Multilayer Piezo Actuators – COM HAS

High Active Stack Technology

Series/Type:	**COM HAS S5, 5.2 x 5.2 x (10, 30, 45) mm**
Ordering code:	**B58004M40*A020**
Date:	2025-09-29
Version:	1

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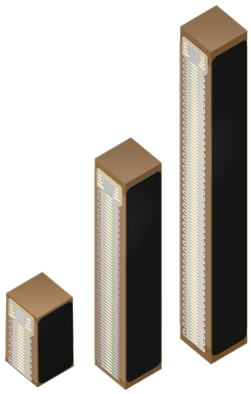
Applications

Used in systems with nanometer-scale precision, fast response times, and high force output.



Features

- High active stack technology
- Highly efficient actuator design thanks to small insulation zones
- Robust design that avoids polarization cracks
- High melting metal bond
- High reliability
- Highest cycle stability at high temperatures
- Outstanding resistance against humidity

Design

- RoHS-compatible PZT (lead zirconium titanate) ceramic with high coupling factor
- Copper inner electrodes
- Dimension of ceramic body: 5.2 x 5.2 x 10 / 30 / 45 (mm)
- Passivated stack
- Polarized with 160 V
- Contains SVHC substance 12626-81-2

General technical data

Ratings

Recommended pre-load	730 N
Stack surface temperature	-40 … +160 °C
Voltage range	-10 … +180 V

Electrical specifications after polarization and ordering codes

		COM10S5	COM30S5	COM45S5
Capacitance	25 °C, 1 kHz, 1 V_{RMS}	typ. 1.0 µF	typ. 3.4 µF	typ. 5.3 µF
Insulation resistance	25 °C, 730 N pre-load, 8 V_{DC}, after ≥ 15 s	> 40 MΩ	> 40 MΩ	> 40 MΩ
Stroke at 160 V (s)	25 °C, 730 N pre-load, 1 N/µm stiffness of pre-load spring, dynamically measured	16 µm ±10%	55 µm ±10%	83 µm ±10%
Stiffness at 160 V (k_{stack})	25 °C, 730 N pre-load, dynamically, various load stiffnesses	typ. 90 N/µm	typ. 25 N/µm	typ. 16 N/µm
Blocking force at 160 V (F_{max})	dynamically, various load stiffnesses, extrapolation to 0 stroke	typ. 1400 N	typ. 1400 N	typ. 1400 N
Resonance frequency ($f_{res.}$)	free state (both ends of the actuator)	typ. 165 kHz	typ. 44 kHz	typ. 30 kHz

