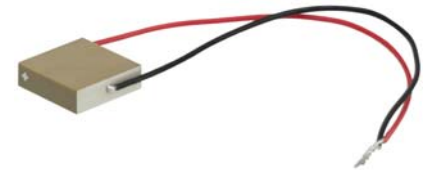


Piezoelectric Chip with Wires, 150 V, 3.5 μm Travel

PA4HKW

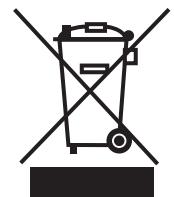


Description

The PA4HKW piezoelectric chip 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 PA4HKW offers a maximum displacement of $3.5 \mu\text{m} \pm 15\%$. A red wire is located next to the electrode that should receive positive bias; the other electrode should be grounded.

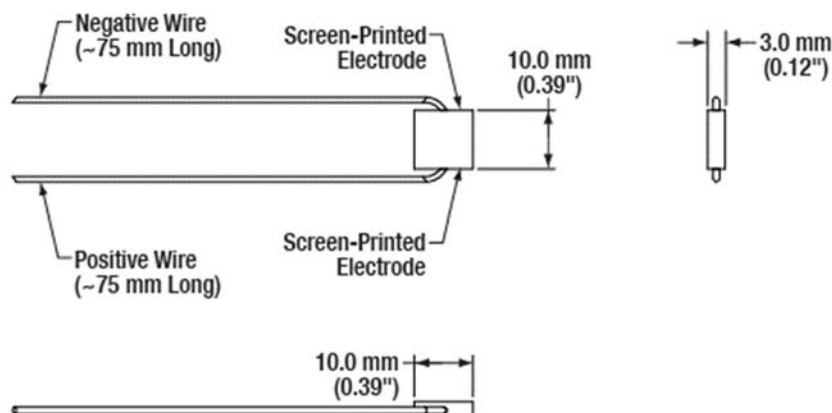
Specifications

PA4HKW ^a	
Drive Voltage Range	0 to 150 V
Displacement (Free Stroke) at 150 V	$3.5 \mu\text{m} \pm 15\%$
Hysteresis	<15% (See Graph on Next Page)
Load (Recommended) ^b	1600 N (360 lbs)
Blocking Force at 150 V	4000 N (900 lbs)
Resonant Frequency	160 kHz (No Load)
Impedance at Resonant Frequency	70 m Ω
Anti-Resonant Frequency	200 kHz
Dissipation Factor	<2.0%
Capacitance	$1.2 \mu\text{F} \pm 15\%$
Operating Temperature	-25 to 130 °C
Curie Temperature	230 °C
External Electrodes	Screen-Printed Silver
Dimensions	Width 1: 10.0 mm \pm 0.1 mm Width 2: 10.0 mm \pm 0.1 mm Length: 3.0 mm \pm 5 μm



- All specifications are quoted at 25 °C, unless otherwise stated.
- Displacement may vary slightly with load. Maximum displacement occurs with the recommended load.

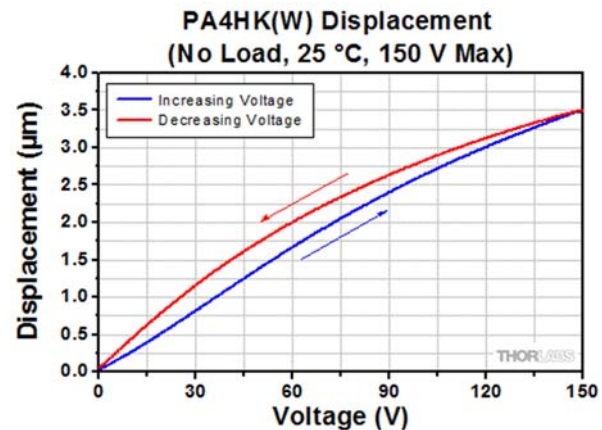
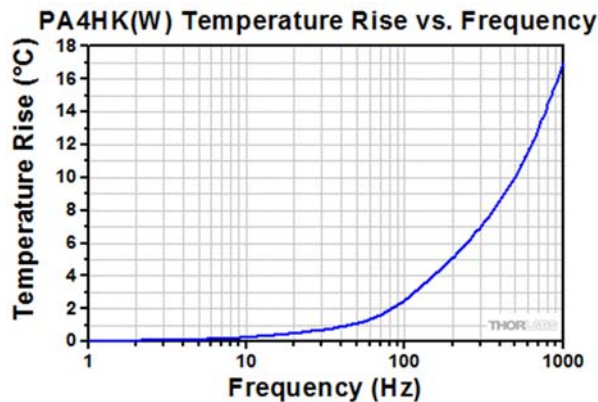
Drawing



July 10, 2020

CTN003180-S01, Rev B

Typical Performance Plots



The temperature increase of the chip was measured after applying a sine-wave drive voltage, with maximum and peak-to-peak amplitudes of 150 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 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 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 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.