

EE 421 / ECG 621
 N_{Si} = density of Silicon Atoms

Digital IC Design

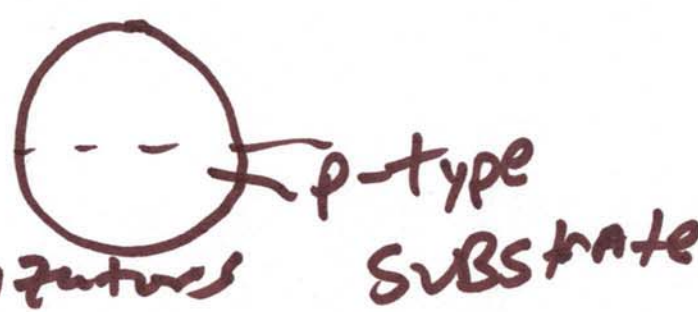
N_A = # of acceptor atoms (Boron)
 N = # of free electrons
 p = # of free holes
 N-well

Lecture 2

August 29, 2018

10^{21} Atoms
 \downarrow
 $\frac{\text{cm}^3}{\text{cm}^3}$
 10^{15} Atoms
 $\rightarrow \frac{\text{cm}^3}{\text{cm}^3}$

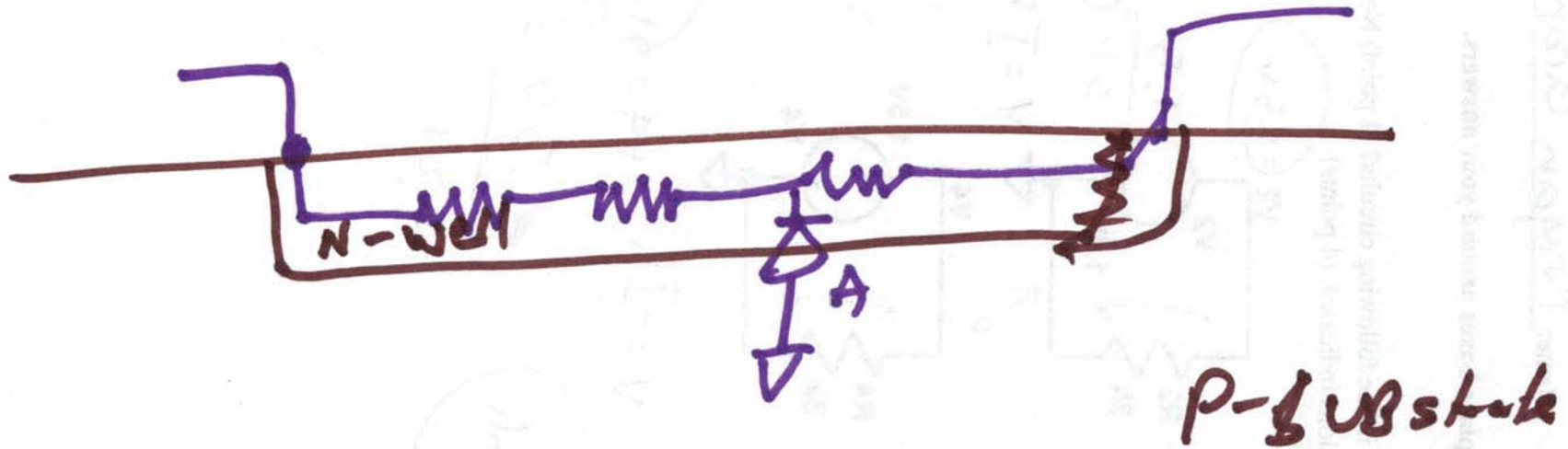
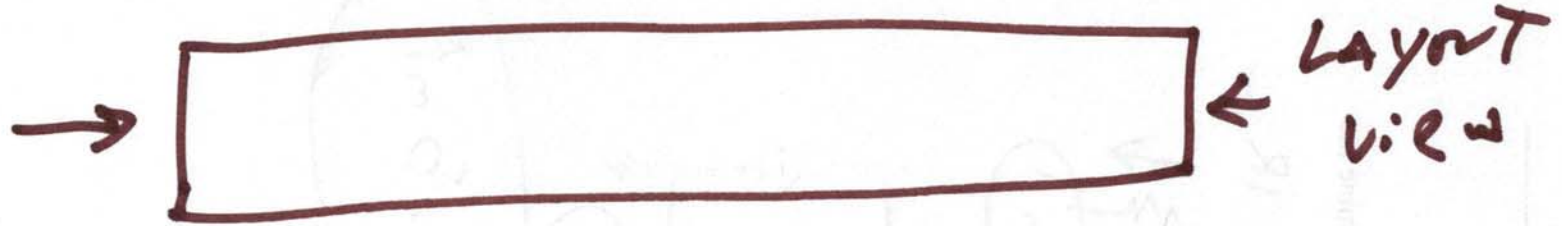
$p \approx N_A$
 Assuming complete ionization



