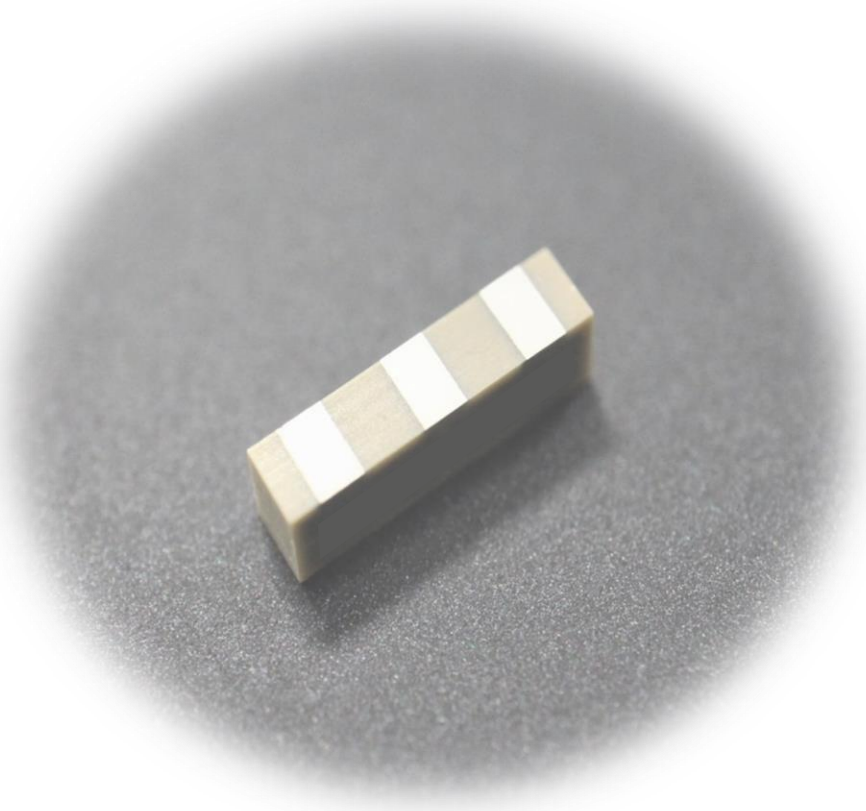
Attracting Tomorrow

Application Note for PiezoStator

TDK Corporation
TDK Group Company
Electronic Components Business Company
Piezo and Protection Business Group

Ver.1.2

Contents



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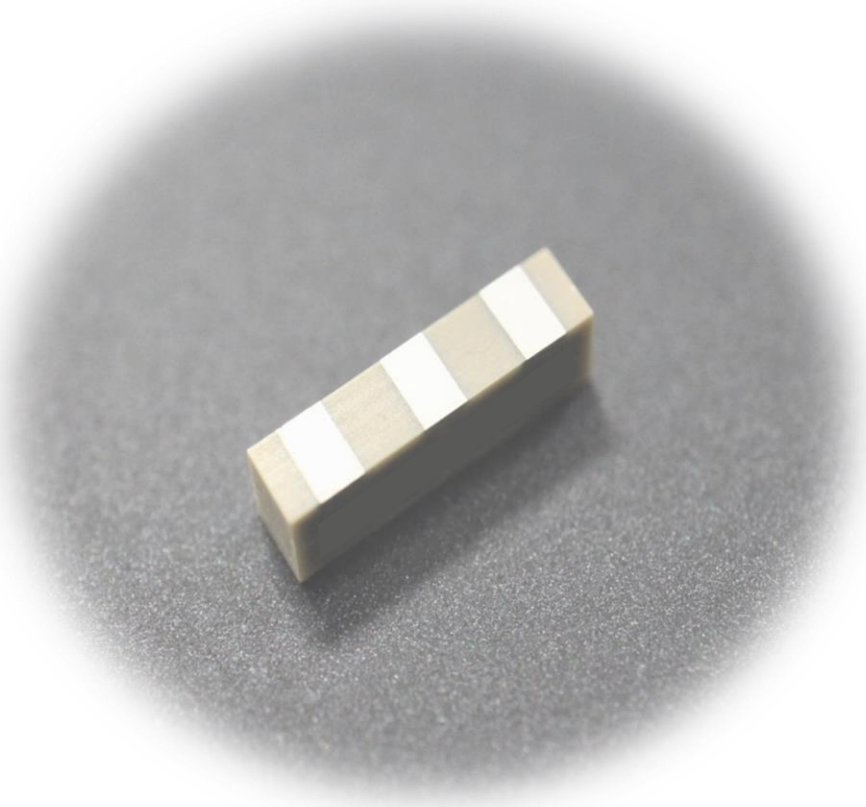

