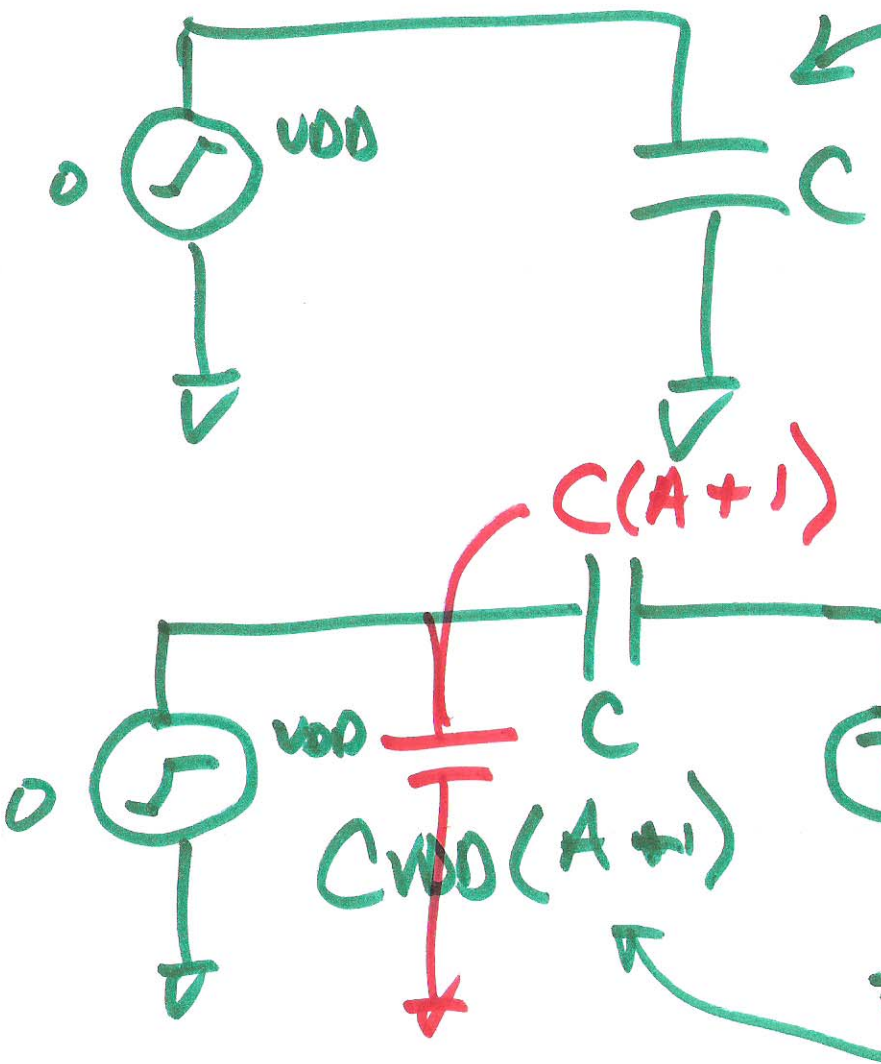
ECE 5/472 Power Electronics

BOISE STATE UNIVERSITY

Dec. 4, 2011

Lecture 25



