Lab 2B switch characterization

Wednesday, November 3, 2021 11:30 PM

Logistics:

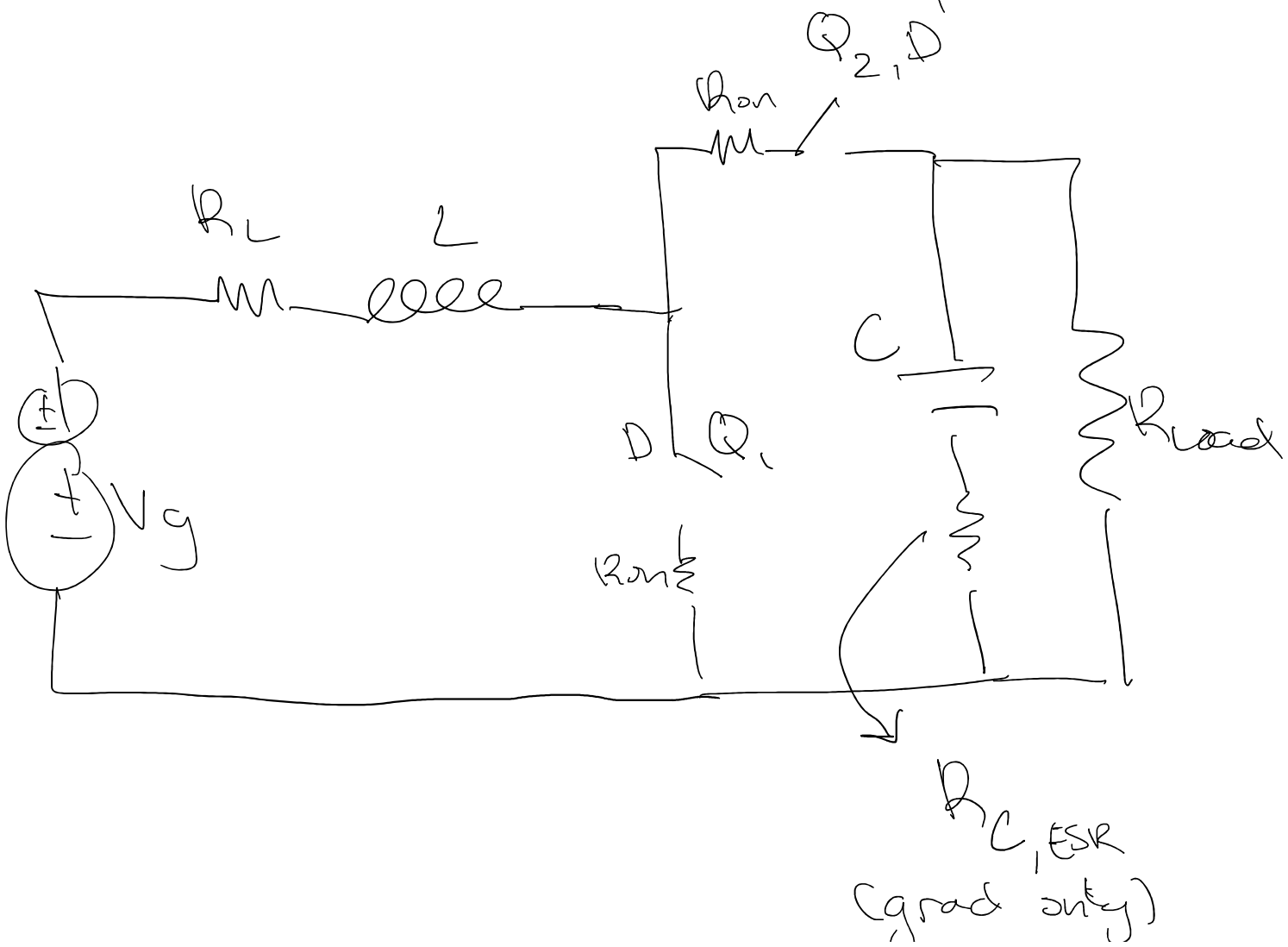
1) Lab 1 due soon! Ping me with any questions

2) No Lab 11/11 (Veteran's day)

Lab 2B:

