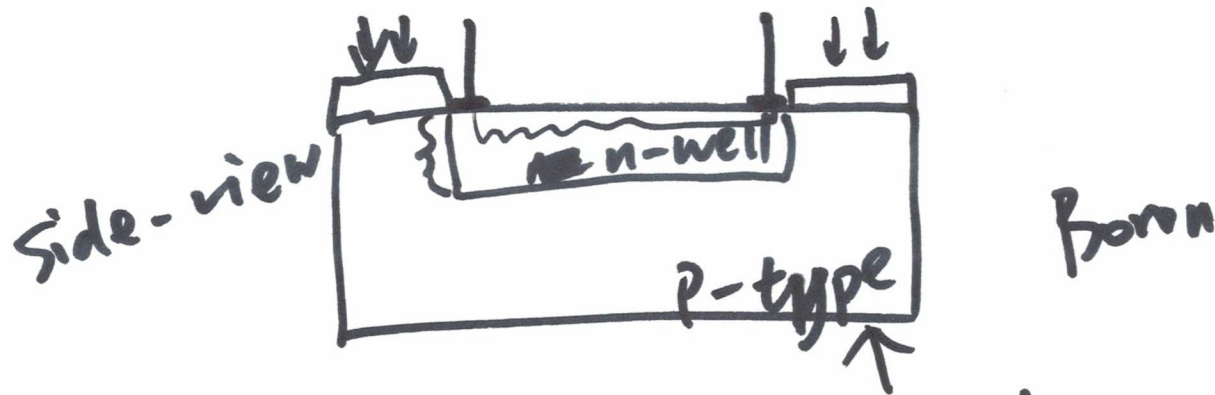
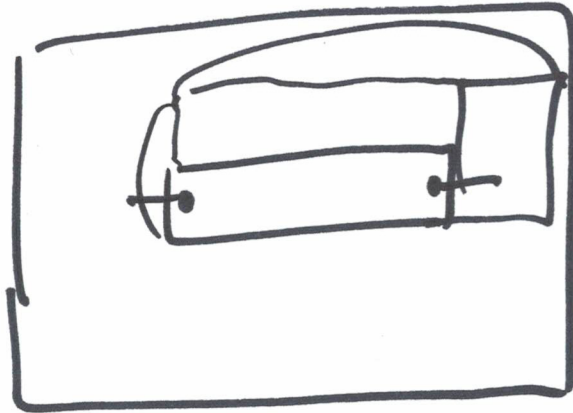


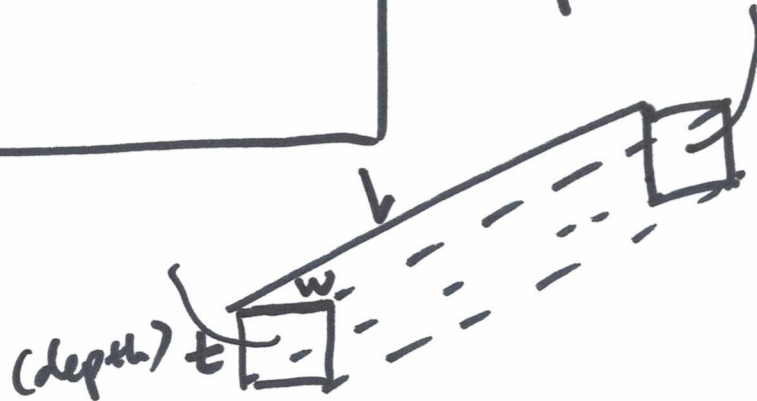
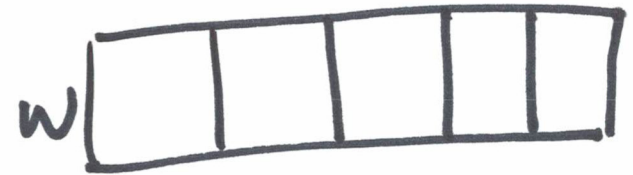