Bef. $CVDD - 0 \cdot V_x$

$Q_{supplied} = (VDD - 0) \cdot C$

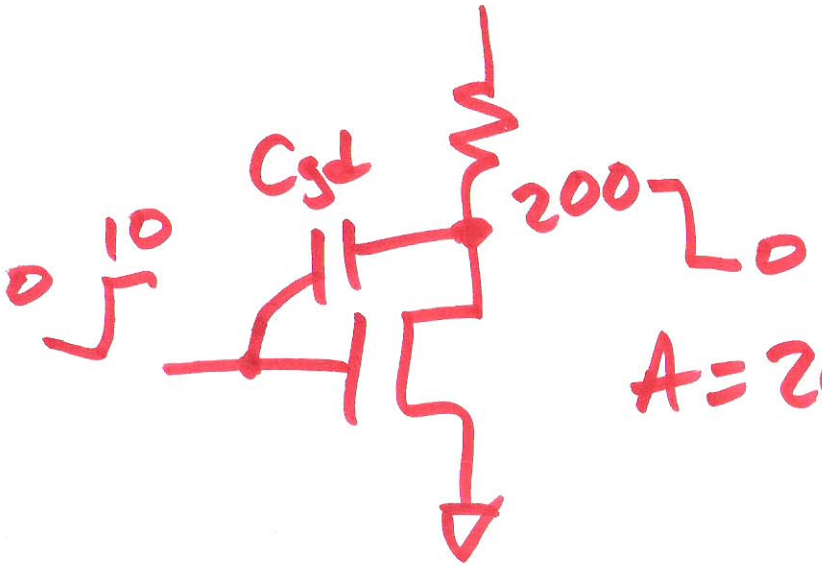
$Q_{supplied} = CVDD$

$(0 - V_x)C$ Befor

