



Multilayer Piezo Actuators – COM HAS

High active passivated stack technology, 3.4 x 3.4 x 27 mm - leaded

Series/Type: COM27S3
Ordering code: Z63000Z2910Z001Z77 (Prototype)
Date: 2023-01-25
Version: 1

Preliminary data
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
- PTFE-insulated leads of silver-plated CU wire (7 x 0.2 mm), 600 mm length


Design

- RoHS-compatible PZT (lead zirconium titanate) ceramic with high coupling factor
- Copper inner electrodes
- Dimension of ceramic body: 3.4 x 3.4 x 27 (mm)
- Passivated stack
- Polarized with 160 V
- Contains SVHC substance 12626-81-2

General technical data
Ratings

Recommended pre-load	320 N
Stack surface temperature	-40 ... +160 °C
Voltage range	-10 ... +180 V
Maximum cable strain (longitudinal direction)	5 N

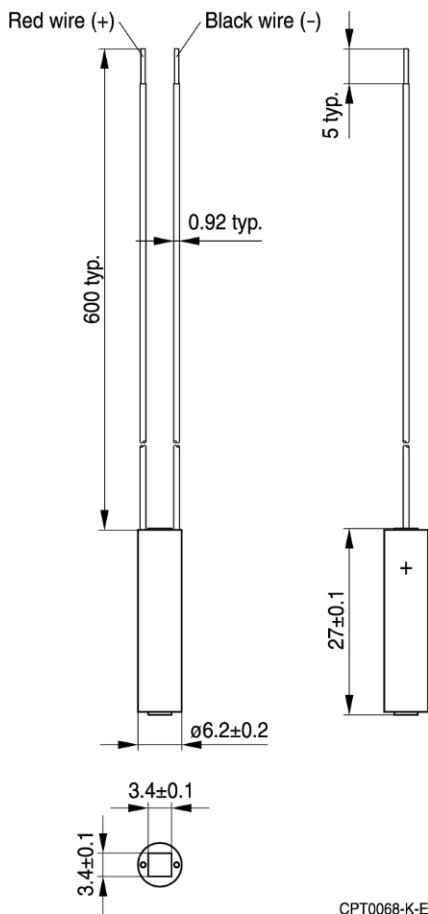
Electrical specifications after polarization

Capacitance	25 °C, 1 kHz, 1 V _{RMS}	typ. 1.3 μF
Insulation resistance	25 °C, 320 N pre-load, 8 V _{DC} , after ≥ 15 s	> 40 MΩ
Stroke at 160 V (s)	25 °C, 320 N pre-load, 1 N/μm stiffness of pre-load spring, dynamically measured	47 μm ±10%
Stiffness at 160 V (k _{stack})	25 °C, 320 N pre-load, dynamically, various load stiffnesses	typ. 12 N/μm
Blocking force at 160 V (F _{max})	dynamically, various load stiffnesses, extrapolation to 0 stroke	typ. 600 N
Resonance frequency (f _{res.})	free state (both ends of the actuator)	typ. 48 kHz

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Dimensional drawings



Preliminary data
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 SO_x, 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

Cardboard box	Packaging unit 40 pcs. (individually packed)
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Preliminary data

Cautions and warnings

General

Some parts of this publication contain statements about the suitability of our ceramic piezo actuator components for certain areas of application, including recommendations about incorporation/design-in of these products into customer applications. The statements are based on our knowledge of typical requirements made of our devices in the particular areas. We nevertheless expressly point out that such statements cannot be regarded as binding statements about the suitability of our piezo actuator components for a particular customer application. As a rule, TDK is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always incumbent on the customer to check and decide whether the piezo actuator components with the properties described in the product specification are suitable for use in a particular customer application.

- 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 > 100 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).

Preliminary data

- 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

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule we are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
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We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

6. Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply**.
7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements ("CSR") TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

Important notes

8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, InsuGate, LeaXield, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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