SD-MSS-1K series
Device information

SD-MSS-1KTM | **SD-MSS-1KPMAl** | **SD-MSS-1KPMAu**

for Torque Magnetometry in DC/Pulsed Field

Version 1.2

Specifications

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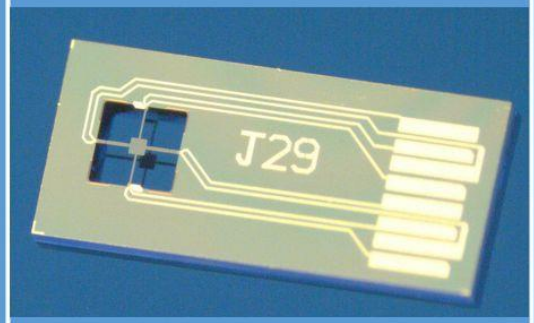
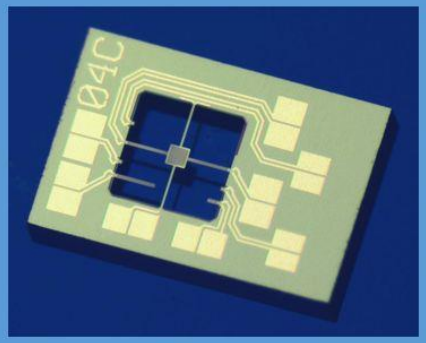
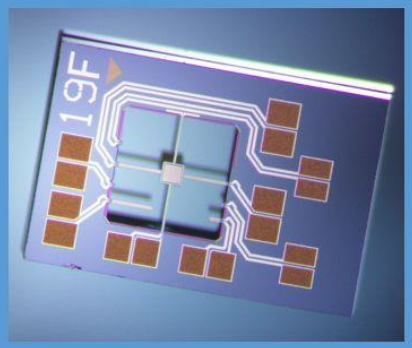
MSS

Code	 SD-MSS-1KTM	 SD-MSS-1KPMAl	 SD-MSS-1KPMAu
Membrane size [µm]	200 square	200 square with coil	
Membrane thickness [µm]	2.8 (typical)		
Chip dimensions [mm]	5.5 x 2.5 x 0.3	3.0 x 2.0 x 0.3	
Resistance value [kΩ]	0.3 – 1.2		
Electric configuration	Separated, 8 pads 0.25 (0.5) mm pitch	***Aluminum*** pads for wire bonding or gluing	***Gold*** pads for wire bonding or gluing
Piezoresistive cantilever	No	120 µm, 400 µm	

Features

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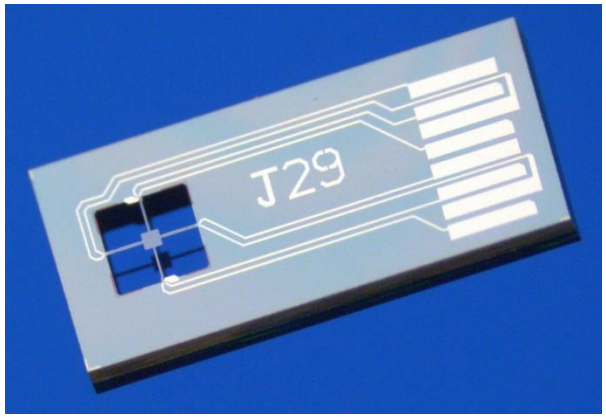
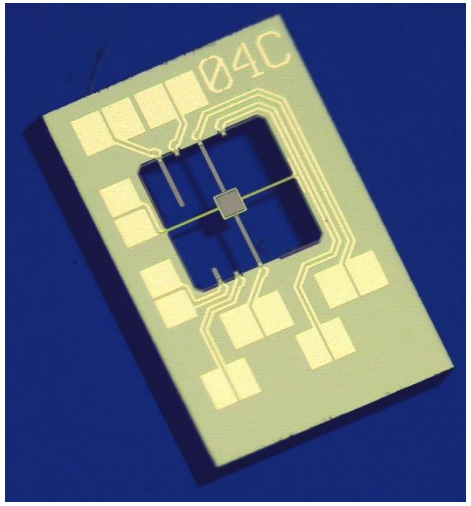
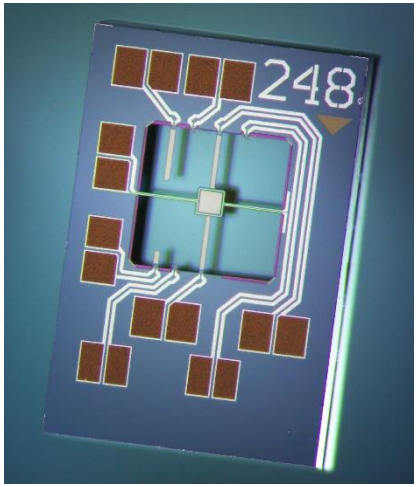


- Reasonable chip size for comfortable handing
- Easy socket connection
- Possibility of changing structure by breaking beams

SD-MSS-1KPMAl



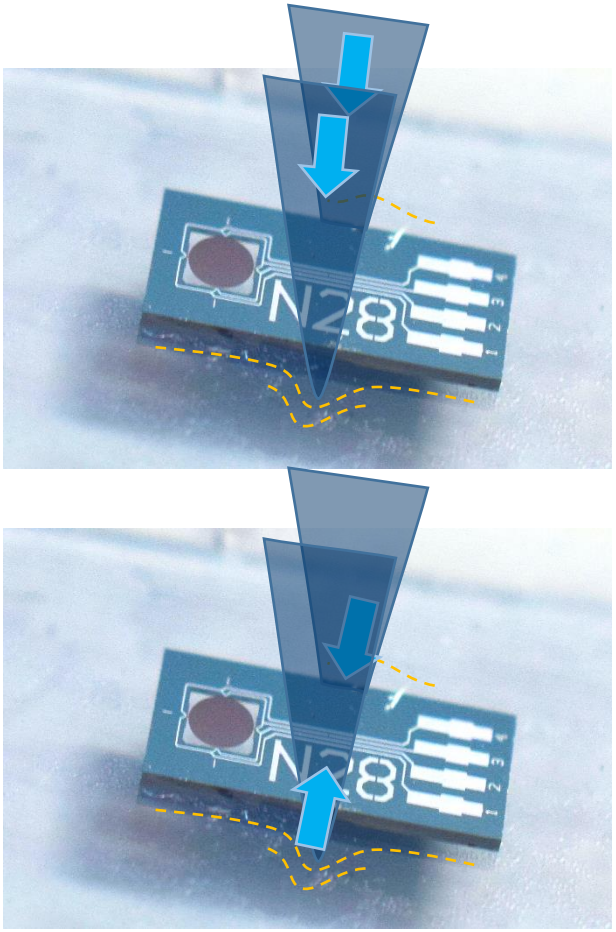
SD-MSS-1KPMAu



- Compact chip size for tight mounting space
- Platform with coil
- Two individual piezoresistive cantilevers
- 3 reference resistors
- Aluminum pads (SD-MSS-1KPMAl), Gold pads (SD-MSS-1KPMAu)

Handling of chips

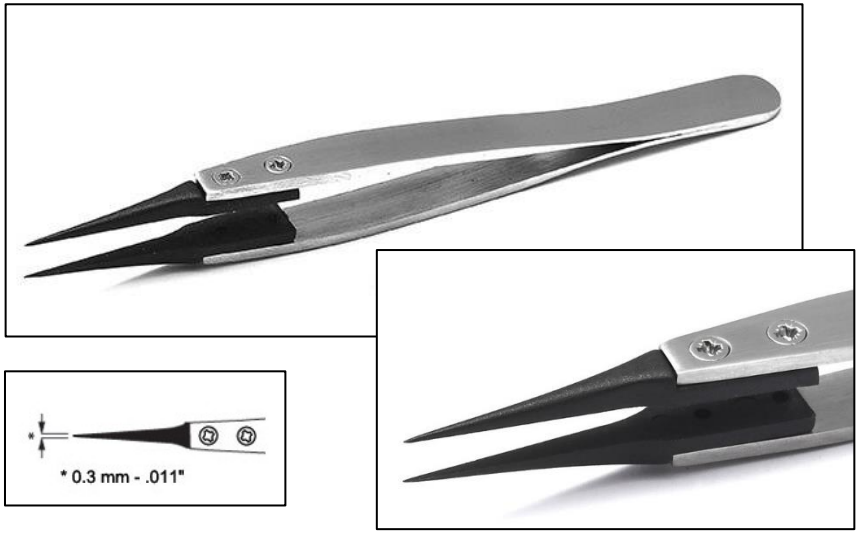
To remove the chip from gel sheet, it is recommended to use a sharp plastic tweezers.



(1) Carefully push the tips of tweezers into the gel sheet, like to create a little space in between the chip back and the gel sheet. Don't clamp the chip at this step.

(2) Slowly move the tips laterally and clamp the chip. Carefully pick up the chip.

Example: SIPEL 1315-SA



If the tips are too sharp, make them blunt.