$(VDD - 0)C$ After

$Q_{supplied} = C(VDD + V_x)$

V_x

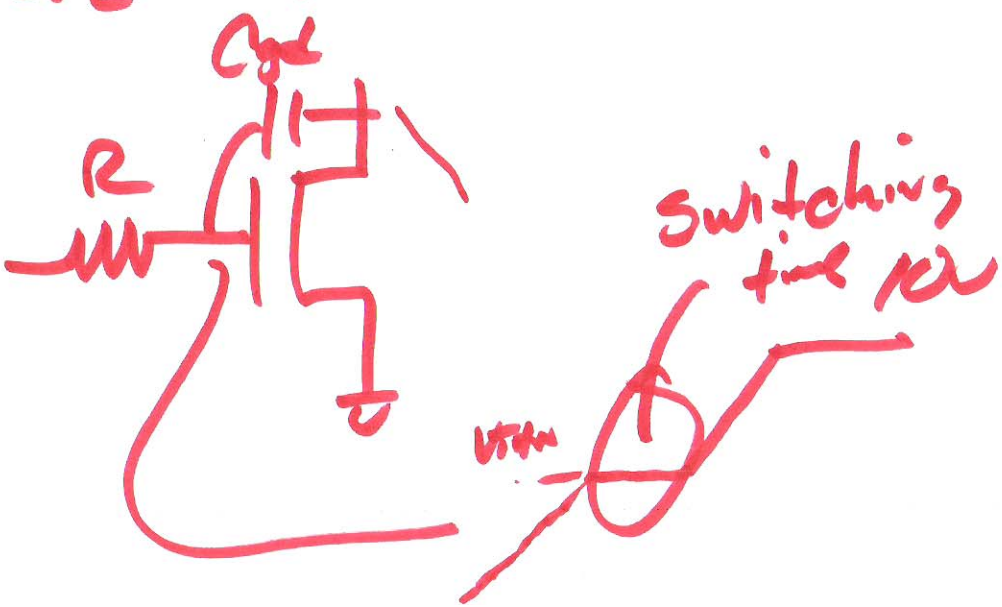


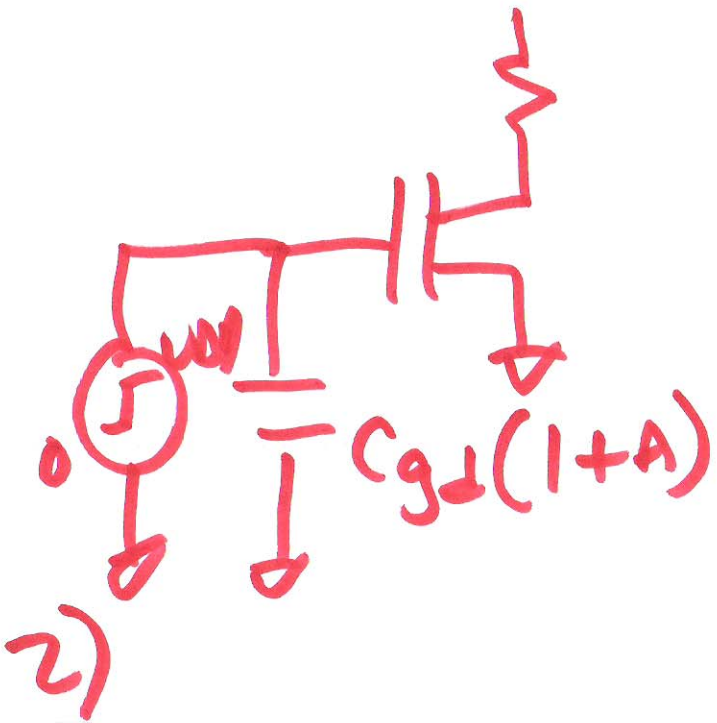