Product Characteristics

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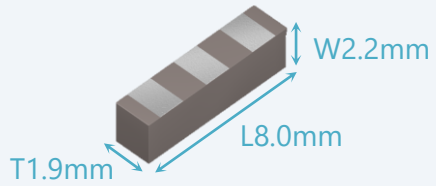
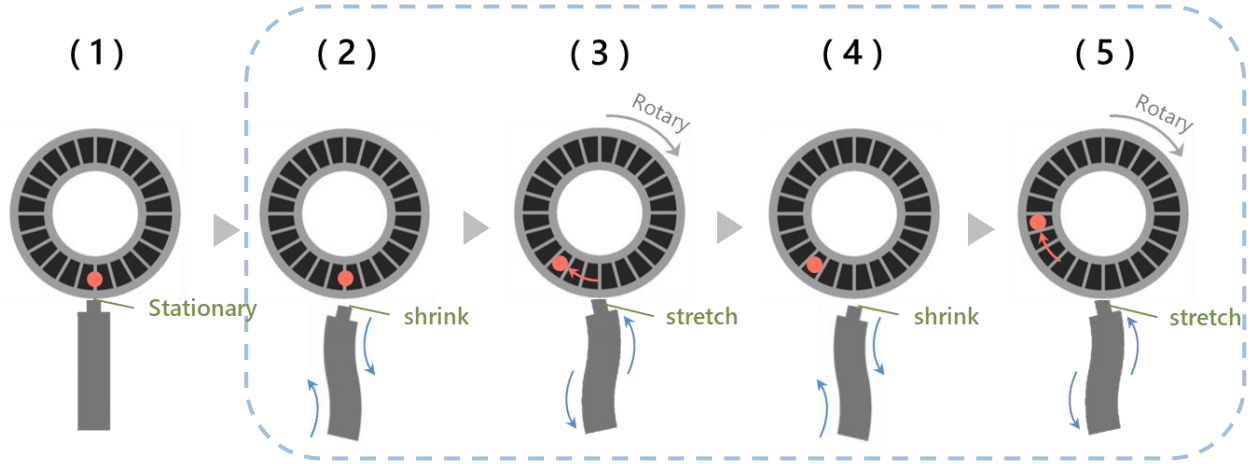
PiezoStator



ITEM	PUS-0818-P04	
SIZE	L8.0mm / W2.2mm / T1.9mm	
Drive Frequency	180kHz(Typ.)	
Max. Drive Voltage	±10V	
	Linear motion	Rotary motion
Max. drive speed	250mm/sec (*1)	238r.p.m (*2)
Max. thrust	0.5N	5.0mN・m (*2)
Min. operating pitch	0.3μm	3×10^-5 rad
Power consumption	0.7W	
Operating Temp. range	5～60℃	

■ Image Action



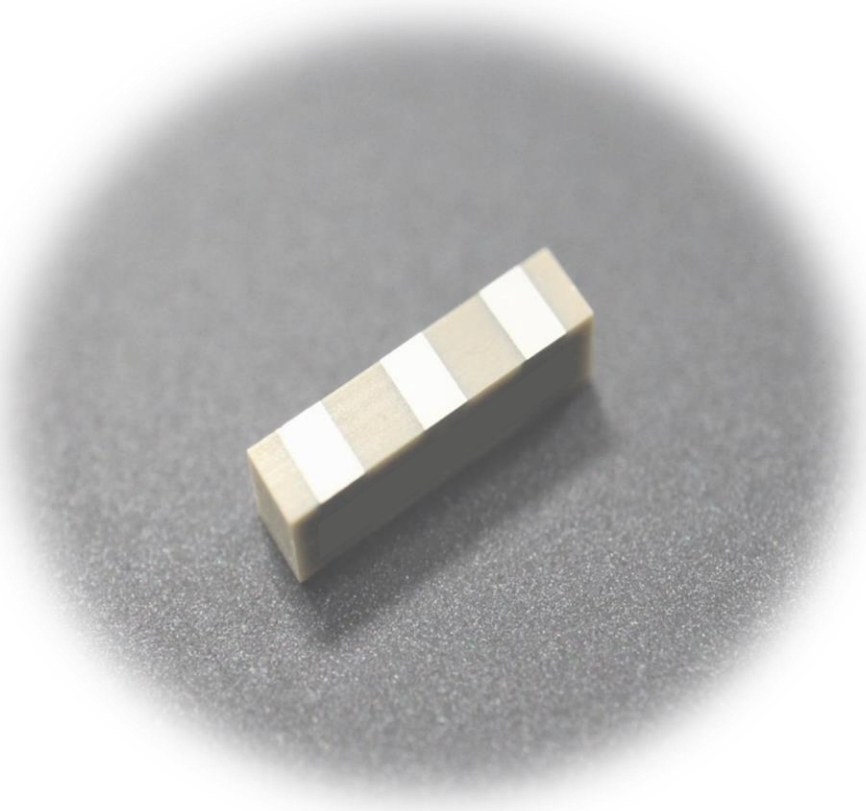
(2) - (5) Repeat

*Contactors (chips) are not provided.
*Customers are requested to make their own selection.