TAk

Device layout

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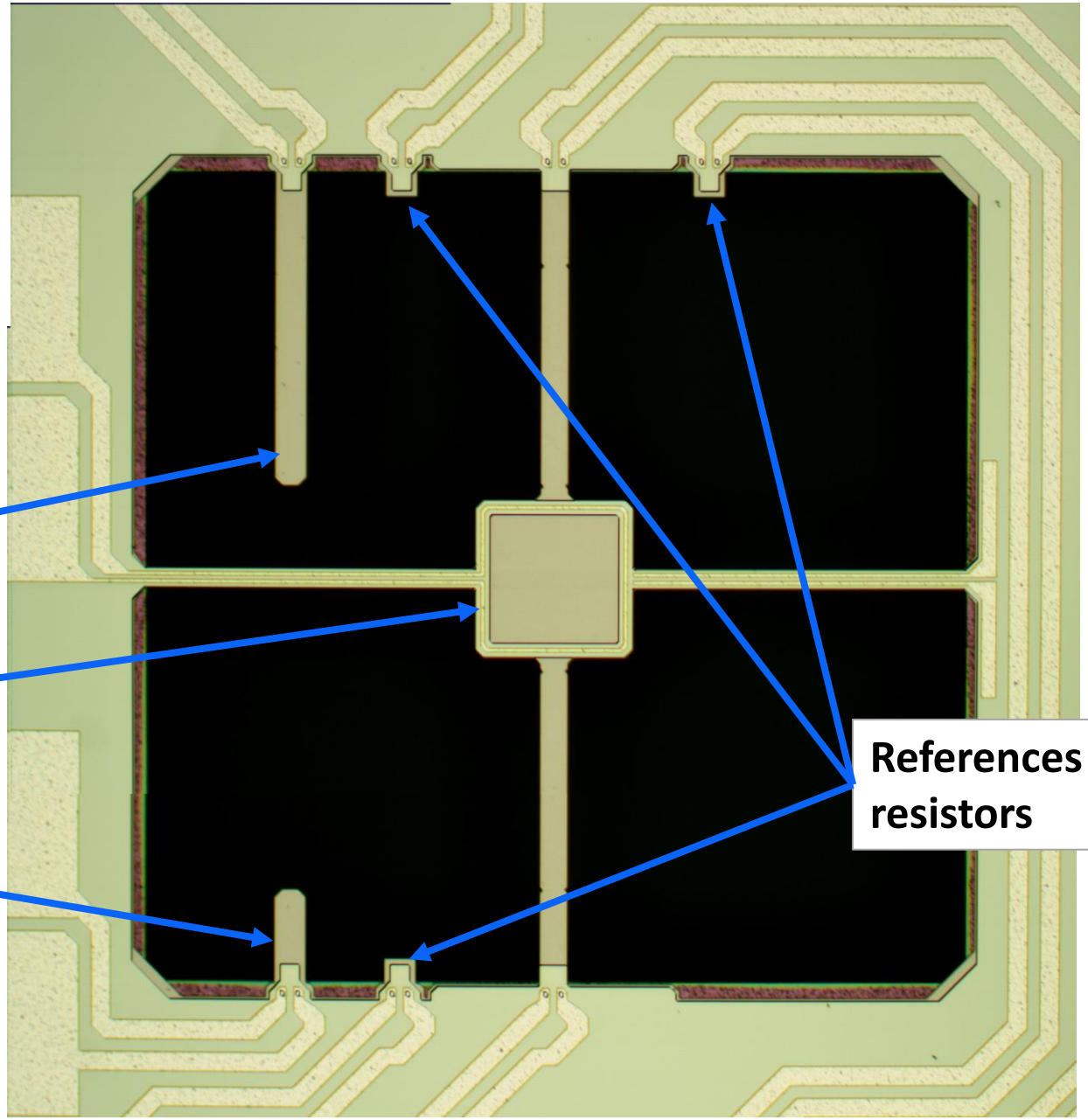
SD-MSS-1KPMAu



Device layout

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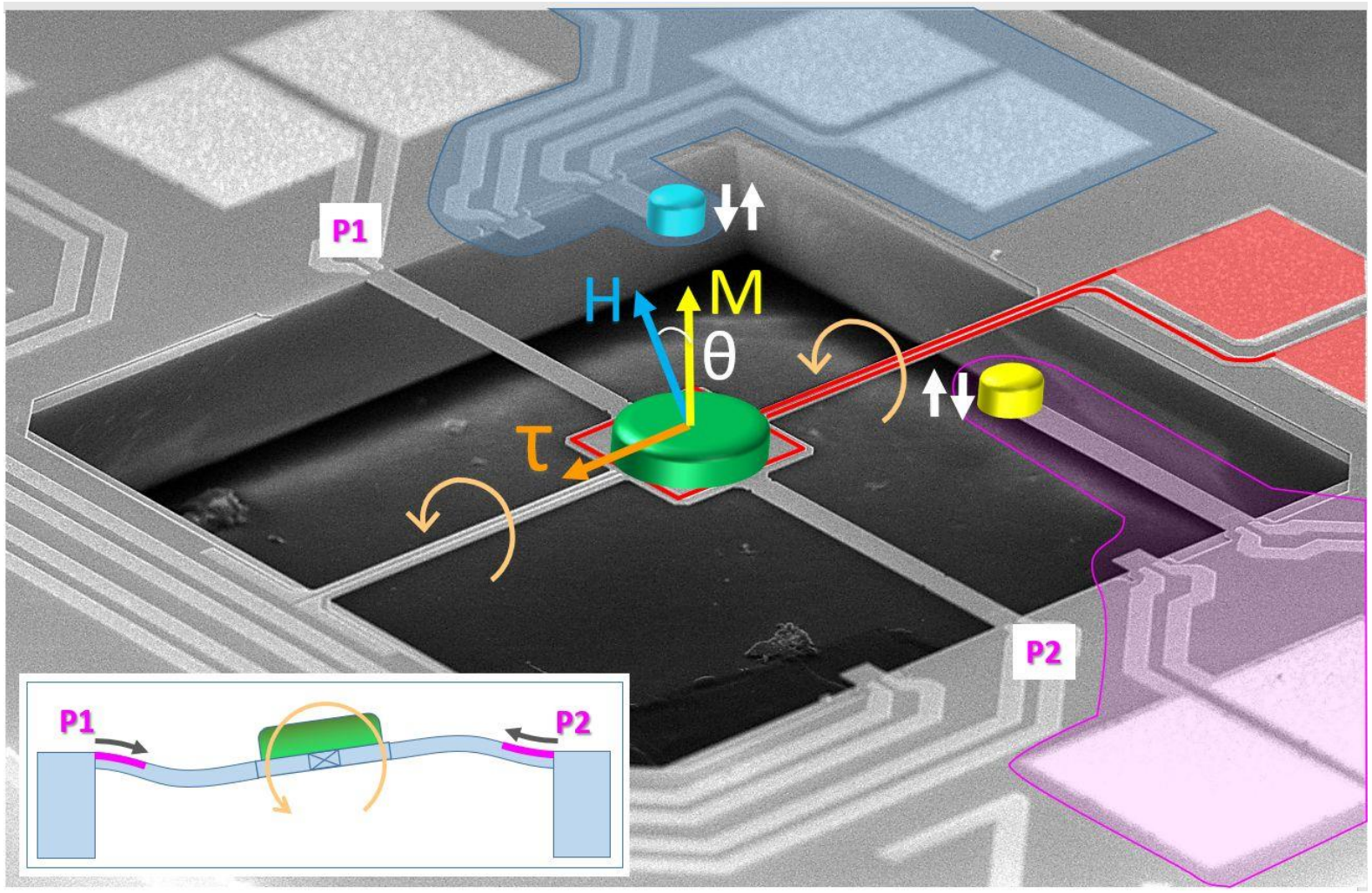
SD-MSS-1KPMAl

SD-MSS-1KPMAu

Piezoresistive cantilever 120 µm



Coil for calibration

Piezoresistive cantilever 400 µm

Dimensions

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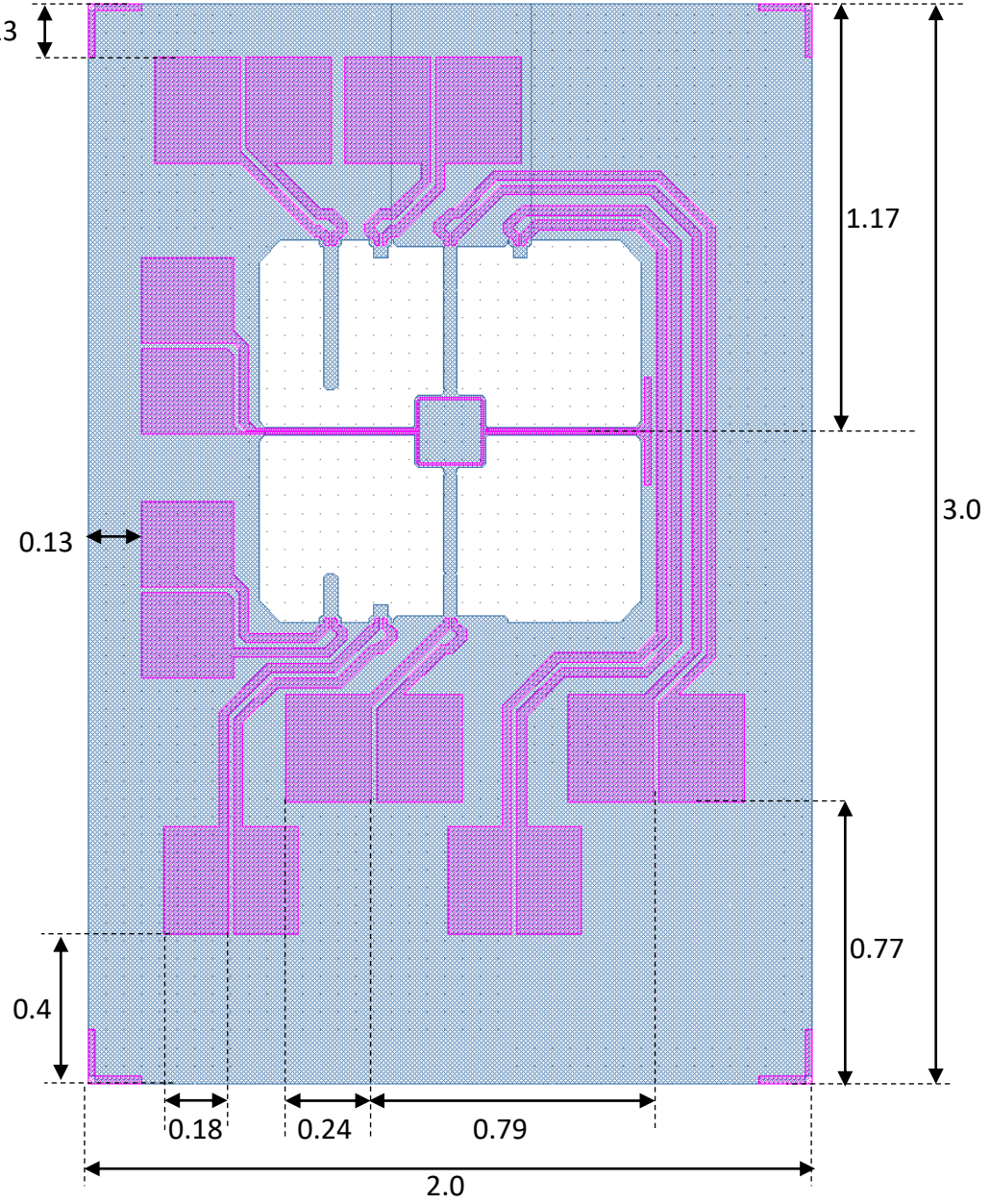
SD-MSS-1KPMAu