Ordering codes

COM10S5: B58004M4010A020

COM30S5: B58004M4030A020

COM45S5: B58004M4040A020

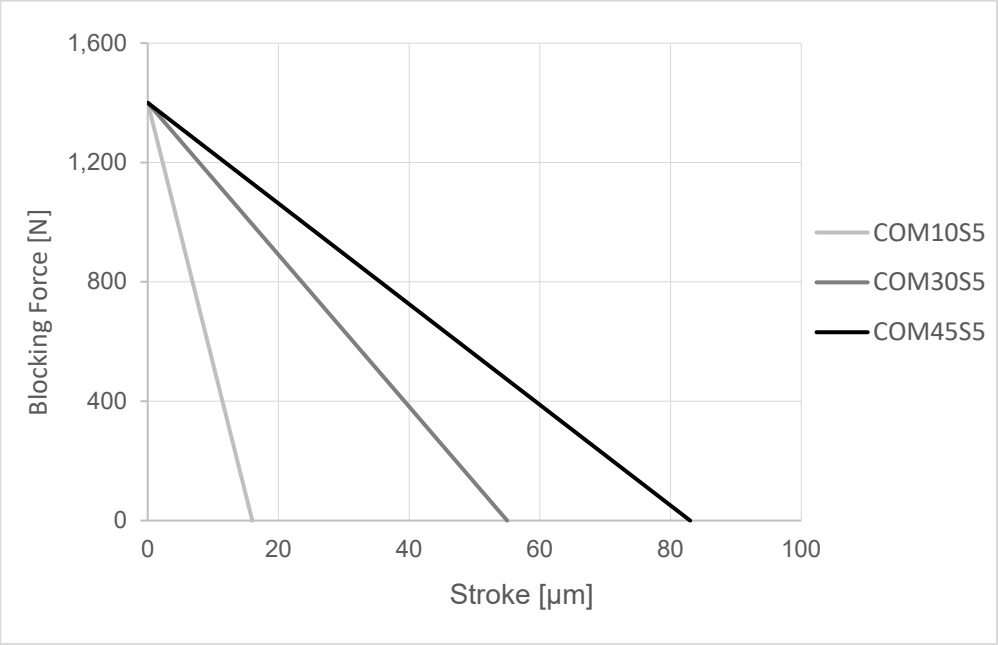


Fig.1: Typical force-stroke diagram at nominal conditions

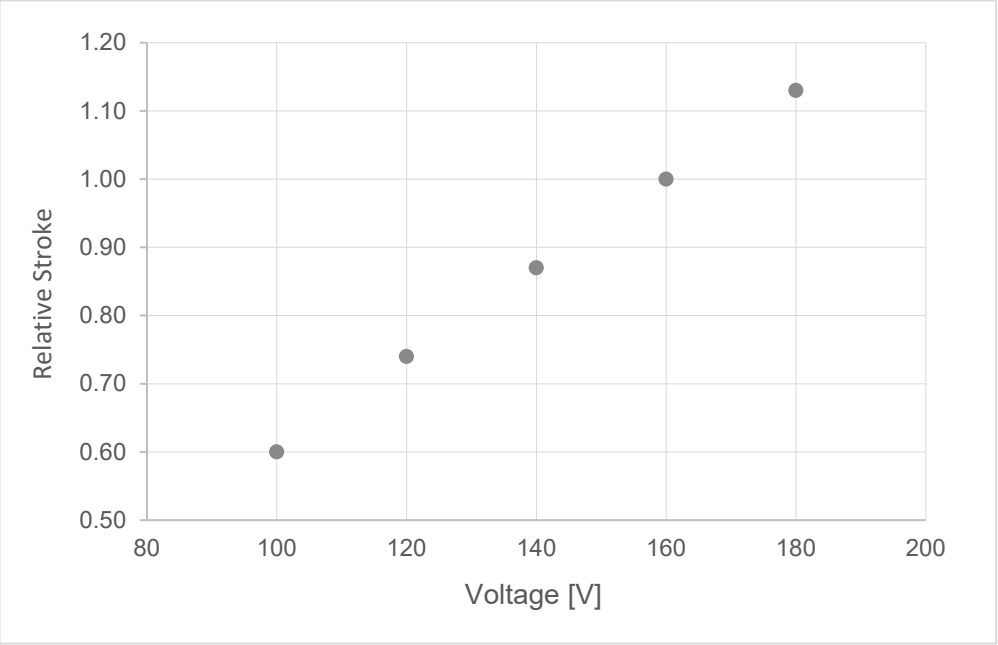
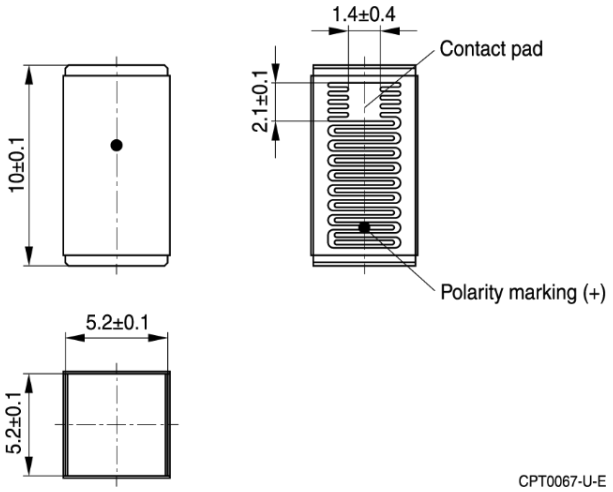
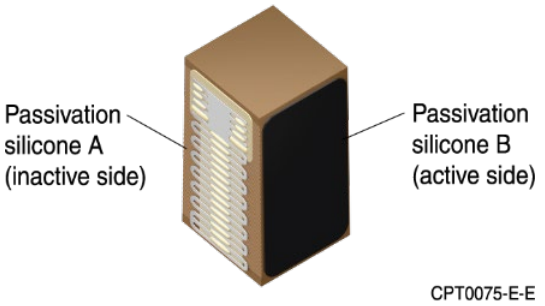


