

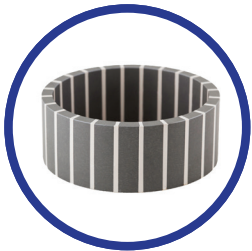


Hemisphere

Sensor Technology Ltd. manufactures high quality piezoelectric ceramics. Our in-house powder production facility in Ontario, Canada yields high quality Navy Types I, II, III, V and VI, as well as several custom formulations. Using an array of CNC machines, we can produce ceramics in any common shape — including tubes,

slugs, plates, discs, washers, rings and hemispheres — or more complex custom geometries. Part sizes cover a wide range, from small 0.070" (1.78mm) diameter tubes to plates almost 7" (177.8mm) long. With the ability to hold tight tolerances on dimensions, frequency, capacitance and form (parallelism, perpendicularity, flatness,

concentricity, etc.), Sensor Technology Ltd. can provide consistent, reliable ceramics for the most demanding applications. We have experience with electrode segmentation and wrap-arounds, pre-stressing by fibre-wrapping and shear mode ceramics. Ceramics can also be provided as-fired.



Striped Tube

HARD PZT

Sensor Technology Ltd. offers Navy Type I and III hard ceramics. They are modified lead zirconate titanate compositions with low dielectric loss and excellent piezoelectric properties. These characteristics make them attractive for applications with highly repetitive, quasi-static loads and large mechanical drive amplitudes.

Navy Type I offers a balance between harder PZT materials and softer PZT and therefore can be used in transmit only or transmit receive services.

Two varieties of Navy Type I are offered, BM400 and BM402. Contact our sales staff for guidance on which option is appropriate for your application.

Navy Type III provides the lowest loss factor of Sensor Technology Ltd.'s hard PZT materials and is ideally suited for transmit applications with high power output and demanding duty cycles. Two varieties of Navy type II are offered, BM800 and BM802. Contact our sales team for guidance on which option is appropriate for your application.

SOFT PZT

Sensor Technology Ltd. manufactures soft Navy Type II, V and VI ceramics as BM500, BM527 and BM532 respectively. They are modified lead zirconate titanate compositions with high coupling coefficients and piezoelectric charge coefficients and are generally used in passive devices (e.g. hydrophones) or devices which require large static displacements.

BM527 and BM532 are softer versions of BM500 and offer significant increases in their dielectric and d constants. They are ideally suited for actuator applications requiring large mechanical displacements.

LEAD TITANATE

Sensor Technology Ltd.'s BM300 is a modified lead titanate composition with very high anisotropy in its piezoelectric properties. It has negligible transverse coupling and therefore has a large hydrostatic response. BM300 has been well received when used in specialized sensor designs that take advantage of its unique properties.



Ceramic Washer

Whether you are looking for a new piezoelectric ceramic supplier, a secondary source for your production requirements or an experienced team to provide a unique solution, Sensor Technology Ltd. can deliver. Call or email to discuss your requirements.



PIEZOELECTRIC MATERIAL SPECIFICATIONS⁴

			Hard PZT				Soft PZT			Lead Titanate
	Symbols	Units	BM400	BM402	BM800	BM802	BM500	BM527	BM532	BM300
			Navy Type I	Navy Type I	Navy Type III	Navy Type III	Navy Type II	Navy Type V	Navy Type VI	
Electrical¹										
Relative Dielectric Constant	K_{33}^r	—	1350	1340	1000	1100	1750	2750	3250	200
Dissipation Factor	Tan δ	%	0.4	0.4	0.3	0.3	1.6	2.0	2.0	2.0
Piezoelectric										
Coupling Factor	k_p	—	0.60	0.60	0.50	0.55	0.62	0.62	0.65	0.05
	k_{31}	—	0.35	0.35	0.30	0.32	0.37	0.37	0.39	0.03
	k_{33}	—	0.70	0.68	0.64	0.66	0.72	0.72	0.75	0.51
Charge Constant	d_{31}^t	10 ⁻¹² C/N	-125	-135	-85	-105	-175	-215	-270	-3
	d_{33}^t	10 ⁻¹² C/N	300	300	225	240	400	500	590	70
Voltage Constant	g_{31}	10 ⁻³ V•m/N	-10.5	-10.5	-10.5	-10.5	-11.5	-9.5	-9.0	-2.0
	g_{33}	10 ⁻³ V•m/N	25	25	26	25	25	22	20	35
Mechanical Quality Factor	Q_M	—	500	500	1000	1000	80	70	70	800
Frequency Constants ²	N_p	Hz•m	2150	2140	2350	2300	2050	2050	2000	2700
	N_1	Hz•m	1650	1550	1700	1770	1400	1400	1425	2100
	N_4	Hz•m	1900	1890	2000	1900	1800	1850	1850	2200
Mechanical										
Compliance	S_{11}^E	10 ⁻¹² m ² /N	12.5	12.7	11.0	10.5	15.5	14.5	14.0	7.2
	S_{33}^E	10 ⁻¹² m ² /N	15.0	15.7	13.5	13.6	19.0	19.5	20.0	9.0
Density	ρ	g/cm ³	7.5	7.6	7.6	7.6	7.6	7.6	7.6	6.7
Curie Temperature	T_C	°C	350	330	325	320	360	225	210	225
Ageing Characteristics 3 (% change/time decade)										
Coupling Factor	k_p	—	-2.5	-2.0	-2.5	-2.5	-0.5	-1.0	-1.0	-0.5
Relative Dielectric Constant	K_{33}^r	—	-6.0	-4.0	-6.0	-5.0	-1.0	-1.0	-1.0	-1.5
Frequency Constant	N_4	Hz•m	1.5	1.5	1.5	1.3	0.5	1.0	1.0	0.8

This table provides a quick comparison of the electrical and physical properties of Sensor Technology's piezoelectric materials.

Measurement of Material Constants

- 1) Low field parameters measured at 1kHz
- 2) N_p - Planar
 N_1 - Longitudinal
 N_4 - Thickness

- 3) Reference point of time: 24 hours after polarization
- 4) All values are average nominal values. Actual production values vary.