The chip thickness is approximately 0.3 mm.

Approximate values, Unit [mm]

Dimensions

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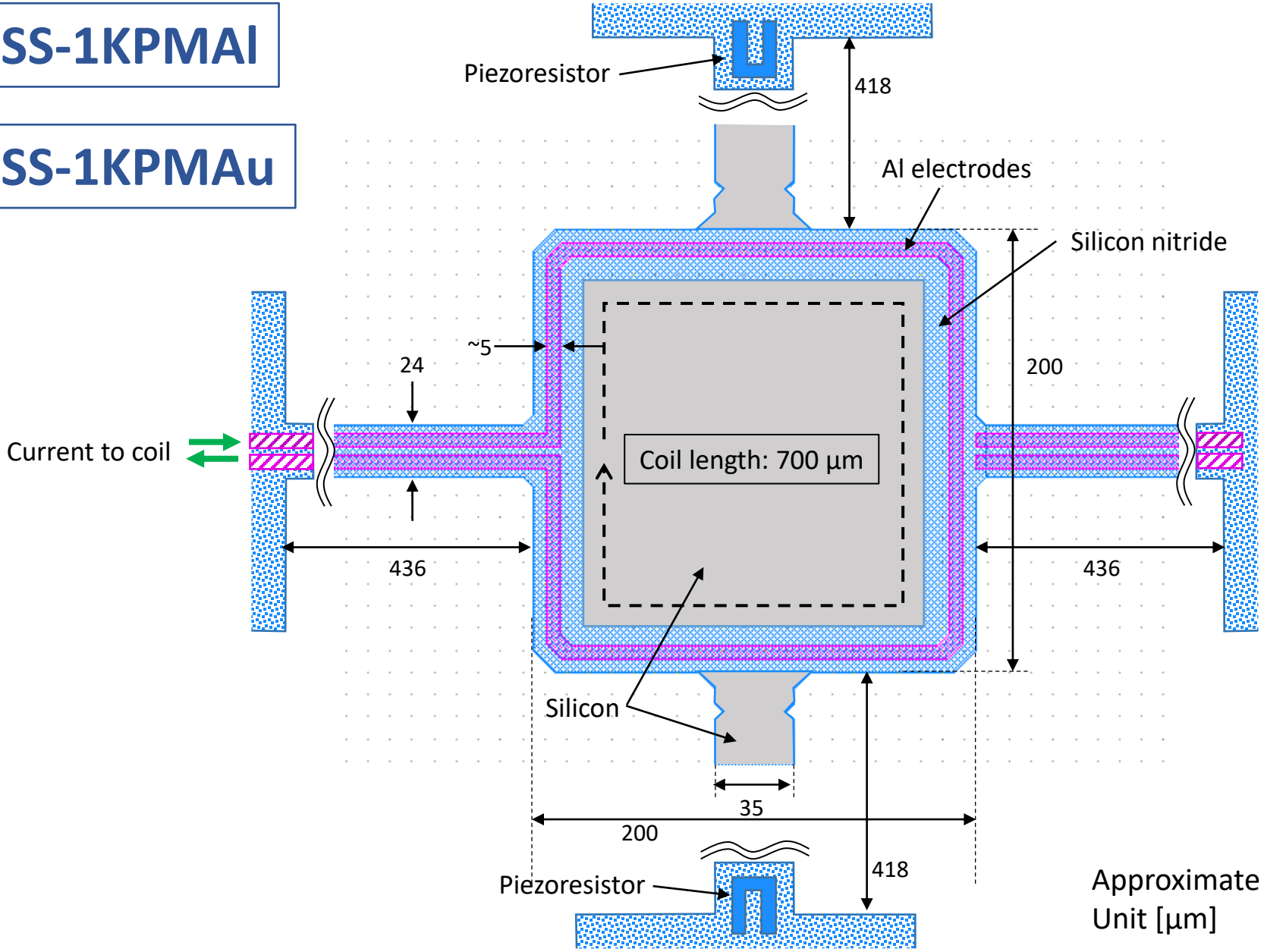
SD-MSS-1KPMAl

SD-MSS-1KPMAu



Approximate values
Unit [µm]

Connection for the platform

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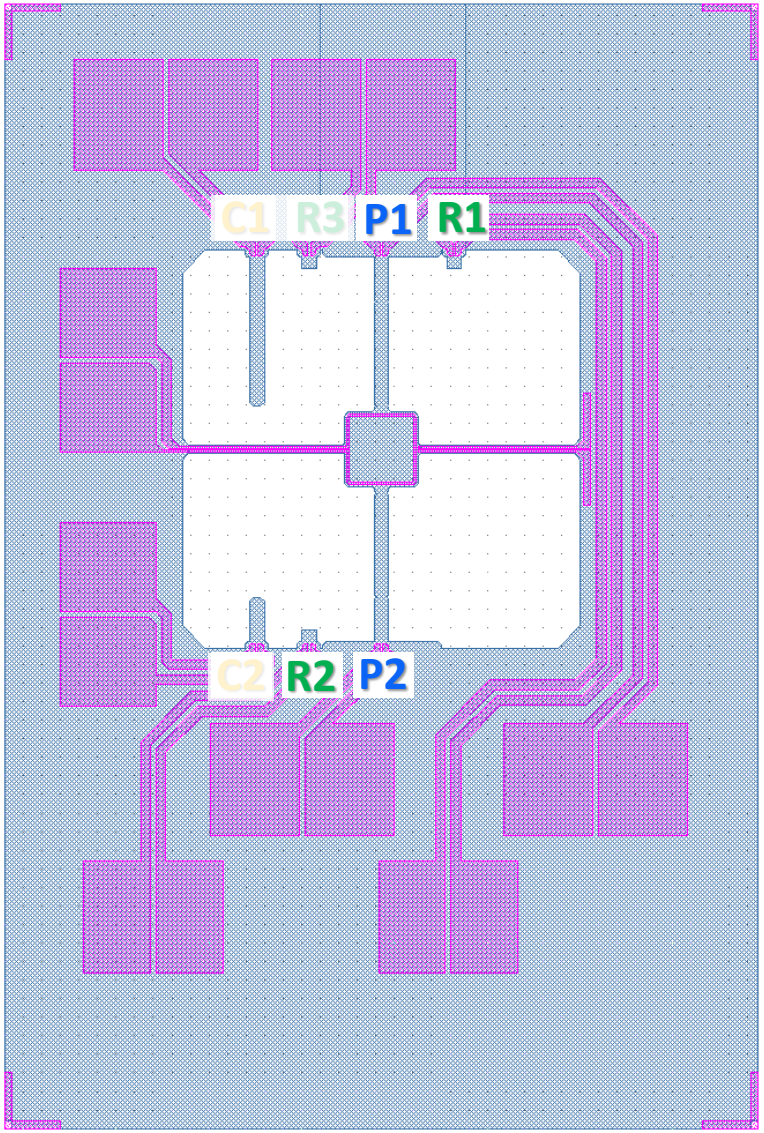
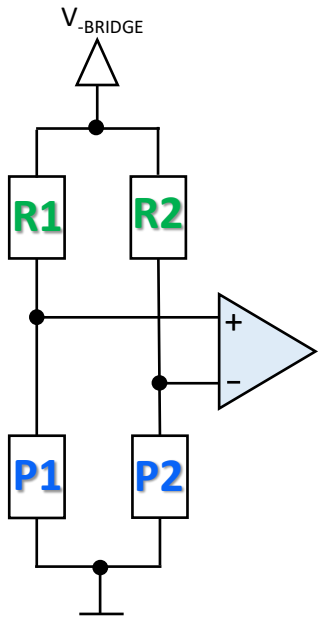
SD-MSS-1KPMAu

C1 C2
P1 P2
R1 R2 R3

All piezoresistors are identical.