Customization available

(*1) In case of stroke 20mm
(*2) In case of bearing diameter 20mm

Contents



What's Piezoelecticity?

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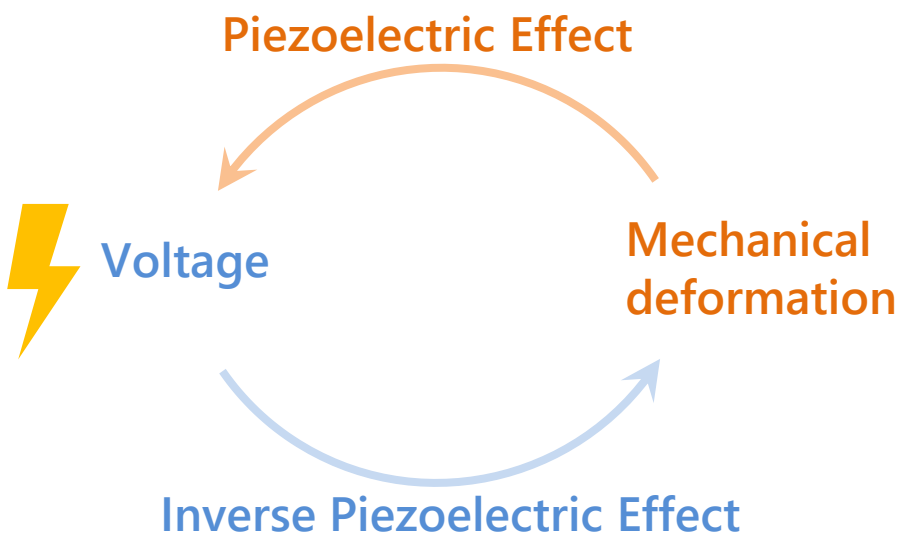
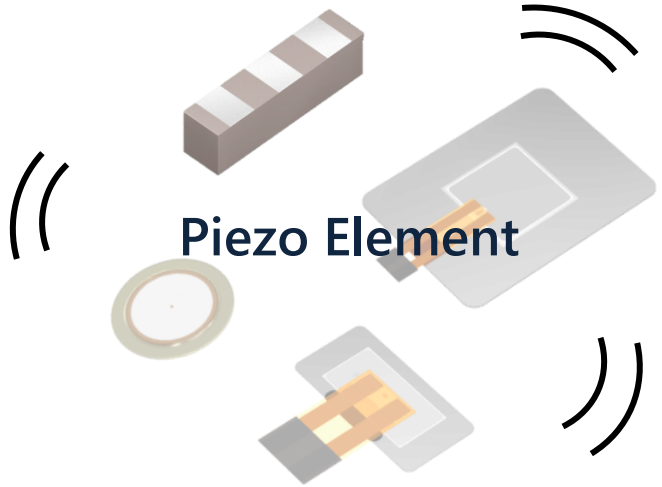
Piezoelectric Effect

An effect in which a voltage is generated in response to the stress caused by applying pressure to a crystal or a specific type of ceramic.

Inverse Piezoelectric Effect

When a voltage is applied to a crystal or ceramic that generates the piezoelectric effect, they are deformed.





Simple Structure of Piezo Element

Simple Structure
Slight movements and vibrations
without any mechanical operations

▼

Durable
Easily miniaturized
Excellent for precision

General Advantages of PiezoStator Solution

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01. High Driving performance

Max. Drive Speed 250mm/sec, Max. Thrust 0.5N

02. Non-magnetic

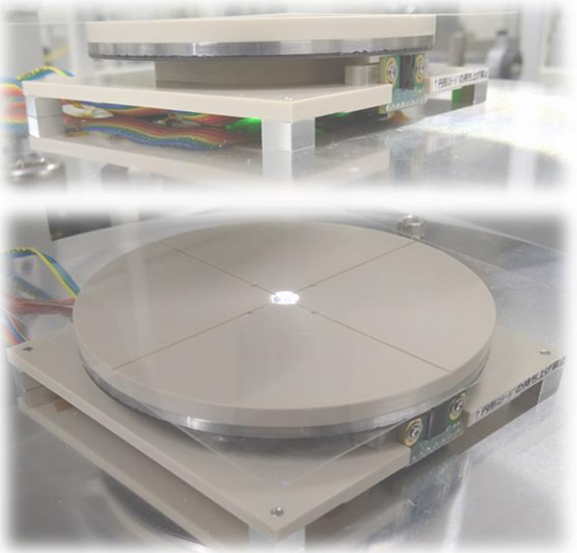
No magnetic fields are generated, no effects are seen, and it can be introduced in environments where magnetic fields are undesirable

03. Power Saving

Since it does not consume power when held stationary, it contributes to power saving for the entire application.

