

# PRS-L100-F500-SCD-PCB

Silicon piezo-resistive sensing cantilevers



## General description

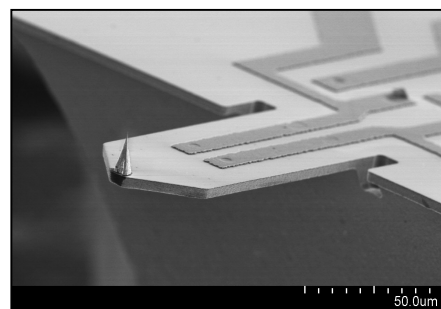
Piezo-Resistive Sensing (PRS) probes are silicon cantilevers with a long-life single crystal diamond tip (SCD). Integrated piezo-resistors are used for self-sensing the cantilever deflection. The piezo-resistors are integrated into a matched Wheatstone bridge to raise the sensitivity and compensate environmental thermal drift. Self-sensing readout technology makes laser adjustment obsolete and saves time during a cantilever change. The free space above the cantilever enables new applications and combination of AFM with various instruments. The SCD tip exhibits low surface energy, which prevents contamination when imaging sticky or biological samples. The cantilever chip is bonded to a small printed circuit board (PCB) with a small connector to enable a quick cantilever change. A cantilever PCB can be connected to a SCL's low-noise pre-amplifier via a SCL's flex PCB with its counter-part PCB.

Specifications	
Model	PRS-L100-F500-SCD-PCB
Tip radius (apex)	<15 nm
Tip height	12...16 µm
Tip material	Long life Single Crystal Diamond (SCD) <100> along tip axis
Glue between tip and cantilever	non-conducting temp-stability: up to 70°C
Resonant frequency	250..750 kHz
Spring constant	12...330 N/m
AFM mode	contact, tapping, non-contact
Sensitivity*	1...3 µV/nm
Force sensitivity*	4...330 nN/µV
Length, width	100 ±5 µm, 48 ±2 µm
Material	silicon cantilever, boron doped 1k Ohm piezo resistors, aluminium tracks
Deflection sensing	on chip piezo-resistive bridge
Actuator	external shaker
Electrical connections	bonded to small PCB with connector (counter part PCB available) or optional bonding pads on chip
Chip dimensions (h, w, l)	0.3 / 1.0 / 2.7 mm
* not amplified (signal direct at the chip), 2.048 V bridge supply	

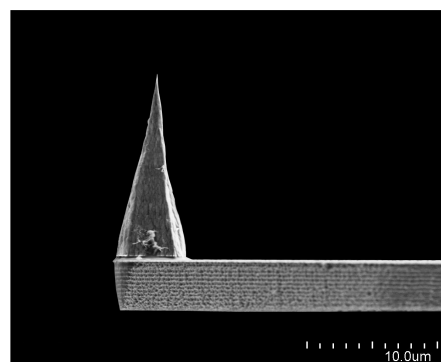
## Applications:

- Integration on a standard AFM scanner
- Direct use on an AFSEM™ inside a SEM ([www.getec-afm.com](http://www.getec-afm.com))
- Force sensing within a SEM, TEM, etc.; nano-indentation

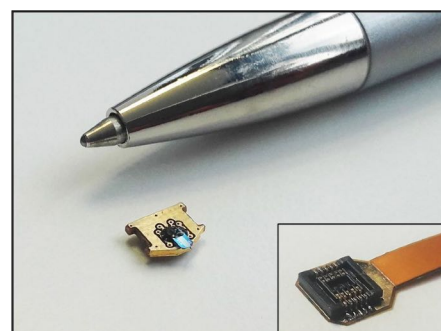
**What about your application? Contact us!**



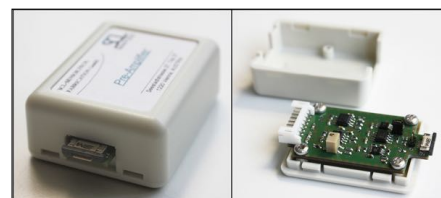
PRS-L100 cantilever with Al tracks for reading out the sensor signal



Side view of a SCD cantilever tip



Cantilever is bonded to a 6 x 4.5 mm PCB (height with connector 1.6 mm, with CP-PCB: 2.5 mm); left: counter part PCB



Hardware for amplified readout:  
Low-noise pre-amplifier (45x35 mm)

## SCL-Sensor.Tech. Fabrication GmbH

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Leaflet version: 2024-03-11

# PRSA-L300-F50-SCD-PCB

Silicon piezo-resistive sensing cantilevers



## General description

Piezo-Resistive Sensing Active (PRSA) probes are silicon cantilevers with a long-life single crystal diamond tip (SCD). Integrated piezo-resistors and a heater are used for self-sensing and self-actuating the cantilever deflection. The piezo-resistors are integrated into a matched Wheatstone bridge to raise the sensitivity and compensate environmental thermal drift. Self-sensing readout technology makes laser adjustment obsolete and saves time during a cantilever change. The free space above the cantilever enables new applications and combination of AFM with various instruments. The SCD tip exhibits low surface energy, which prevents contamination when imaging sticky or biological samples. The cantilever chip is bonded to a small printed circuit board (PCB) with a small connector to enable a quick cantilever change. A cantilever PCB can be connected to a SCL's low-noise pre-amplifier via a SCL's flex PCB with its counter-part PCB.

