Piezoelectric Chip with Wires, 45 V, 2.0 µm Travel

PA1CEW

Description

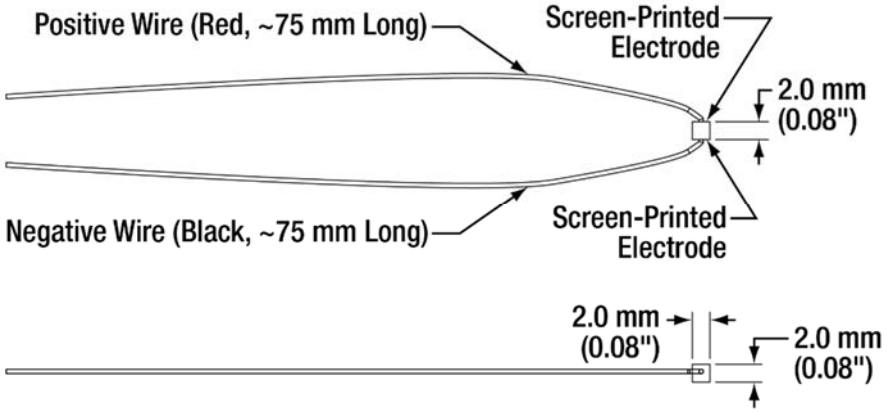
The PA1CEW piezoelectric chip consists of stacked piezoelectric ceramic layers (which are mechanically in series) that are sandwiched between interdigitated electrodes (which are electrically in parallel). It offers a maximum displacement of 2.0 µm ± 15%. A red wire is attached to the electrode that should receive positive bias, and a black wire is attached to the electrode that should be grounded.

Specifications

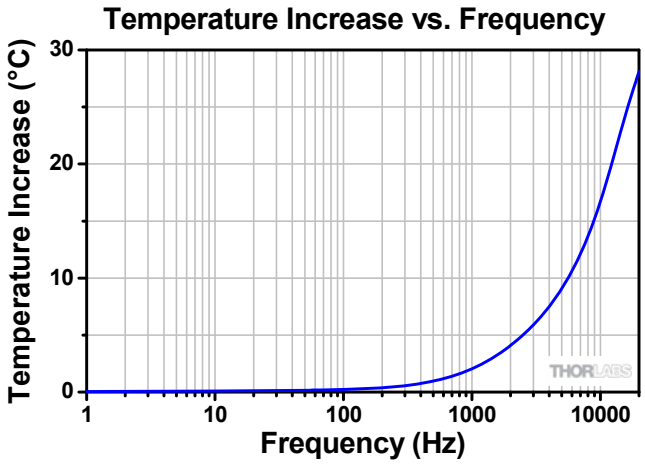
PA1CEW[a]	
Drive Voltage Range	0 to 45 V
Displacement (Free Stroke) at 45 V	2.0 µm ± 15%
Hysteresis	<15% (See Graph on Next Page)
Load for Maximum Displacement[b]	65 N (15 lbs)
Blocking Force at 45 V	160 N (36 lbs)
Resonant Frequency	540 kHz (No Load)
Impedance at Resonant Frequency	400 mΩ
Anti-Resonant Frequency	705 kHz
Dissipation Factor[c]	<4.0%
Capacitance[c]	215 nF ± 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 Height: 2.0 mm ± 5 µm

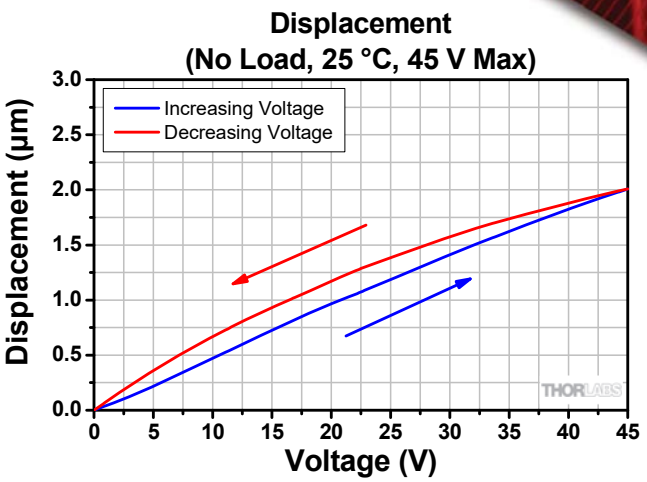
a. All specifications are quoted at 25 °C, unless otherwise stated.
b. The displacement may vary slightly for different loads, and the maximum displacement occurs when the load for maximum displacement is used.
c. Specified at 1 kHz, 1 V_{RMS}

Drawing



Typical Performance Plots





These temperature rises were measured after applying a sine-wave drive voltage ranging from 0 to 45 V at the specified frequency for 10 minutes.

Operation

Electrical Considerations

- The electrode attached to the red wire should be positively biased, and the electrode attached to the black wire should be grounded. The maximum drive voltage is 45 V. Exceeding 45 V will decrease the device's lifespan and may cause mechanical failure. Reverse biasing may cause mechanical failure.
- If it becomes necessary to reattach the wires to the electrodes, use a soldering iron at 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 red and black wires has the risk of electricity discharging, spark, and even failure. We recommend using a resistor (>1 kΩ) between the wires 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 # 353NDPK or TS10. Loctite Hysol 9340 is also usable.
- Loads should only be attached to the central area of the chip face since the edges do not translate. Attaching a load to the non-translating 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.