

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 $(V_{out_nom} * (V_{in_max} - V_{in_nom})) / (I_{max} * 0.2 * freq * V_{in_max})$
 $L > 4.025 \mu H$ or 3.913

Choosen $4.5 \mu H$

Duty cycles

$D_{buck_min} = V_{out_mon} / V_{in_max} = 0.766$

$D_{boost} \text{ max} = V_{in_min} / V_{out_nom} = 0.652$

Capacitor min

Vripple = 0.2

C_{in} have to be higher of
 $C_{in_buck} = L_{max} * (1 - D_{buck_min}) / (freq * Vripple)$ or
 $C_{in_boost} = L_{max} * 0.2 / (8 * freq * Vripple * (1 - D_{boost_max}))$

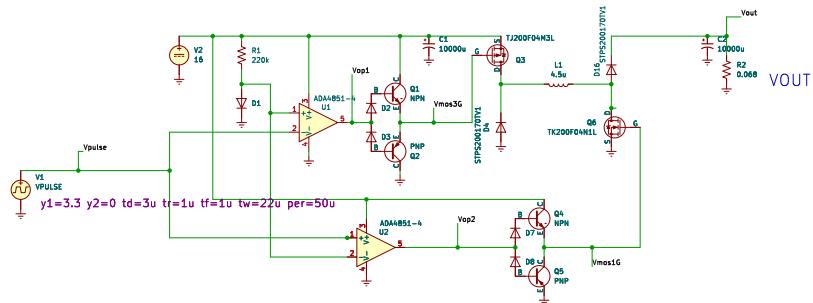
$C_{in_buck} = 8962 \mu F$
 $C_{in_boost} = 3591 \mu F$

Choosen $10000\mu F$

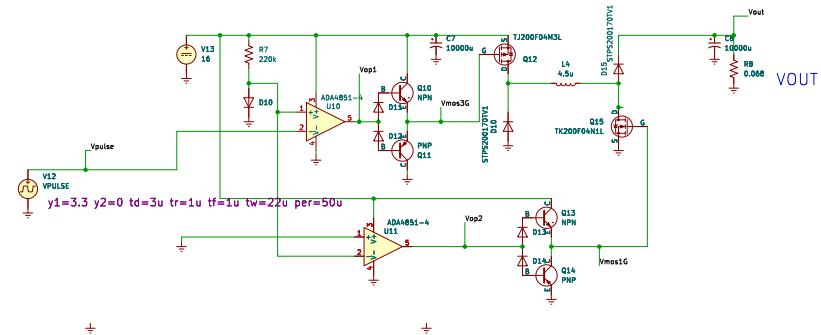
$DV_{removal} = \text{maximum voltage change for load remove}$
 $DV = 0.8V$

$C_{out} = I_{load}^2 * L / (2 * V_{out_nom} * DV)$
 $C_{out} = 8272 \mu F$
choosen $10000\mu F$

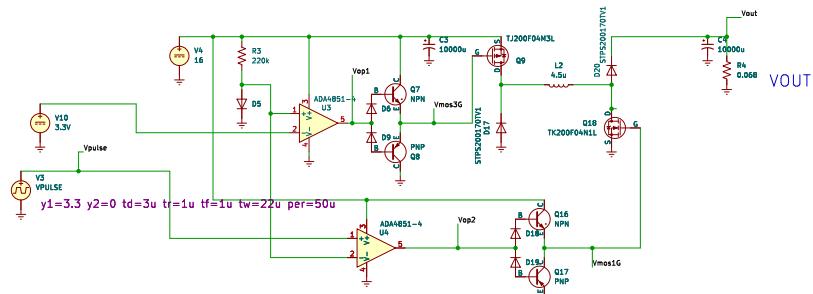
CONDITION ABS(VIN – VOUT) < 1 V (BUCK-BOOST CONVERTER)



CONDITION VIN – VOUT > 1 V (BUCK CONVERTER)



CONDITION VOUT – VIN > 1 V (BOOST CONVERTER)



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