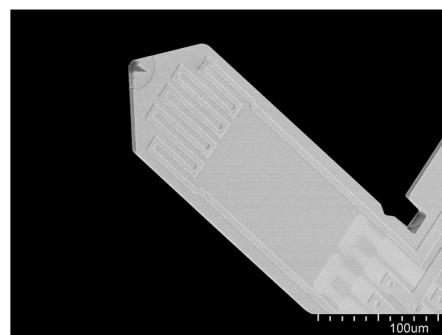
## Specifications

Model	PRSA-L300-F50-SCD-PCB
Tip radius (apex)	<15 nm
Tip height	12...16 µm
Tip material	Long life Single Crystal Diamond (SCD) <100> along tip axis
Glue between tip and cantilever	non-conducting temp-stability: up to 70°C
Resonant frequency	30..65 kHz
Spring constant	1...15 N/m
AFM mode	contact, non-contact
Sensitivity*	1...2 µV/nm
Force sensitivity*	0.5...56 nN/µV
Length, width	300 ±5 µm, 110 ±3 µm
Material	silicon cantilever, boron doped 1k Ohm piezo resistors, aluminium tracks
Deflection sensing	on chip piezo-resistive bridge
Actuator	external shaker or on chip heater (20-45 Ohm)
Electrical connections	bonded to small PCB with connector (counter part PCB available) or optional bonding pads on chip
Chip dimensions (h, w, l)	0.3 / 1.2 / 2.5 mm
* not amplified (signal direct at the chip), 2.048 V bridge supply	

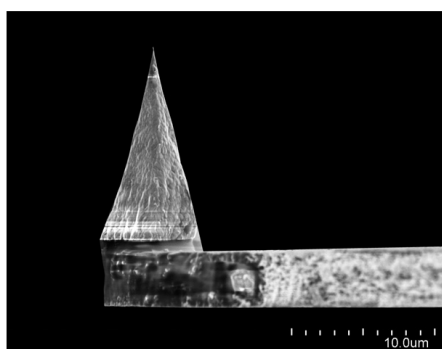
## Applications:

- Integration on a standard AFM scanner
- Direct use on an AFSEM™ inside a SEM ([www.getec-afm.com](http://www.getec-afm.com))
- Force sensing within a SEM, TEM, etc.; nano-indentation

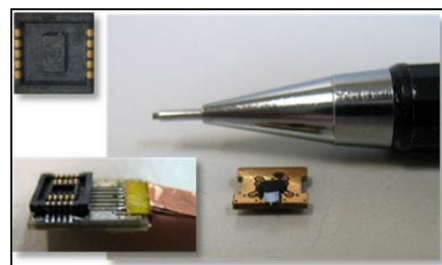
**What about your application? Contact us!**



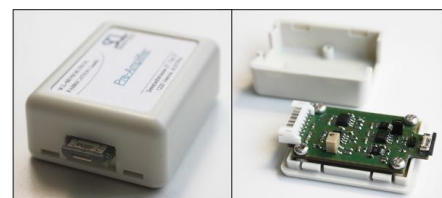
PRSA-L300-F50-SCD cantilever with Al tracks for reading out the sensor signal



Side view of a SCD cantilever tip



Cantilever is bonded to a 6 x 4.5 mm PCB (height with connector 1.6 mm, with CP-PCB: 2.5 mm); left: counter part PCB



Hardware for amplified readout:  
Low-noise pre-amplifier (45x35 mm)

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# PRSA-L400-F30-SCD-PCB

Silicon piezo-resistive sensing cantilevers



## General description

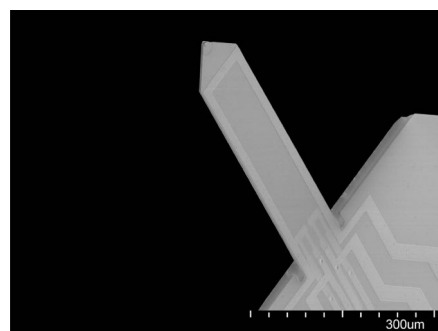
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Specifications	
Model	PRSA-L400-F30-SCD-PCB
Tip radius (apex)	<15 nm
Tip height	12...16 µm
Tip material	Long life Single Crystal Diamond (SCD) <100> along tip axis
Glue between tip and cantilever	non-conducting temp-stability: up to 70°C
Resonant frequency	15..40 kHz
Spring constant	0.4...8.3 N/m
AFM mode	contact, tapping, non-contact
Sensitivity*	1 µV/nm
Force sensitivity*	0.4...8.3 nN/µV
Length, width	410 ±5 µm, 115 ±3 µm
Material	silicon cantilever, boron doped 1k Ohm piezo resistors, aluminium tracks
Deflection sensing	on chip piezo-resistive bridge
Actuator	external shaker or on-chip heater (10 +/-2 Ohm)
Electrical connections	bonded to small PCB with connector ready to connect to our counter part PCB
Chip dimensions (h, w, l)	0.3 / 1.2 / 2.5 mm
* not amplified (signal direct at the chip), 2.048 V bridge supply	