$A = 20 = \frac{200}{10}$

$Q_1 = C_{gd}(0 - 200)$

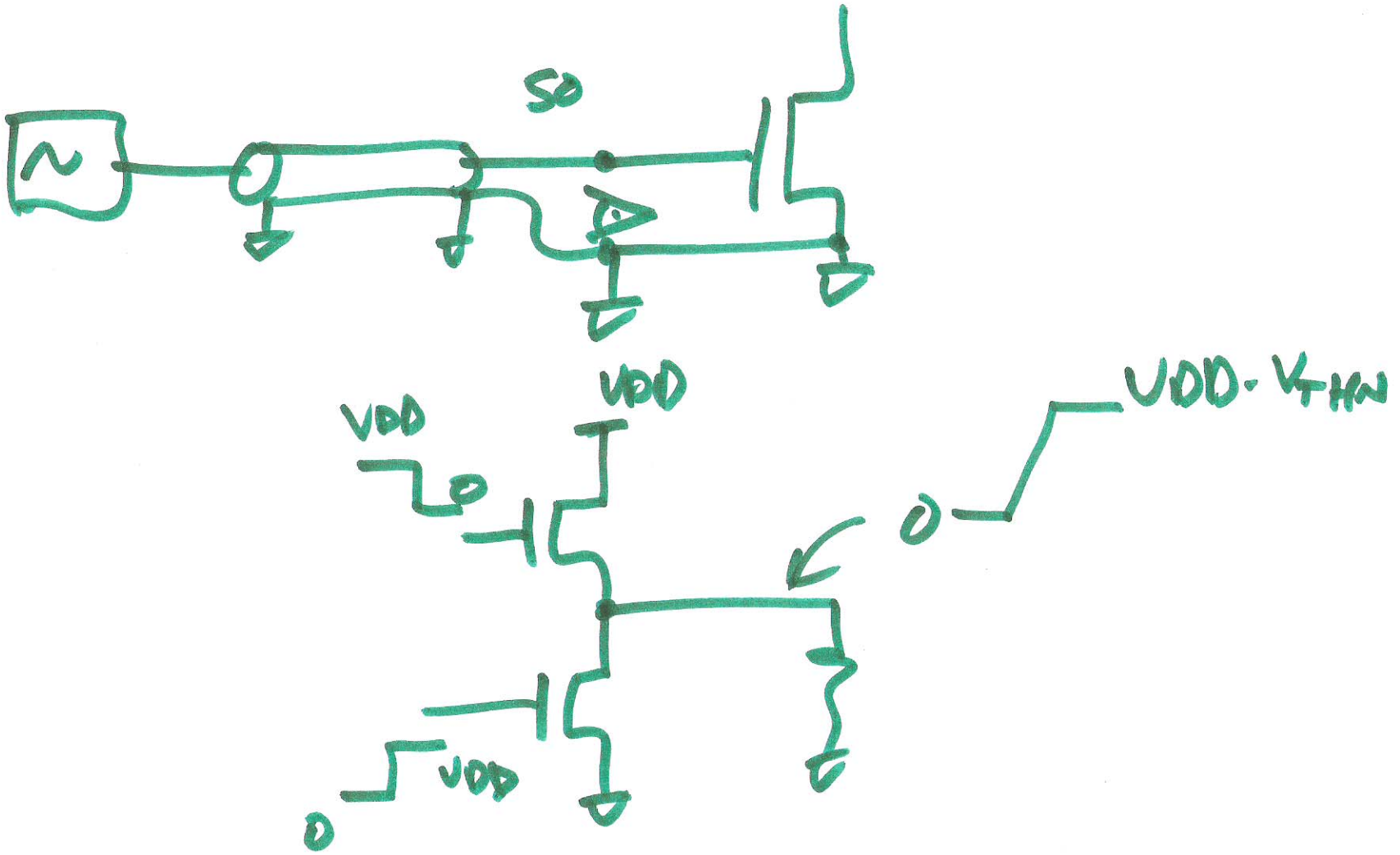
$Q_2 = C_{gd}(10 - 0)$

