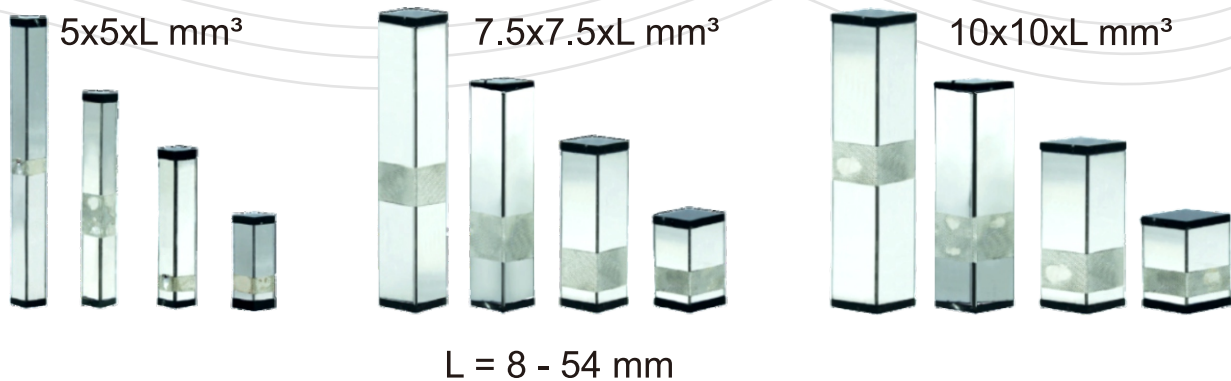


Hi-Fi Stake Piezoelectric Actuator

“Hi-Fi Stake” Piezoelectric Single Crystal Actuator

Linear, Hysteresis-Free



Key Features

- Linear ($R^2 > 0.998$) and near-hysteresis-free ($< 1.2\%$) responses.
- Large stroke (up to 50 μm @ +240V) with moderate working loads (up to 14kg)
- Used temperature up to 60°C
- Sub-nanometer resolution, sub-microsecond response
- Minimum aging problem
- Low device capacitance ($< 5 \text{ nF}$ to 250 nF); low power consumption under a.c. drive
- Five different types are available: “Cost-Effective”, “Large-Stroke”, “High-Load”, “High-Temperature” and “Cryogenic” Stakes

We offer the following 5 types of Hi-Fi Stake Single Crystal Piezoelectric Actuators

- “**Cost-Effective**” Hi-Fi Stakes (HFS-CE) - see Table A for more.
- “**Large-Stroke**” Hi-Fi Stakes (HFS-LS)- of (upper + lower) 2-level design, see Table B .
- “**High-Load**” Hi-Fi Stakes (HFS-HL) - of (inner + outer) 2-layer design, see Table C.
- “**High-Temperature**” Hi-Fi Stakes (HFS-HT) - of use temperature up to 80°C. (*)
- “**Cryogenic**” Hi-Fi Stakes (HFS-CG) (*)

(*) currently under development.

Please contact us for other details and customized products.



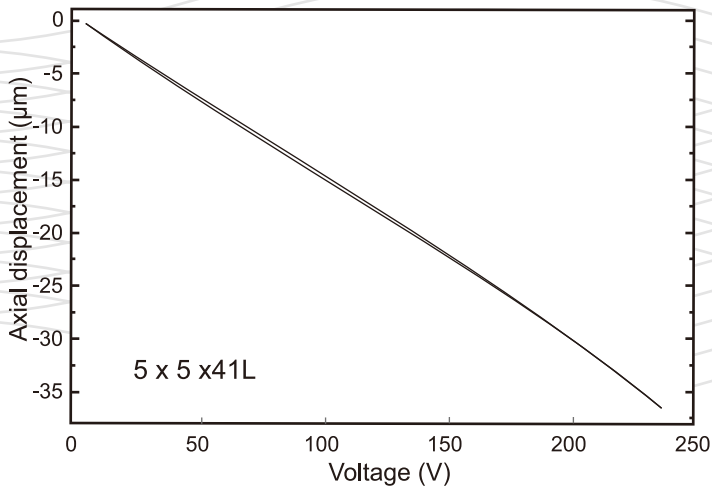
Microfine Materials Technologies Pte Ltd

