

Parameters	Symbol	Materials									Tolerance
		PZT-33	PZT-41	PZT-42	PZT-44	PZT-51	PZT-52	PZT-53	PZT-61	PZT-81	
Electromechanical coupling coefficient	$K_p$	0.60	0.56	0.58	0.60	0.65	0.64	0.68	0.53	0.53	±6.0%
	$K_{31}$	0.36	0.33	0.34	0.36	0.38	0.37	0.33	0.30	0.31	
	$K_{33}$	0.70	0.66	0.67	0.70	0.74	0.76	0.76		0.63	
	$K_{15}$	0.70	0.66	0.67	0.70	0.72	0.75	0.76	0.61	0.66	
	$K_t$	0.47	0.48	0.48	0.48	0.50	0.49	0.55	0.47	0.47	
Free relative permittivity	$\epsilon_r^T$	1.725	1.050	1.275	1.350	2.100	3.250	3.000	1.100	1.025	±12.5%
	$\epsilon_r^1$	1.725	1.450	1.700	1.900	2.400	3.500	4.100	1.100	1.400	
Dielectric loss	$tg\delta$	0.020	0.005	0.006	0.005	0.020	0.020	0.020	0.008	0.004	≤
Elastic soft constant (X10-12m <sup>2</sup> / N)	$S_{11}^E$	15,0	12,0	11,5	13,0	15,0	15,5	15,0		11,0	±10%
	$S_{33}^D$	9,0	8,5	8,0	8,5	9,0	9,0	8,8		8,5	
	$S_{55}^D$	25,0	21,0	21,0	21,5	22,0	23,0	22,0		21,0	
Piezoelectric strain constants (X10-12m / v or C / N)	$d_{31}$	160,0	-110,0	-130,0	-150,0	-210,0	-260,0	-270,0		-100,0	±12.5%
	$d_{33}$	390,0	250,0	290,0	320,0	450,0	575,0	590,0		225,0	
	$d_{15}$	480,0	460,0	500,0	530,0	710,0	950,0	1.050,0		450,0	
Mechanical quality factor	$Q_m$	75,0	500,0	500,0	400,0	70,0	65,0	65,0	800,0	800,0	≥
Frequency constants (Hz · m)	$N_d$	1.950	2.250	2.200	2.200	2.000	1.940	1.950	2.350	2.300	±5%
	$N_1$	1.470	1.650	1.700	1.600	1.450	1.450	1.480	1.700	1.700	
	$N_3$	1.880	1.950	2.050	2.000	1.900	1.900	1.900		1.960	
	$N_5$	1.130	1.230	1.230	1.230	1.200	1.200	1.200	1.300	1.230	
	$N_t$	2.250	2.270	2.300	2.300	2.250	2.300	2.300	2.300	2.280	
Sound speed (M / s)	$V_t$	3.000	3.460	3.500	3.300	3.000	3.010	3.040		3.500	±5%
	$V_1$	2.940	3.300	3.400	3.200	2.900	2.900	2.900		3.400	
	$V_3$	3.760	3.900	4.100	4.000	3.800	3.800	3.800		3.920	
	$V_5$	2.260	2.460	2.460	2.460	2.400	2.400	2.400		2.460	
	$V_t$	4.500	4.540	4.600	4.600	4.500	4.600	4.700		4.560	
Curie temperature (°C)	$T_c$	335,0	310,0	300,0	300,0	260,0	180,0	200,0	320,0	300,0	≥
Ten times the rate of change (%)	$A_{Nd}$	0.20	1.3	1.3	1.2	0.35	0.35	1.3	0.1	1.3	
	$A_{Kp}$	-0.25	-2.5	-2.0	-1.8	-0.4	-0.25	-1.7	0.5	-2.0	
	$A_{\epsilon}$	-1.5	-4.5	-4.5	-4.0	-1.5	-2.0	-3.8	0.8	-4.0	
Temperature relative change rate (%) - 10 °C - 50 °C reference 25 °C	$\Delta N_d / N$	1.0	1.0	1.5	1.0	1.5	2.0	2.0	0.35	1.5	
	$\Delta \epsilon / \epsilon$	15,00	9.5	9.5	9.0	20,00	40,00	40,00		9.0	
Strong field dielectric properties T = 25 °C E = 400V	$tg\delta$		0.04	0.04	0.04					0.01	≤
	$\Delta \epsilon / \epsilon$		0.18	0.20	0.17					0.06	≤

Value subject to change without notice