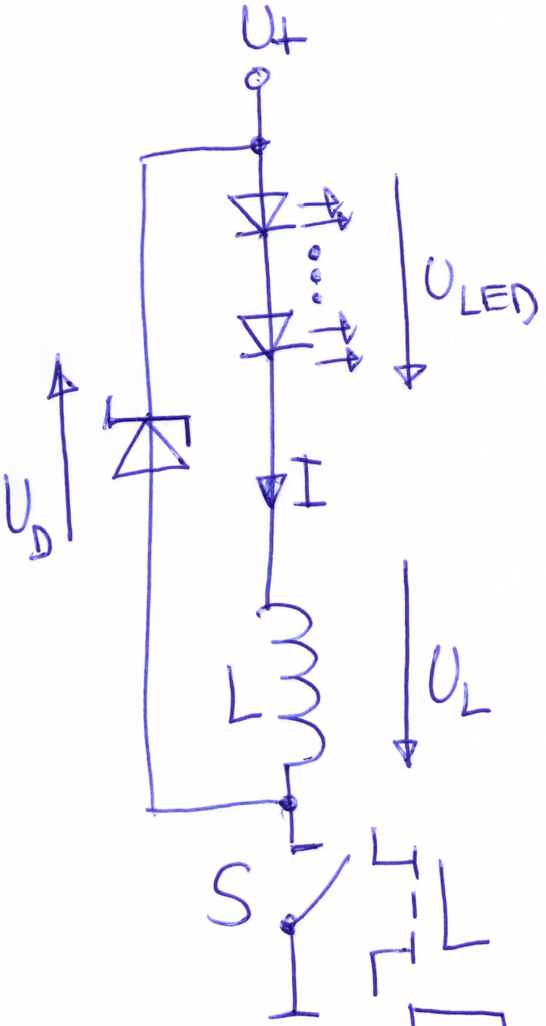
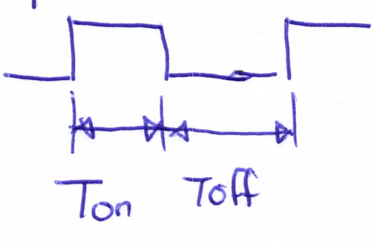
eand 26.9.2019





$$i_L(t) = \frac{1}{L}\int u_L(t)\,dt$$

when S is closed:

$$U_L = U_+ - U_{LED} \approx const.$$

$$\Delta I_{on} = \frac{1}{L}(U_+ - U_{LED})\cdot T_{on}$$

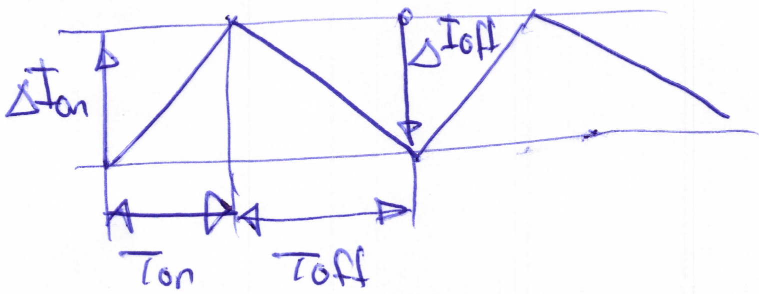
when S is open:

$$U_L = -U_{LED} - U_D$$

$$\Delta I_{off} = -\frac{1}{L}(U_{LED} + U_D)\cdot T_{off}$$

for stable operation:

$$\Delta I_{on} = -\Delta I_{off}$$



$$\cancel{\frac{1}{L}}(U_+ - U_{LED})\cdot T_{on} = \cancel{\frac{1}{L}}(U_{LED} + U_D)\cdot T_{off}$$

$$U_+\cdot T_{on} - U_D\cdot T_{off} = U_{LED}(T_{on} + T_{off})$$

$$U_{LED} = U_+\cdot\frac{T_{on}}{T_{on}+T_{off}} - U_D\cdot\frac{T_{off}}{T_{on}+T_{off}}$$

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with duty cycle d:

$$d = \frac{T_{on}}{T_{on} + T_{off}} \quad , \quad 1-d = \frac{T_{off}}{T_{on} + T_{off}}$$

$$U_{LED} = U_+ \cdot d - U_D\,(1-d)$$

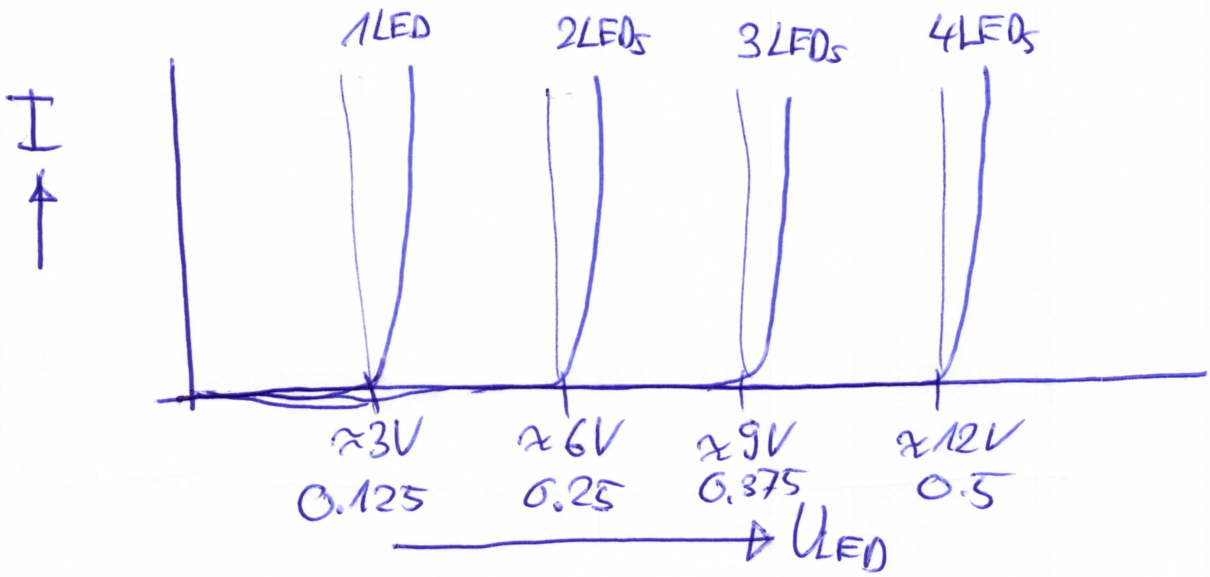
$$d = \frac{U_{LED} + U_D}{U_+ + U_D}$$

when $U_{LED} \gg U_D$ ($U_+ \gg U_D$ is also true):

$$d = \frac{U_{LED}}{U_+} \quad , \quad U_{LED} = d \cdot U_+$$

$\rightarrow U_{LED}$ is proportional to d!

I depends on U_{LED} and on the LEDs characteristics:



Nicht den ganzen PWM Bereich brauchen

$\longrightarrow d$