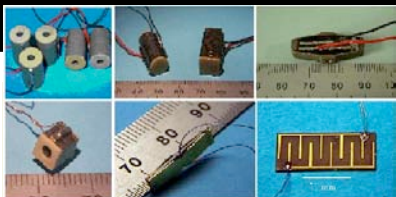


# Single Crystal Piezoelectric Actuators



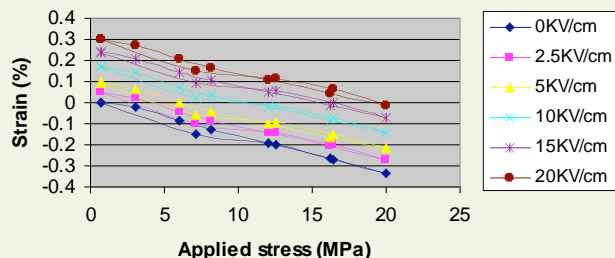
## TRS-XA High Strain Actuators

TRS single crystal piezoelectric actuators are featured with low profile, high strain, high force and high precision. TRS-XA actuators hold exceptional performances for applications in cryogenic actuators, nano-positioning, adaptive optics, vibration control, adaptive structures, etc.

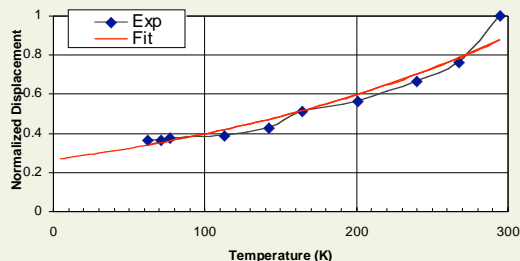
### Benefits of Single Crystal Piezoelectrics

- High energy density
- High piezoelectric coefficients ( $d_{33} \sim 2000$  pC/N,  $d_{31} \sim 1000$  pC/N)
- High electromechanical coupling ( $k_{33} > 0.9$ )
- Excellent cryogenic properties (<20 K – 360 K)

Stacked Actuator Pre-stress v. Strain Curves



Single Crystal Cryogenic Actuation



### TRS-XA Specifications

	TRS-XAST	TRS-XA31FL	TRS-XA33FL
Actuator Type	Standard	Flextensional	Flextensional
Strain	>0.35%		
Stroke ( $\mu\text{m}$ )	0-100	0-250	0-250
Resolution (nm)	<1	5	5
Blocking stress (MPa)	20		
Working Temp. (K)	<20-360	<20-360	<20-360
Driving Field (kV/cm)	-2.5-25	-2.5-25	-2.5-25

### TRS-XA Dimensions

	Dimensional Range	Tolerances (+/-)	
		Standard	Fine
X (mm)	0.5-25	0.2	0.05
Y (mm)	0.5-25	0.2	0.05
Z (mm)	1-50	0.2	0.02

#### Standard:

- Insulating PZT ceramic endcaps, 0.5 mm thick
- Electrical connections, 0.001" thick Cu shims
- Plates and shims are bonded using epoxy
- Color coded lead wires, 28 AWG, 1000V, 12" long
- Stacks encapsulated using Silicone or Glyptal
- Stacks are HiPot tested @ 20 kV/cm

#### Notes:

- Custom configurations available on request
- Size range can be extended on request
- Tolerances can be reduced on request