$Q_2 - Q_1 = C_{gd} \cdot 10 \cdot (21)$

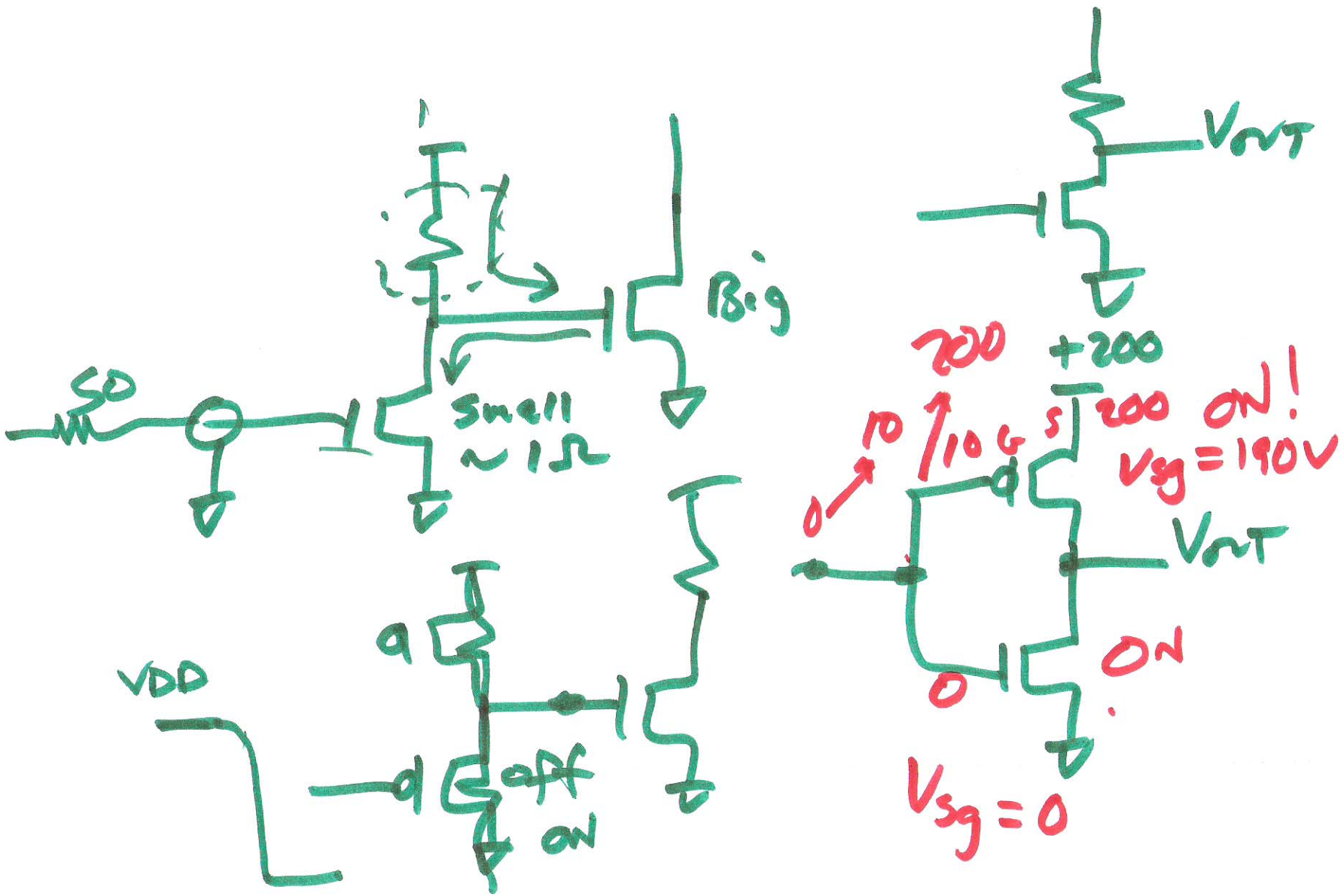




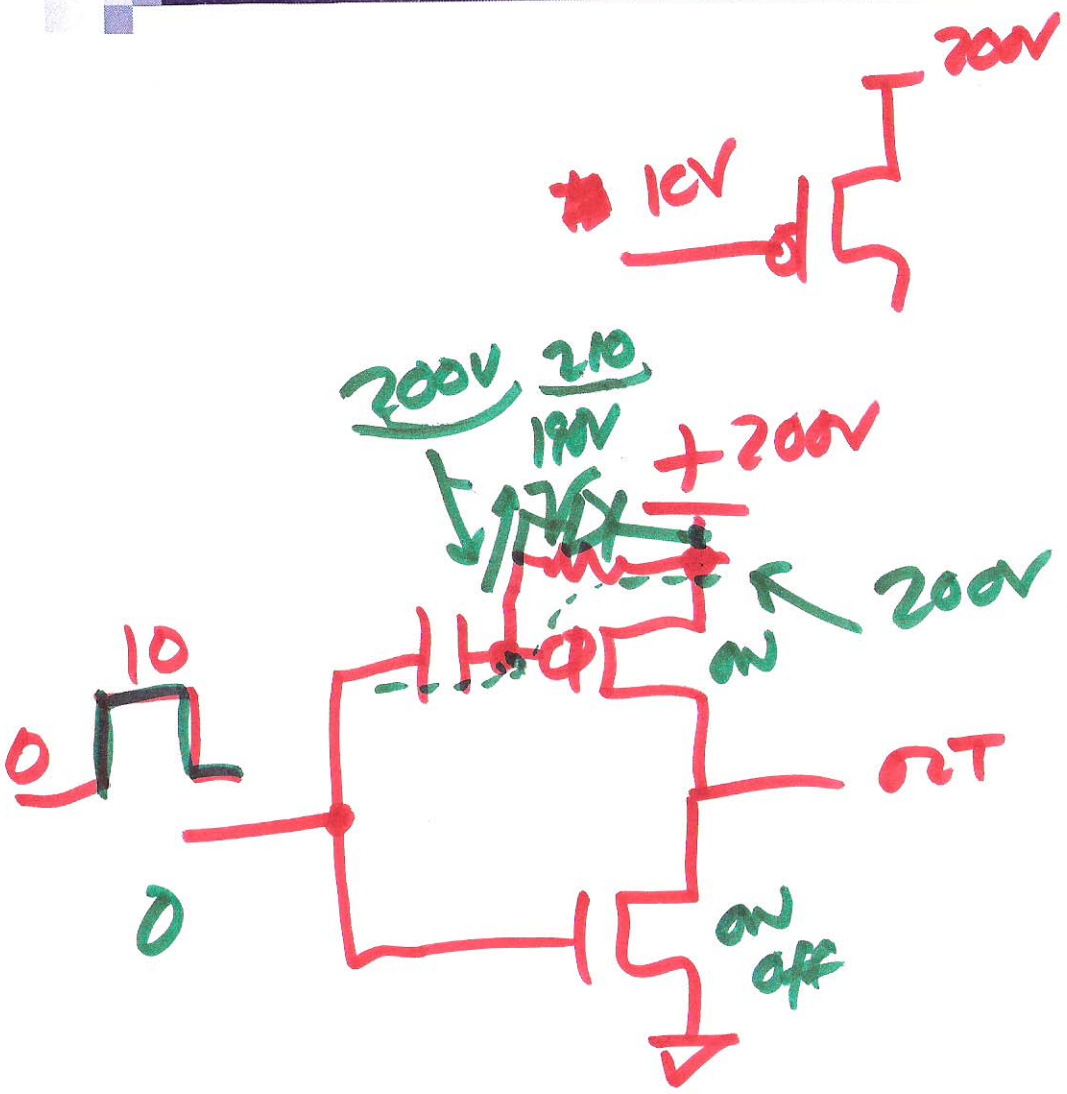
2)