PiezoStator provides versatile actuation

- ✓ Supports both linear and rotary motion
- ✓ Coarse and fine movement can be switched depending on the input waveform.
- ✓ Since they are non-magnetic, they do not affect each other even if multiple units are used at the same time.



Actual usage image

PiezoStator operation image

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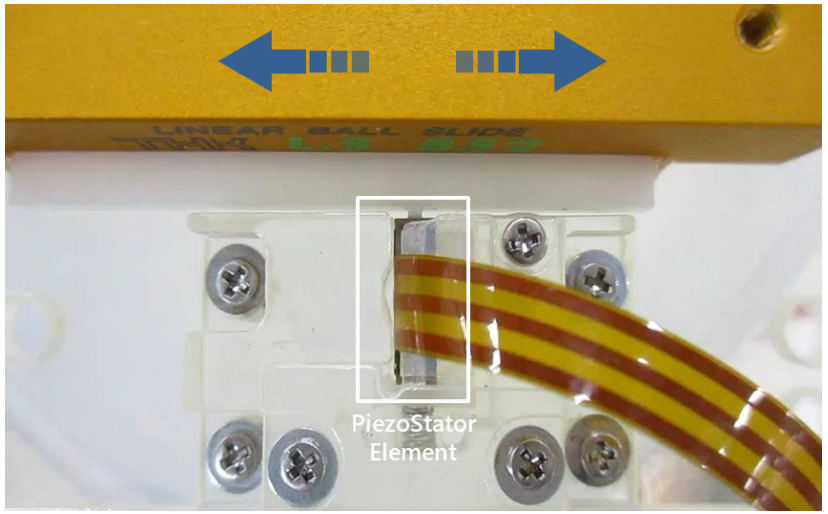
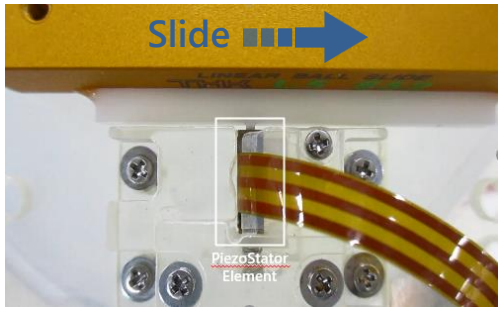
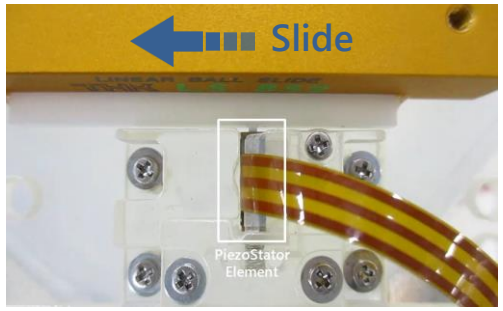
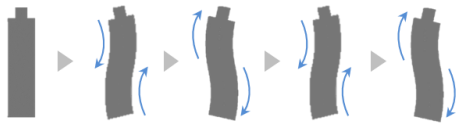
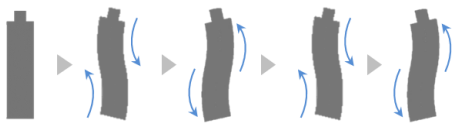
Linear Motion Slider Drive (No Position Sensor)



