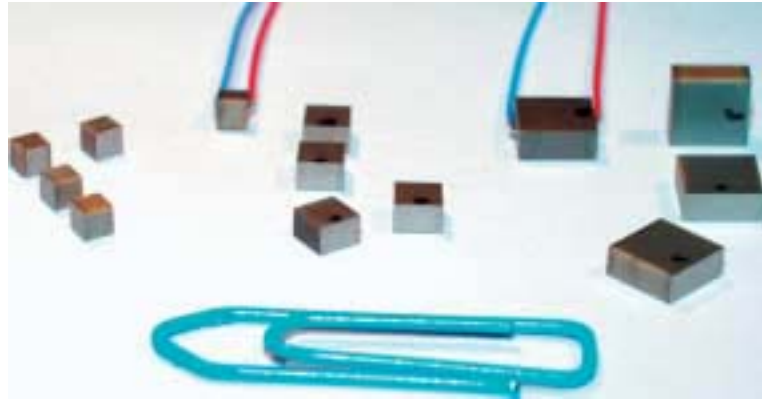


PL022

PL033

PL055

## PICMA™ Chip Monolithic Multilayer Piezo Actuators



PICMA™ Chip actuators are the smallest ceramic-insulated multilayer piezo actuators available. Standard cross-sections range from 2x2 to 5x5 mm<sup>3</sup>.

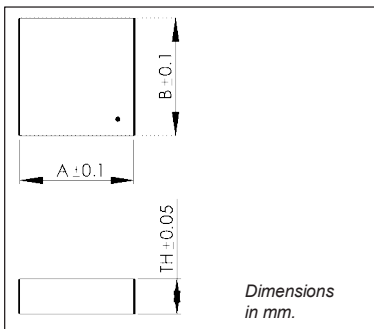
### Application Examples

- Static and Dynamic NanoPositioning
- Laser Tuning
- Micro-dispensing
- Interferometry
- Life Sciences
- Photonics

**Ceramic Insulation for Extended Lifetime Ultra-Compact from 2x2x2 mm<sup>3</sup>**  
**High Curie Temperature Ideal for Dynamic Operation**  
**Sub-Millisecond Response / Sub-Nanometer Resolution**  
**UHV Compatible to 10<sup>-9</sup> hPa**  
**Superior Lifetime Even Under Extreme Conditions**

### Ultra-Compact Monolithic Piezo Actuators

PICMA™ Chip actuators are the smallest monolithic multilayer piezo actuators available. Providing sub-nanometer resolution and sub-millisecond response, they are ideally suited to high-level dynamic applications. PICMA™ actuators consist of a highly reliable ceramic-insulated PZT block (made of ~ 50 μm layers) with solderable terminations, and come in standard sizes as small as 2x2x2 mm<sup>3</sup>.



### Optimized PZT Ceramics, Humidity Resistance

PICMA™ actuators are made from a ceramic material in which the piezoceramic properties such as stiffness, capacitance, displacement, temperature stability, leakage current and lifetime are optimally combined. The monolithic, ceramic-insulated design makes polymer-film insulation unnecessary. Diffusion of water molecules into the insulation layer, the major cause of dielectric breakdown, is greatly reduced by the use of cofired outer ceramic insulation.

### Long Lifetime and High Performance—Ideal for Dynamic Operation

PICMA™ Chip actuators are superior to conventional actuators in high-endurance situations, where they show substantially longer lifetimes both in static and dynamic operation, even in harsh environments. Due to their high resonant frequency, these actuators are ideally suited for dynamic operation with light loads; an external preload is

recommended for dynamic operation with larger loads. The high Curie temperature of 320 °C provides a usable temperature range extending up to 150 °C, well above the 80 °C limit of conventional multilayer actuators. At the low end, operation down to a few kelvin is possible. (with some reduction in performance specifications).

### Optimum UHV Compatibility—Minimal Outgassing

The lack of polymer insulation and the high Curie temperature make for optimal ultra-high-vacuum compatibility (no measurable outgassing / high bakeout temperatures of up to 150 °C).

### Amplifiers, Drivers & Controllers

PI offers a wide range of control electronics for piezo actuators (see page 28 and [www.pi.ws](http://www.pi.ws)) from low-power drivers to multi-channel, closed-loop, digital controllers. Of course, PI also designs custom amplifiers and controllers.

### Technical Data / Ordering Numbers

Ordering Number*	Dimensions A x B x TH in mm	Displacement [μm ±20% @ 100V]	Blocking Force [N]	Electrical Resonant Capacitance [nF ±20%]	Resonant Frequency [kHz]
PL022.30	2 x 2 x 2	2.2	> 250	25	> 300
PL033.20**	3 x 3 x 2	2.2	> 300	160	> 300
PL033.30	3 x 3 x 2	2.2	> 300	80	> 300
PL055.20**	5 x 5 x 2	2.2	> 500	450	> 300
PL055.30	5 x 5 x 2	2.2	> 500	250	> 300

\* For optional wire leads change order number extension to .x1 (e.g. PL022.31)  
 Resonant frequency measured at 1 V<sub>pp</sub>, capacitance measured at 1 V<sub>pp</sub>, 1 kHz.  
 Max. operating voltage: -20 to +100 V  
 Max. operating temperature: 150°C (\*\* 85°C only)  
 Standard Mechanical Interface: ceramic (top & bottom)  
 Standard Electrical Interface: solderable termination  
 Available Options: special mechanical interfaces, etc.  
 Other specifications on request.  
 Specifications subject to change without notice.