If the potential of the silicon part should be 0V, the bridge voltage must be negative ($V_{BRIDGE} < 0V$).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

Connection for the cantilevers

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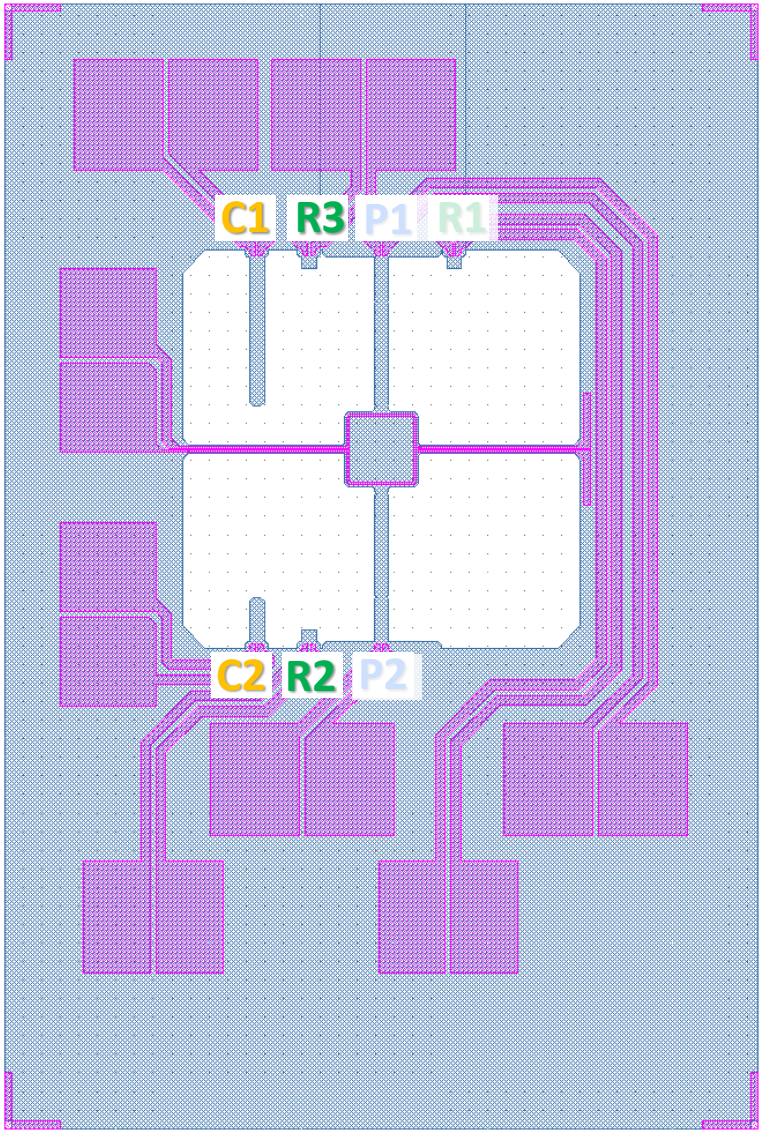
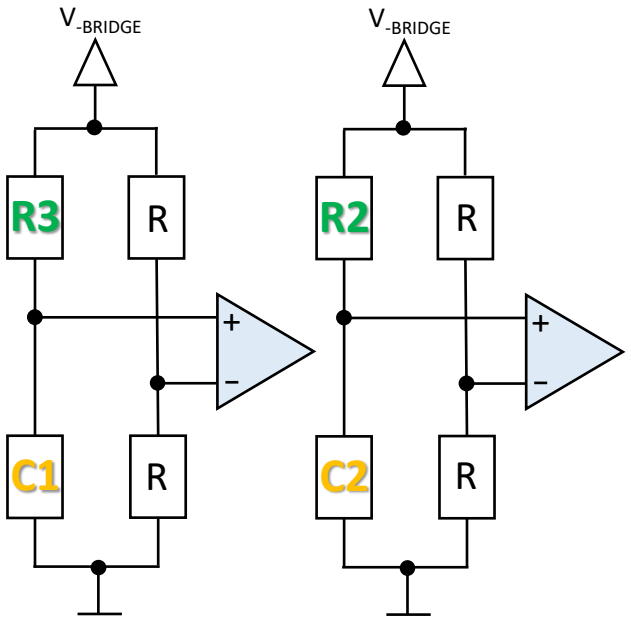
SD-MSS-1KPMAu

C1 C2
P1 P2
R1 R2 R3

All piezoresistors are identical.



400 µm **120 µm**



R: external resistor

If the potential of the silicon part should be 0V, the bridge voltage must be negative ($V_{BRIDGE} < 0V$).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

Device layout

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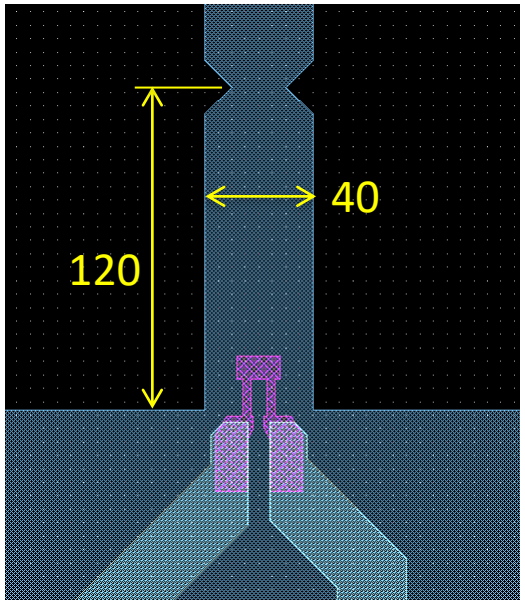