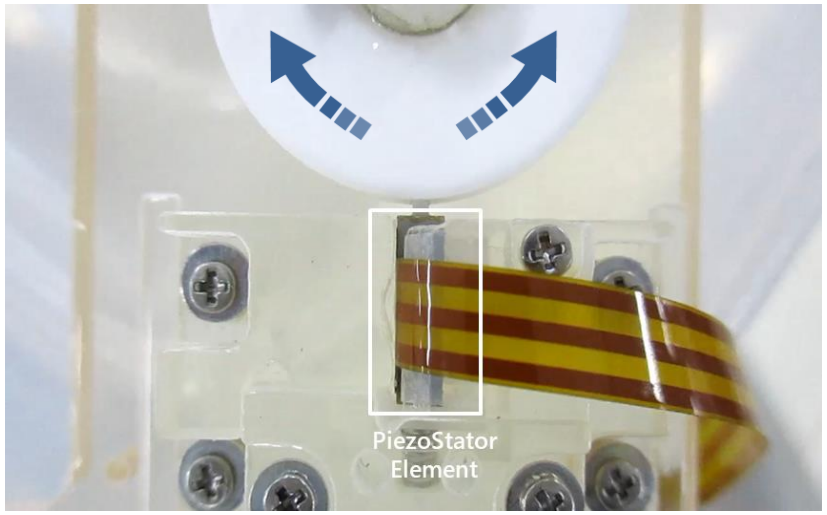


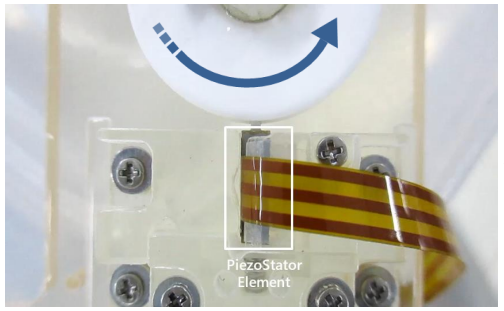


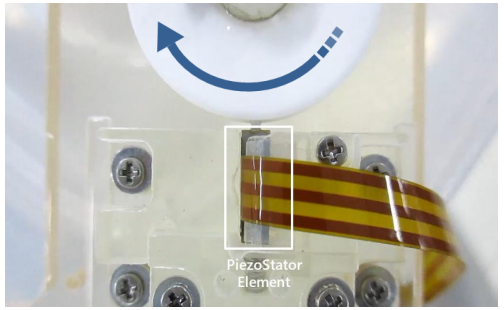


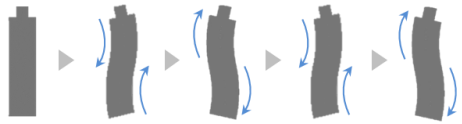


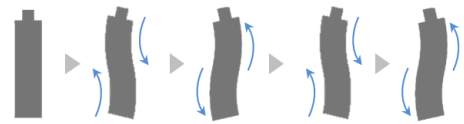
Rotational Motion Plate Drive (No angle sensor)











