$f_s = 100kHz$

$V_{in} = 10V \sim 12V$, $V_{out} = 5V$

$I_{out\_max} = 1A$, $I_{out\_min} = 0.2A$

V_{ripple} ratio $< 2\%$

I_{ripple} $\Delta i_L < 20\%$ $I_{out\_max} = 0.2A$

Estimated Efficiency $\eta = 80\%$

$$D_{min} = \frac{V_{out}}{(V_{in\_max})\eta} = \frac{5}{(12)(0.8)} = 0.52083$$

$$D_{max} = \frac{V_{out}}{(V_{in\_min})\eta} = \frac{5}{(8)(0.8)} = 0.78125$$

$$L_{min} = \frac{V_{out}(1-D_{min})}{f_s \Delta i_L} = \frac{5(1-0.5083)}{2(100e3)0.2} = 122.925mH$$

Actual $L = 140mH$

$$\Delta i_{L\_max} = \frac{V_{out}}{f_s L}(1-D_{min}) = \frac{5(1-0.52083}{100e3(140\times10^{-6})} = 0.1713$$

$$C_{min} = \frac{\Delta i_{L\_max}}{8 f_s \Delta V} = \frac{0.1713}{8(100e3)(0.1)} = 2.139mF$$

$C = 10\mu F$

$$L = \frac{\mu_0 \mu_r N^2 A_c}{l_c}$$