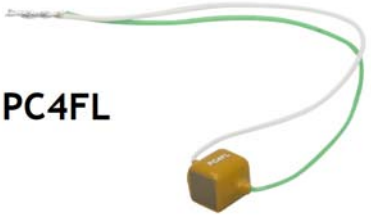
Co-fired Stacks, 150 V, 4.6 µm Travel



Description

The PC4FL co-fired stack consists of a series of stacked piezoelectric ceramic layers separated by electrodes that extend across the full surface of layer. The entire stack is sintered as a single unit. This construction provides a free stroke displacement significantly larger than discrete piezo stacks, which are constructed of piezo chips epoxied together. As the electrodes span the entire surface of the piezoelectric layers, the entire surface is active and responds to the driving voltage.

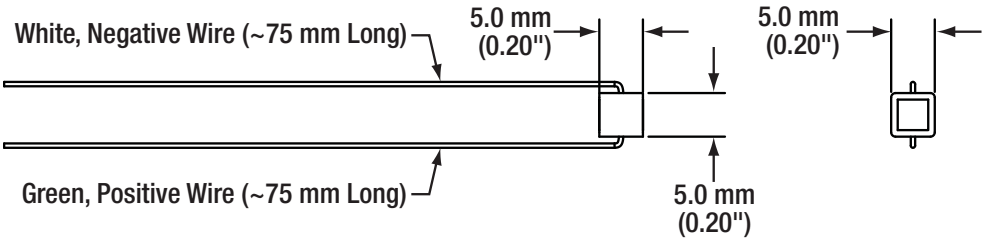
The PC4FL offers a maximum displacement of 4.6 µm ± 15%. A green wire is soldered to the electrode that should receive positive bias; the other electrode should be grounded.

Specifications

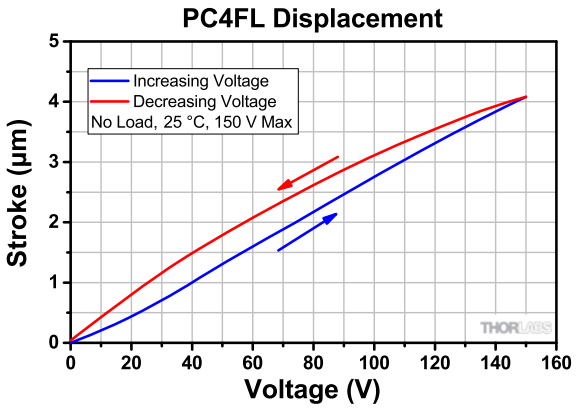
PC4FL[a]	
Drive Voltage Range	0 to 150 V
Displacement (Free Stroke) at 150 V[b]	4.6 µm ± 15%
Hysteresis	≤15% (See Graph on Next Page)
Recommended Preload	<200 N (45 lbs)
Load for Maximum Displacement[c]	200 N (45 lbs)
Blocking Force at 150V	500 N (110 lbs)
Resonant Frequency	240 kHz ± 10% (No Load)
Impedance at Resonant Frequency	900 mΩ
Anti-Resonant Frequency	335 kHz
Dissipation Factor[d]	<2.0%
Capacitance[d]	125 nF ± 15%
Operating Temperature	-25 to 110 °C
Curie Temperature	230 °C
Dimensions	Width 1: 5.0 mm + 0/-0.5 mm Width 2: 5.0 mm + 0/-0.5 mm Length: 5.0 mm ± 5 µm

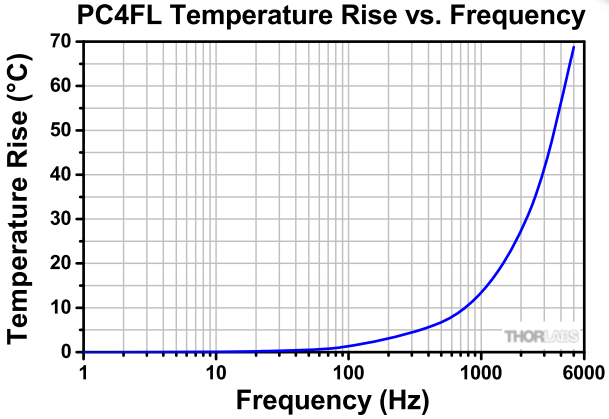
a. All specifications are quoted at 25 °C, unless otherwise stated.
b. The "free stroke" displacement corresponds to no load.
c. The displacement may vary slightly for different loads, and the maximum displacement occurs when the load for maximum displacement is used.
d. Specified at 1 kHz, 1 V_{RMS}.

Drawing



Typical Performance Plots





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

Operation

Electrical Considerations

- The electrode attached to the green wire should be connected to positive (+) drive voltage, and the opposite electrode attached to the white 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 the device may cause mechanical failure.
- After driving, the piezo is fully charged. Directly connecting the green and white wires has the risk of electricity discharging, spark, and even failure. We recommend using a resistor (>1 kΩ) between the green and white wires to release the charge.
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Attaching Devices to the Piezo Stack

- Any epoxy which 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 acceptable.
- Loads should only be attached to the uncoated faces, sine the polymer-coated faces do not translate. Attaching a load to the coated faces may lead to mechanical failure.

Storage Instructions

- Do not store the device at temperatures above 110 °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.