on the same heat sink to save space, the thermal equivalent circuit looks like this

$$P = I_D^2 * R_{DS(on)} \Rightarrow 5^2 \text{ A} * 0,024 \Omega = 0,6 \text{ W} \Rightarrow 0,6 \text{ W} * 3 = 1,8 \text{ W}$$

$$R_{\theta_{jc}} = \frac{3,3 \text{ }^\circ\text{C}}{3 \text{ W}} \quad R_{\theta_{cs}} = \frac{0,45 \text{ }^\circ\text{C}}{3 \text{ W}}$$



Now check if the junction temperature is OK under these conditions:

$$R_{\theta_{ja}} = R_{\theta_{jc}} + R_{\theta_{cs}} + R_{\theta_{sa}} = \frac{T_j - T_a}{P} \Leftrightarrow T_j = P * R_{\theta_{ja}} + T_a$$

$$R_{\theta_{ja}} = \frac{3,3 \text{ }^\circ\text{C}}{3 \text{ W}} + \frac{0,45 \text{ }^\circ\text{C}}{3 \text{ W}} + 5,5 \frac{^\circ\text{C}}{\text{W}} = 6,75 \frac{^\circ\text{C}}{\text{W}}$$

$$T_j = 1,8 \text{ W} * 6,75 \frac{^\circ\text{C}}{\text{W}} + 70 \text{ }^\circ\text{C} = \underline{\underline{82,15 \text{ }^\circ\text{C}}}$$

