

Piezoelectric thin films

General features

- Piezoelectric thin films applicable on metallic sheets consisting of $\text{Pb}(\text{Ti},\text{Zr})\text{O}_3$ compositions
- Applications:
 - Switches
 - Sensors with and without proximity function for automotive interior, white goods, machines

Physical properties

- Dielectric properties
 - Permittivity: $\epsilon_{33} \approx 400$
 - $\tan \delta$: 0,001
- Piezoelectric properties
 - remanent polarization of $30 \mu\text{C}/\text{cm}^2$
 - piezoelectric modulus $d_{33} 60 \text{ pC}/\text{N}$
- Mechanical properties
 - $2 \mu\text{m}$ thick piezoelectric film on $10 - 400 \mu\text{m}$ thick stainless steel substrates, area up to $150 \times 200 \text{ mm}^2$
- Life time/ fatigue
tested lifetime 10^7 cycles at 0,12 % strain, 1 Hz, room temperature

Characterization methods

- Electrical properties
- Piezoelectric properties
- Adhesion on the substrates by cross cut/tape test according to DIN EN ISO 2409

Advantages

- capable of being applicable or integrated
- robust
- non corrosive
- low cost ($10 \text{ ct}/100 \text{ mm}^2$)
- large areas ($\sim \text{m}^2$), thin ($\sim 0,1 \text{ mm}$)