10 Bukit Batok Crescent, #06-02, The Spire Singapore 658079

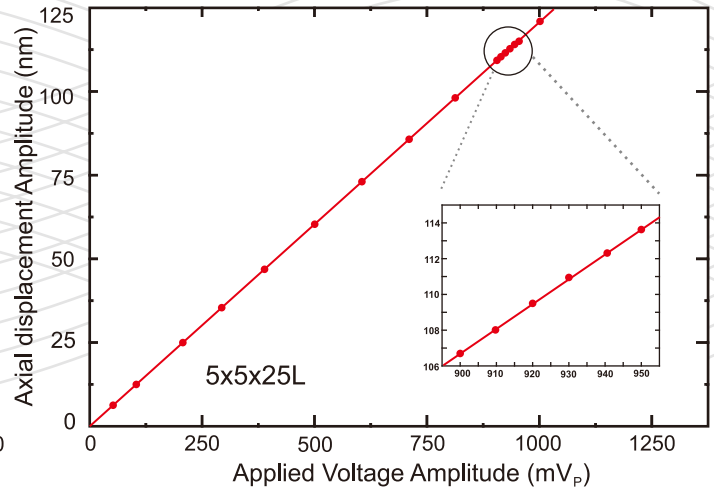
Tel : +65 6264 0112 Website : www.microfine-piezo.com

Please contact us for other details.

All Enquiries:
sales@microfine-piezo.com



Linear, Hysteresis-Free

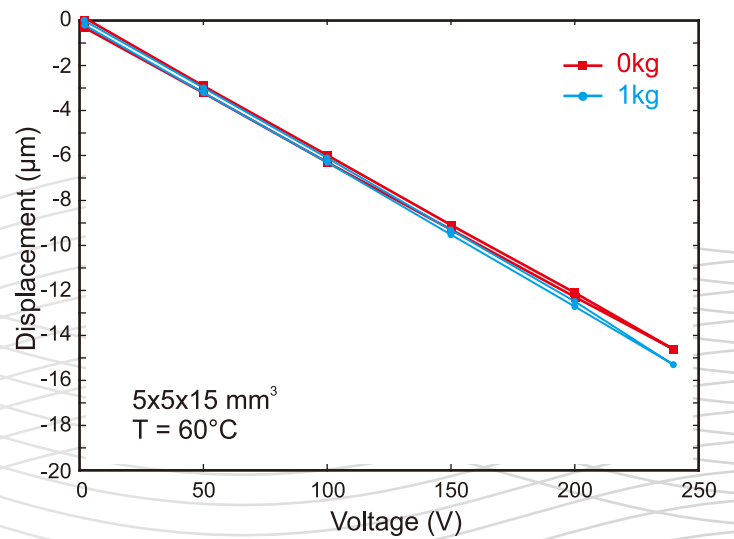
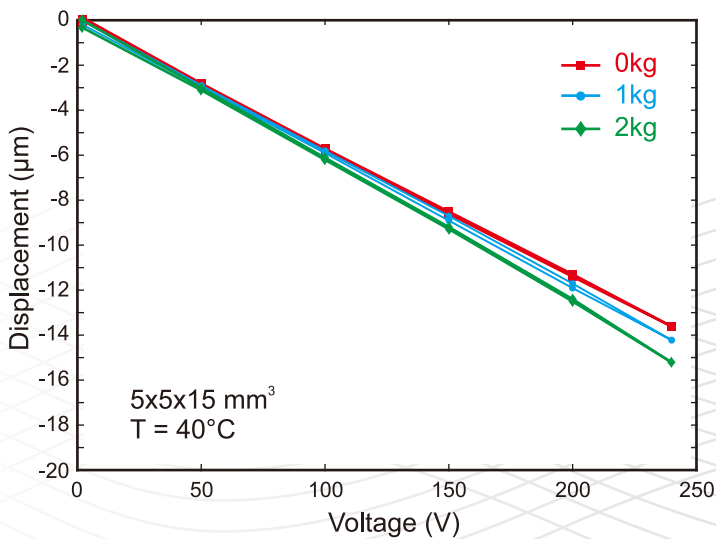
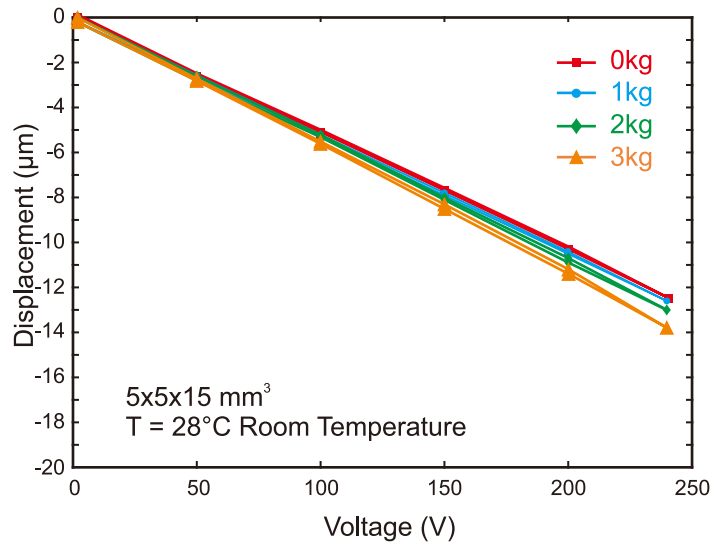