3)


SD
Big
small
~ 1Ω
VDD
g
off
ON
VOUT
200
+200
200 ON!
10
/10 G
S
0
Vsg = 190V
VOUT
ON
0
Vsg = 0

4)

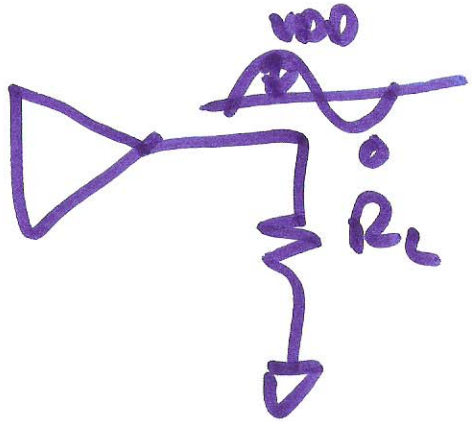


Gate-oxide Voltage?

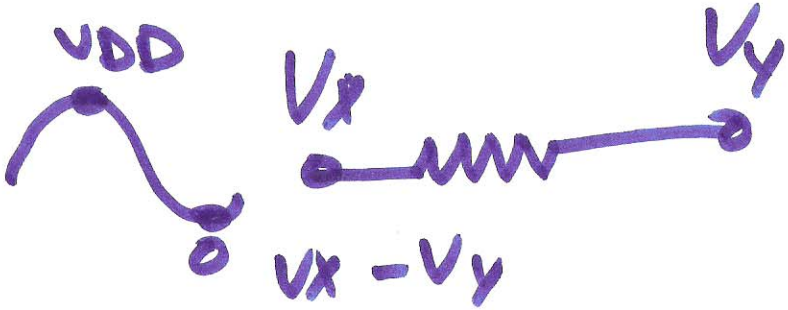
190V

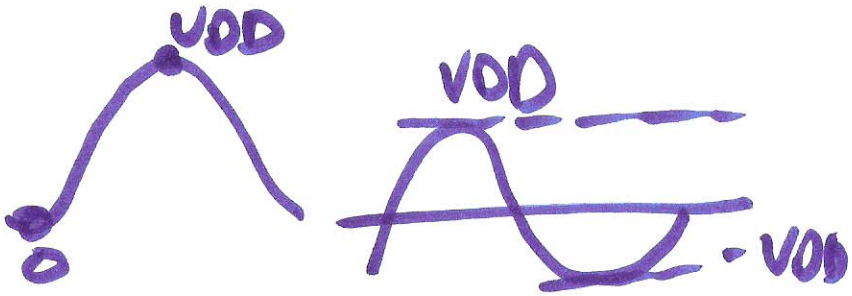
stress across oxides << 20V

5)



