

PIEZOELECTRIC SINGLE-CRYSTAL MATERIALS

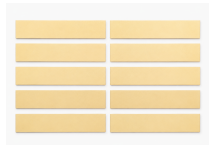
PMN-PT Single Crystal

High piezoelectric response for advanced transducer, sensing and actuation systems

PMN-PT (Lead Magnesium Niobate-Lead Titanate) single crystals provide high piezoelectric response and strong electromechanical coupling. Multiple cuts, poling configurations and processed geometries support work from material evaluation and prototype development through recurring production.

KEY FEATURES

- High piezoelectric response
- High electromechanical coupling
- (001) and (011) cut availability
- Custom dimensions and geometries
- Fine-ground or polished surfaces
- Silver and gold electrode options



TYPICAL APPLICATIONS

Medical Ultrasound

Imaging transducers

NDT & Ultrasonics

Inspection and sensing

Sensors

High-sensitivity detection

Actuators

Precision solid-state motion

Advanced R&D

Prototype and evaluation

TYPE I

Lower PT-content range with high piezoelectric performance and a balanced temperature window.

TYPE II

Higher PT-content range with enhanced piezoelectric response and higher achievable d33 values.

Property	Unit	Type I	Type II
PT content	mol%	28-30	30-34
Relative dielectric constant, ϵ_r	-	4000-5500	5500-10000
Dielectric loss, $\tan\delta$	%	<0.8	<1.0
Piezoelectric constant d_{33}	pC/N	1200-1600	1600-3000
Piezoelectric constant d_{32}	pC/N	-(600-900)	-(800-1100)
Electromechanical coupling factor k_{33}	-	0.88-0.92	0.90-0.94
Phase transition temperature T_{rt}	°C	90-100	80-90
Curie temperature T_c	°C	130-140	140-160
Coercive field E_c	kV/cm	2.0-2.5	2.2-2.8
Mechanical Quality Factor Q_m	-	~100	~60
Density	g/cm ³	8.1	8.1

~ 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 a Core Commercial Configuration

Main (011)-cut performance, including piezoelectric constants d_{32} and d_{15} , is provided on Page 3.

(011)-CUT SPECIFICATION RANGES

Main performance for common (011)-cut configurations

Property	Type I	Type II
Dielectric constant, ϵ_r	2500-4000	3500-5000
Piezoelectric constant d_{33} (pC/N)	700-1100	1100-1800
Piezoelectric constant d_{32} (pC/N)	-(1100-1600)	-(1500-2400)
Piezoelectric constant d_{15} , P//(01-1) (pC/N)	2000-3500	3000-4500
Piezoelectric constant g_{15} , P//(01-1) (10^{-3} Vm/N)	45-55	55-65
Piezoelectric constant d_{15} , P//(11-1) (pC/N)	3000-4500	4000-7000
Piezoelectric constant g_{15} , P//(11-1) (10^{-3} Vm/N)	45-55	55-65
Electromechanical coupling factor k_{32}	0.88-0.90	0.89-0.93
Curie temperature T_c (°C)	130-140	140-160

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

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	PMN-PT; 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.