Bottom

p-type substrate



top-view



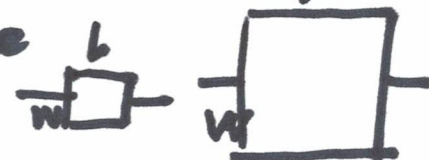
$$R = \rho \cdot \frac{L}{A} = \rho \frac{L}{w \cdot t}$$

$$= \frac{\rho}{t} \cdot \frac{L}{w} = \left(\frac{\rho}{t} \right) \cdot \left(\frac{L}{w} \right)$$

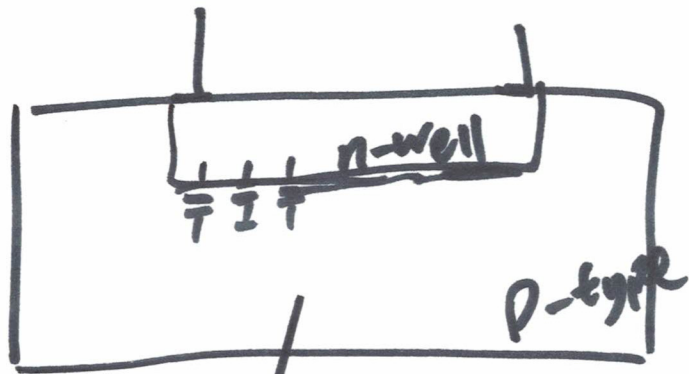
Sheet resistance

CS: $800 \Omega/\square$

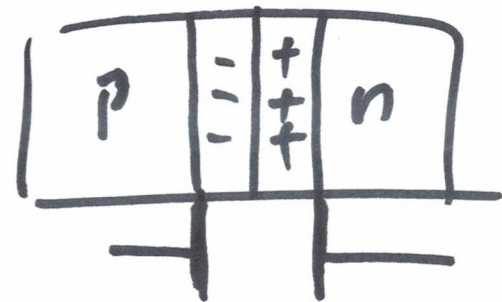
①



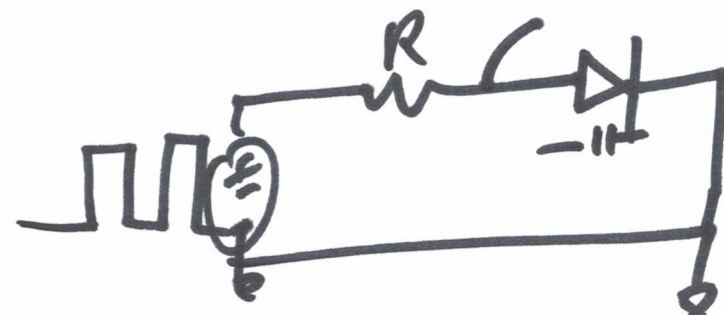
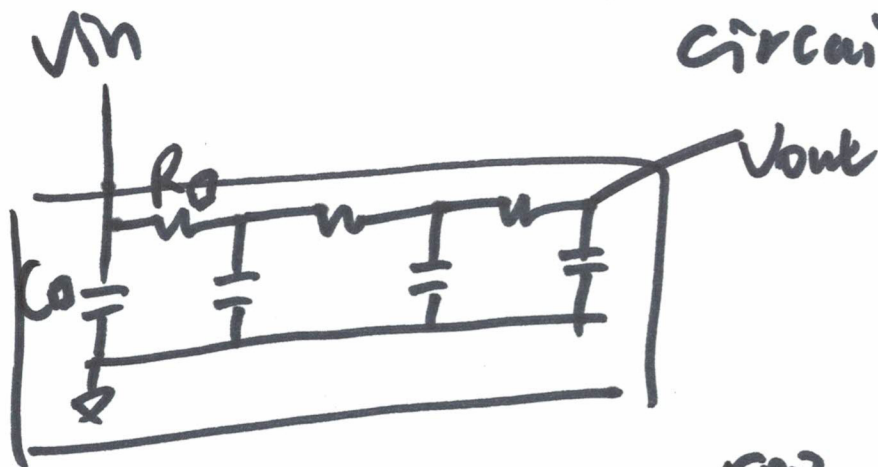
Same resistance



