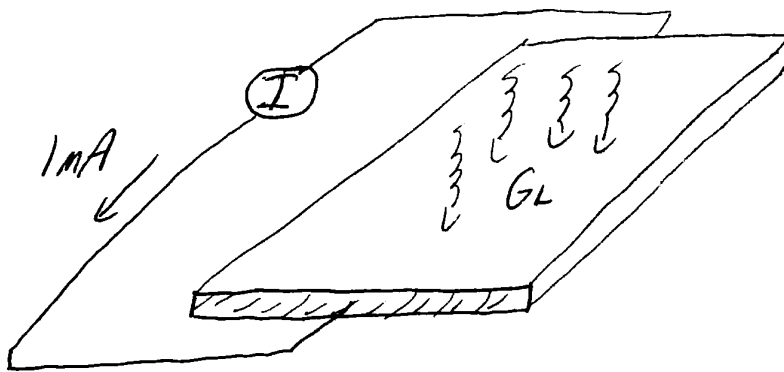


Recitation 4  
EE 3161 – Spring 2008

- 1) A thin slab of intrinsic silicon is connected to a current source of 1mA as shown below. Assume  $\tau_p = \tau_n = 1\mu\text{s}$ .
- Draw the energy band diagram for the system, including the voltage drop. Is there a Fermi level associated with this diagram? Why or why not?
  - If the silicon is uniformly illuminated such that  $G_L = 10^{18}\text{ cm}^{-3}\text{ sec}^{-1}$ , draw the new band diagram, including the voltage drop.
  - How would the band diagram change if  $N_T$ , the trap density, is reduced by a factor of two in the first half of the slab?



- 2) Write an expression for the electric field in a block of semiconductor heavily doped with donors where drift and diffusion currents exactly cancel one another. What functional form would  $n(x)$  have to take in order for the electric field to be constant throughout the semiconductor? How does this electric field develop? (In other words, what are the positive charges and negative charges and how are they arranged in the semiconductor?)