

EE 421 / ECG 621

Digital IC Design

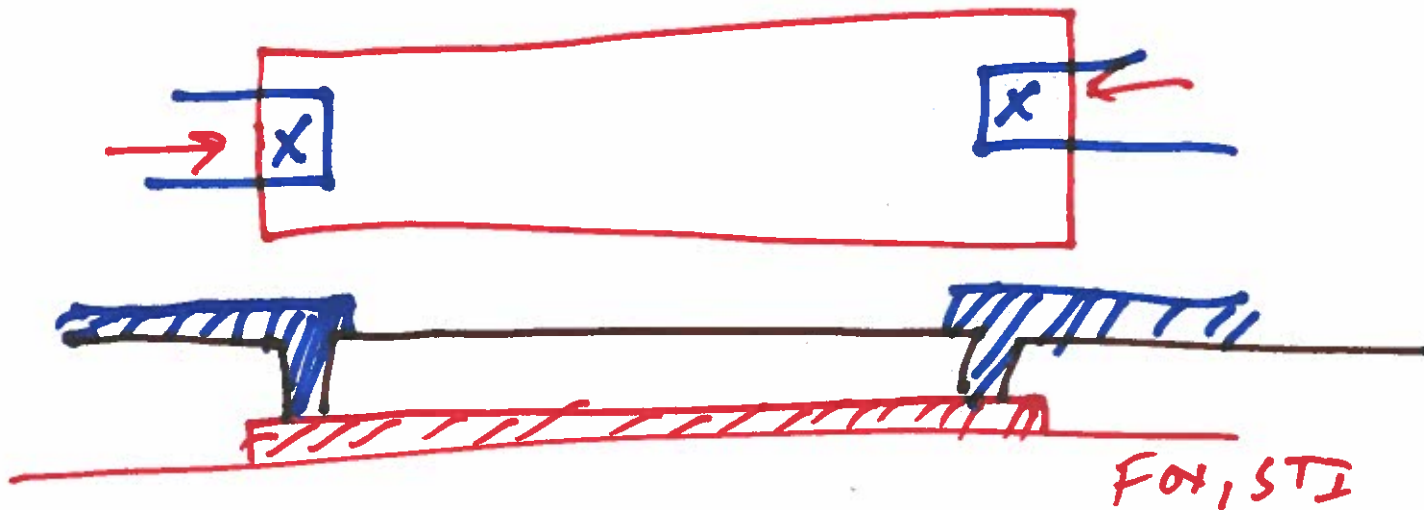
Lecture 9

Sept. 25, 2019

poly

20 Ω /□

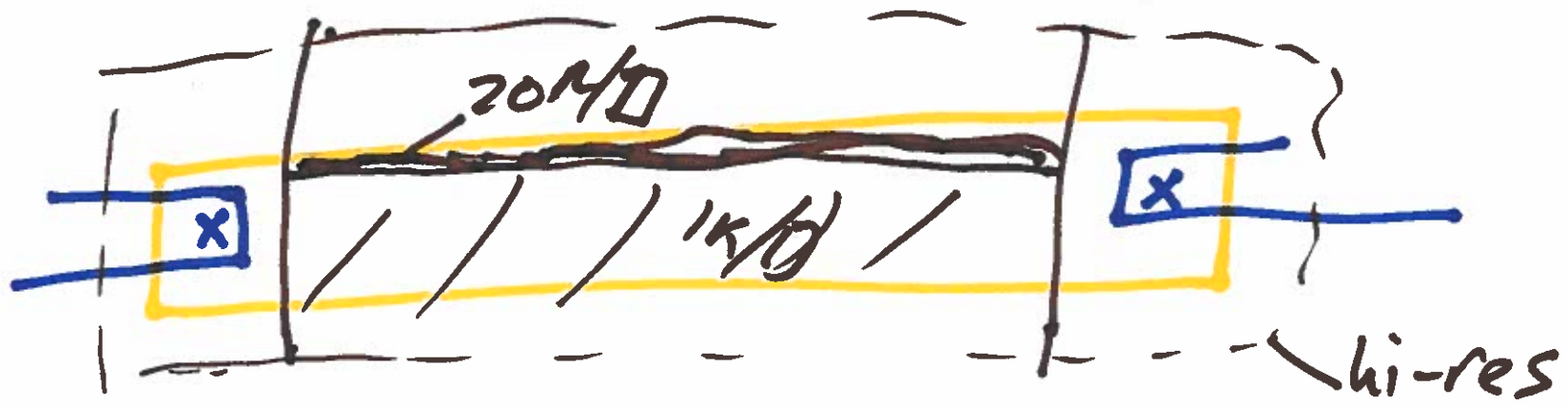
doped in-situ
(while being deposited)