Comparison with competitors' products

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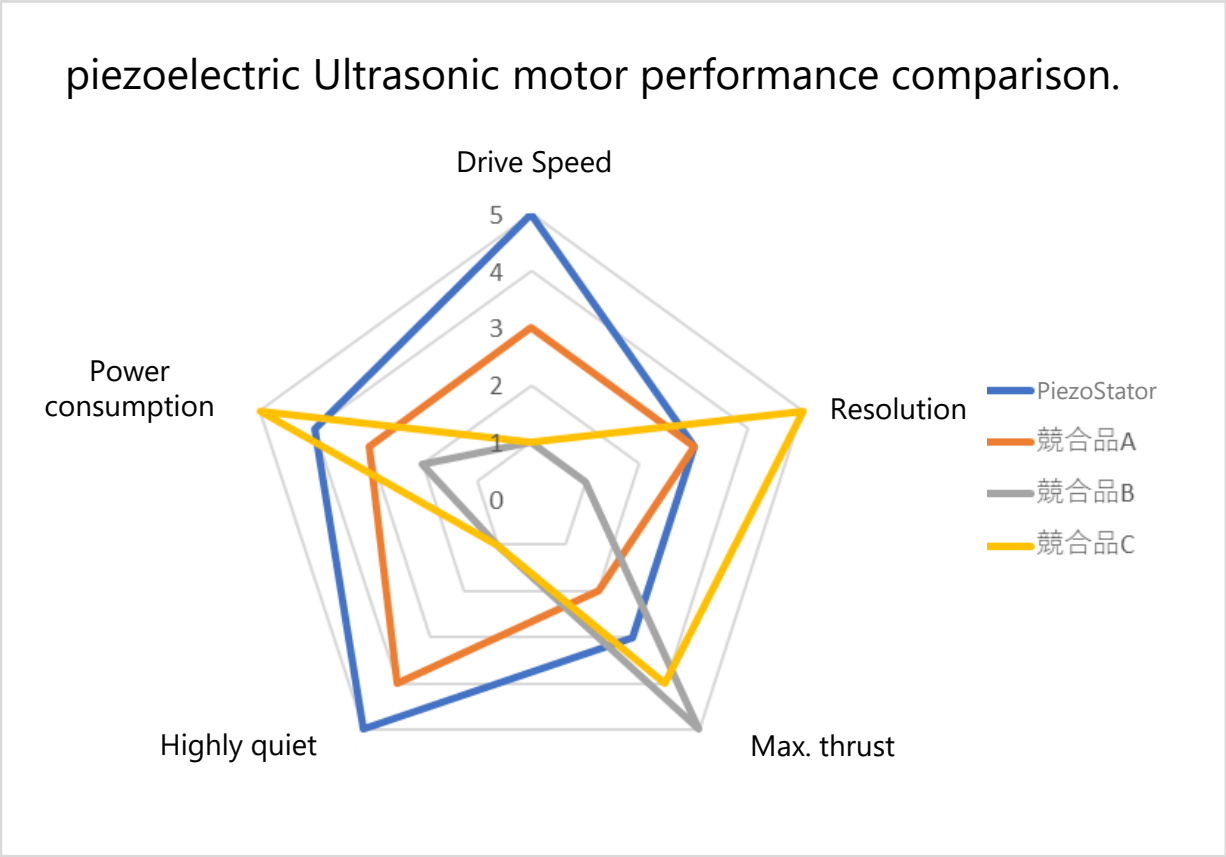
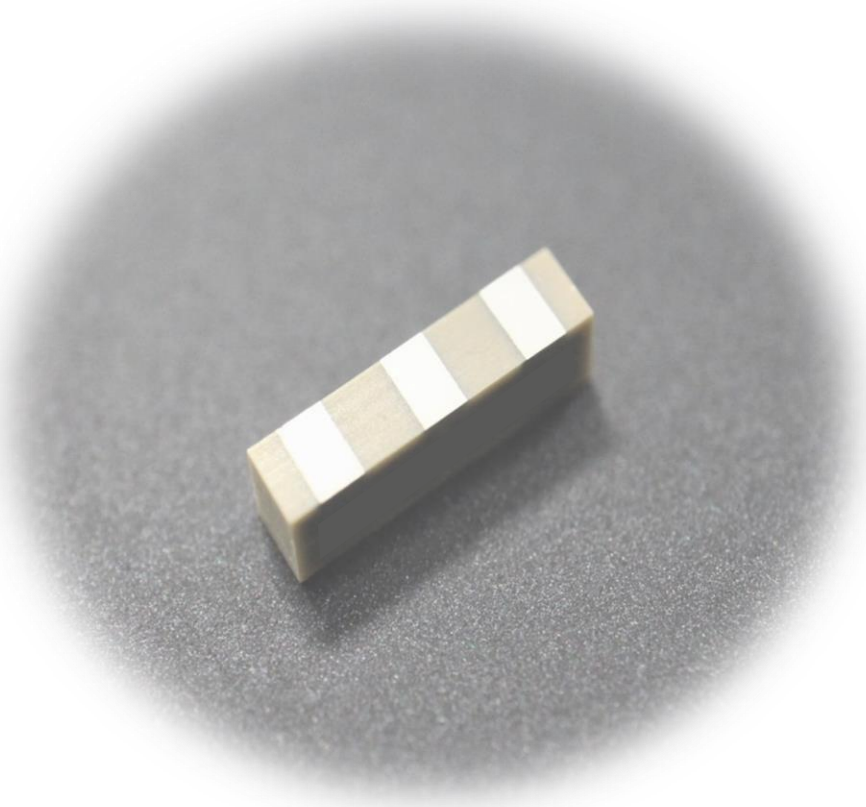
Currently, piezoelectric Ultra Sonic Motor is also available in our competitor's line-up, however TDK's PiezoStator's key parameter is balanced high standard relating to drive performance and provides more user-friendly actuator.



Merit of PiezoStator

- high-speed drive
- highly quiet
- battery-driven available and low power consumption

Contents



Application Examples

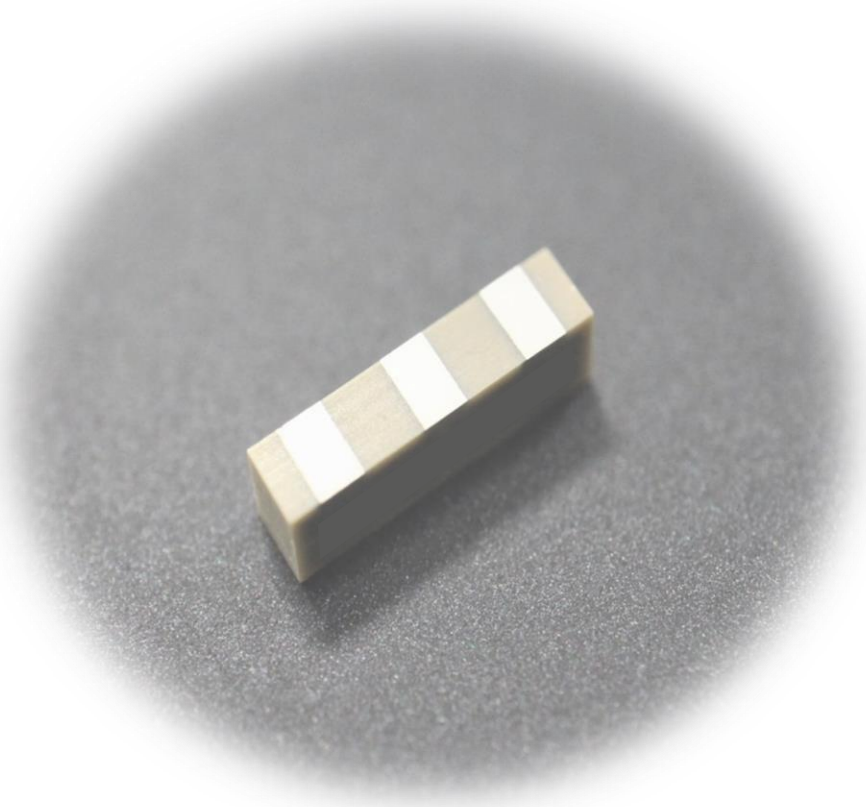
Security camera
(subject-following)

