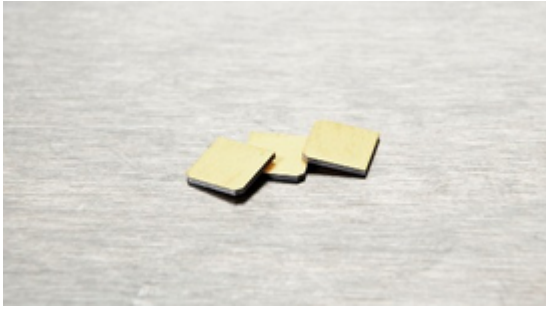


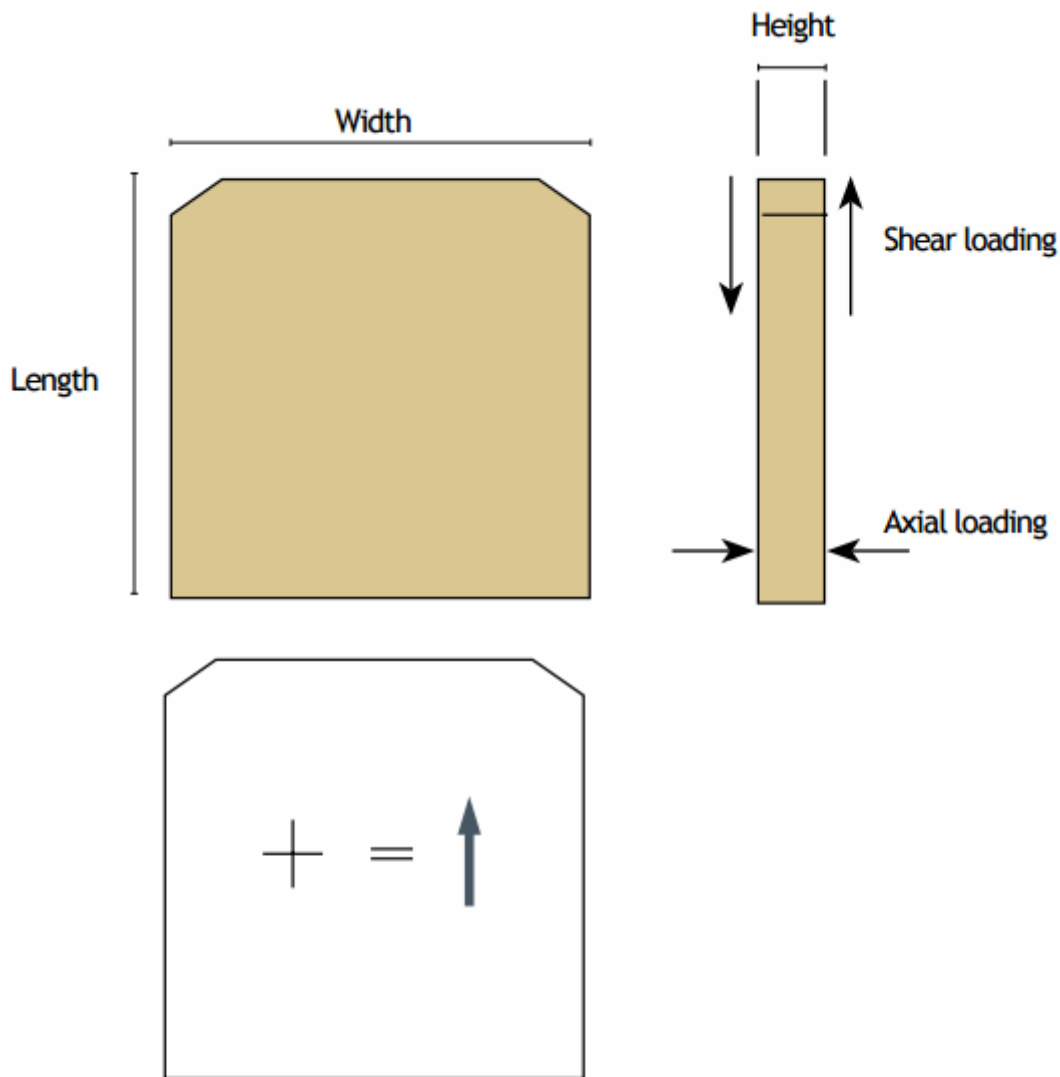
## CSAP02



The Noliac shear plate actuators are characterized by providing a large stroke for a very compact design. The shear plate CSAP02 measures 5x5x0.5 mm and provides a free stroke of 1.5  $\mu$ m and a capacitance of 830 pF.

### SPECIFICATIONS

| Attributes                       | Value  | Tolerance  |
|----------------------------------|--|------------|
| Length / outer diameter          | 5 mm   | +/-0.10 mm |
| Width / inner diameter           | 5 mm   | +/-0.10 mm |
| Height                           | 0.5 mm   | +/-0.05 mm |
| Chamfers                         | 0.5 x 45° mm   |            |
| Operating voltage, max.          | $\pm$ 320 V  |            |
| Free stroke, from -Vmax to +Vmax | 1.5 $\mu$ m  | +/- 15%    |
| Capacitance                      | 0.83 nF  | +/- 15%    |
| Maximum operating temperature    | 200 °C   |            |
| Material                         | NCE51  |            |
| Unloaded resonance frequency     | 1750.00 kHz  |            |
| Electrodes                       | Au on Ni, plated   |            |
| Remarks                          | Stroke measured under up to 3,5Mpa axial load without loss of performance, |            |



**Sign convention:**

A positive voltage on one electrode leads to a relative displacement of this electrode towards the chamfered edge. This displacement is recorded as positive.

## **MOUNT AND CONNECT**

### **Mounting**

Shear plate actuators present electrodes on top and bottom surfaces. They may be mounted either by mechanical clamping or gluing.

In case of clamping, axial stress on shear plate actuators must be controlled. Too low pressure can lead to slippage whereas too high pressure can damage the ceramic. With the appropriate contact surface and in the case of low shear force, a pressure of 1 to 3 MPa can be recommended.

If clamping is used, the stiffness of the loading mechanism in the actuation direction shall be as low as possible in order not to hinder the movement of the actuator.

