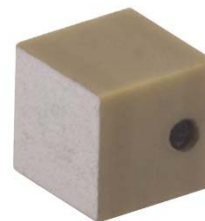


PA4CE



Description

The PA4CE piezoelectric chip consists of stacked piezoelectric ceramic layers (which are mechanically in series) that are sandwiched between interdigitated electrodes (which are electrically in parallel). It offers a maximum displacement of $2.0 \mu\text{m} \pm 15\%$. A black dot is located next to the electrode that should receive positive bias; the other electrode should be grounded. The electrodes are bare.

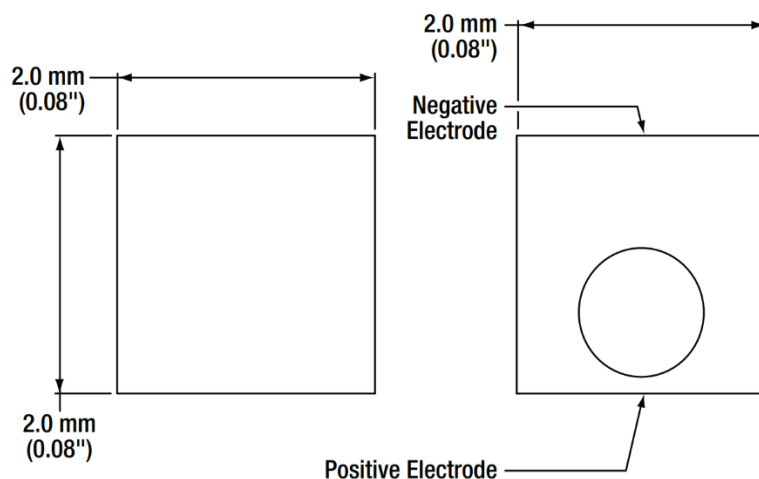
Specifications

| PA4CE ^a | |
|-------------------------------------|--|
| Drive Voltage Range | 0 - 150 V |
| Displacement (Free Stroke) at 150 V | $2.0 \mu\text{m} \pm 15\%$ |
| Hysteresis | <15% (See Graph on Next Page) |
| Load (Recommended) | 65 N (15 lbs) |
| Blocking Force at 150 V | 160 N (36 lbs) |
| Resonant Frequency | 560 kHz (No Load) |
| Impedance at Resonant Frequency | 780 m Ω |
| Anti-Resonant Frequency | 730 kHz |
| Dissipation Factor | <2.0% |
| Capacitance | 22 nF $\pm 15\%$ |
| Operating Temperature | -25 to 130 °C |
| Curie Temperature | 230 °C |
| External Electrodes | Screen-Printed Silver |
| Dimensions | Width 1: 2.0 mm ± 0.1 mm Width 2: 2.0 mm ± 0.1 mm Length: 2.0 mm $\pm 5 \mu\text{m}$ |



a. All specifications are quoted at 25 °C, unless otherwise stated.

Drawing

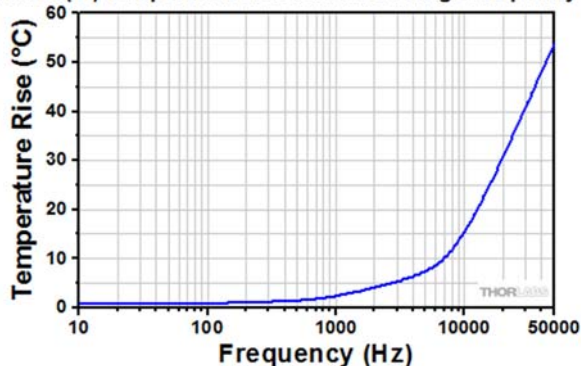


July 10, 2020

CTN002579-S01, Rev B

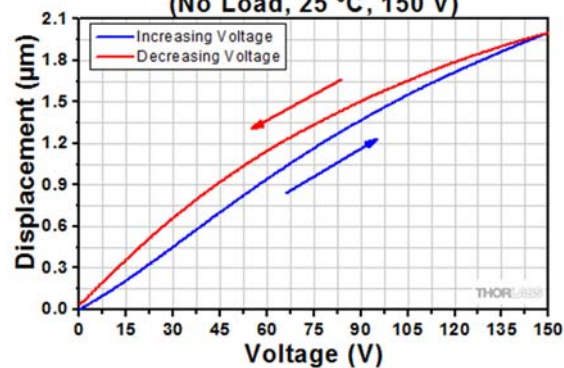
Typical Performance Plots

PA4CE(W) Temperature Rise vs. Drive Voltage Frequency



These temperature rises were measured after applying a sine-wave drive voltage ranging from 0 to 150 V at the specified frequency for 10 minutes.

PA4CE(W) Displacement
(No Load, 25 °C, 150 V)



Operation

Electrical Considerations

- The electrode closest to the black dot should be positively biased, and the opposite electrode should be grounded. The maximum drive voltage is 150 V. Exceeding 150 V will decrease the device's lifespan and may cause mechanical failure. Reverse biasing 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 Piezo

- 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 usable.
- 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.