

# List of Symbols

Symbol	Description
$b_f$	forward transfer susceptance
$b_i$	input susceptance
$b_o$	output susceptance
$b_r$	reverse transfer susceptance
$C_0$	shunt capacity across crystal
$C_1$	motional arm capacitance
$f_a$	antiresonant frequency
$f_L$	frequency at load capacitance $C_L$
$f_s$	series resonant frequency
$g_f$	forward transfer conductance
$g_f(\text{min})$	minimum forward transfer conductance required for oscillation
$g_i$	input conductance
$g_m$	forward transfer conductance (transconductance)
$g_o$	output conductance
$g_r$	reverse transfer conductance
$h_f$	forward current transfer ratio
$h_i$	input impedance
$K$	Boltzman's constant $1.38 \times 10^{-23} \text{ J/}^\circ\text{K}$
$L_1$	motional arm inductance
$P_c$	power dissipated in crystal
ppm	parts per million
$q$	electron charge $1.602 \times 10^{-19} \text{ C}$
$R_1$	motional arm resistance
$R_e$	equivalent resistance of crystal
$R_{\text{in}}$	parallel input resistance
$R_L$	external load resistance
$R_{\text{max}}$	maximum resistance crystal oscillator is capable of handling

**x List of Symbols**

$R_T$	total resistive component of collector load
$\omega_T$	angular frequency at which the common emitter current gain has decreased to unity
$X_e$	equivalent reactance of crystal
$y_f$	forward transfer admittance
$y_i$	input admittance
$y_o$	output admittance
$y_r$	reverse transfer admittance
$Z_f$	forward transfer impedance
$Z_i$	input impedance
$Z_o$	output impedance
$Z_r$	reverse transfer impedance