Model the RC circuit



$C_j = \text{junction capacitor}$



Example: $W=10$ $L=500$
 $R=250k\Omega$
 10×10 capacitance of n-well
 is $5fF$, what is t_d ?

$$\lambda = 300nm$$

$$2\lambda = 600nm$$

$$5 \times 300nm$$

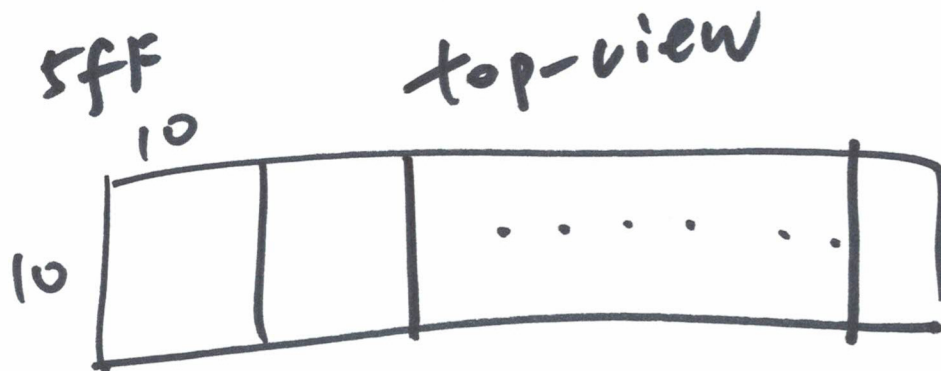
λ rule

$$7C_5 = \underline{\underline{500nm}}$$

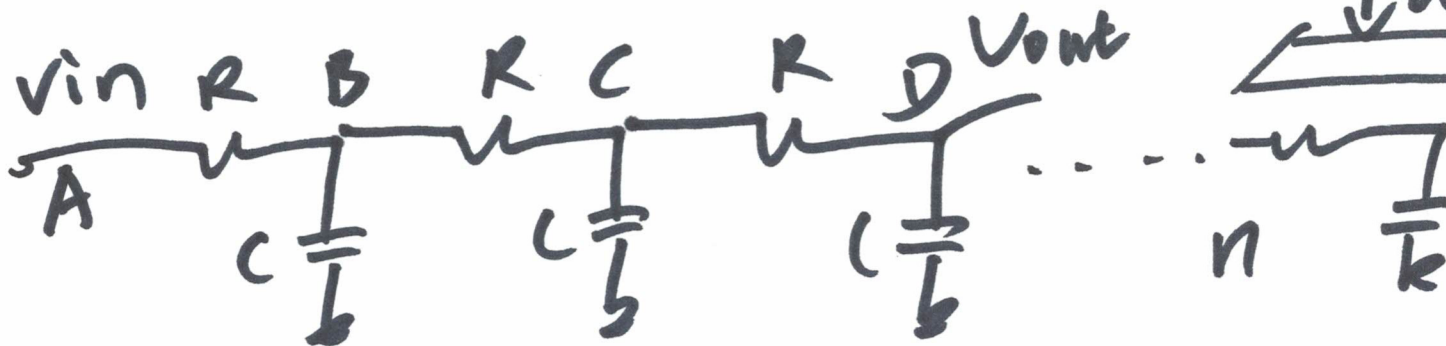
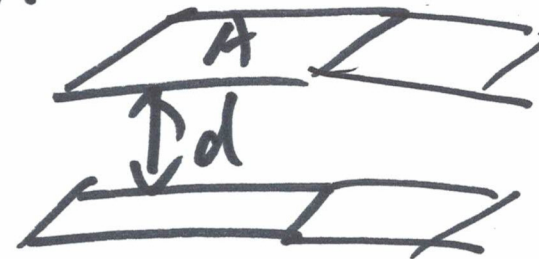
(2)

$$\frac{L}{W} = \frac{500}{10} = \underline{\underline{50 \text{ ns}}}$$

$$R_{\square} = \frac{R}{50 \text{ ns}} = \frac{250 \text{ k}\Omega}{50 \text{ ns}} = \underline{\underline{5 \text{ k}\Omega/\square}}$$



