

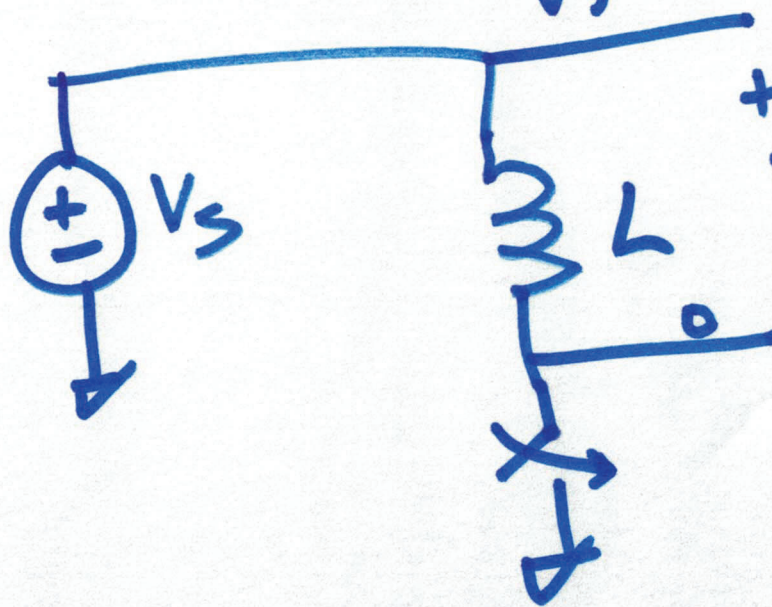
EE 442 / EGG 742 Power Electronics

Lecture 7

Sept. 21, 2022

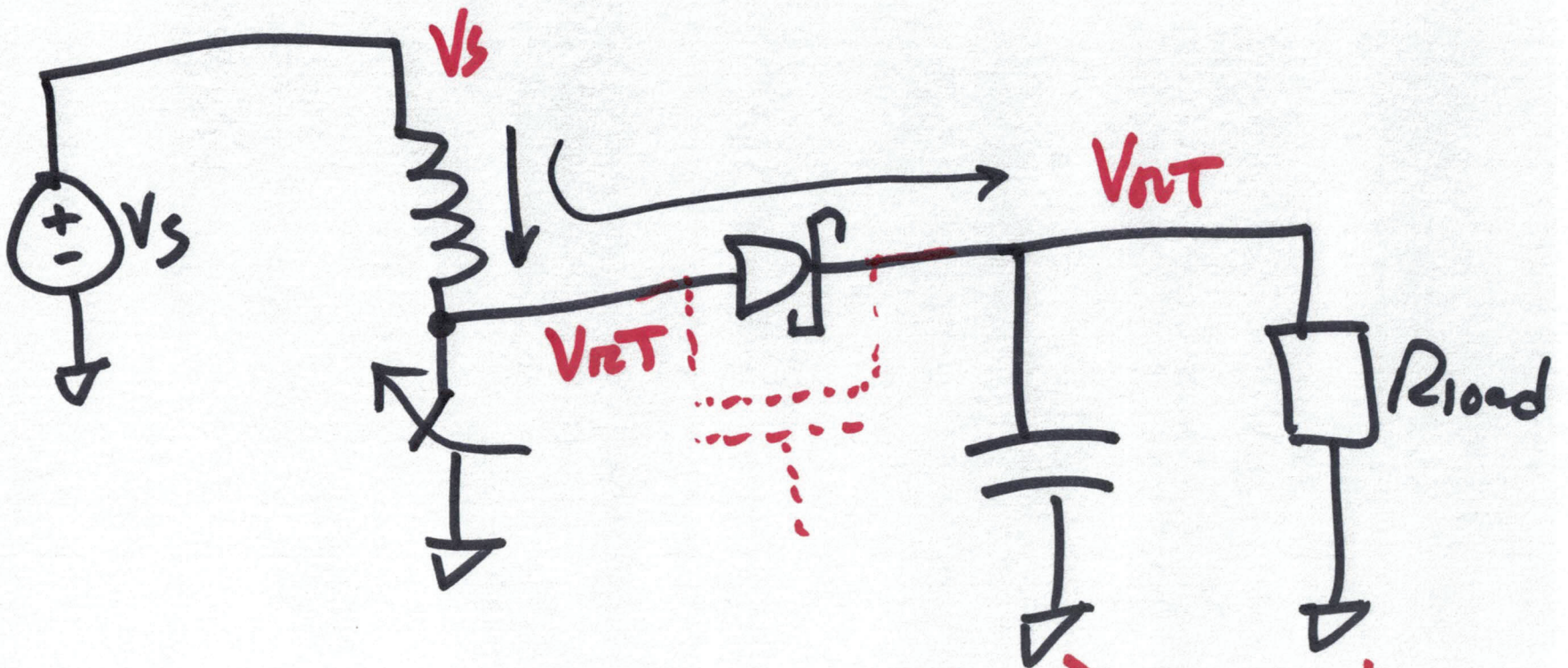
Boost SPS

Low voltage
high voltage



$$V_s - 0 = L \frac{\Delta i_L}{\Delta T}$$

$$\Delta i_L = \frac{V_s \cdot \Delta T}{L}$$



$$\Delta i_L = \frac{(1-D)T \cdot (V_s - V_{out})}{L}$$

