

# Special Developments List (version 4.6)

Please be aware that all these Special Developments are not standard products.

Therefore, specifications are not guaranteed and may change, datasheets may not be available, price may change, delivery time could be longer than usual and subsequent delivery may not be possible.

Price and delivery time on request. For ordering, please use the codes starting with SD-...

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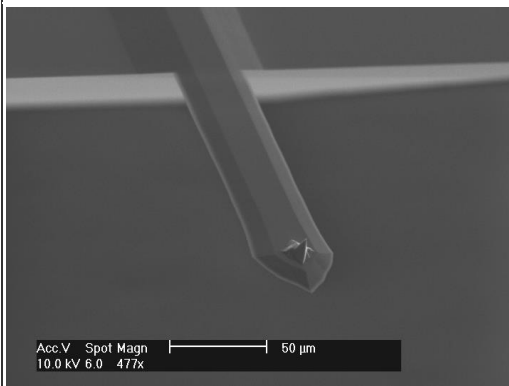
## A) Cantilevers and material variations

### PointProbePlus (PPP) Probes with extraordinary mechanical properties:

→ High Softness

→ High Stiffness

→ High Frequency



**Tip:** Silicon

<b>Radius [nm]</b>	< 10 (PPP) / < 5 (SSS*)
<b>Height [μm]</b>	10 - 15

**Cantilevers:** Silicon. Different versions are available:

	SD-T1L450B	SD-T1L225	SD-T5L450B
<b>Resonance Frequency [kHz]</b>	6.5	25	35
<b>Force Constant [N/m]</b>	0.02	0.1	3
<b>CB length [μm]</b>	450	225	450
<b>CB width [μm]</b>	48	23	58
<b>CB thickness [μm]</b>	1.0	1.0	5.0
<b>Coating</b>	-	-	-

	SD-T5L225	SD-T7L100	SD-T10L100
<b>Resonance Frequency [kHz]</b>	135	850	1'000
<b>Force Constant [N/m]</b>	15	600	2'000
<b>CB length [μm]</b>	225	100	100
<b>CB width [μm]</b>	33	38	45
<b>CB thickness [μm]</b>	5.0	7.0	10.0
<b>Coating</b>	-	30 nm Al on detector side (optional)	

	SD-SSS-T10L250*	SD-NCVH	SD-TL-T4L90**
<b>Resonance Frequency [kHz]</b>	220	1'200	680
<b>Force Constant [N/m]</b>	120	66	110
<b>CB length [μm]</b>	250	45	90
<b>CB width [μm]</b>	45	25	30
<b>CB thickness [μm]</b>	10.0	1.8	4.0
<b>Coating</b>	-	30 nm Al on detector side (optional)	-

\* SuperSharpSilicon (SSS) tip      \*\* TipLess  
 Other mechanical properties available on request

**Support chip:** Silicon

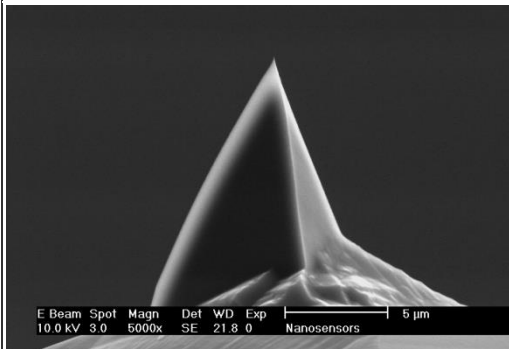
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## Phosphorus doped PointProbePlus (PPP) Probes



**Tip:** Phosphorus doped Silicon

<b>Radius [nm]</b>	< 10
<b>Height [µm]</b>	10 - 15

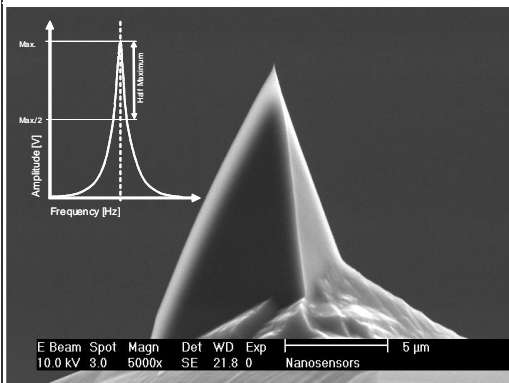
**Cantilevers:** Phosphorus doped Silicon. Different versions are available:

	SD-P-NCH*	SD-P-FM	SD-P-CONT
<b>Resonance Frequency [kHz]</b>	320	75	13
<b>Force Constant [N/m]</b>	42	2.8	0.2
<b>CB length [µm]</b>	125	225	450
<b>CB width [µm]</b>	30	28	50
<b>CB thickness [µm]</b>	4.0	3.0	2.0