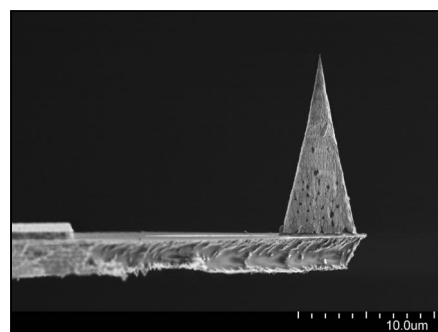
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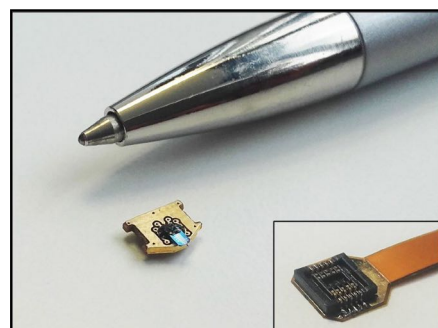
**What about your application? Contact us!**



PRSA-L400-F30-SCD cantilever with Al tracks for reading out the sensor signal



Side view of a SCD cantilever tip



Cantilever is bonded to a 6 x 4.5 mm PCB (height with connector 1.6 mm, complete height connected to CP-PCB: 1.8 mm); left: counter part PCB



Hardware for amplified readout:  
Low-noise pre-amplifier (45x35 mm)

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Leaflet version: 2024-03-11

# PRS-L450-F30-SCD-PCB

Silicon piezo-resistive sensing cantilevers



## General description

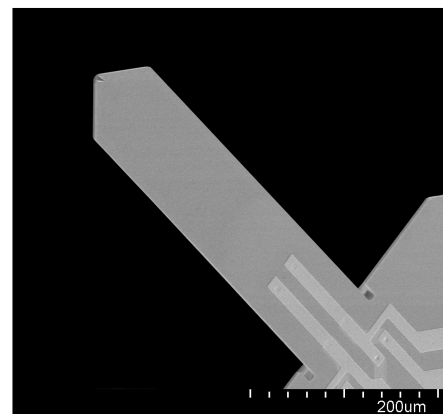
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Specifications	
Model	PRS-L450-F30-SCD-PCB
Tip radius (apex)	<15 nm
Tip height	12...16 µm
Tip material	Long life Single Crystal Diamond (SCD) <100> along tip axis
Glue between tip and cantilever	non-conducting temp-stability: up to 70°C
Resonant frequency	14..48 kHz
Spring constant	0.5...24 N/m
AFM mode	contact, non-contact
Sensitivity*	1...2 µV/nm
Force sensitivity*	0.25...24 nN/µV
Length, width	450 ±5 µm, 100 ±3 µm
Material	silicon cantilever, boron doped 1k Ohm piezo resistors, aluminium tracks
Deflection sensing	on chip piezo-resistive bridge
Actuator	external shaker
Electrical connections	bonded to small PCB with connector (counter part PCB available) or optional bonding pads on chip
Chip dimensions (h, w, l)	0.3 / 1 / 2.6 mm
* not amplified (signal direct at the chip), 2.048 V bridge supply	

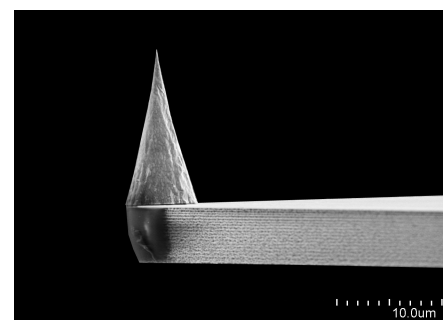
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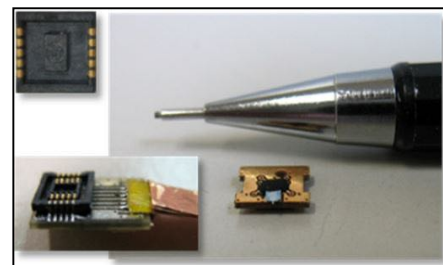
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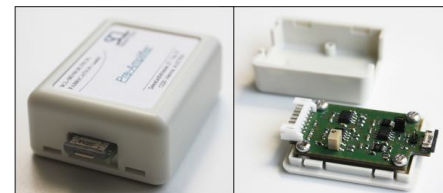
PRS-L450-F30-SCD cantilever with Al tracks for reading out the sensor signal



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Hardware for amplified readout:  
Low-noise pre-amplifier (45x35 mm)

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