Sub-nanometer resolution

Under constant load conditions and within the operating load range, the axial displacement (ΔL) varies approximately with temperature and the applied voltage via the equation below:

$$\Delta L = \{a + b(T - 20)\} V L_{ac}$$

where ΔL is in μm , T is in $^{\circ}\text{C}$, V is in volts and L_{ac} is in mm. $a = 0.0044$, $b = 1.9 \times 10^{-5}$.



Cost-Effective Hi-Fi Stake

Product Dimensions and Performance Specifications

Cost-Effective Hi-Fi Stakes (HFS-CE)

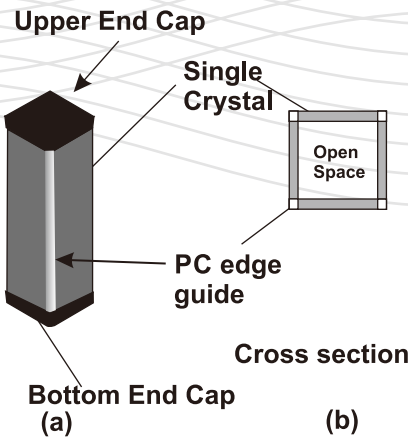


Table A - “Cost-Effective” Hi-Fi Stakes (HFS-CE)

Product Code	Dimensions ^[1] W ₁ x W ₂ x L (mm ³)	Stroke ^[2] @ +240V (μm)	Stiffness (kg-f/μm)	Max. Load Allowed (kg-f) ^[3]		
				25°C	40°C	60°C
HFS-CE-3.6x8L	3.6x3.6x8L	-5	0.35	1.8	1.5	0.9
HFS-CE-3.6x11L	3.6x3.6x11L	-8	0.21			
HFS-CE-3.6x15L	3.6x3.6x15L	-12	0.14			
HFS-CE-3.6x19L	3.6x3.6x19L	-16	0.11			
HFS-CE-3.6x23L	3.6x3.6x23L	-20	0.09			
HFS-CE-3.6x28L	3.6x3.6x28L	-25	0.07			
HFS-CE-5x8L	5x5x8L	-5	0.52	3.0	2.5	1.5
HFS-CE-5x11L	5x5x11L	-8	0.32			
HFS-CE-5x15L	5x5x15L	-12	0.22			
HFS-CE-5x19L	5x5x19L	-16	0.16			
HFS-CE-5x23L	5x5x23L	-20	0.13			
HFS-CE-5x28L	5x5x28L	-25	0.10			
HFS-CE-7.5x8L	7.5x7.5x8L	-5	0.83	4.8	4.0	2.4
HFS-CE-7.5x11L	7.5x7.5x11L	-8	0.51			
HFS-CE-7.5x15L	7.5x7.5x15L	-12	0.35			
HFS-CE-7.5x19L	7.5x7.5x19L	-16	0.26			
HFS-CE-7.5x23L	7.5x7.5x23L	-20	0.21			
HFS-CE-7.5x28L	7.5x7.5x28L	-25	0.16			
HFS-CE-10x8L	10x10x8L	-5	1.14	7.5	6.0	3.7
HFS-CE-10x11L	10x10x11L	-8	0.7			
HFS-CE-10x15L	10x10x15L	-12	0.48			
HFS-CE-10x19L	10x10x19L	-16	0.35			
HFS-CE-10x23L	10x10x23L	-20	0.29			
HFS-CE-10x28L	10x10x28L	-25	0.22			

[1] Active length (L_{AC}) = L-3 mm.

[2] The actuator contracts under positive-polarity applied voltage. Negative-polarity applied voltage under +240V bias drive is recommended for extensional axial displacement.

[3] Unlike PZT stacks, STAKE actuators contract under positive-polarity applied voltage. The usual definition and determination of Blocking Force is thus not applicable here. The extent of linear, non-hysteretic response of STACK actuators is determined by the phase transformation properties of the component single crystals. The displacement response is linear with no occurrence of rhombohedral-to-orthorhombic phase transformation of the component single crystals at stipulated operating temperatures and loads.

Also Available are:

- “High-Temperature” Hi-Fi Stakes (HFS-HT) - of use temperature up to 80°C.
- “Cryogenic” Hi-Fi Stakes (HFS-CG)
- Customized specifications.