\*Optional: Rotated tip

**Support chip:** Phosphorus doped Silicon

## Low Q- / High Q-Factor Probes



**Tip:** Silicon

<b>Radius [nm]</b>	< 10
<b>Height [µm]</b>	10 - 15

**Cantilevers:** Silicon. Different versions are available:

	SD-LQNCHR	SD-QCONTR
<b>Resonance Frequency [kHz]</b>	320	13
<b>Force Constant [N/m]</b>	42	0.2
<b>CB length [µm]</b>	125	450
<b>CB width [µm]</b>	30	50
<b>CB thickness [µm]</b>	4.0	2.0
<b>Coating</b>	Al on detector side	
<b>Q-Factor in UHV</b>	2'000	70'000

**Support chip:** Silicon

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## B) Special Coatings

### Coatings



**Tips:** PointProbePlus, Arrow, ATEC,...

**Cantilevers:** NC, FM, CONT,...

**Support chips:** Silicon, Pyrex

**Coatings:** Material: Ag, Al, Au, Cr, FeNi, Ir, Ni, NiCo, Pt, Rh, Ti  
*additional materials available upon request*

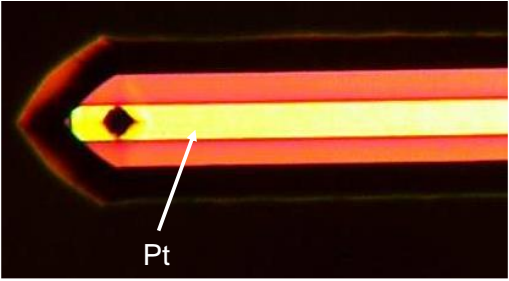
Side: frontside (TipSide, TS), backside (DetectorSide, DS)  
 both sides (BothSides, BS)

**Some restrictions concerning coating thickness and probe types could occur (due to technical problems)**

**Examples:**

<b>SD-CONTTuR:</b>	40 nm Tungsten (TS) / 40 nm Tungsten + 30 nm Al (DS)
<b>SD-CONTPt40:</b>	40 nm Pt (BS)
<b>SD-EFM60:</b>	60 nm Pt (BS)
<b>SD-EFM100:</b>	100 nm Pt (BS)
<b>SD-ZEILR60:</b>	60 nm Al (DS)
<b>SD-DT-CONT:</b>	non-conductive Diamond coating (TS)
<b>SD-DT-NCL:</b>	non-conductive Diamond coating (TS)
<b>SD-CDTP-NCHR:</b>	200 nm conductive Diamond coating

### Partial Coatings of Cantilevers



**Coatings:** Material: Ag, Al, Au, Cr, FeNi, Ir, Ni, NiCo, Pt, Rh, Ti  
*additional materials available upon request*

Side: frontside (TipSide, TS), backside (DetectorSide, DS), both sides (BothSides, BS)

Minimal feature size: 10 µm

Alignment accuracy: ~ 5 µm

**Note:** Reflex coating on ATEC is possible

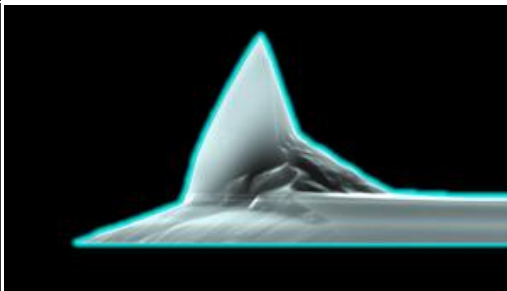
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## PointProbePlus (PPP) Probes with very thin Silicon Nitride layer



**Tip:** Silicon

<b>Radius [nm]</b>	< 20
<b>Height [μm]</b>	10 - 15
<b>Coating</b>	10 nm Silicon Nitride

*Other tips / coating thicknesses available on request*

**Cantilevers:** Silicon. Different versions are available:

	<b>SD-FM-SiN</b>	<b>SD-CONT-SiN*</b>
<b>Resonance Frequency [kHz]</b>	75	13
<b>Force Constant [N/m]</b>	2.8	0.2
<b>CB length [μm]</b>	225	450
<b>CB width [μm]</b>	28	50
<b>CB thickness [μm]</b>	3.0	2.0
<b>Coating</b>	80 nm Au on detector side	

*\* Rotated tip*

*Other mechanical properties available on request*

**Support chip:** Silicon

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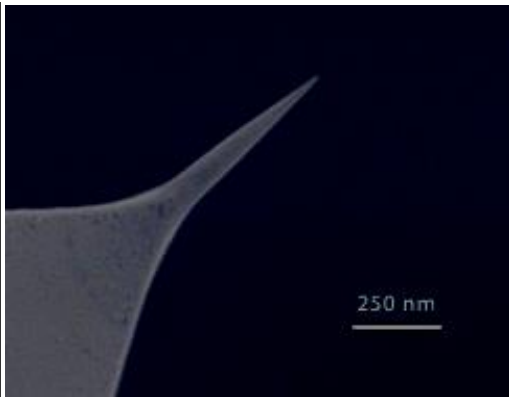
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## C) Tips modifications

