

# PL022 · PL033 · PL055 PICMA® Chip Actuators

## Miniature Multilayer Piezo Stack Actuators



PICMA® chip miniature piezo actuators are the smallest ceramic encapsulated multilayer piezo actuators available, paper clip for size comparison

- Superior Lifetime Even Under Extreme Conditions
- Ultra-Compact: from 2 x 2 x 2 mm
- Ideal for Dynamic Operation
- Sub-Millisecond Response
- Sub-Nanometer Resolution
- Vacuum Compatible to 10<sup>9</sup> hPa
- High Humidity Resistance

### Smallest Dimensions – High Performance

PICMA® Chip actuators sized from 2 x 2 x 2 mm are the smallest monolithic multilayer piezo stack actuators available. Providing sub-nanometer resolution and sub-millisecond response, they are ideally suited to high-level dynamic applications.

### New Production Process, Optimized Piezo Ceramics

PICMA® actuators are made from a ceramic material in which the piezoceramic proper-

#### Application Examples

- Static and dynamic precision positioning
- Laser tuning
- Micro-dispensing
- Metrology / Interferometry
- Life science, Biotechnology
- Photonics

ties such as stiffness, capacitance, displacement, temperature stability and lifetime are optimally combined. Thus the actuators accomplish sub-nanometer resolution in positioning and sub-millisecond response!

### Increased Lifetime Through Humidity Resistance

The monolithic ceramic-encapsulated design provides better humidity protection than polymer-film insulation. Diffusion of water molecules into the insulation layer is greatly reduced by the use of cofired, outer ceramic encapsulation. Due to their high resonant frequency the actuators are suitable for highly dynamic applications with small loads; depending on the load an external preload for dynamic applications is recommended. The high Curie temperature of 320 °C gives PICMA® actuators a usable temperature range extending up to 150 °C, far beyond 80 °C as is common for conventional mul-

tilayer actuators. With conventional multilayer actuators, heat generation – which is proportional to operating frequency – either limits the operating frequency or duty cycle in dynamic operation, or makes ungainly cooling provisions necessary. At the low end, operation down to a few Kelvin is possible (with reduction in performance specifications).

### Optimum UHV Compatibility – Minimum Outgassing

The lack of polymer insulation and the high Curie temperature make for optimal ultra-high-vacuum compatibility (high bakeout temperatures, up to 150 °C).

### Piezo Drivers, Controllers & High-Voltage Amplifiers

High-resolution amplifiers and servo-control electronics, both digital and analog, are described in the “Piezo Drivers / Servo Controllers” section.

### Technical Data / Product Order Numbers

Order number*	Dimensions A x B x TH in mm	Nominal displacement [µm @ 100 V] ±20 %	Blocking force [N]	Electrical capacitance [nF] ±20 %	Resonant frequency [kHz]
PL022.30	2 x 2 x 2	2.2	>120	25	>300
PL033.30	3 x 3 x 2	2.2	>300	80	>300
PL055.30	5 x 5 x 2	2.2	>500	250	>300

\* For optional PTFE insulated wire leads change order number extension to .x1 (e.g. PL022.31)

Resonant frequency at 1 V<sub>pp</sub>, unloaded, free at both sides. The value is halved for unilateral clamping

Capacitance at 1 V<sub>pp</sub>, 1 kHz

Operating voltage: -20 to +100 V

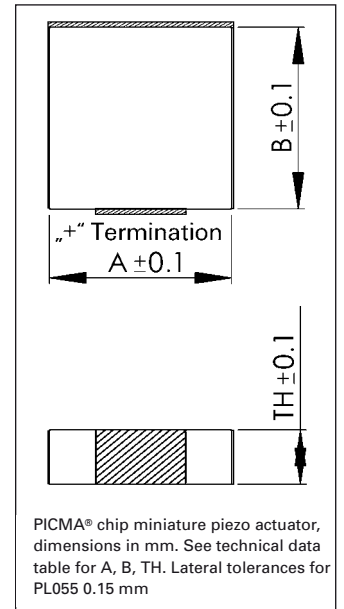
Operating temperature range: 150 °C

Standard electrical interfaces: Solderable pads

Other specifications on request.

Recommended preload for dynamic operation: 15 MPa

Maximum preload for constant force: 30 MPa



PICMA® chip miniature piezo actuator, dimensions in mm. See technical data table for A, B, TH. Lateral tolerances for PL055 0.15 mm