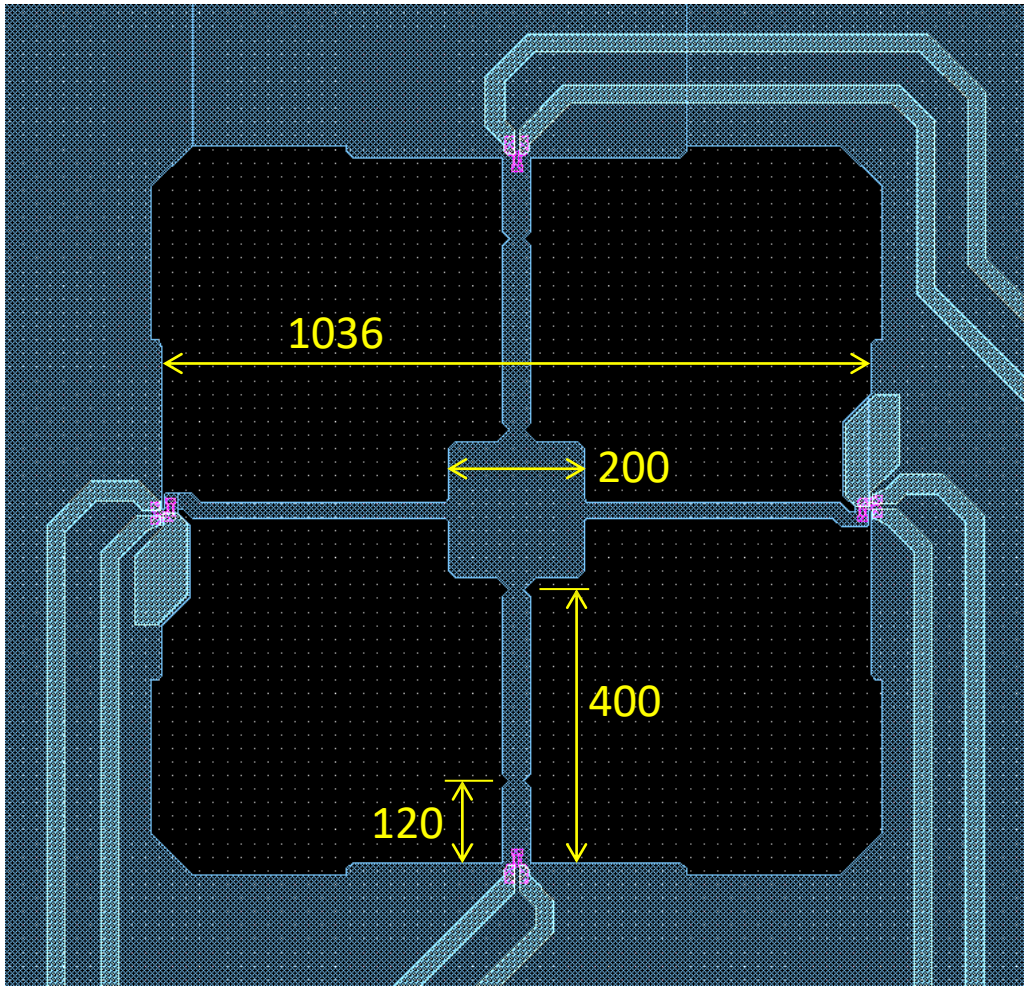

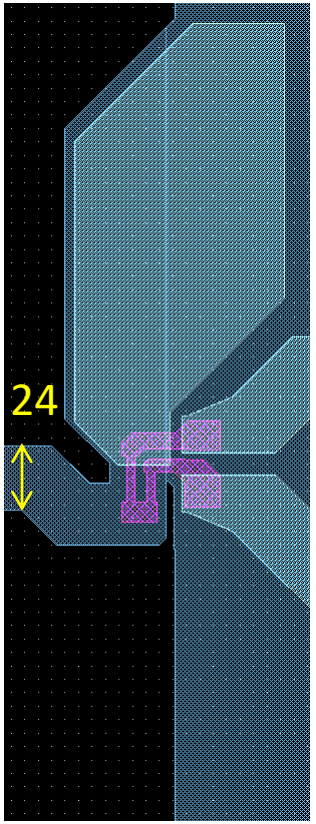

Typical thickness: 2.8 µm

Typical application

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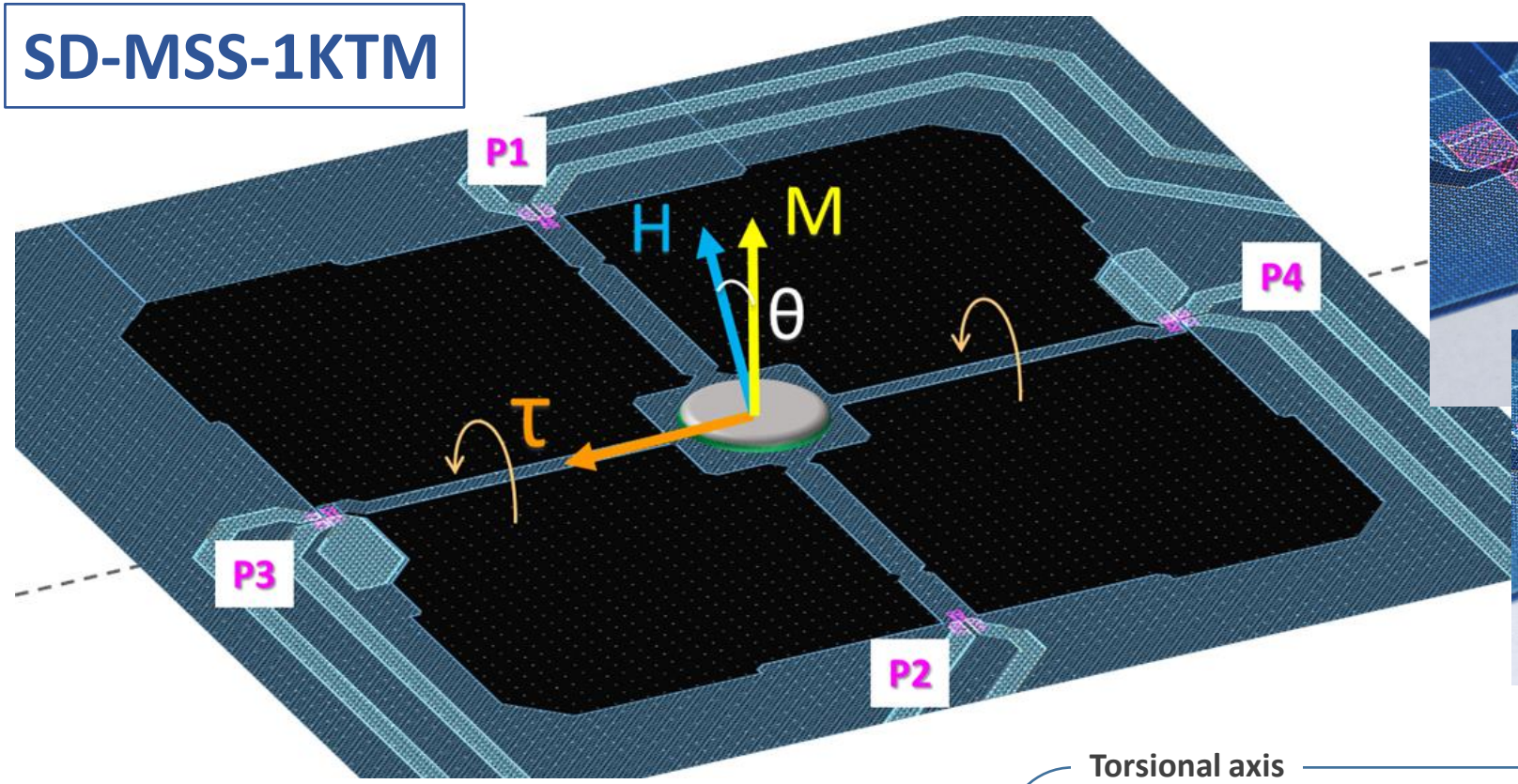
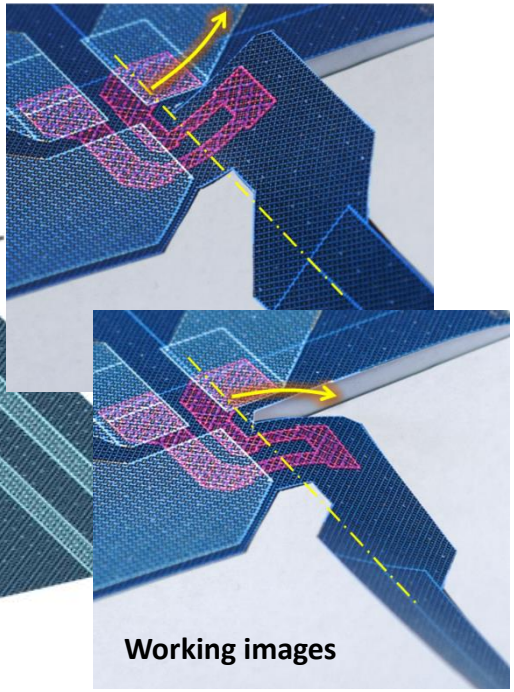
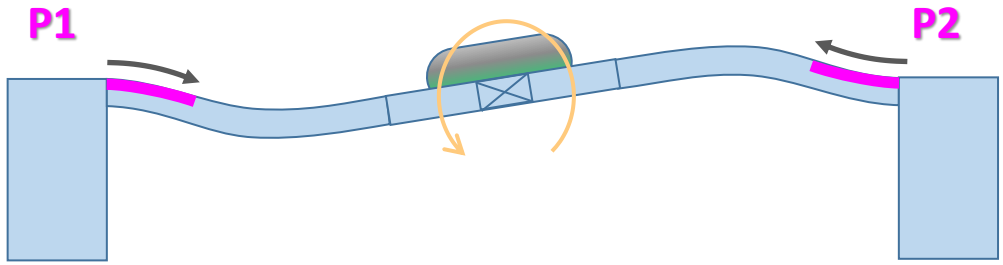
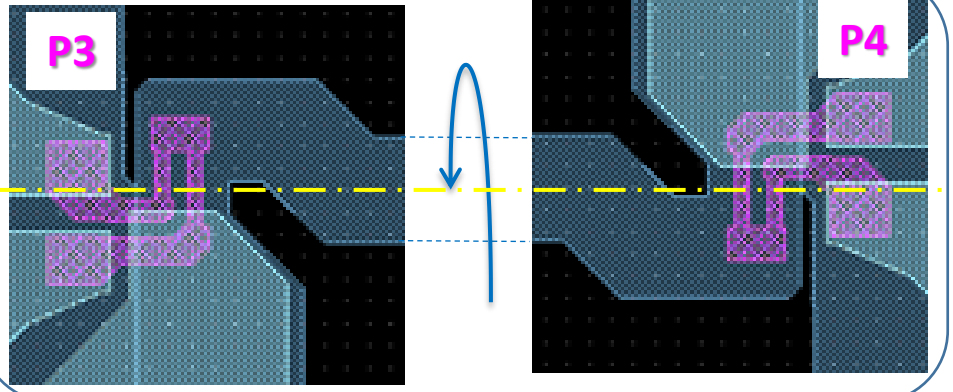




Bending axis



Torsional axis



Dimensions

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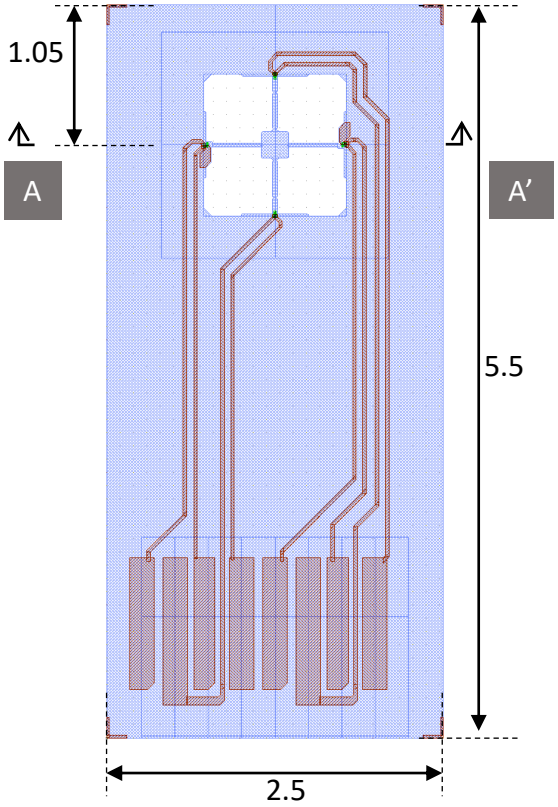