p-SUB

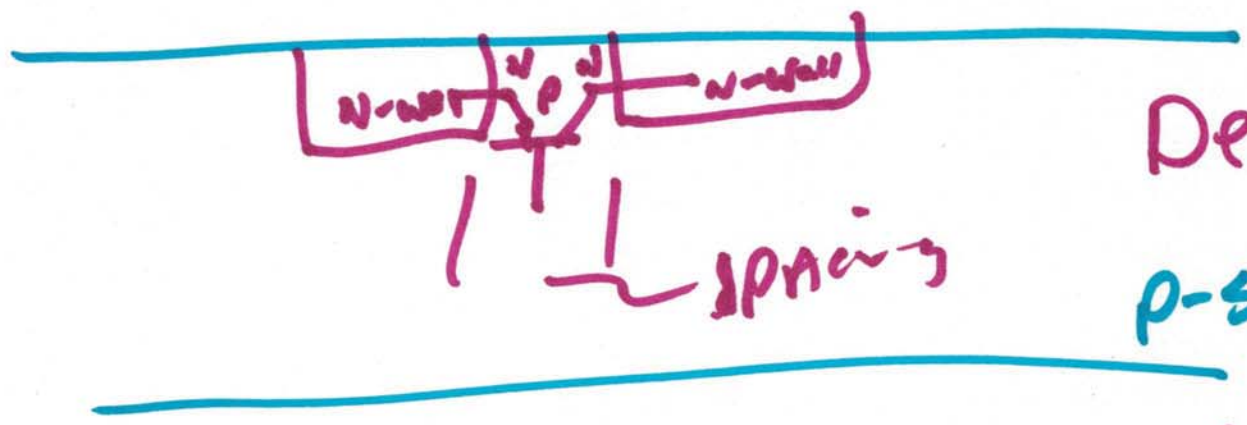
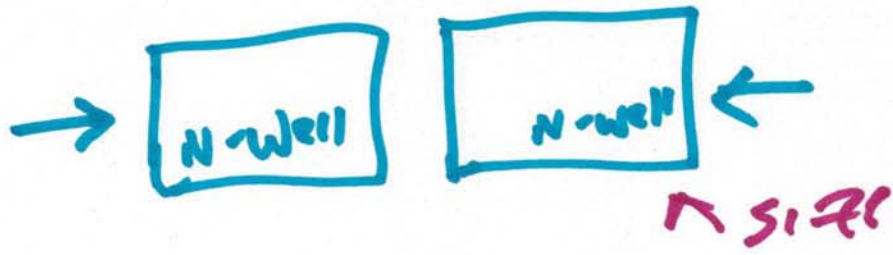


N-well

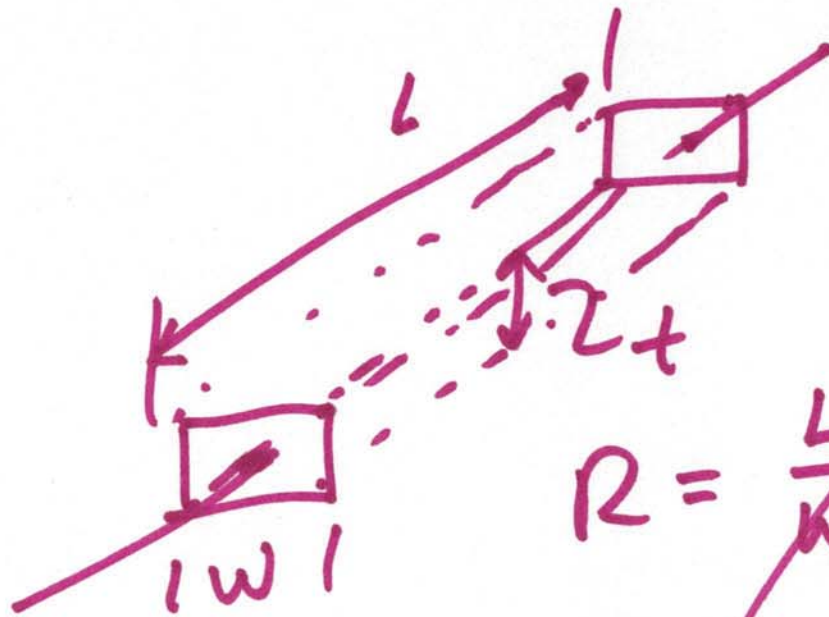


N-well → resistor
diode
Body of device
pmos

2)



Design
Rule
p-sub check
(DRC)



$$R = \frac{L}{W} \cdot \frac{\rho}{t}$$

$$L = W$$

Sheet resistance $\rho \cdot \Omega \cdot \text{cm}$

$$\frac{\Omega}{\square}$$

N-well

$$800 \frac{\Omega}{\square}$$

LAYOUT A 10k Resistor
 $R_{D_{N-well}} = 800 \frac{\Omega}{\mu}$ USING N-well

$$R = 10k = \frac{L}{W} \cdot 800$$

$$\frac{L}{W} = 12.5$$

$\rightarrow 64$

$$L = 754 \mu$$