Robotics
(assist the motion)

Adjustment of viewing position

Educational gadget

Contents



Attachment Method

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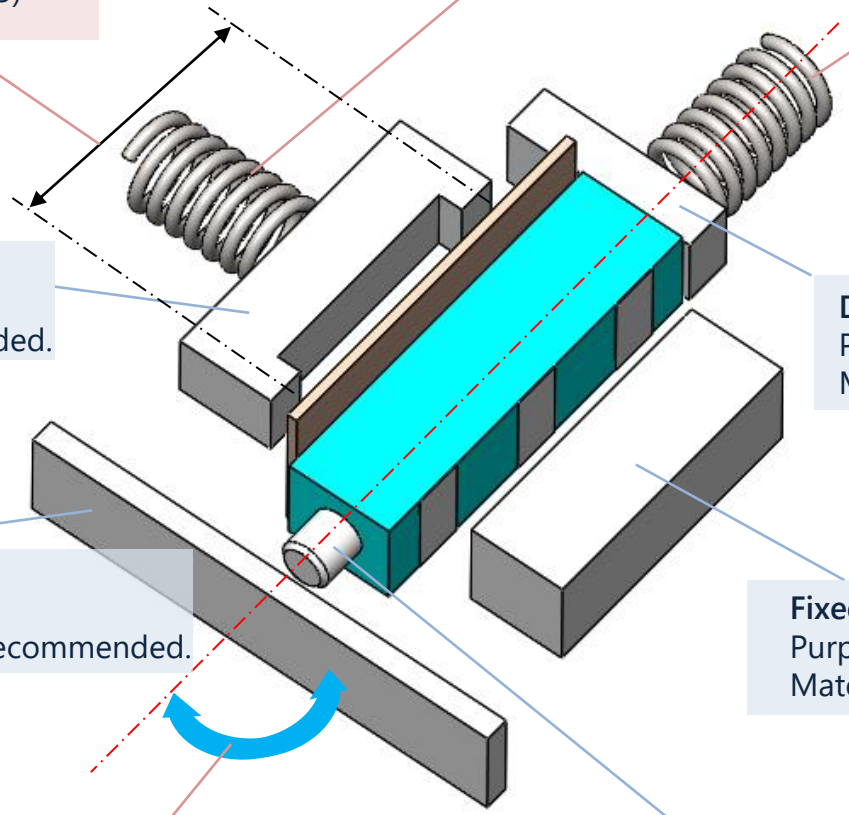
Side Pressure Spring(also possible leaf spring)
Recommendation : actual value 1.5～3N

Input
Recommendation : Piezo ceramic Length (L)×(2/3)

Pressing Spring (also possible leaf spring)
Recommendation : actual value 1.5～3N



Anti-Vibration Block
Purpose : Maintain good position of PiezoStator
Materials : PPS etc、Heat-resistant materials recommended.

Damping Blocks
Purpose : Letting go of PiezoStator 's recoil
Materials : PPS etc、Heat-resistant materials recommended.

Sliding Plate
Purpose : Transmits vibrations to the drive.
Materials : Al2O3,SUS,etc、Abrasion-resistant materials recommended.

Fixed-block
Purpose : Maintain good position of PiezoStator
Materials : PPS etc、Heat-resistant materials recommended.

Mounting Angle
Recommendation : 90±0.2°

Contactor
Purpose : Transmits vibrations to the drive.
Materials : Al2O3,SUS,etc、Abrasion-resistant materials recommended.

* We can assist you with installation instructions.