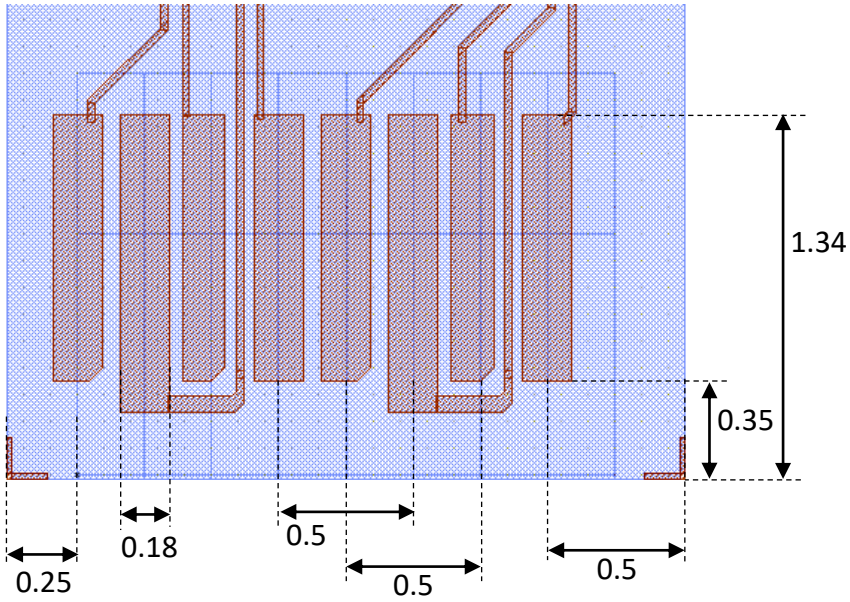

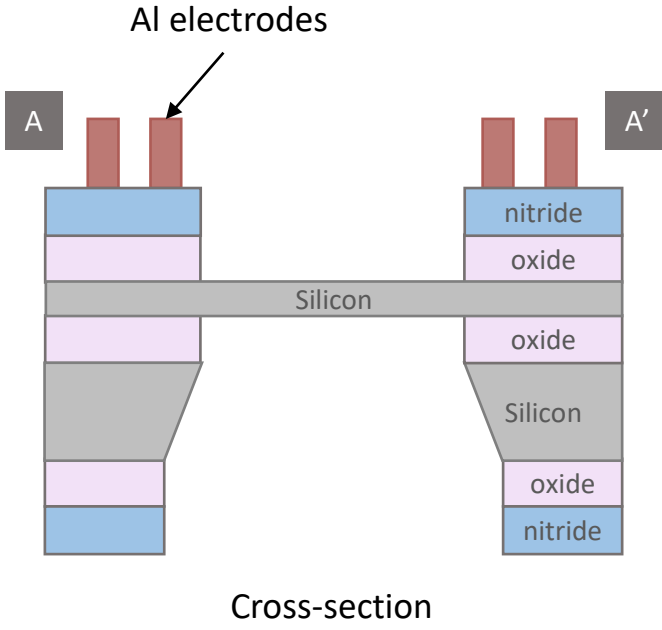

Cross-section

The chip thickness is approximately 0.3 mm.

Approximate values, Unit [mm]

Contacts and connector 1

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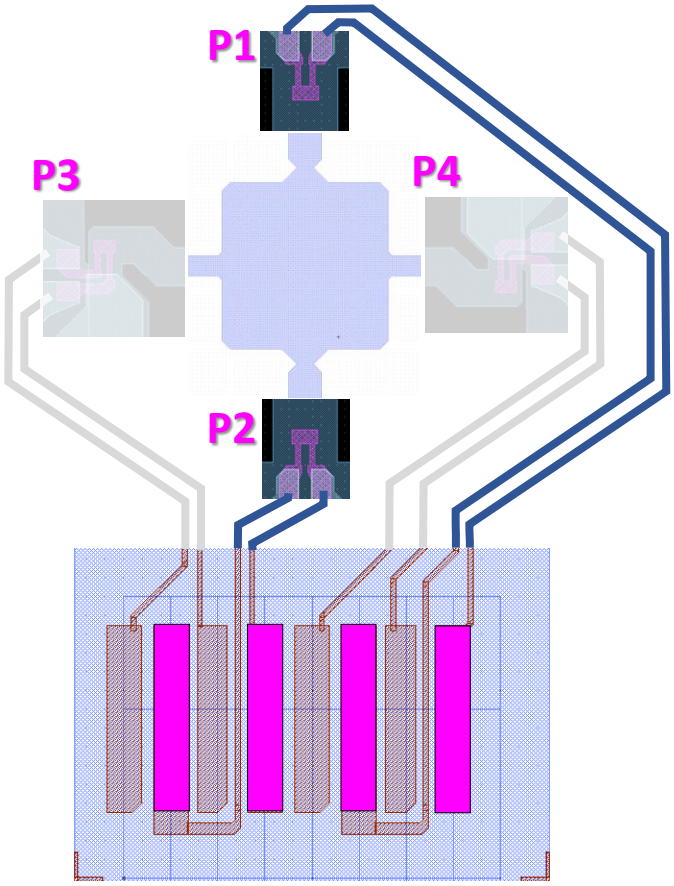
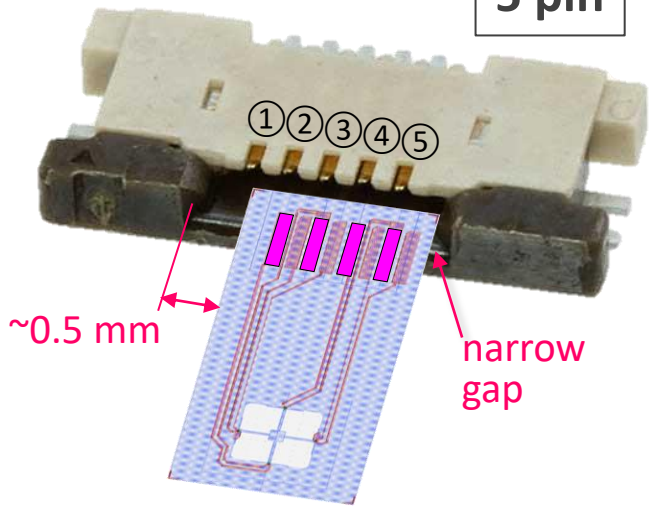
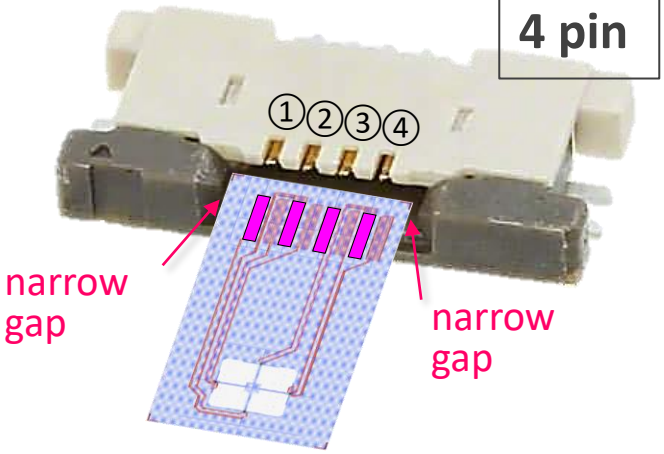


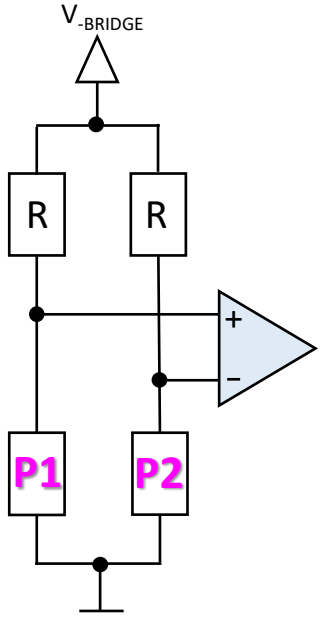
5 pin



4 pin



Not possibility to connect P3 and P4



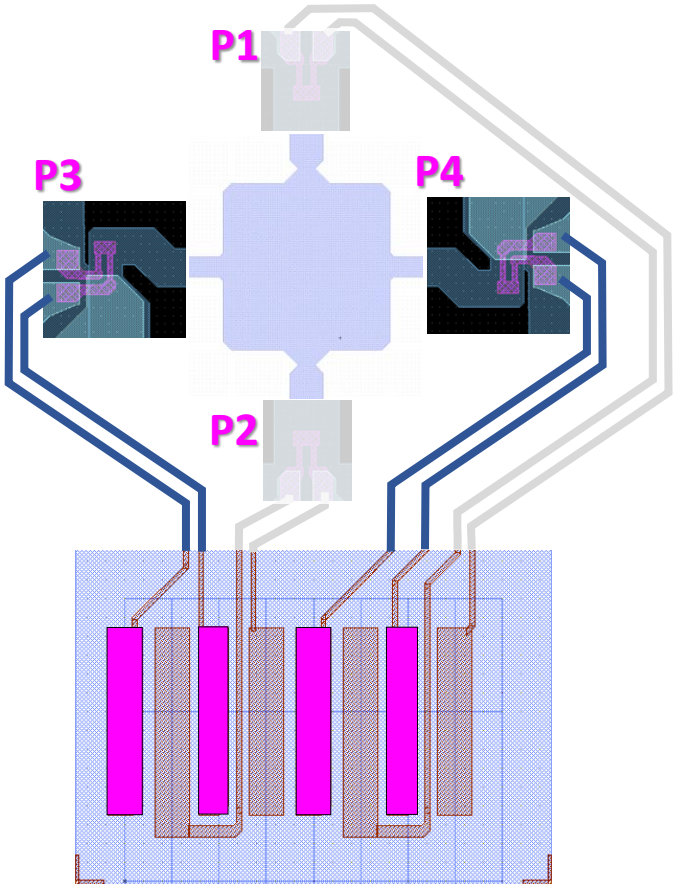
R: external resistor

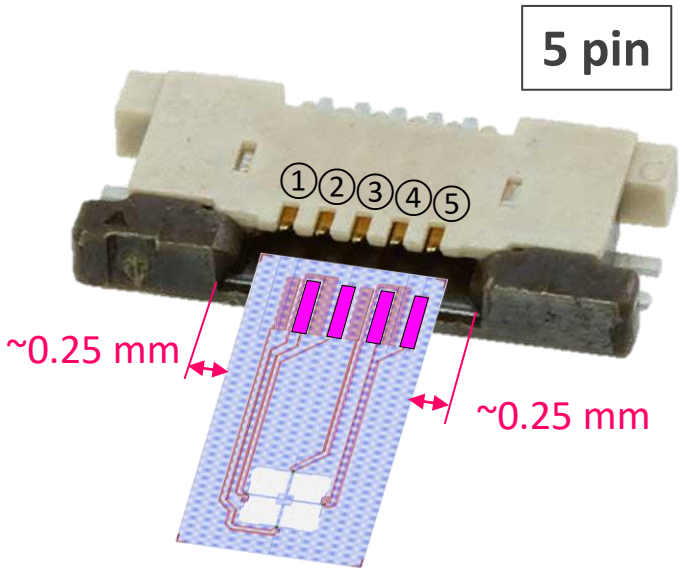
If the potential of the silicon beams should be 0V, the bridge voltage must be negative ($V_{-BRIDGE} < 0V$).