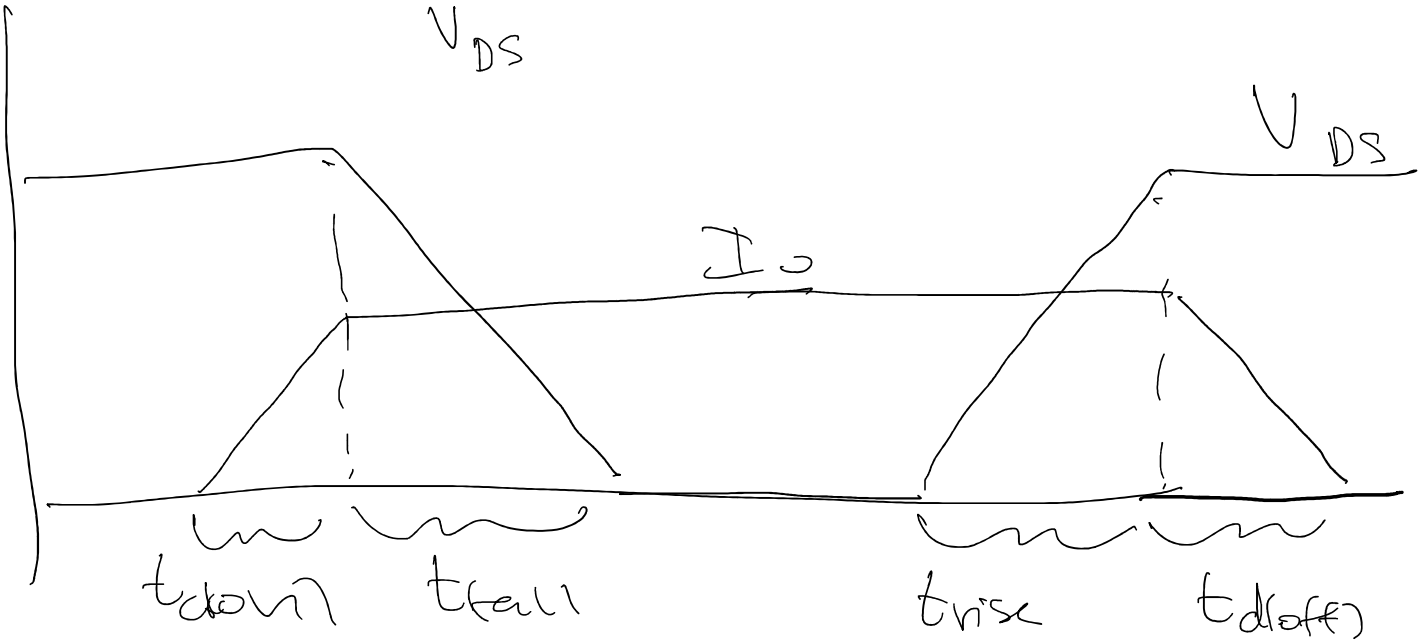
Solve this model:

(and pass)



(grad 'only)

- mostly analytical
- part (a):
  (1) find $\frac{V_o}{V_g}$ using balance equations. Just like ltw!
  (2) find 2 equation using current ripple equation
  (3) conduction loss as usual (R_on in datasheet)
  switching loss:
  - disregard R_on when finding V_{DS}



$E_{on} = \frac{1}{2} V_d I_o t_{on}$ $\quad t_{on} = t_{down} + t_{fall}$

$E_{off} = \frac{1}{2} V_d I_D t_{off}$

$E_{loss} = E_{on} + E_{off}$

$P_{loss} = E_{loss} f_{sw}$

$t_{off} = td_{off} + t_{fall}$

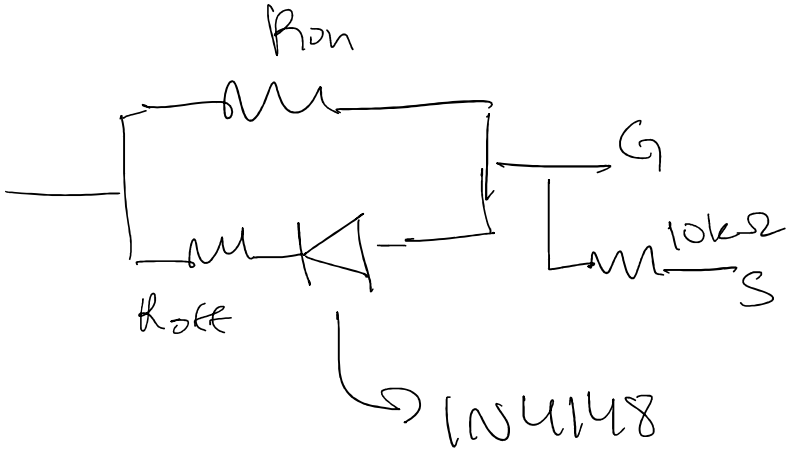
find in datasheet

(4): efficiency: η

$P_{in} = P_{out} + P_{loss}$

What is η?

MOSFET R_{on} / R_{off}



R_{GS} forces cutoff region when not driven

R_{on} / R_{off} to prevent ringing

Suggest $R_{on} = 8\,\Omega$

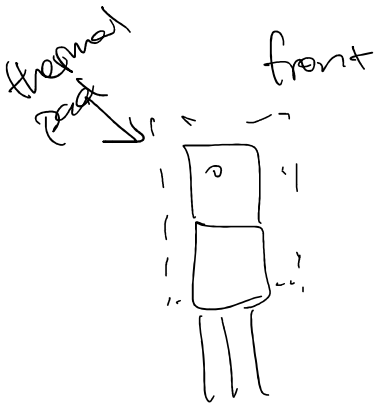
$R_{off} = 10\,\Omega$

$R_{off} > R_{on}$

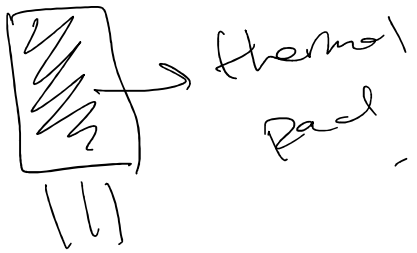
info in UCC27712

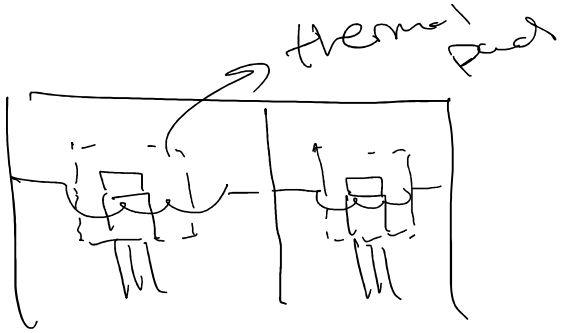
(out of scope)

MOSFET HEATSINK w/ Thermal Pads



back





- stick thermal pad adhesive side to back of MOSFET

- thermal pad BETWEEN heatsink and MOSFET.