Round Piezoelectric Chip
200 V, 3.3 µm Travel

PA25LE

Description

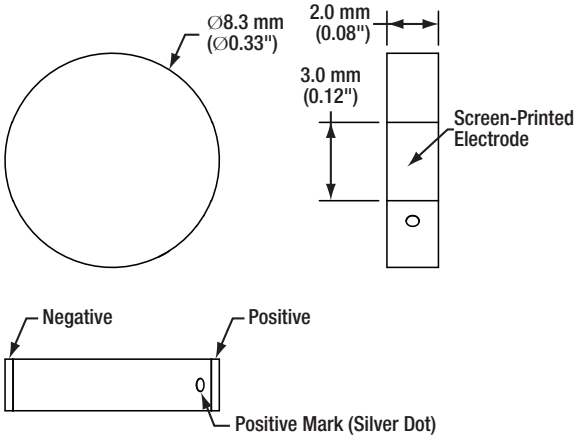
The PA25LE round piezoelectric chip has an 8.3 mm diameter. It consists of a series of stacked piezoelectric ceramic layers, each possessing screen-printed electrodes. The printed layers are isostatically pressed to form the chip. The electrodes are electrically in parallel, and the PA25LE provides a maximum displacement of 3.3 µm ± 15%. A silver dot is located next to the electrode that should receive the positive bias; the other electrode should be grounded. The electrodes are bare.

Specifications

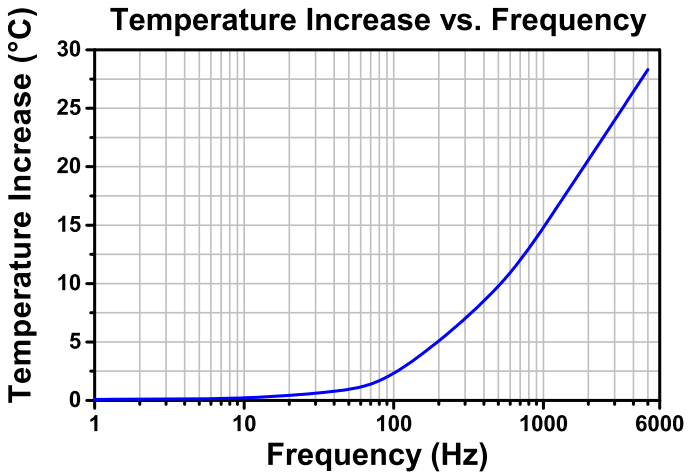
PA25LE[a]	
Drive Voltage Range	0 to 200 V
Displacement (Free Stroke) at 150 V[b]	3.0 µm ± 15%
Displacement (Free Stroke) at 200 V[b]	3.3 µm ± 15%
Hysteresis	<15% (See Graphs on Next Page)
Load for Maximum Displacement[c]	720 N (162 lbs)
Blocking Force at 150 V	1800 N (405 lbs)
Resonant Frequency	235 kHz (No Load)
Impedance at Resonant Frequency	150 mΩ
Anti-Resonant Frequency	300 kHz
Dissipation Factor[d]	<2.0%
Capacitance[d]	580 nF ± 15%
Operating Temperature	-25 to 130 °C
Curie Temperature	230 °C
External Electrodes	Screen-Printed Silver
Dimensions	Diameter : 8.3 mm ± 0.1 mm Length: 2.0 mm ± 5 µm

a. All specifications are quoted at 25 °C, unless otherwise stated.
b. The "free stroke" displacement corresponds to no load.
c. Displacement varies with loading. When used with this load, these chips achieve the maximum displacement, which is larger than the free stroke displacement.
d. Specified at 1 kHz, 1 V_{RMS}.

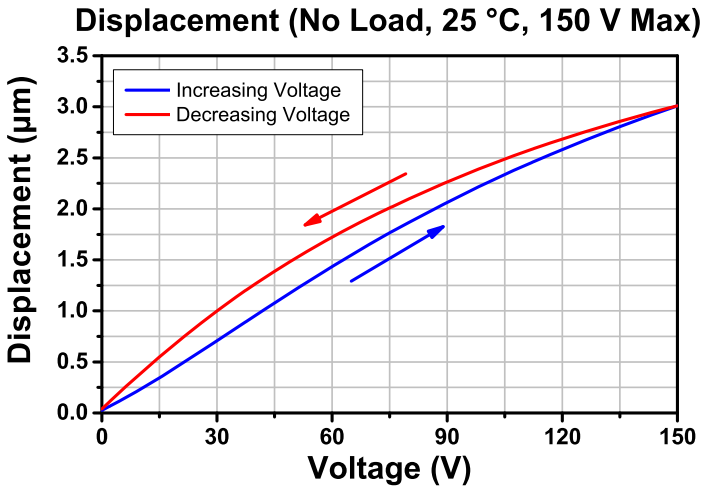
Drawing

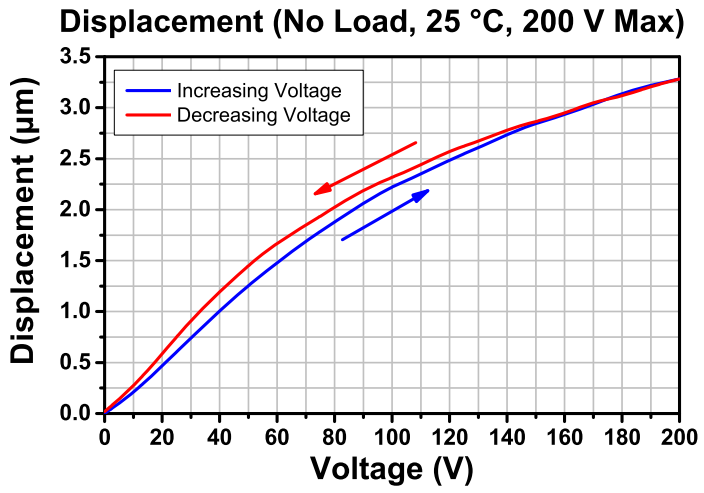


Typical Performance Plots



The temperature increase of the chip was measured after applying a sine wave driving voltage, with maximum and peak-to-peak amplitudes of 150 V, at the specified frequency for 10 minutes.





Operation

Electrical Considerations

- The electrode closest to the silver dot should be positively biased, and the opposite electrode should be grounded. The maximum drive voltage is 200 V. Exceeding 200 V will decrease the device's lifespan and may cause mechanical failure. Reverse biasing the device may cause mechanical failure.
- When soldering wires to the electrodes, use a temperature no greater than 370 °C (700 °F) for a maximum of 2 seconds per spot. Solder to the middle of the electrode, keeping the spot as small as possible.
- **Caution:** After driving, the piezo is fully charged. Directly connecting the positive and negative electrodes has the risk of electricity discharging, spark, and even failure. We recommend using a resistor (>1 kΩ) between the electrodes to release the charge.

Attaching Devices to the Piezoelectric Chip

- Any epoxy which cures at a temperature lower than 80 °C is safe to use. We recommend Thorlabs Item Numbers 353NDPK or TS10. Loctite Hysol 9340 is also acceptable.
- Loads should only be attached to the central area of the largest face since the edges do not translate. Attaching a load to the smaller faces may lead to mechanical failure.

Storage Instructions

- Do not store the device at temperatures above 80 °C.
- Do not store the device in humid environments. The relative humidity (RH) should be less than 40%.
- Do not immerse the device in organic solvents.
- Do not use the device around combustible gases or liquids.