EE394J11 Homework Assignment #2

Due date: 10/14/2011

For all questions elaborate some few conclusions or comments about the results. For all questions plot the switch voltage and current in time domain and their evolution in a x vs. y plot.

1)   Find the datasheet of a MUR3060 rectifier (power diode). Using the information from the datasheet develop a simple behavioral model for this part. Plot the turn-on and turn-off transients for a resistive load and for a clamped combination of an inductive and resistive load. You may choose the parameter values that you consider are appropriate without exceeding the operational limits in the datasheet. You can also make all necessary assumptions you consider necessary in order to simplify the model without affecting behavior representation significantly.

2)   Repeat problem 1 for an IRFPS3810 MOSFET.

3)   Consider the circuit in the figure below. What is the maximum input voltage E that can be applied to the circuit without exceeding the switch requirements as indicated by the SOA also indicated below? Why?

     (NOTE: this SOA is the one for the same MOSFET in problem 2 but for this problem you can assume that the switch is an ideal one and the RDS(on) has been integrated with the resistance in series with the switch). The capacitor has a capacitance of 100 µF, the inductor an inductance of 100 µH, the resistor in series with the inductor has a resistance of 0.5 Ω and the resistor in series with the switch has a resistance of 0.2 Ω.