

# Constants and Parameters

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$$\epsilon_0 = 8.85 \times 10^{-14} \text{ F/cm}$$

$$q = 1.6 \times 10^{-19} \text{ C}$$

$$k = 8.62 \times 10^{-5} \text{ eV/K}$$

$$h = 6.63 \times 10^{-34} \text{ J s} = 4.14 \times 10^{-15} \text{ eV s}$$

$$m_0 = 9.11 \times 10^{-31} \text{ kg}$$

Material Properties	Si	Ge	GaAs
$m_{n(dos)}^*/m_0$	1.18	0.55	0.066
$m_{p(dos)}^*/m_0$	0.81	0.36	0.52
$m_l^*/m_0$	0.92	1.59	—
$m_t^*/m_0$	0.19	0.082	—
$m_{n(cond)}^*/m_0$	0.26	0.12	0.067
$m_{hh}^*/m_0$	0.54	0.35	0.51
$m_{ih}^*/m_0$	0.15	0.043	0.082
$m_{p(cond)}^*/m_0$	0.39	0.3	0.5
$N_C \text{ (cm}^{-3}\text{)}$	$3.2 \times 10^{19}$	$1.0 \times 10^{19}$	$4.2 \times 10^{17}$
$N_V \text{ (cm}^{-3}\text{)}$	$1.8 \times 10^{19}$	$5.4 \times 10^{18}$	$9.5 \times 10^{18}$
$n_i \text{ (cm}^{-3}\text{)}$	$1.0 \times 10^{10}$	$2.4 \times 10^{13}$	$2.25 \times 10^6$
$E_G@0\text{K (eV)}$	1.17	0.744	1.52
$E_G@300\text{K (eV)}$	1.120	0.67	1.42
$dE_G/dT \text{ (} T > 300\text{K)}$	$-2.8 \times 10^{-4}$	$-3.7 \times 10^{-4}$	$-5.0 \times 10^{-4}$