$$I_{av} = \frac{V_{out}}{R_{load}}$$



$$\frac{V_s \cdot D \cancel{T}}{\cancel{T}} = \left(\frac{(1-D) \cancel{T} \cdot (V_s - V_{out})}{\cancel{T}} \right)$$

$$\cancel{V_s} \cdot D = V_{out} - V_s - DV_{out} + DV_s$$

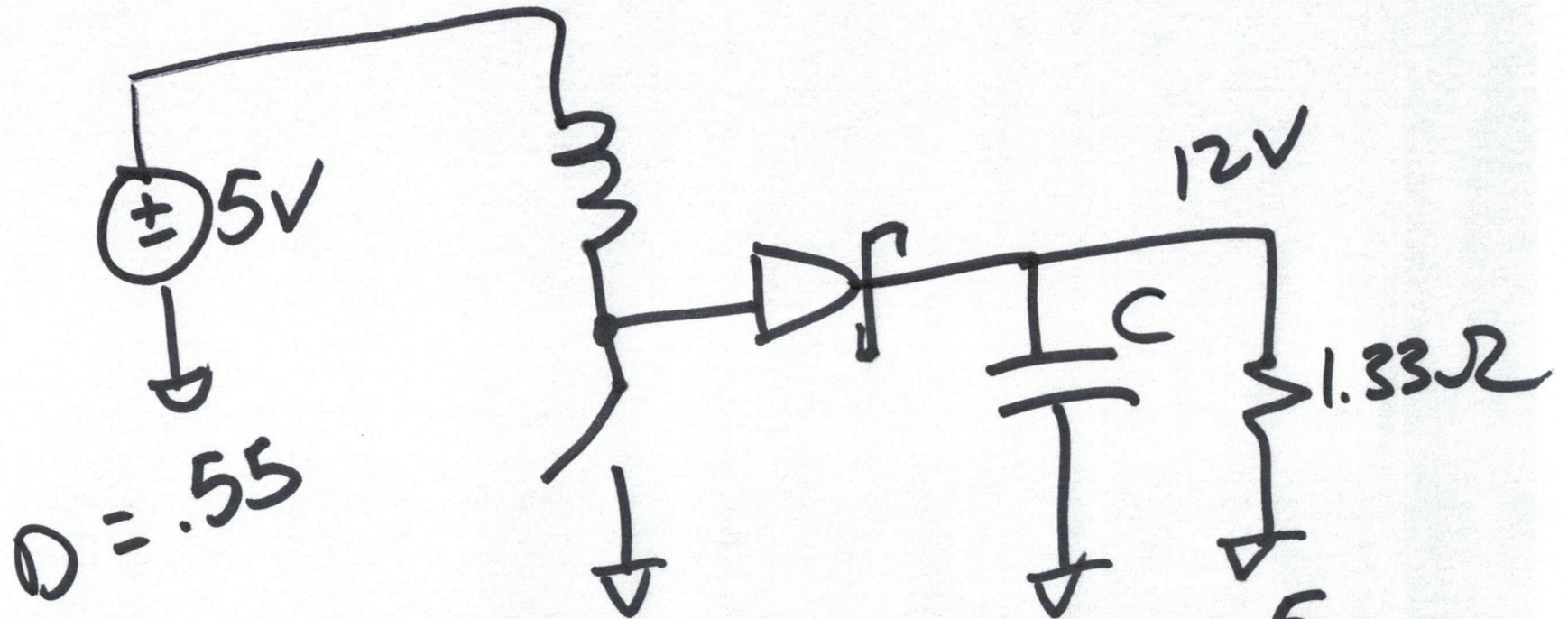
$$(1-D)V_{out} = V_s$$

$$V_{out} = \frac{V_s}{1-D}$$

3)