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



$$A \rightarrow D = \cancel{0.7RC} + 0.7RC + 0.7 \cdot 2RC + 0.7 \cdot 3RC$$

$$= 0.7RC (1 + 2 + 3)$$

③

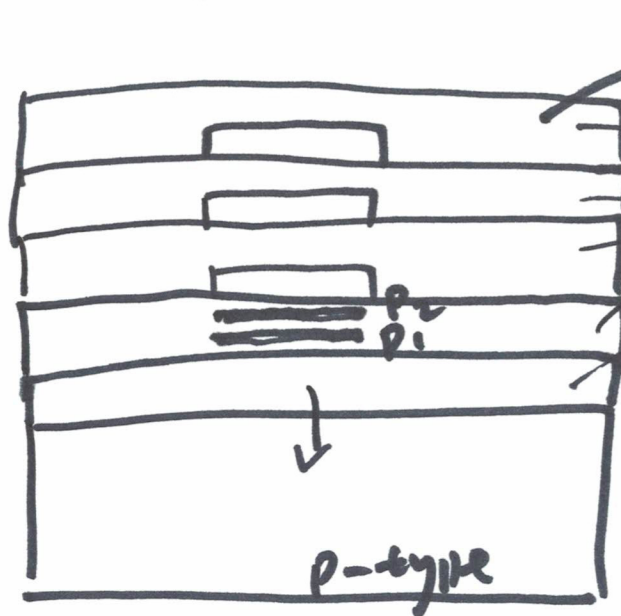
$$0.7RC (1+2+3 \dots + n)$$

$$\text{when } n \rightarrow \infty = 0.7R \frac{(1+n) \cdot n}{2}$$

$$= 0.35 R C n^2$$

n : number of squares.