1)

poly 2 - elec

2054D

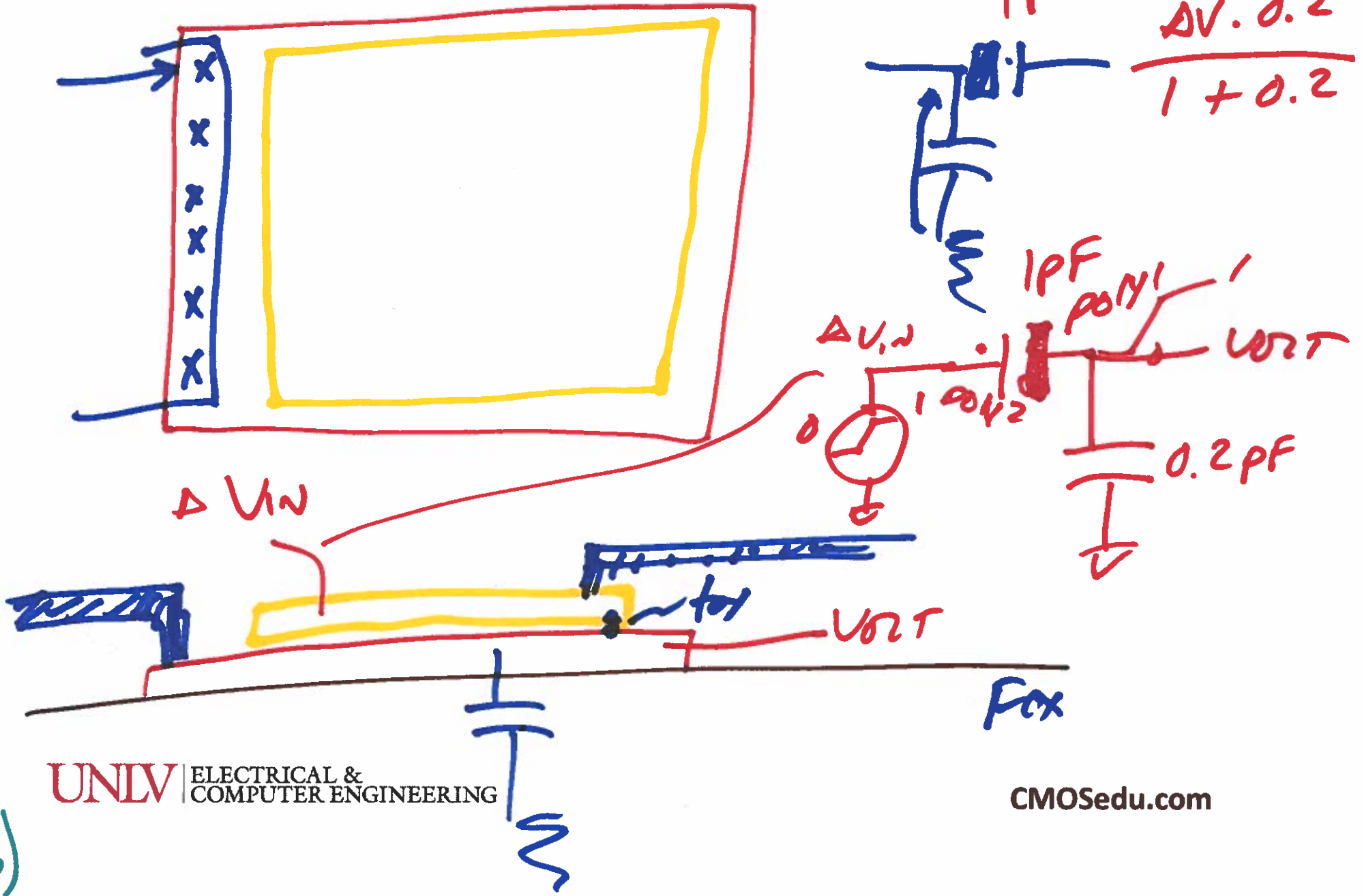


4

poly - poly
 $140 \text{ \AA} = \text{~~0.014~~ } 0.0042$

$$W_{IT} = \Delta V \cdot \frac{1}{\frac{1}{1 \text{ pF}} + \frac{1}{0.2 \text{ pF}}}$$

$$= \frac{\Delta V \cdot 0.2}{1 + 0.2}$$



3)

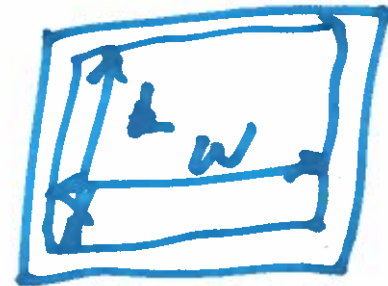
$$t_{ox} = 0.0144 \mu = 140 \text{ \AA}$$

$$C'_{ox} = \frac{3.9 \cdot 8.85 \frac{\text{aF}}{\mu\text{m}^2}}{0.0144 \mu\text{m}} = 500 \text{ f}$$

$$C = \frac{\epsilon A}{t}$$

$$C'_{ox} = \frac{3.9 \cdot 8.85 \text{ aF}}{1 \mu\text{m} \cdot 0.0144 \mu\text{m}} \approx \frac{2.5 \text{ fF}}{\mu\text{m}^2}$$

$$1 \text{ pF} = \frac{2.5 \text{ fF}}{\mu\text{m}^2} \cdot \begin{matrix} 4 \cdot \mu\text{m} \\ \downarrow \\ 10 \end{matrix} \cdot \begin{matrix} 4 \cdot \mu\text{m} \\ \downarrow \\ 40 \end{matrix}$$