Fig. 2: Relative stroke versus voltage under nominal conditions (730 N preload)

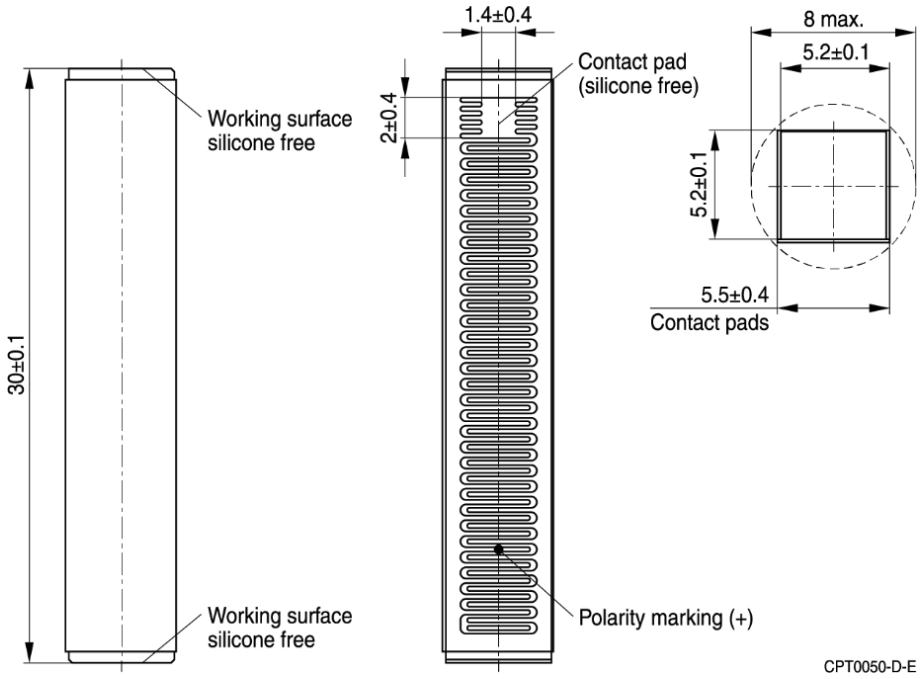
Dimensional drawings

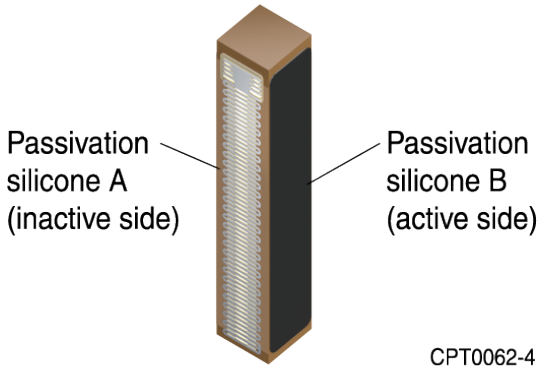
- COM10S5



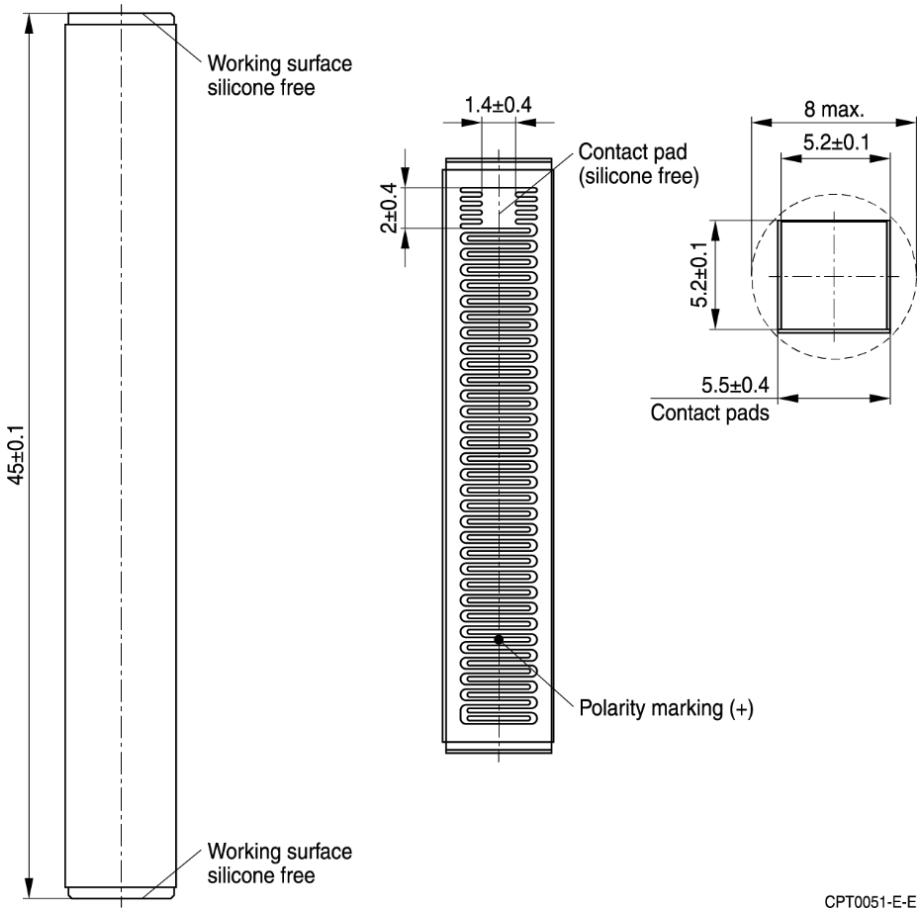


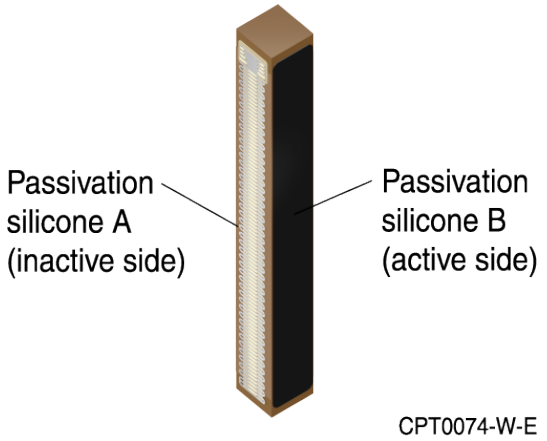
■ COM30S5


1.4±0.4
8 max.
5.2±0.1
Contact pad
(silicone free)
Working surface
silicone free
2±0.4
5.2±0.1
5.5±0.4
Contact pads
30±0.1
Working surface
silicone free
Polarity marking (+)
CPT0050-D-E


Passivation
silicone A
(inactive side)
Passivation
silicone B
(active side)
CPT0062-4

■ COM45S5


Working surface
silicone free
1.4±0.4
Contact pad
(silicone free)
2±0.4
8 max.
5.2±0.1
5.2±0.1
5.5±0.4
Contact pads
45±0.1
Polarity marking (+)
Working surface
silicone free
CPT0051-E-E


Passivation
silicone A
(inactive side)
Passivation
silicone B
(active side)
CPT0074-W-E

Storage, handling, mounting, and packaging instructions

Storage

- Store piezo actuator components exclusively in their original packaging. We recommend keeping the original packaging closed until processing. The piezo actuator component is short-circuited in the original packaging.
- Avoid contamination of the surface of the piezo actuator component during storage.
- Avoid storage of the piezo actuator components in harmful environments (e.g. exposure to corrosive gases, such as SOx, Cl, etc.).
- Storage conditions:
  - Storage temperature: -25 °C to +45 °C
  - Relative humidity (RH): ≤ 75% annual average, ≤ 95% on 30 days a year
  - Dew precipitation is inadmissible.
- Process piezo actuator components within 12 months after shipment from TDK.

