Si material parameters:

Band gap energy at 300 K: $E_g = 1.124$ eV

Relative permittivity: $\varepsilon = 11.7$

Effective mass of electron:

$m_n^* = 1.08 m_o$ for density of states, $m_n^* = 0.26 m_o$ for conductivity

Effective mass of hole:

$m_p^* = 0.81 m_o$ for density of states, $m_p^* = 0.39 m_o$ for conductivity

Mobility:

$\mu_n = 1400$ cm^2/V·s, $\mu_p = 470$ cm^2/V·s

Diffusion coefficient:

$D_n = 36$ cm^2/s, $D_p = 12$ cm^2/s

Effective density of states at 300 K:

$N_C = 2.82 \times 10^{19}$ cm^{-3} $N_V = 1.83 \times 10^{19}$ cm^{-3}

Intrinsic carrier concentration at 300 K: $n_i = 8.2 \times 10^9$ cm^{-3}

GaAs material parameters:

Band gap energy at 300 K: $E_g = 1.42$ eV

Relative permittivity: $\varepsilon = 13.1$

Effective mass:

$m_n^* = 0.068 m_o$ $m_p^* = 0.5 m_o$

Mobility:

$\mu_n = 8800$ cm^2/V·s, $\mu_p = 400$ cm^2/V·s

Diffusion coefficient:

$D_n = 228$ cm^2/s, $D_p = 10$ cm^2/s

Effective density of states at 300 K:

$N_C = 4.45 \times 10^{17}$ cm^{-3} $N_V = 8.87 \times 10^{18}$ cm^{-3}

Intrinsic carrier concentration at 300 K: $n_i = 2.35 \times 10^6$ cm^{-3}

Physical Constants:

Vacuum permittivity: $\varepsilon_o = 8.85 \times 10^{-14}$ F/cm

Planck's constant: $h = 6.63 \times 10^{-34}$ J·s

Speed of light: $c = 3.0 \times 10^{10}$ cm/s

Electronic charge: $q = 1.60 \times 10^{-19}$ C

Electron rest mass: $m_o = 9.11 \times 10^{-31}$ kg

Boltzmann constant: $k_B = 1.38 \times 10^{-23}$ J/K

Thermal energy at 300 K: $k_BT = 0.0259$ eV

Energy unit conversion: $1 \text{ eV} = 1.60 \times 10^{-19}$ J