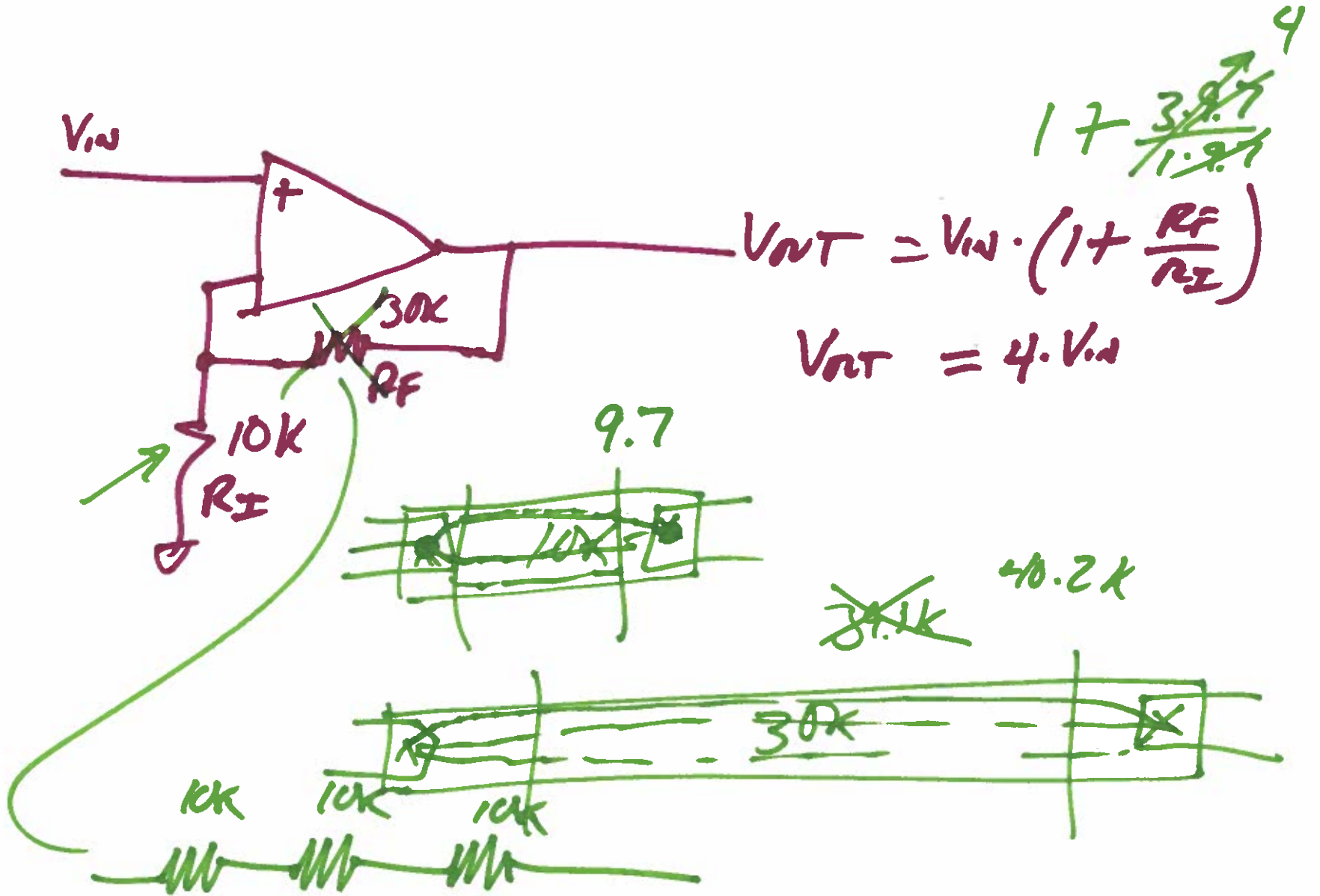
$$C_p = 0.9 \frac{\text{fF}}{\mu\text{m}^2} \cdot 33\mu\text{m} \cdot 33\mu\text{m}$$

$$C = 980 \text{ fF} \approx 1 \text{ pF}$$

$$C_{sw} = \underbrace{33\mu\text{m}}_{1-2\mu\text{m}/0} \cdot 0.065 \frac{\text{fF}}{\mu\text{m}} = 8.58 \text{ fF}$$



5)



6)