Enquires are welcome!



Large-Stroke Hi-Fi Stake

Product Dimensions and Performance Specifications

Large-Stroke Hi-Fi Stakes (HFS-LS)

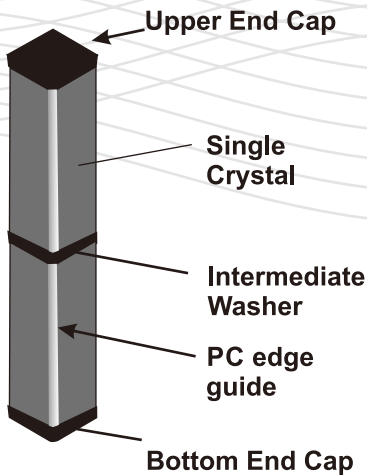


Table B - "Large-Stroke" Hi-Fi Stakes (HFS-LS)

Product Code	Dimensions ^[1] W ₁ x W ₂ x L (mm ³)	Stroke ^[2] @ +240V (μm)	Stiffness (kg-f/μm)	Max. Load Allowed (kg-f) ^[3]		
				25°C	40°C	60°C
HFS-LS-5x32L	5x5x32L	-28	0.093	3.0	2.5	1.5
HFS-LS-5x36L	5x5x36L	-32	0.081			
HFS-LS-5x41L	5x5x41L	-37	0.070			
HFS-LS-5x45L	5x5x45L	-41	0.063			
HFS-LS-5x49L	5x5x49L	-45	0.058			
HFS-LS-5x54L	5x5x54L	-50	0.052			
HFS-LS-7.5x32L	7.5x7.5x32L	-28	0.15	4.8	4	2.4
HFS-LS-7.5x36L	7.5x7.5x36L	-32	0.13			
HFS-LS-7.5x41L	7.5x7.5x41L	-37	0.11			
HFS-LS-7.5x45L	7.5x7.5x45L	-41	0.1			
HFS-LS-7.5x49L	7.5x7.5x49L	-45	0.09			
HFS-LS-7.5x54L	7.5x7.5x54L	-50	0.08			
HFS-LS-10x32L	10x10x32L	-28	0.20	7.5	6	3.7
HFS-LS-10x36L	10x10x36L	-32	0.18			
HFS-LS-10x41L	10x10x41L	-37	0.15			
HFS-LS-10x45L	10x10x45L	-41	0.14			
HFS-LS-10x49L	10x10x49L	-45	0.13			
HFS-LS-10x53L	10x10x54L	-50	0.11			

[1] Active length (L_{AC}) = L-4 mm; [2] & [3] See footnotes of Table A

High-Load Hi-Fi Stake

High-Load Hi-Fi Stakes (HFS-HL)

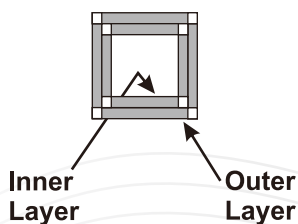


Table C - "High-Load" Hi-Fi Stakes (HFS-HL)

Product Code	Dimensions ^[1] W ₁ x W ₂ x L (mm ³)	Stroke ^[2] @ +240V (μm)	Stiffness (kg-f/μm)	Max. Load Allowed (kg-f) ^[3]		
				25°C	40°C	60°C
HFS-HL-7.5x8L	7.5x7.5x8L	-5	1.56	8.5	7.5	4.5
HFS-HL-7.5x11L	7.5x7.5x11L	-8	0.96			
HFS-HL-7.5x15L	7.5x7.5x15L	-12	0.66			
HFS-HL-7.5x19L	7.5x7.5x19L	-16	0.49			
HFS-HL-7.5x23L	7.5x7.5x23L	-20	0.39			
HFS-HL-7.5x28L	7.5x7.5x28L	-25	0.30			
HFS-HL-10x8L	10x10x8L	-5	2.18	14.0	11.0	7
HFS-HL-10x11L	10x10x11L	-8	1.34			
HFS-HL-10x15L	10x10x15L	-12	0.92			
HFS-HL-10x19L	10x10x19L	-16	0.67			
HFS-HL-10x23L	10x10x23L	-20	0.56			
HFS-HL-10x28L	10x10x28L	-25	0.42			

[1] Active length (L_{AC}) = L-3 mm; [2] & [3] See footnotes of Table A

Microwave reserves the right to change specifications without notice.



Microwave Materials Technologies Pte Ltd

10 Bukit Batok Crescent, #06-02, The Spire Singapore 658079

Tel : +65 6264 0112 Website : www.microwave-piezo.com

Please contact us for other details.

All Enquiries:

sales@microwave-piezo.com