**Constants**

Electron charge,

at

Electron voltage,

Boltzmann Constant,

Permittivity of free space,

Dielectric constant of silicon,

Dielectric constant of ,

Electron affinity for silicon,

For silicon,

**Formulas**

Intrinsic carrier concentration,

when   
 when

Equilibrium con. (No Electric Field),

Fermi potential,   
For *n*-type,   
   
For *p*-type,

Thermal voltage,

Equilibrium con. (Electric Field),

Poisson’s eq.,

Rate of change of elec. field,

Permittivity,

Transit time,   
   
 (when )

Total free electron charge,

Velocity drift,   
At low elec. field, (inside semi.)

Electric field,

Conductance,

Conductivity,

Resistance,

Sheet resistance,

Diffusion constant,

Current,

Contact potential,

Work function potential,   
For *n*-type,   
For *p*-type,

Built-in potential,  
 (Zero bias)  
 (Forward/Reverse bias)

Current for forward bias,

Depletion region in reverse bias,

Elec. field in depletion region,

Poten. across in depletion region,

Total length of depletion region,

For one sided step junction,  
For ,   
   
For ,

Small-signal capacitance per unit area,   
  
, where is

Potential drop across oxide,

Oxide capacitance per unit area,

Equivalent oxide thickness (EOT),

Flatband voltage,

Body effect coefficient,