Recommended Driver IC

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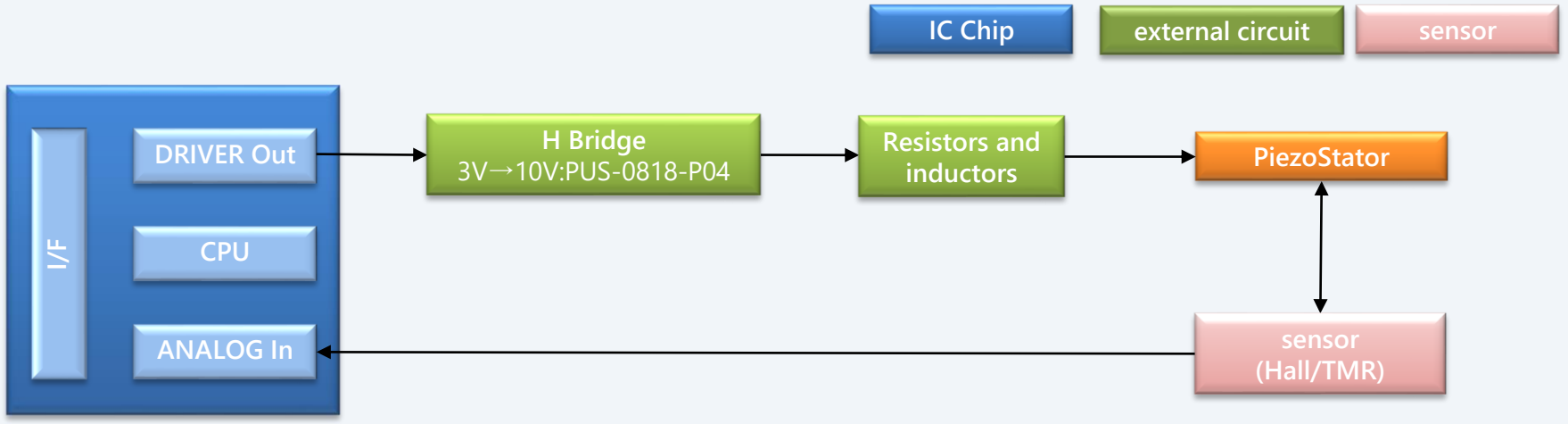
TDK recommend drive IC bellow.

Drive IC manufacturer	model number	Number of supported Piezo elements	Sensing Function	Notes
Renesas Electronics	RAA305350MGBM	1	YES	Regarding of specific IC specifications, please contact company Renesas directly.

Circuit Block Diagram

◆ Renesas Driver IC



※Please contact company Renesas for advice on external circuits.

Contents

Next society and required TDK Piezo Products

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From transportation to comfortable space

Piezo speaker, Haptics

Realistic sound, contributed to seamless design.

Usage of drone is expanded (AI smart drone, smart agriculture)

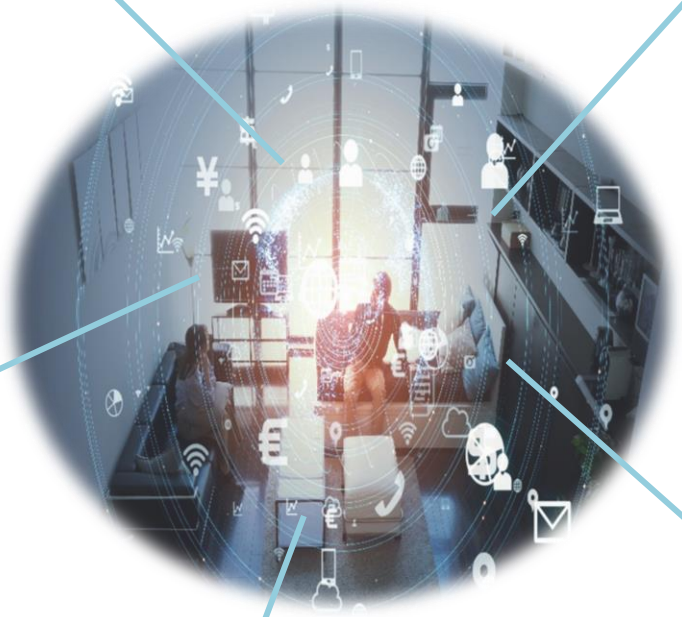
Piezo Actuator

Contributed to high picture quality for camera and expand opportunity for drone usage.

Smart in any environment

Haptics, Piezo Switch

Strong in water and providing a wide range of functionality in any environment.



More comfortable Smart Home

Smart Mater、Haptics、Piezo Speaker

Integrate to lifestyle and achieve more effective energy management and enable smart home.

Transmitting realistic tactile from away

Haptics, Piezo Actuator

Providing more realistic and various experience with rich tactile pattern.


TDK