Handling

- Do not drop piezo actuator components or allow them to be chipped.
- Apply maximum force of 10 N to the component during handling.
- Do not touch piezo actuator components with bare hands – powderless nitrile gloves are recommended.
- Avoid contamination of the surface of the piezo actuator component during handling.

Mounting

- Make sure the surface of the contact pads is not scratched before, during or after the mounting process.
- Make sure contacts and housings used for assembly with piezo actuator components are clean and dry before mounting.
- Avoid contamination of the surface of the piezo actuator component during processing.
- Make sure ceramic end surfaces are clean before the mounting process. We recommend short-circuiting the piezo actuator component during the whole mounting process.

Packaging

COM10S5	Cardboard box	Packaging unit 30 pcs.
COM30S5	Cardboard box	Packaging unit 15 pcs.
COM45S5	Cardboard box	Packaging unit 10 pcs.

Cautions and warnings

General

- Do not use TDK piezo actuator components for purposes not identified in our specifications and/or operating conditions.
- Ensure the suitability of a piezo actuator component in particular by testing it for reliability during design-in. Always evaluate a piezo actuator component under worst-case conditions.
- Pay special attention to the reliability of piezo actuator components intended for use in safety-critical applications (e.g. medical equipment, automotive, spacecraft, nuclear power plants).

Design notes

- Consider derating at higher operating temperatures and loads.
- In some cases, the malfunctioning of the piezo actuator components or failure before the end of their service life cannot be completely ruled out in the current state of the art, even if they are operated as specified. In applications requiring a very high level of operational safety and especially when the malfunction or failure of piezo actuator component could endanger human life or health (e.g. in accident prevention, life-saving systems, or automotive battery line applications such as clamp 30), ensure by suitable design of the application or other measures (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of such a malfunction or failure.
- Specified values only apply to piezo actuator components that have not been subject to prior electrical, mechanical, or thermal damage.

Operation

- Use piezo actuator components only within the specified operating temperature range.
- Use piezo actuator components only within specified voltage and current ranges.
- Piezo actuator components have to be operated in a dry, non-reducing atmosphere which must not contain any additional chemical vapours or substances. We recommend appropriate drying of all components prior to hermetically sealing.
- The piezo actuator component is designed for on/off ratios up to 95% and maximum frequency of 500 Hz.
- A pre-load > 150 N must be ensured under all driving conditions. Please consider that the piezo actuator component contraction during discharging reduces the effective pre-load.
- Prevent a piezo actuator component from contacting liquids and solvents. Make sure that no water enters a piezo actuator component (e.g. through plug terminals).
- Avoid dewing and condensation.
- TDK piezo actuator components are mainly designed for encased applications. Under all circumstances avoid exposure to:
  - direct sunlight
  - rain or condensation
  - steam, saline spray
  - corrosive gases
  - atmosphere with reduced oxygen content.

- We expressly point out that in case of non-observance of the aforesaid notes, in particular due to reasons attributable to chemical vapours, a malfunction or failure of the piezo actuator components before the end of their usual service life cannot be completely ruled out, even if they are operated as specified.

Safety instructions

- Depending on the individual application, piezo actuator components are electrically connected to voltages and currents, which are potentially dangerous for life and health of the operator. Installation and operation of piezo actuator components have to be done only by authorized personnel. Ensure proper and safe connections, couplers, and drivers.
- Piezo actuator components are highly efficient charge storing capacitors. Even when they are disconnected from a supply, the electrical energy content of a loaded actuator can be high and is held for a long time. Always ensure a complete discharging of a piezo actuator component (e.g. via a 10 kΩ resistor) before handling. (Do not discharge by simple short-circuiting, because of the risk of damaging the ceramic.)
- Electrical charges can be generated on disconnected piezo actuator components by varying load or temperature. We recommend to design in a parallel resistor from 100 kΩ up to 10 MΩ in any application to guarantee discharging of the piezo actuator component.
- Discharge a piezo actuator component before connecting it to a measuring device/electronics, when this device is not sufficiently voltage proofed.

  This listing does not claim to be complete but merely reflects the experience of TDK.

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Important notes

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