

Inductor calculation the higher of:

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

Chosen 4.5 uH

Duty cycles

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

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

Capacitor min

$V_{ripple} = 0.2$

$C_{in}$  have to be higher of  
 $C_{in\_buck} = I_{max} * (1 - D_{buck\_min}) / (freq * V_{ripple})$  or

$C_{in\_boost} = I_{max} * 0.2 / (8 * freq * V_{ripple} * (1 - D_{boost\_max}))$

$C_{in\_buck} = 8962$  uf

$C_{in\_boost} = 3591$  uf

Chosen 10000uf

$DV_{removal} = \text{maximun voltatage change for load remove}$

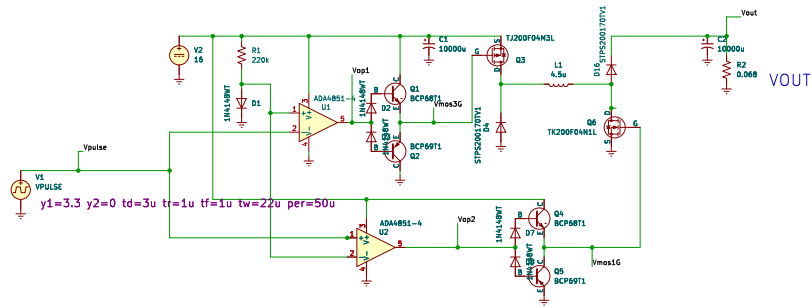
$DV = 0.8V$

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

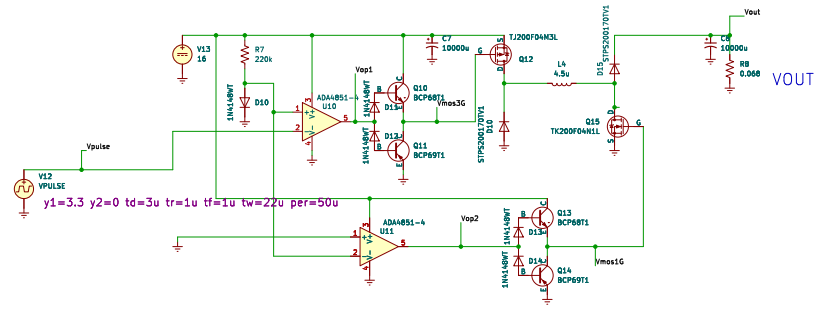
$C_{out} = 8722$  uf

choosen 10000uf

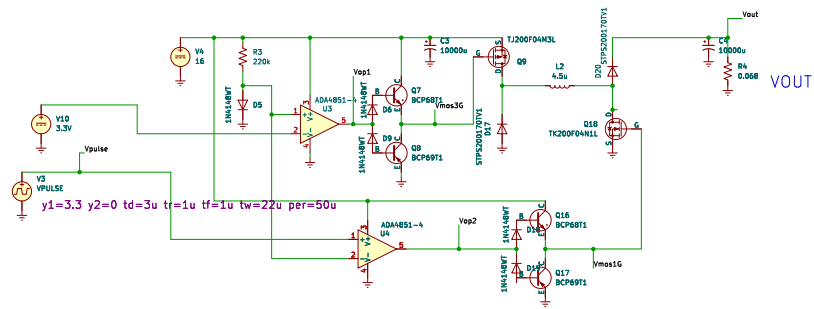
CONDITION  $ABS(V_{IN} - V_{OUT}) < 1$  V (BUCK-BOOST CONVERTER)



CONDITION  $V_{IN} - V_{OUT} > 1$  V (BUCK CONVERTER)



CONDITION  $V_{OUT} - V_{IN} > 1$  V (BOOST CONVERTER)



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