$$\frac{\left(\frac{VDD}{2\sqrt{2}}\right)^2}{R} = \text{Power}$$





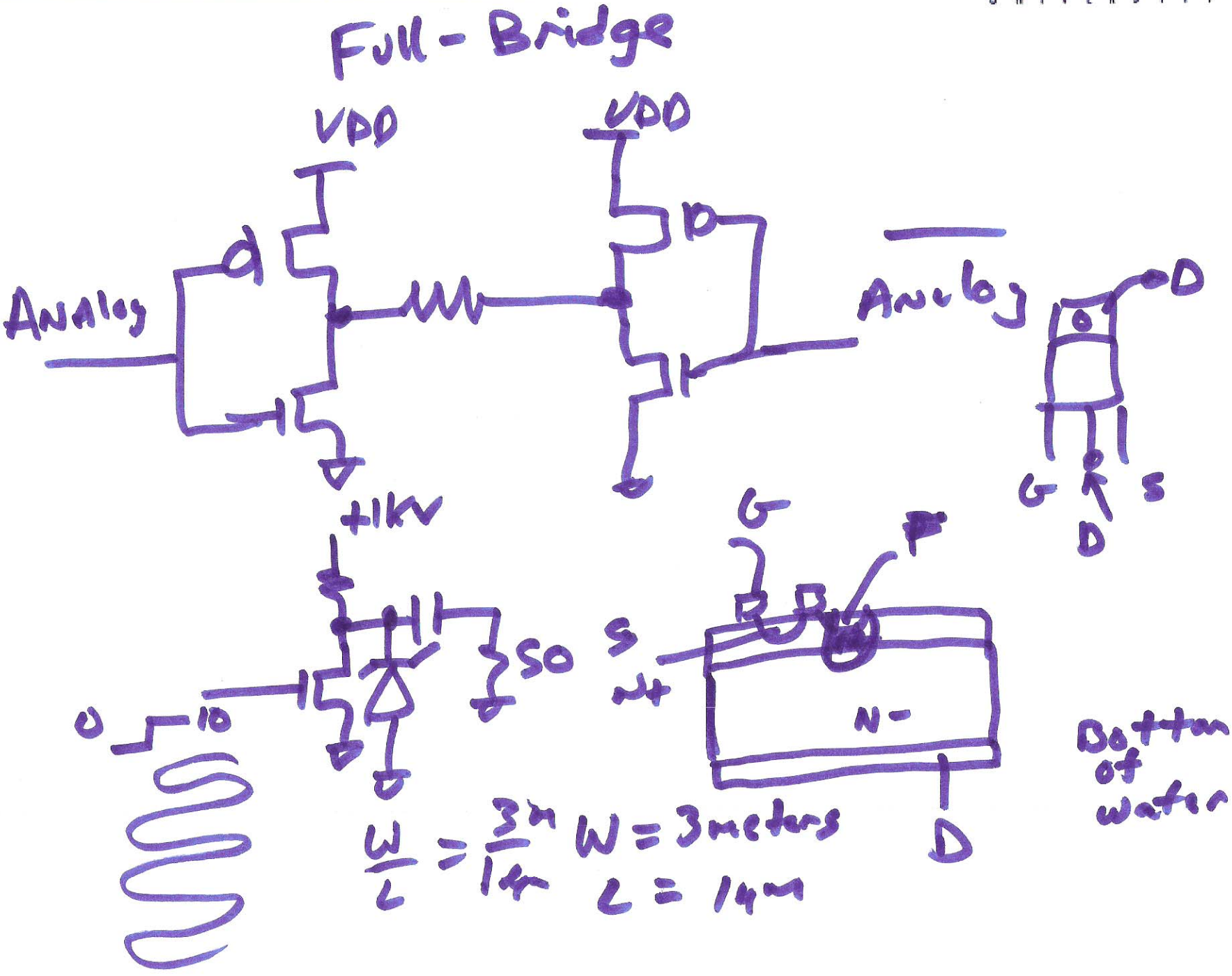
$VDD - 0 = VDD$

$0 - VDD = -VDD$

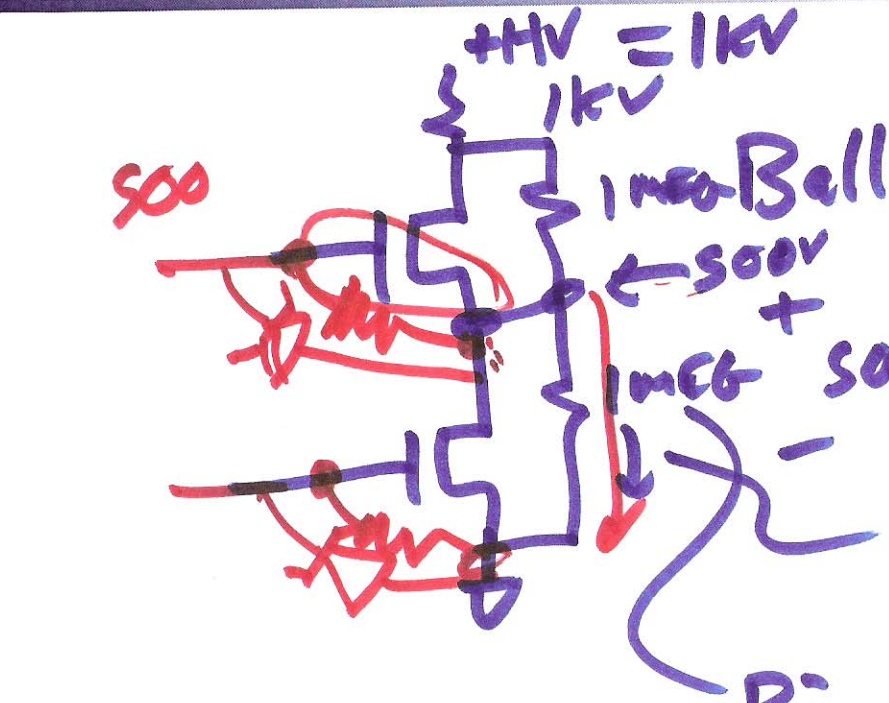
Swing is $2VDD$

$$\text{Power} = \frac{\left(\frac{2VDD}{2\sqrt{2}}\right)^2}{R} \Rightarrow 4\times \text{Power}$$

6)


