

Lithium Niobate

Physical Properties

Molecular Weight	147.85
Density	4.65 g/cm ³
Crystal Class	Rhombohedral
Moh's Hardness	5
Q _M	Approx. 10000
Q _E	1000
Melting Temperature	1253°C
Curie Point	1150°C
Thermal Expansion	15.4 x 10 ⁻⁶ /°C parallel to C-axis in a temperature range from 0°C to 110°C.
(@ 25°C)	7.5 x 10 ⁻⁶ /°C perpendicular to C-axis in a temperature range from 0°C to 110°C
Thermal Conductivity	1 x 10 ⁻² cal/(cm/sec/°C)
(@ 25°C)	

Piezoelectric & Dielectric Properties

Piezo Strain Constants	
(x 10 ⁻¹² C/N)	(C/m ²)
d ₁₅ = 69.2	e ₁₅ = 3.83
d ₂₂ = 20.8	e ₂₂ = 2.37
d ₃₁ = -0.85	e ₃₁ = 0.23
d ₃₃ = 6.0	e ₃₃ = 1.80
Piezo Pressure Constants	
(x 10 ⁻² m ² /C)	(x 10 ⁹ N/C)
g ₁₅ = 6.92	h ₁₅ = 9.5
g ₂₂ = 2.8	h ₂₂ = 6.4
g ₃₁ = -0.4	h ₃₁ = 0.8
g ₃₃ = 2.3	h ₃₃ = 5.1
Dielectric Constants	
e ^S ₁₁ /e ₀ = 44.3	e ^T ₁₁ /e ₀ = 85.2
e ^S ₃₃ /e ₀ = 27.9	e ^T ₃₃ /e ₀ = 28.7

Elastic Constants

Young's Modulus	2.93 x 10 ⁷ PSI parallel to C-axis 2.63 x 10 ⁷ PSI perpendicular to C-axis
Modulus of Rigidity	1.04 x 10 ⁷ PSI parallel to C-axis 1.09 x 10 ⁷ PSI perpendicular
Compliance Constants (x 10⁻¹² m²/N)	
S ^E ₁₁ = 5.831	S ^D ₁₁ = 5.20
S ^E ₁₂ = -1.150	S ^D ₁₂ = -0.44
S ^E ₁₃ = -1.452	S ^D ₁₃ = -1.45
S ^E ₁₄ = -1.000	S ^D ₁₄ = 0.87
S ^E ₃₃ = 5.026	S ^D ₃₃ = 4.89
S ^E ₄₄ = 17.10	S ^D ₄₄ = 10.8
S ^E ₆₆ = 13.96	S ^D ₆₆ = 11.3
Elastic Constants (x 10¹¹ N/m²)	
C ^E ₁₁ = 2.030	
C ^E ₁₂ = 0.573	
C ^E ₁₃ = 0.752	
C ^E ₁₄ = 0.085	
C ^E ₃₃ = 2.424	
C ^E ₄₄ = 0.595	
C ^E ₆₆ = 0.728	

Optical Properties

Birefringence	N _o - N _e = 0.085 +/- 0.001
Refractive Index @ 0.6328 Å	N _o = 2.2868 N _e = 2.2030
Transmission Range	0.4 μm - 5.0 μm

Direction Dependent Properties and Constants

Orientation	Wave Type	Wave Speed (m/s)	Coupling Factor
36° Rotated Y-cut	Quasi-longitudinal	7340	.485
163° Rotated Y-cut	Quasi-shear	4528	.612

10° Rotated Y-cut	Quasi-longitudinal/	7063/	.472/
	Quasi-shear	4271	.436
41° X-cut	Shear	4795	.684
Z	Longitudinal	7316	.162
Y-Z	Surface	3488	.045
128°-X	Surface	3992	.053

Questions? [Contact us](#) to discuss your particular application.