

PIEZOELECTRIC SINGLE-CRYSTAL MATERIALS

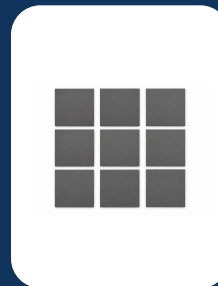
Mn:PIN-PMN-PT Single Crystal

Low-loss, high-stability single crystals for demanding transducer and electromechanical systems

Mn:PIN-PMN-PT (Mn:PIMNT) single crystals are Mn-doped relaxor-based piezoelectric materials with low dielectric loss, elevated coercive field and high temperature capability. They support demanding transducer, sensing, actuation and research programs where stable operation is important.

KEY FEATURES

- Low dielectric loss
- Elevated coercive field
- High temperature capability
- (001) and (011) cut availability
- Custom dimensions and geometries
- High mechanical quality factor (Q_m)



TYPICAL APPLICATIONS

Medical Ultrasound

Specialty transducer development

NDT & Ultrasonics

Industrial inspection systems

Sensors

Stable electromechanical sensing

Actuators

High-stability actuation

Advanced R&D

Prototype and evaluation

Mn:PIN-PMN-PT Single Crystal

PRODUCT DATASHEET

SPECIFICATION RANGES - (001)-CUT / <001>-POLED

TYPE I

Lower PT-content Mn-doped range with low dielectric loss and elevated coercive field.

TYPE II

Higher PT-content Mn-doped range combining strong coupling with high temperature capability.

Property	Unit	Type I	Type II
PT content	-	Lower PT	Higher PT
Relative dielectric constant, ϵ_r	-	3000-3700	3500-5500
Dielectric loss, $\tan\delta$	%	<0.40	<0.40
Piezoelectric constant d_{33}	pC/N	900-1200	1100-1700
Piezoelectric constant d_{32}	pC/N	-(500-800)	-(700-900)
Electromechanical coupling factor k_{33}	-	0.86-0.91	0.88-0.92
Phase transition temperature T_{rt}	°C	118-130	100-120
Curie temperature T_c	°C	155-170	170-210
Coercive field E_c	kV/cm	5.5-6.0	5.5-6.5
Mechanical Quality Factor Q_m	-	~400-800	~400
Density	g/cm ³	8.12	8.12

~ indicates approximate value

INTERPRETATION NOTE

Values shown are specification ranges intended for preliminary material selection. Final order specifications and acceptance criteria are subject to quotation and technical agreement. Performance can depend on composition, crystallographic orientation, poling configuration, geometry, processing and test conditions.

(011)-Cut Is Also Available for Mn:PIMNT

The current specification lists piezoelectric constants d_{33} and d_{32} , electromechanical coupling factor k_{32} and T_c for the (011)-cut. Additional mode-specific data can be added when confirmed.

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(011)-CUT PERFORMANCE, PROCESSING & RFQ

PRODUCT DATASHEET

(011)-CUT SPECIFICATION RANGES

Main performance currently specified for (011)-cut

Property	Type I	Type II
Dielectric constant, ϵ_r	2200-3000	2800-4500
Piezoelectric constant d_{33} (pC/N)	600-800	800-1100
Piezoelectric constant d_{32} (pC/N)	-(800-1200)	-(1200-1600)
Electromechanical coupling factor k_{32}	0.86-0.89	0.87-0.92
Curie temperature T_c (°C)	150-175	170-200

AVAILABLE FORMS & PROCESSING

Cuts	(001), (011)
Forms	Plates, wafers, rings, rods, custom
Length	1-70 mm
Width	1-30 mm
Thickness	0.1-10 mm
Surface	Fine ground, polished
Electrodes	Silver, gold

High mechanical quality factor: Q_m is listed in the (001)-cut performance table on Page 2.

RFQ CHECKLIST

Information for faster technical review

Material / Grade	Mn:PIN-PMN-PT (Mn:PIMNT); Type I / Type II / Recommend
Cut / Poling	(001), (011); specify direction or request recommendation
Geometry / Dimensions	Plate, wafer, ring, rod or custom; include tolerances
Surface / Electrode	Fine ground or polished; none, silver or gold
Quantity / Volume	Prototype quantity and expected production volume
Application	Ultrasound, NDT, sensor, actuator, R&D; or other
Drawing	Attach when available

Specification ranges are intended for material selection; final order specifications and acceptance criteria are subject to technical agreement.