

Inductor calculation the higher of:

$V_{in\_nom} = 13.8 \text{ volts}$   
 $V_{in\_min} = 9 \text{ volts}$   
 $V_{in\_max} = 18 \text{ volts}$   
 $I_{mas} = 200 \text{ Amp}$   
 $Freq = 20000 \text{ hz}$   
 $L > (V_{in\_min} * (V_{out\_nom} - V_{in\_min}) / (I_{max} * 0.2 * freq * V_{out\_nom})$   
 or  $(V_{out\_nom} * (V_{in\_max} - V_{out\_nom}) / (I_{max} * 0.2 * freq * V_{in\_max})$   
 $L > 4.025 \text{ uH or } 3.913$

Chosen 4.5 uH

Duty cycles

$Dbuck\_min = V_{out\_nom} / V_{in\_max} = 0.766$

$Dboost\_max = V_{in\_min} / V_{out\_nom} = 0.652$

Capacitor min

Vripple = 0.2

Cin have to be he higher of  
 $Cin\_buck = I_{max} * (1 - Dbuck\_min) / (freq * Vripple)$  or

$Cin\_boost = I_{max} * 0.2 / (8 * freq * Vripple * (1 - Dboost\_max))$

$Cin\_buck = 8962 \text{ uf}$

$Cin\_boost = 3591 \text{ uf}$

Chosen 10000uf

$DV\_removal = \text{maximun voltatage change for load remove}$

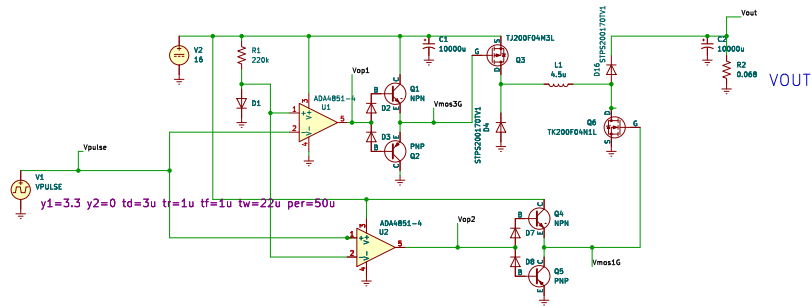
$DV = 0.8V$

$Cout = I_{load} * 2 * L / (2 * V_{out\_nom} * DV)$

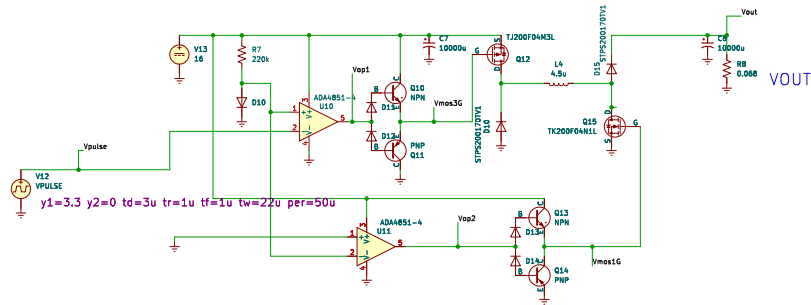
$Cout = 8722 \text{ uf}$

choosen 10000uf

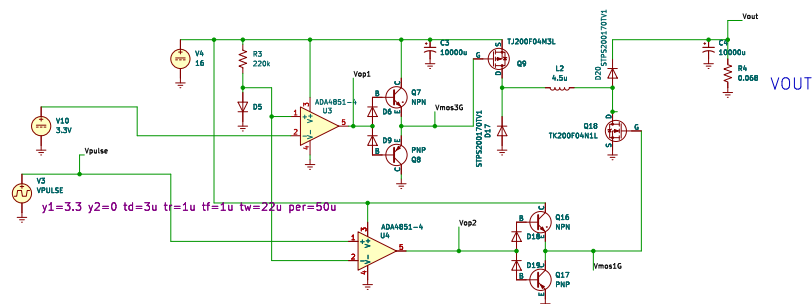
CONDITION  $ABS(V_{in} - V_{out}) < 1 \text{ V}$  (BUCK-BOOST CONVERTER)



CONDITION  $V_{in} - V_{out} > 1 \text{ V}$  (BUCK CONVERTER)



CONDITION  $V_{out} - V_{in} > 1 \text{ V}$  (BOOST CONVERTER)



CONDITIONS MUST BE PROGRAMMED  
 CIRCUIT IS SIMPLIFIED NEED TO BE ADDED POWER TO HANDLE MOSFET  
 GATES