Symbols, Descriptions and Units

Symbol	Meaning	Metric Units
C	Capacitance	farad
C_{ij}	Elastic stiffness constant	newton/meter^2
C_0	Shunt capacitance	farad
C_1	Series capacitance	farad
d_{ij}	Piezoelectric strain constants	coulomb/newton
d_{33}	Piezoelectric strain constant	x 10^{-12} Meter/Volt
d_{31}	Piezoelectric strain constant	x 10^{-12} Meter/Volt
d_{15}	Piezoelectric strain constant	x 10^{-12} Meter/Volt
E	Electric field	V/m
f_a	Antiresonance frequency	cycles/second
f_r	Resonance frequency	cycles/second
f_n	Frequency of max. impedance	cycles/second
f_m	Frequency of min. impedance	cycles/second
f_p	Parallel resonance frequency	cycles/second
f_s	Series resonance frequency	cycles/second
g_{ij}	Piezoelectric voltage constants	meter^2/coulomb
g_{33}	Piezoelectric voltage constant	X 10^{-3} voltmeter/newton
g_{31}	Piezoelectric voltage constant	X 10^{-3} voltmeter/newton
g_{15}	Piezoelectric voltage constant	X 10^{-3} voltmeter/newton
h_{ij}	Piezoelectric pressure constants	newton/coulomb
K_{ij}	Electromechanical coupling constant	
k_{31}	Transverse coupling constant	
k_{33}	Longitudinal coupling constant	
k_{15}	Shear coupling constant	
k_t	Thickness coupling constant	
k_p	Planar coupling constant	
K^T	Free relative dielectric constant	
K^S	Clamped relative dielectric constant	
P	Electric polarization	coulomb/meter^2
Q_M	Mechanical quality factor	
Q_E	Electrical quality factor	
S_{ij}	Elastic compliance constant	meter^2/newton
|Y|	Admittance	mho
|Z|	Impedance	ohm

Curie Point: The temperature at which the dielectric constant peaks and all polarization disappears.

Coupling Coefficient (k): A dimensionless number related to the ratio of the energy stored in the mechanical and electrical portions of the material. The first subscript indicates the direction of the electric field and the second indicates the direction of the mechanical strain, expressed in percent.

Density: The ratio of mass to volume in the material, expressed in kg/m^3.

Dielectric Constant: The ratio of the permitivity of the material to the permitivity of free space. The value specified is for the "free" condition (i.e., unclamped and well below the mechanical resonance of the part).

Dissipation Factor: A measure of the dielectric losses in the material defined as the tangent of the loss angle or the ratio of parallel resistance to parallel reactance expressed in percent.

"d" Constant: The piezoelectric constant relating mechanical strain and applied electric field - defined as the ratio of strain to field. The first subscript indicates the direction of the field and the second the direction of the resulting strain, expressed in meters/volt.

Field: The ratio of voltage developed to the distance between the electrodes.

Frequency Constant: Defined as the resonant frequency (f_r) times the controlling dimension, expressed in KHz-m.

"g" Constant: The piezoelectric constant relating open circuit voltage and mechanical stress - defined as the ratio of voltage to stress. The first subscript indicates the direction of the generated voltage, and the second indicates the direction of the force, expressed in volt-meters/newton.

Mechanical Q (Q_M): The ratio of reactance to resistance in the equivalent electric series circuit representing the mechanical vibrating resonant system. The shape of the part affects the value.

Strain: The ratio of the change in length to the length.

Stress: The ratio of applied force to the cross sectional area.

Young's Modulus (Y): The mechanial stiffness property of a piezoelectric ceramic material and is expressed as the ratio or stress to strain the material, while vibrating at its resonant frequency, expressed in $newtons/meter^2$.