



## Ferroperm™ Piezoelectric ceramics

# Pz194 Very soft relaxor type PNN-PZT

### A very soft relaxor type PNN-PZT solid solution

Ferroperm P1 94 is a very soft piezoceramic material with very high coupling factors and charge coefficients. The material is specially optimised for applications where high sensitivity, low porosity and small grain-size are required in combination with high reproducibility of the performance from batch to batch.

### Repeatable performance

The main focus through our entire production process is to provide materials and components with the highest possible reproducibility of properties and parameters and to obtain the lowest aging rates in the industry.

Our materials have a variation of  $\pm 5\%$  for all parameters. This reduces the requirements for impedance matching, frequency tuning and dimensioning of the housing meaning fewer rejects and lower costs.

### Customised solutions

We have more than 60 years of experience in the production of advanced piezoelectric ceramics. Our team has extensive expertise in customising designs to match the customer's needs.

Please contact us to discuss your requirements in further detail.

### Key benefits

- Lowest batch to batch variation in the industry
- Stable material with consistent performance
- Customised or standard designs

### Key features

- High sensitivity
- Low porosity
- Small grain size

### Applications

- 1D and 2D medical arrays for imaging systems
- Shear Inkjet print heads
- High precision flow meters

### Contact

#### CTS Ferroperm

Porthusvej 4, DK-3490  
Kvistgaard  
Denmark  
Tel: +45 49 12 71 00

e-mail: [pz@ctscorp.com](mailto:pz@ctscorp.com)

[www.ferropermpiezoceramics.com](http://www.ferropermpiezoceramics.com)



# Pz194 Very soft relaxor type PNN-PZT

## Material properties

Electrical	Symbol	P194
Relative dielectric permittivity at 1 kHz	$K_{33}^T$	4500
Dielectric dissipation factor at 1 kHz	$\tan \delta$	$17 \times 10^3$
Curie temperature	$T_c$	$\sim 185^\circ\text{C}$
Recommended working range	<	$\sim 105^\circ\text{C}$
Electromechanical		
Coupling factors	$k_p$	0.63
	$k_t$	0.50
	$k_{33}$	0.72
Piezoelectric charge coefficient	$d_{33}$	640 pC/N
Mechanical		
Mechanical Quality Factor	$Q_{m,t}^E$	60
Density	$\rho$	7.9 g/cm <sup>3</sup>

Note: Due to continuous process improvement, specifications are subject to change without notice.

Please be aware that extreme dimensions and geometries can lead to exaggeration in tolerances in all materials.

P189 and P194 are a part of a full technology transfer of the Quartz & Selice programme from Saint-Gobain Quartz in 2010