3 metal layers



SiO_2

M3

M2

M1

poly silicon

Fox: Field oxide

SiO_2

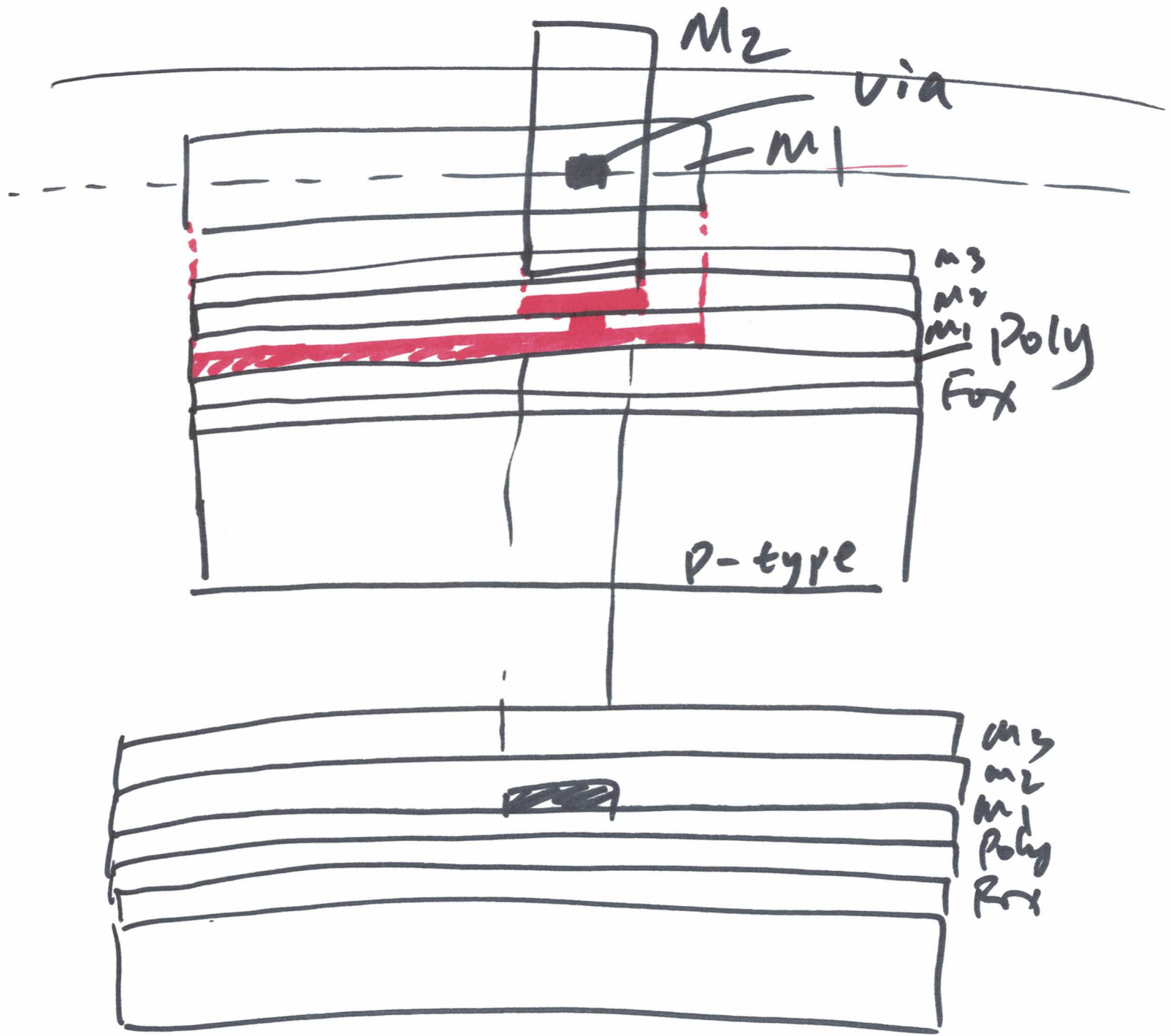
p-type

insulator

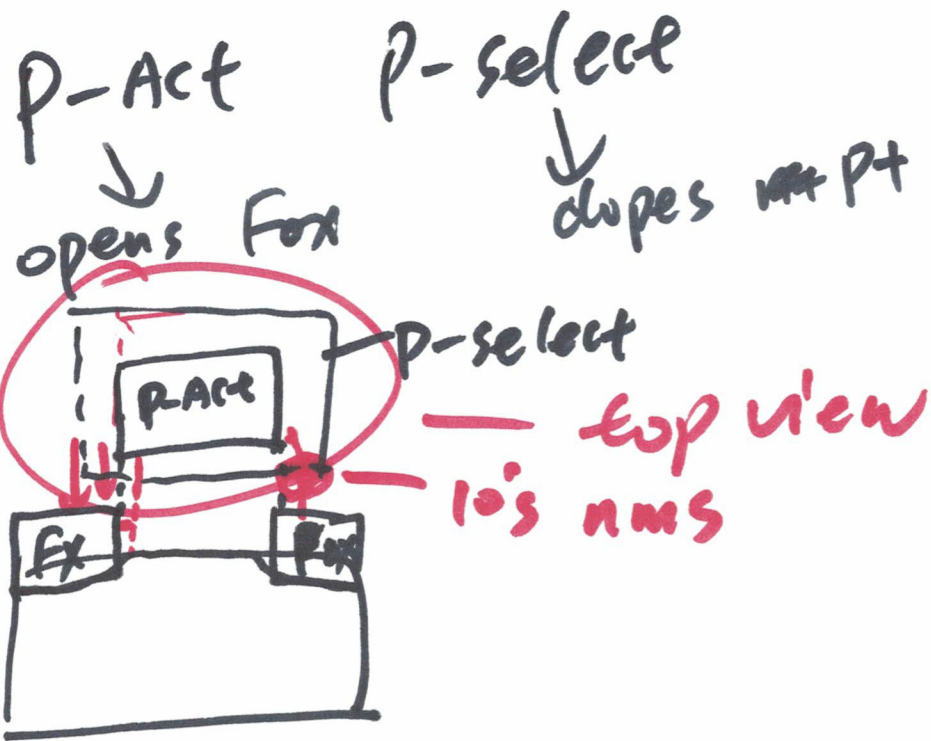
Grates/resistor

C5

C4



(5)



⑥