

PA44M3K



Description

The PA44M3K piezoelectric ring chip has a 15.0 mm outer diameter and a 9.0 mm inner 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 PA44M3K provides a maximum displacement of $3.9 \mu\text{m} \pm 15\%$. A silver dot is located next to the electrode that should receive positive bias; the other electrode should be grounded. The electrodes are bare.

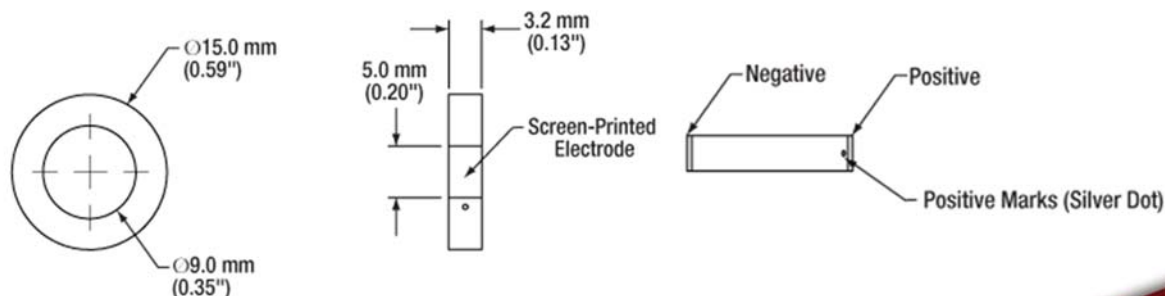
Specifications

PA44M3K ^a	
Drive Voltage Range	0 - 150 V
Displacement (Free Stroke) at 150 V ^b	$3.9 \mu\text{m} \pm 15\%$
Hysteresis	<15% (See Graph on Next Page)
Load for Maximum Displacement ^c	1810 N (406 lbs)
Blocking Force at 150V	4520 N (1015 lbs)
Resonant Frequency	260 kHz (No Load)
Impedance at Resonant Frequency	100 m Ω
Anti-Resonant Frequency	485 kHz
Dissipation Factor ^d	<2.0%
Capacitance ^d	$2.2 \mu\text{F} \pm 15\%$
Operating Temperature	-25 to 130 °C
Curie Temperature	230 °C
External Electrodes	Screen-Printed Silver
Dimensions	Outer Diameter: 15.0 mm \pm 0.1 mm Inner Diameter: 9.0 mm \pm 0.1 mm Length: 3.2 mm \pm 5 μm

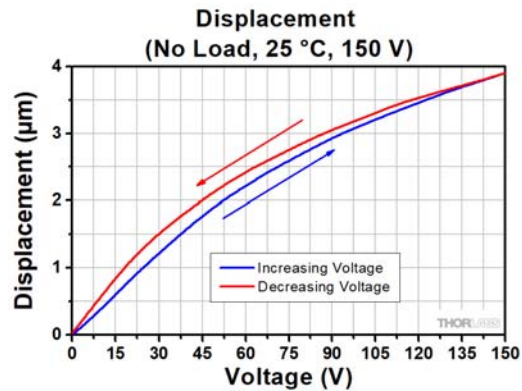
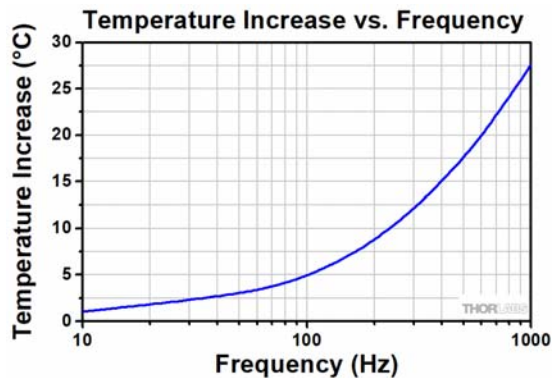


- All specifications are quoted at 25 °C, unless otherwise stated.
- The "free stroke" displacement corresponds to no load.
- Displacement varies with loading. When used with this load, these chips achieve the maximum displacement, which is larger than the free stroke displacement.
- Specified at 1 kHz,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

Drawing



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 closest to the silver dot should be connected to the output port or positive pole of a driver or controller or amplifier, 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 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 (>10 kΩ) between the electrodes to release the charge.

Attaching Devices to the Piezo

- Any epoxy that cures at a temperature lower than 80 °C is safe to use. We recommend Thorlabs Item #s 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.