Qual com Quick Charge

12V @ 9A
 $V_s = 5V$
 $20mA$



$$12 = \frac{5}{1-D} \rightarrow 12 - 12D = 5$$

$$D = \frac{7}{12}$$

$$7 = 12D$$

$$D = .58$$

$$20 \mu\text{A} = \frac{5 \cdot .55 \cdot 100 \mu}{L}$$

$$f = 10 \text{ kHz}$$

$$f = 100 \mu\text{s}$$

$$I = C \frac{dv}{dt}$$

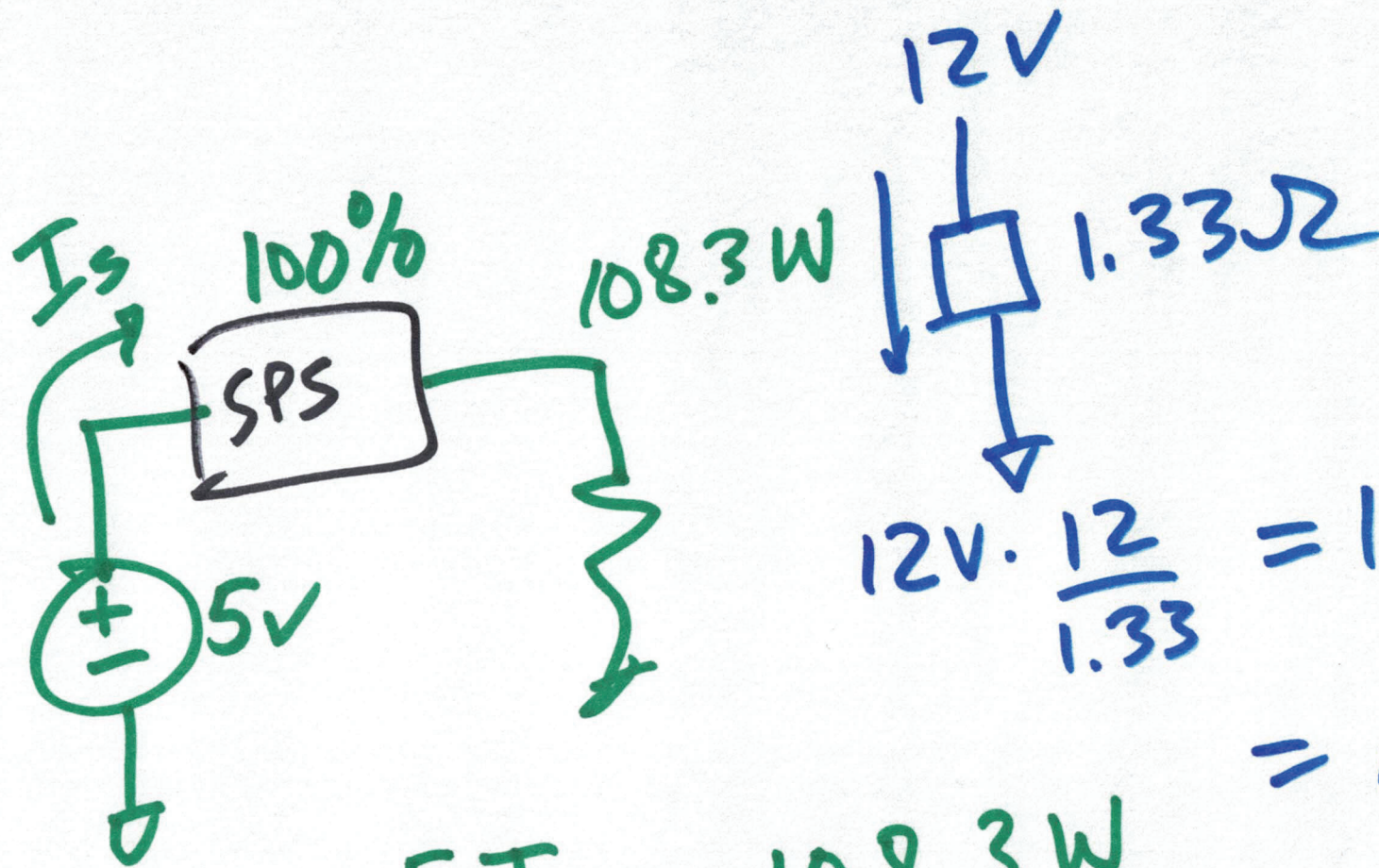
$$q = C \cdot \frac{5 \text{ mV}}{2454}$$

$$C = 81 \text{ nF}$$

$$L = \frac{5 \cdot .55 \cdot 10 \mu}{20 \mu}$$

$$= \frac{.5 \cdot .55}{20}$$

$$L = 13.75 \text{ nH}$$



$$12V \cdot \frac{12}{1.33} = 12 \cdot I_{load} = 108.3 \text{ Watts}$$

$$5 \cdot I_s = 108.3 \text{ W}$$

$$I_s = 21.7 \text{ A}$$

6)