

Step	PARAMETERS/EQUATIONS	
1: Inputs	Pick $V_{in}$ , $V_{out}$ , and $f_{osc}$ to calculate equations below.	$V_{in} = 18\text{ V}$ $V_{out} = -15\text{ V}$ $f_{osc} = 1\text{ MHz} (< f_{max} = 2.5\text{ MHz})$
2: DC	$DC \cong \frac{ V_{OUT} +0.5V}{V_{IN}+ V_{OUT} +0.5V-0.27V}$	$DC \cong \frac{ -15 +0.5}{18+ -15 +0.5-0.27} = 46.6\%$
3: L	$L_{TYP} = \frac{(V_{IN}-0.27V) \cdot DC}{f_{osc} \cdot 1.8A}$ $L_{MIN} = \frac{(V_{IN}-0.27V) \cdot (2DC-1)}{4A \cdot f_{osc} \cdot (1-DC)}$ $L_{MAX} = \frac{(V_{IN}-0.27V) \cdot DC}{f_{osc} \cdot 0.5A}$	$L_{TYP} = \frac{(18-0.27) \cdot 0.466}{1 \cdot 10^6 \cdot 1.8} = 4.59\text{ }\mu H$ $L_{MIN} = \frac{(18-0.27) \cdot (2 \cdot 0.466 - 1)}{4 \cdot 1 \cdot 10^6 \cdot (1-0.466)} = -564\text{ nH} \rightarrow 564\text{ nH}$ $L_{MAX} = \frac{(18-0.27) \cdot 0.466}{1 \cdot 10^6 \cdot 0.5} = 16.5\text{ }\mu H$
4: $I_{RIPPLE}$	$I_{RIPPLE} = \frac{(V_{IN}-0.27V) \cdot DC}{f_{osc} \cdot L}$	$I_{RIPPLE} = \frac{(18-0.27) \cdot 0.466}{1 \cdot 10^6 \cdot 4 \cdot 10^{-6}} = 2.066\text{ A}$
5: $I_{OUT}$	$I_{OUT} = \left(6A - \frac{I_{RIPPLE}}{2}\right) \cdot (1 - DC)$	$I_{OUT} = \left(6 - \frac{2.066}{2}\right) \cdot (1 - 0.466) = 2.652\text{ A}$
6: $D_1$	$V_R > V_{IN} +  V_{OUT} $ ; $I_{AVG} > I_{OUT}$	$V_R > 18 +  -15  \rightarrow V_R > 33\text{ V}$ $I_{AVG} > 1\text{ vA}$
7: $C_1$	$4.7\text{ }\mu F$ (typical); $V_{RATING} > V_{IN} +  V_{OUT} $	$C_1 = 4.7\text{ }\mu F$ $V_{RATING} > 18 +  -15  \rightarrow V_{RATING} > 33\text{ V}$
8: $C_{OUT}$	$C_{OUT} = \frac{I_{RIPPLE}}{8 \cdot f_{osc} \cdot 5 \cdot 10^{-3} \cdot  V_{OUT} }$	$C_{OUT} = \frac{2.066}{8 \cdot 1 \cdot 10^6 \cdot 5 \cdot 10^{-3} \cdot  -15 } = 3.443\text{ }\mu F$
9: $C_{IN}$	$C_{IN} = C_{PWR} + C_{VIN}$ $C_{IN} = \frac{I_{RIPPLE}}{8 \cdot f_{osc} \cdot 5 \cdot 10^{-3} \cdot V_{IN}} + \frac{6A \cdot DC}{40 \cdot f_{osc} \cdot 5 \cdot 10^{-3} \cdot V_{IN}}$	$C_{IN} = \frac{2.066}{8 \cdot 1 \cdot 10^6 \cdot 5 \cdot 10^{-3} \cdot 18} + \frac{6 \cdot 0.466}{40 \cdot 1 \cdot 10^6 \cdot 5 \cdot 10^{-3} \cdot 18} = 3.646\text{ }\mu F$
10: $R_{FB}$	$R_{FB} = \frac{ V_{OUT} +9mV}{83.3\mu A}$	$R_{FB} = \frac{ -15 +9 \cdot 10^{-3}}{83.3 \cdot 10^{-6}} = 180.180\text{ k}\Omega \rightarrow 180\text{ k}\Omega$
11: $R_T$	$R_T = \frac{87.6}{f_{osc}} - 1$ ; $f_{osc}$ in MHz and $R_T$ in k $\Omega$	$R_T = \frac{87.6}{1} - 1 = 86.6\text{ k}\Omega \rightarrow 82\text{ k}\Omega$