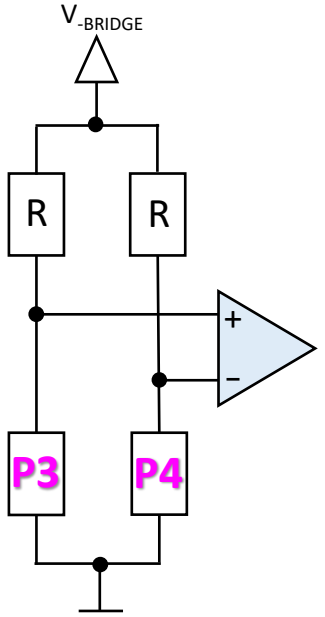
This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

Contacts and connector 2

SD-MSS-1KTM







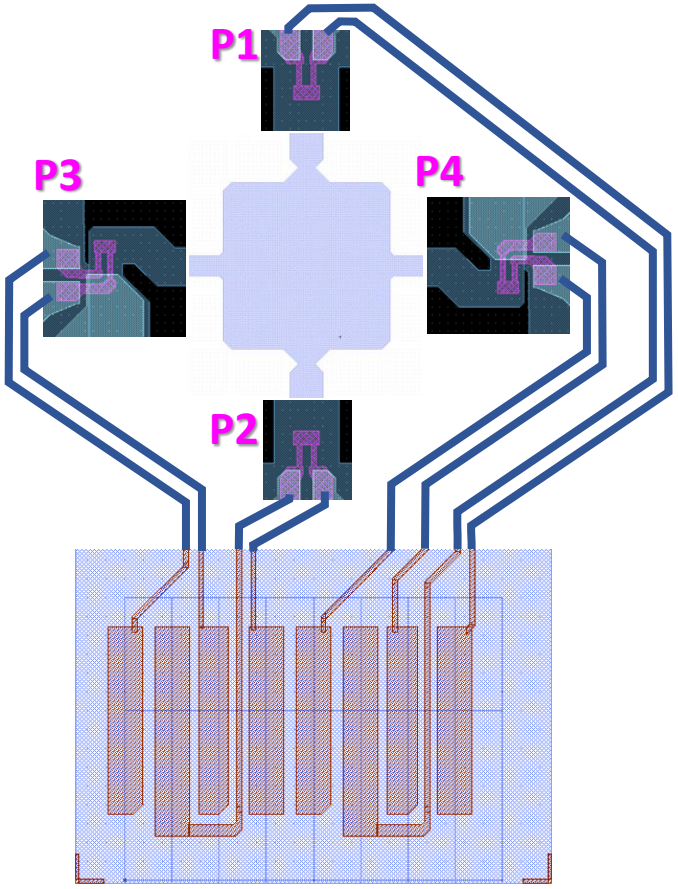
R: external resistor

If the potential of the silicon beams should be 0V, the bridge voltage must be negative ($V_{-BRIDGE}$< 0V).

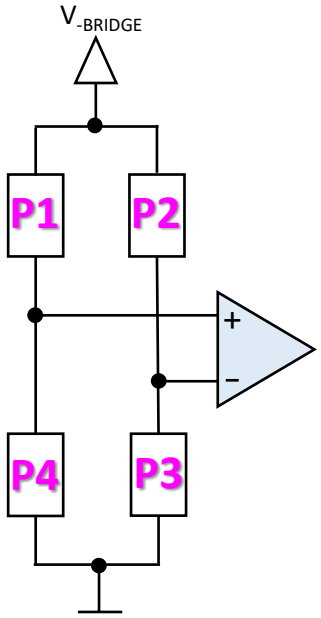
This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

Contacts and connector 3

SD-MSS-1KTM



All pads have to be connected by e.g., wire bonding.



If the potential of the silicon beams should be 0V, the bridge voltage must be negative ($V_{-BRIDGE} < 0V$).

This is because the piezoresistors are p-type diffusions on n-type substrate and the potential of the silicon part becomes the highest potential available on the chip.

Commercial connectors

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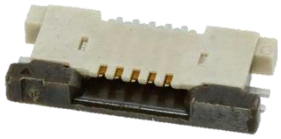
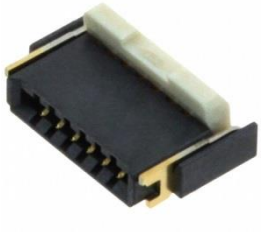
The following connectors are recommended for Torque Magnetometry applications.



- Molex 54550 series, e.g., 54550-0471 (4 pin), 54550-0571 (5 pin) : Front slider type. Not simple to fix the chip, but the chip can be strongly clamped. The alignment between the pads on the chip and the connector pins is highly visible. The size of the connector is relatively big.

  http://www.digikey.ch/product-detail/en/molex-llc/0545500471/WM8825CT-ND/3197255



- Panasonic Y5B series, e.g., AYF530535A (5 pin) : Back rotary clamp, easy to mount the chip. However, the chip is not strongly clamped compared to the connector mentioned above, which may be problematic in some applications. A big advantage is its compact size.

  https://www.digikey.ch/products/en?keywords=255-5520-nd

- Hirose FH34(S) series, e.g., FH34S-4S-0.5SH (4 pin) : Back rotary clamp, easy to mount the chip. This connector has almost the same features as Panasonic one.

  http://www.digikey.ch/product-detail/en/hirose-electric-co-ltd/FH34S-4S-0.5SH(50)/HFT104TR-ND/2033607

- Other bland are of course usable if the following conditions are met.

  - **FPC (Flexible Printed Circuit)/ FFC (Flexible Flat Cable) connectors**
  - **0.5 mm pitch**
  - **For 0.3 mm-thick cable**
  - **Top, or top&bottom, contact**

User options (Examples)

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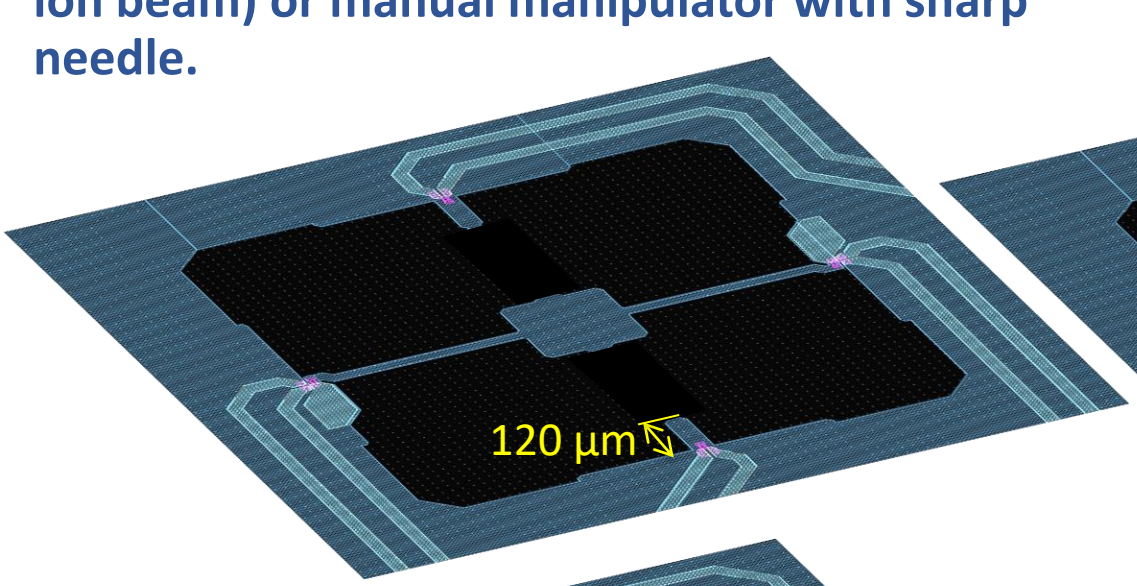
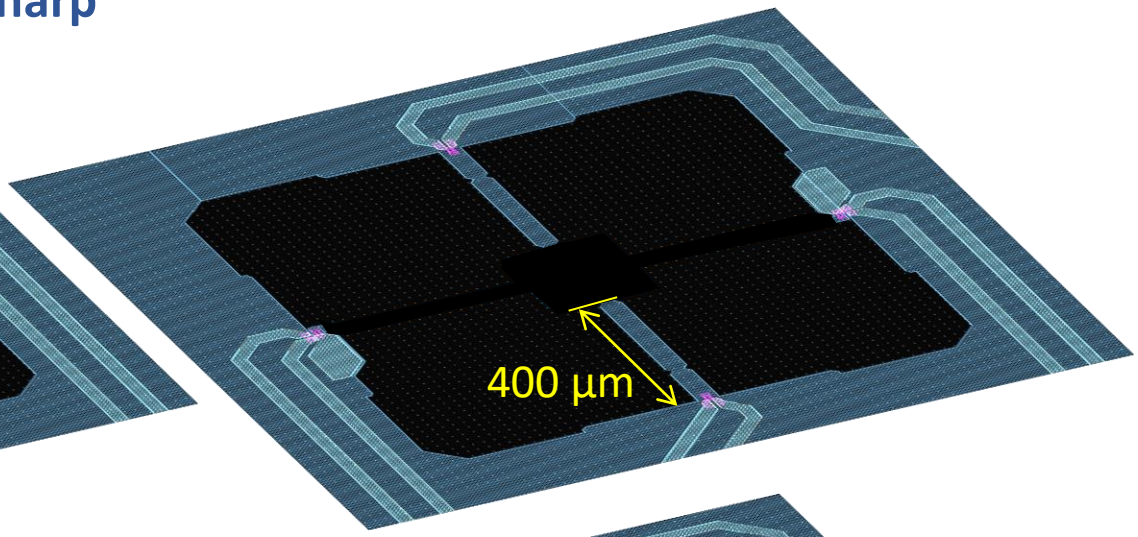
MSS

