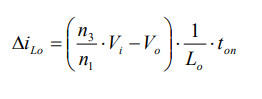
Component selection

Output capacitor: The main consideration with the output capacitor is that is should withstand tho output voltage. Since we have 10 volts for output, we don not really need a particularly expensive or bulky capacitor. We picked a 16 V 47 uF capacitor.

Output inductor: In order to have %2 ripple on the output, we have used the formula below to figure out the output inductor:



* Lo = 2.2 mH

At first, we decided to be sure and have an even larger output inductor. We have wound an inductor that was 4.7 mH strong, then we got afraid that it could saturate, therefore we took off some windings and had a 2.7 mH output inductor.

For the core of the output inductor, we saw that everybody was using totoidal cores. However, even with the best and largest toroidal cores, we had to do maybe 60 turns for that inductance. If we used E-cores we could get the job done with only 20 turns. Therefore, we decided to use E- cores to increase our life quality.

Diodes: At first, we didnt spend a lot of time thinking about the diodes and we were thinking “ All we need is a diode that can withstand our maximum voltages and currents, what could possiby go wrong?”. However, we figured out the hard way that when you buy random diodes off Konya Sokak, they might not do the job well. The first ones that we bought were considered “slow diodes”. They were heating up a lot and they were causing a lot off loss on the system. After this incident, we figured that we needed fast diodes to reduce the loss.

After buying the fast diodes, their operation was smooth and relatively low loss.

MOSFETs: The bane of our existence was the switches. The first MOSFETs that we bought off Konya Sokak were complete trash, and it took a lot of time for us to figure out that we they were both slow and high resistance.

After buying the new ones(IRF640), the performance improved, however, they were heating up a lot. Later we figured out that the gate resistor was quite important as well. The resistance amount was directly effecting the losses on the MOSFETs. Firstly, we were using 1k gate resistance. As expected, this was rubbish because it was causing a lot of losses. Then we tried 10 ohms, however, we couldnt get the MOSFETs to work with this resistance value. Lastly, we used 47 ohms, which apparently was doing the job.

Snubber Considerations:

At the earlier design steps, we actually decided to go with single switch and a reset winding. After winding the transformer with a reset winding, with the incentive provided from Ozan Hoca saying that it wasn’t that hard to implement two switches, we decided to spice things up by making the converter double-switched. We kept the reset winding, so that we could go even higher duty cycles than %50 if we felt the need.

When we built the whole circuit for the first time, we didn’t really thoroughly and we used a single optocoupler for both of the MOSFET’s gates. Of course, this didn’t work and when we figured out that we actually needed two optocouplers and two external power supplies for the optocouplers, we realized that having two switches was easier said than done.

(belki burdan sonrası snubber considerations olabilir)

At first, one might think that “Hey, it’s a double-switch forward converter, it’s silly to have snubbers installed parallel to the MOSFETs.” We have had the same train of thought, but when we saw that the MOSFETs were hitting 200 degrees celsius, we figured that we needed to do something about it.

When we couldnt get the two-switch to work, we decided to go one switch since we had a reset winding. We prepared a snubber with 100-ohm resistor and 100 nF and observed that it was somehow working. When we saw that the converter was working, we decided to go one step further and implement two snubbers at two MOSFETs.

For testing purposes, we didn’t implement the same resistance for each snubber. First snubber had 100 ohms and 100 nF, the other one had 200 ohms and 200 nF. Later we figured out that both were working fine, and we were really scared if we played any more with the circuit, we might have had screwed things up and we let the snubbers be uneven.