The force must be applied on the full surface of the actuator in order to ensure a good load distribution. In particular when applying the pressure, the contact surfaces have to be sufficiently flat or compliant.

It can be necessary to insulate the contact surfaces from the rest of the structure. This can be achieved by adding inactive ceramic plates in the structure, or polyimide film insulator.

If glued, it is important to ensure a very thin glue line between the shear plate actuators and the substrate. This is generally ensured by using low viscosity glue. A pressure, e.g. 2-3 MPA, should be applied during the curing process.

Epoxy glues are well suited for gluing piezoceramics however several alternatives exist.

### **Electrical connection**

#### External electrodes

Since shear plate actuators can be used with bipolar symmetrical electrical supply, both electrodes are identical. The direction of operation is indicated by the chamfers.

Sign convention: A positive voltage on one electrode leads to a relative displacement of this electrode towards the chamfered edge.

Electrical connection to the external electrodes can be achieved by mechanical contacts, soldering, gluing with electrically conductive glues or wire bonding.

#### Mechanical connections

Mechanical connections can be arranged by e.g. copper springs contacted to the external electrodes. Shear plate actuators are provided with gold plated electrodes for optimal electrical contact and to avoid oxidation of the electrodes. For demanding applications, it might be necessary to have both contacts gold plated.

## WIRES

Shear actuators are typically delivered without wires, as the preferred connection method is a mechanical contact to the gold-plated electrodes. We currently have these options:

|           | Option A01                  | Option C      |
|-----------|-----------------------------|---------------|
| Type      | 32 AWG Teflon               | Custom        |
| Length    | 200 +/- 10mm                | To be defined |
| Position  | Corner of the component     | To be defined |
| Direction | Perpendicular to the height | To be defined |