Lecture 5 ex 1

Si compensated

$N_D = 4 \cdot 10^{14}\ cm^{-3}$ $N_A = 4{,}001 \cdot 10^{14}\ cm^{-3}$

$p \approx N_A - N_D = 1 \cdot 10^{11}\ cm^{-3}$

$n \approx 0$ SIMPLIFICATION

$\Rightarrow R_H = \frac{n_p}{qp^2} = \frac{0{,}7}{1{,}602 \cdot 10^{-19} \cdot 1 \cdot 10^{11}} = 4{,}4 \cdot 10^7\ cm^3/C$

Ex 2 $I = 10\ mA$ $B = 100\ Gauss = 1 \cdot 10^{-2}\ T$

$t = 10\ \mu m$ $n^+_{min} = 10^{12}\ cm^{-2} = 10^{16}\ m^{-2}$

$n^+_{max} = 10^{13}\ cm^{-2} = 10^{17}$

eq 16

$V_H = \frac{I \cdot B}{q n^+ t}$ $V_{H\,max} = 0{,}062\ V$

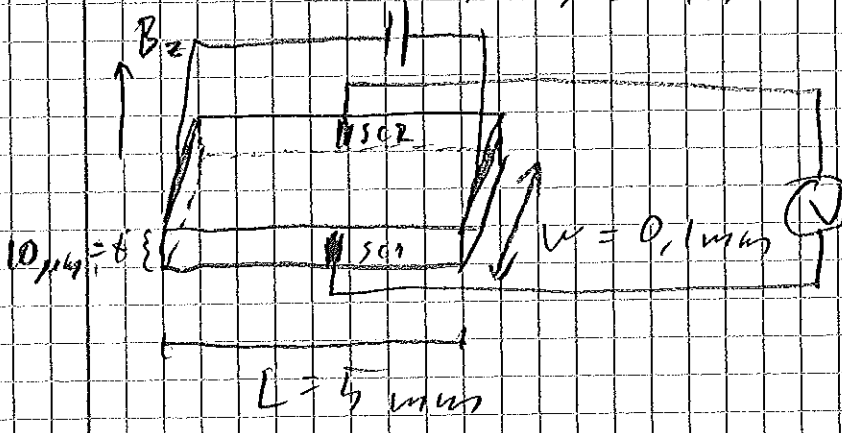
$V_{H\,min} = 6{,}2\ mV$

$1\ cm \rightarrow 0{,}1\ dm$

$1\ cm^{-1} \rightarrow 10\ dm^{-1}$

Lecture 5

ex 3 $V_L = 0,1\,V$, $I = 1\,mA$ $B_z = 10 \cdot 10^{-5}\ Wb/cm^2$



$t = 10 \cdot 10^{-6}\,m = 1 \cdot 10^{-5}\,m$
$= 1 \cdot 10^{-3}\,cm$

$V_{SC12} = -2\,mV$

Negative V_{SC12} → Electrons

$$R_H = \frac{V_{SC12} \cdot t}{I\,B} = -20\ cm^3/C$$

$$R_H = -\frac{1}{q\,n} \Rightarrow n = -\frac{1}{q\,R_H} = 3,1 \cdot 10^{17}\ cm^{-3}$$

Answer: $n_0 = 3,1 \cdot 10^{17}\ cm^{-3}$

Electrons are majority carriers

From table: $\mu_n = 600\ cm^2/Vs$