Full-Bridge
VDD
VDD
Analog
Analog
D
G
S
D
+1kV
50
0
10
G
P
S
N+
N-
D
Bottom of water
W/L = 3m/14m
W = 3meters
L = 14m

7)



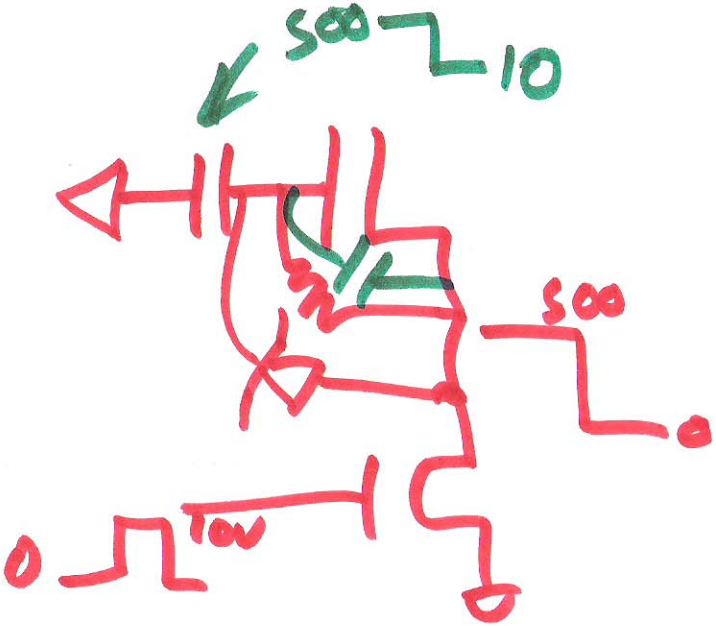
Ballast resistor

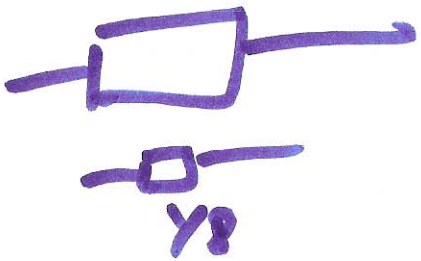
$\frac{500V}{1MEG} = \frac{1}{2}$ ma

BAD

Big as possible

voltage coefficient





8)