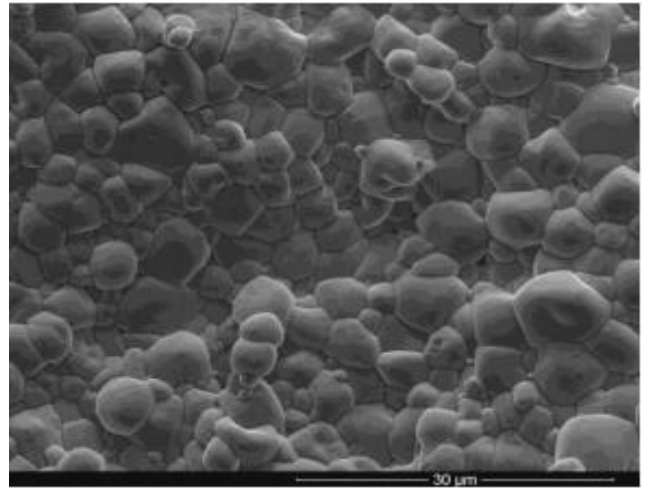


**DATA SHEET**

## HIFU type PZT

### Type Pz52



#### 01 Description

The new Ferroperm Pz50 material series have very high permittivities, high mechanical Qm values, and low dielectric losses. They are therefore the optimum choice for applications, where the highest power levels are required in combination with the smallest possible volume. The materials were developed to meet the challenges dictated by the rapid development in ultrasonic assisted surgery and therapeutics.

##### 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.

#### 02 Key features and benefits

- Lowest batch to batch variation in the industry
- Stable material with consistent performance
- Customised or standard designs
- High operating temperature
- High permittivities
- High mechanical Qm values
- Low dielectric losses

#### 03 Applications

- Highly specialized HIFU transducers
- Ultrasonic assisted surgery and therapeutics

#### 04 Contact

CTS | Ferroperm

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

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

**DATA SHEET**

**HIFU type PZT, Type Pz52**

**05 Material properties**

**Electrical**

Relative dielectric permittivity at 1 kHz  
Dielectric dissipation factor at 1 kHz  
Curie temperature  
Recommended working range

**Symbol**

$K_{33T}$   
 $\tan\delta$   
 $T_C >$   
<

**Pz52**

1900  
 $3 \times 10^{-3}$   
250 °C  
200 °C

**Electromechanical**

Coupling factors

$k_p$   
 $k_t$

0.60  
0.53

Piezoelectric charge coefficient

$d_{33}$   
 $N_t$

420 pC/N  
1960 Hz m

**Mechanical**

Mechanical Quality Factor

$Q_{m,t}^E$

550

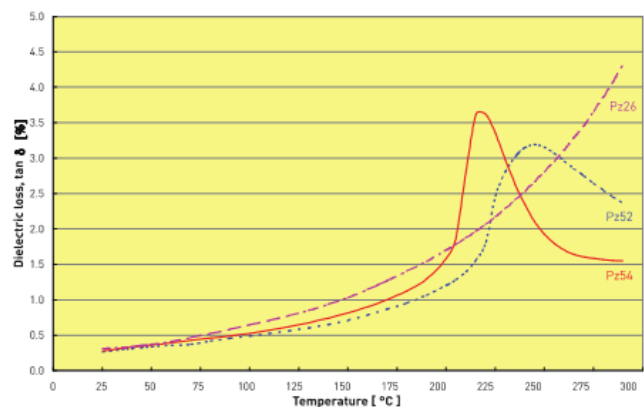
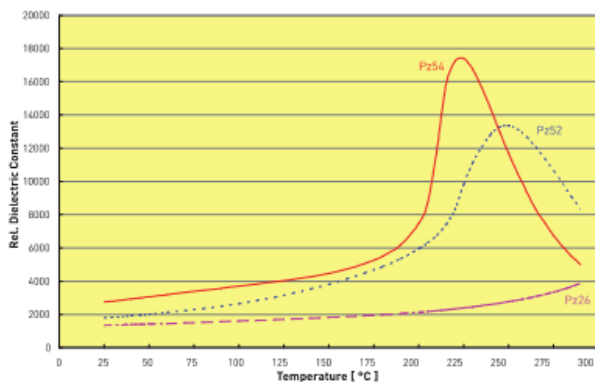
Density

$\rho$

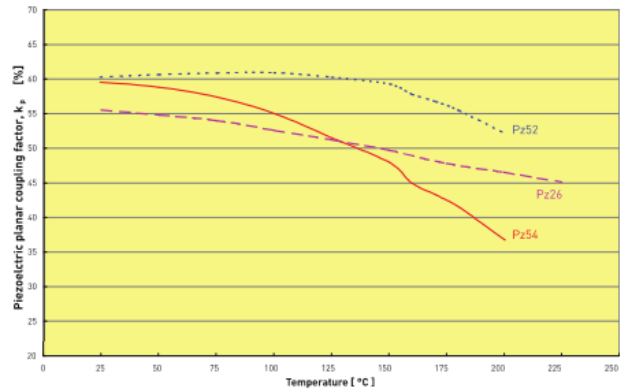
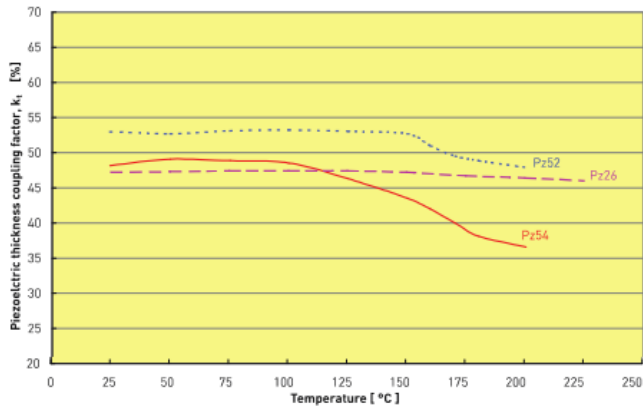
7.3 g/cm<sup>3</sup>

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.

**06 Technical performance**



Temperature dependence of the free dielectric constant,  $\epsilon_r$ , (left) and dielectric loss tangent,  $\tan\delta$ , (right) of Pz52 and Pz54 in comparison with a traditional Type 100 high-power material (Pz26). A very moderate and linear increase in both parameters can be observed in the recommended working range from room temperature to 180-200°C. It is worth noting, that  $\tan\delta$  for both Pz52 and Pz54 is lower than in Pz26 at temperatures as high as 200°C



Temperature dependence of the thickness coupling constant  $k_t$  (left) and planar coupling constant  $k_p$  (right) in Pz52 and Pz54 in comparison with a traditional Type 100 high-power material (Pz26). The coupling coefficients are very stable, and at high level within the entire recommended temperature range from room temperature to 180-200°C.