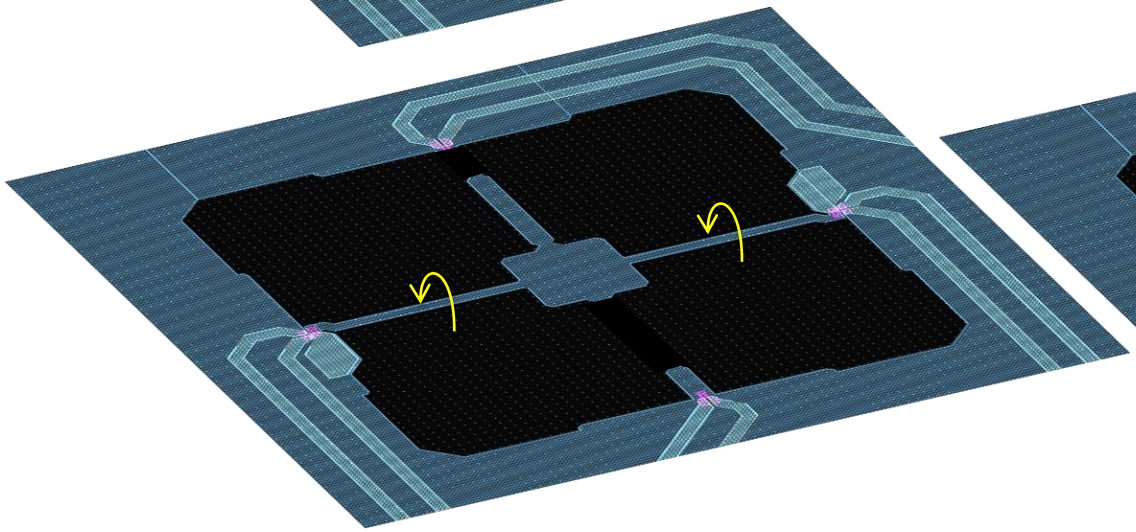
SD-MSS-1KTM

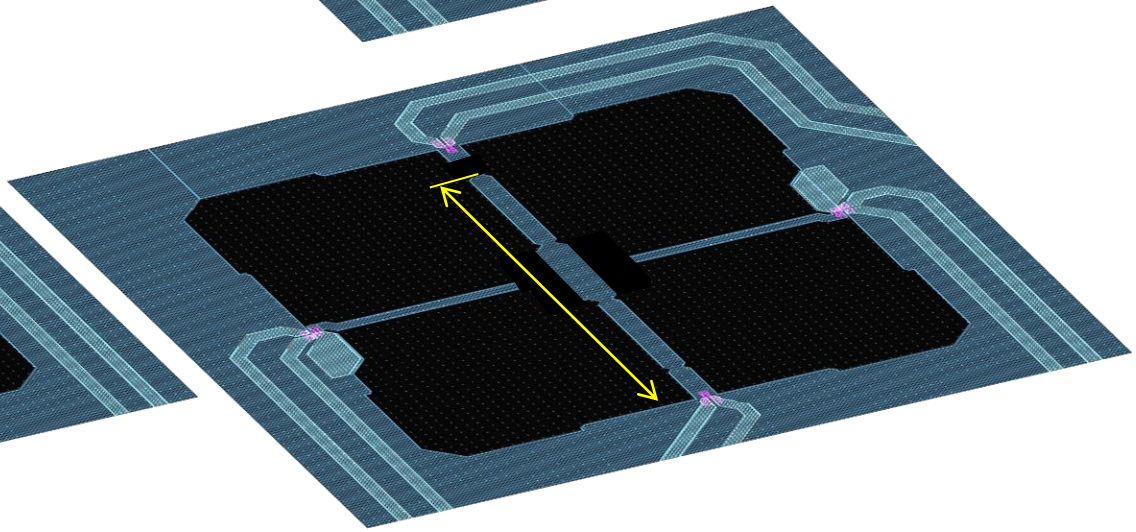
Please do this option at your own risk.

Breaking (cutting) out of beams by FIB (focused ion beam) or manual manipulator with sharp needle.









Tips for breaking beams

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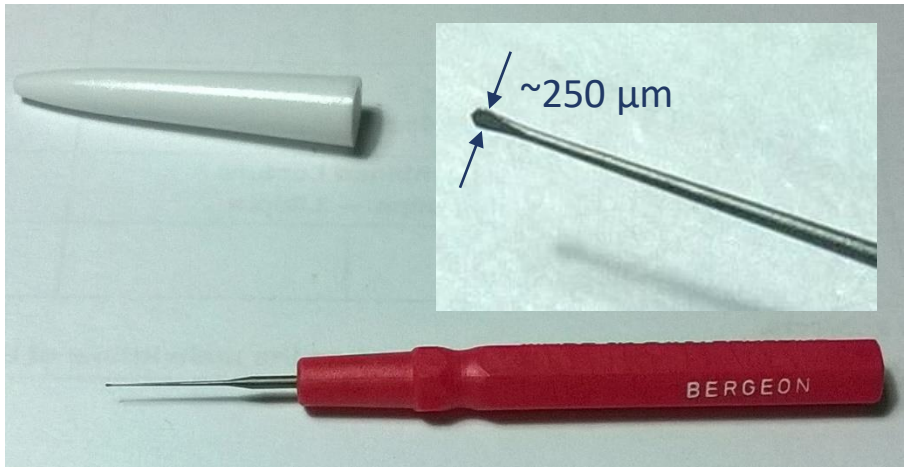
MSS

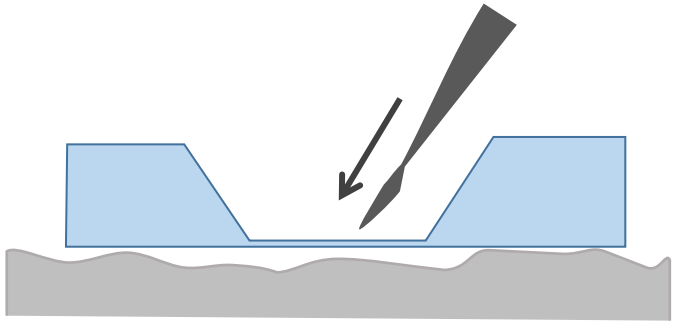
SD-MSS-1KTM

Manual breaking of beams is very challenging. However, it's very convenient in some cases and save time.

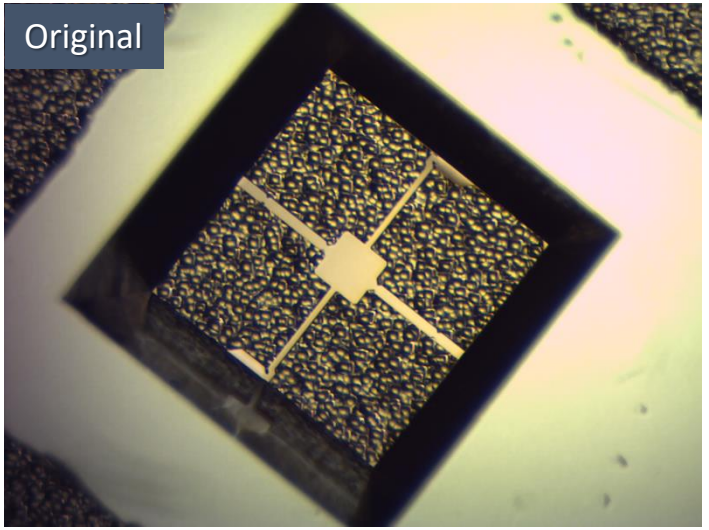
- ❑ Place the chip up-side-down on a rough and hard surface, e.g., back surface of a single-side-polished silicon wafer.
- ❑ Use a sharp needle (e.g., oiler for watchmaker) and poke a beam.



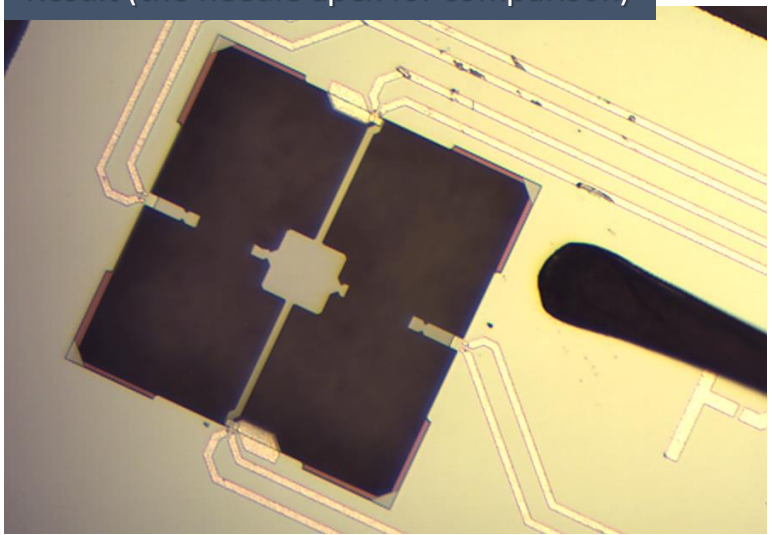
Bergeon 30102-A Oiler (can be purchased on ebay)
(Polishing the flat part of the apex with oil-stone enhances the edge sharpness.)



Original



Result (the needle apex for comparison)



Contact

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