### Biotool / Biotool XXL



These probes have been developed in collaboration with nanotools®



**Tip:** Silicon Nitride / High Dense Diamond Like Carbon (DLC) spike

	SD-PNP-TR-Bio	SD-PNP-TR-BioXXL
Radius [nm]	10	10
Height [μm]	SiN : 3.5 / DLC : 0.5	SiN : 3.5 / DLC : 10

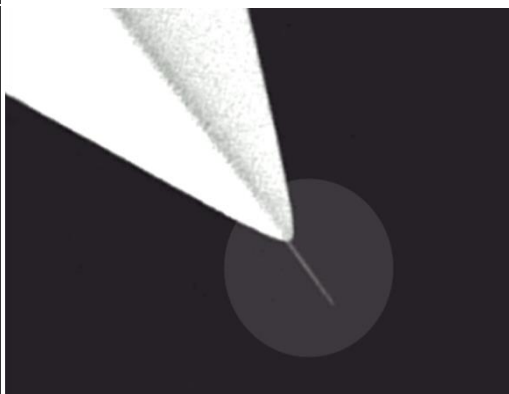
**Cantilevers:** Silicon Nitride

	SD-PNP-TR-Bio / SD-PNP-TR-BioXXL
Resonance Frequency [kHz]	67
Force Constant [N/m]	0.32
CB length [μm]	100
CB width [μm]	2x 13.5
CB thickness [μm]	0.6
Coating	30 nm Au on both sides (tip remains uncoated)

**Support chip:** Pyrex glass

*Also available through nanotools®*

### Carbon NanoTip



This probe has been developed in collaboration with nanotools®



**Tip:** Silicon / High Dense Diamond Like Carbon (DLC) spike

Radius [nm]	2 (< 5 guaranteed)
Height [μm]	Si : 10 - 15 / DLC : 0.125
Orientation [°]	13 (tilt compensated)

**Cantilevers:** Silicon

	SD-aCNT-NCH	SD-aCNT-FM
Resonance Frequency [kHz]	330	75
Force Constant [N/m]	40	2.8
CB length [μm]	125	225
CB width [μm]	30	28
CB thickness [μm]	4.0	3.0

**Support chip:** Silicon

*Also available through nanotools®*



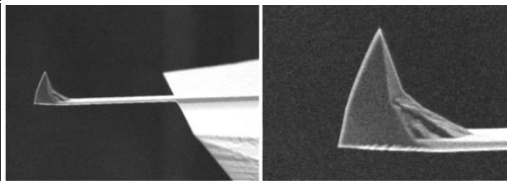
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## Extra Tall PointProbePlus Tips



**Tip:** Silicon

**Radius [nm]** < 10

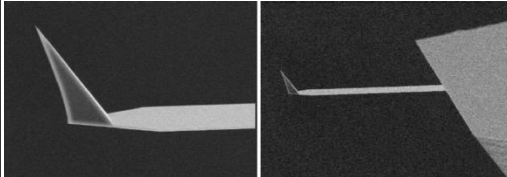
**Height [μm]** > 50

**Cantilevers:** Silicon. Different versions are available:

	SD-PXL-NCL	SD-PXL-FM	SD-PXL-CONTSC
Resonance Frequency [kHz]	105	45	8
Force Constant [N/m]	60	7.0	0.2
CB length [μm]	225	225	225
CB width [μm]	60 - 85	55 - 80	45 - 75
CB thickness [μm]	6.0	3.0	1.0

**Support chip:** Silicon

## Extra Tall ATEC Tips



**Tip:** Silicon

**Radius [nm]** < 10

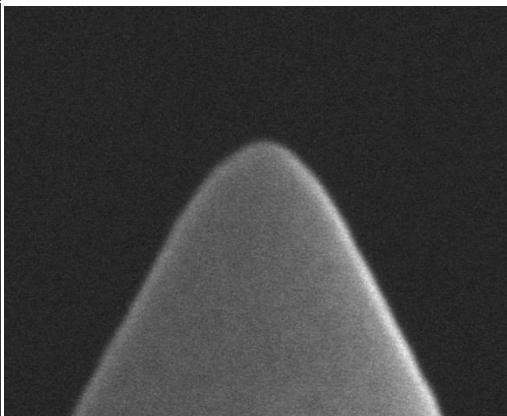
**Height [μm]** > 30

**Cantilevers:** Silicon. Different versions are available:

	SD-AXL-NC	SD-AXL-FM	SD-AXL-CONT
Resonance Frequency [kHz]	200	75	20
Force Constant [N/m]	45	3.0	0.2
CB length [μm]	240	240	240
CB width [μm]	41	38	37
CB thickness [μm]	7.3	3.0	1.2

**Support chip:** Silicon

## Rounded Tips R30



**Tip:** Silicon

**Radius [nm]** 30

**Height [μm]** 10 - 15

**Cantilevers:** Silicon. Different versions are available:

	SD-R30-NCH	SD-R30-FM	SD-R30-CONT
Resonance Frequency [kHz]	330	75	13
Force Constant [N/m]	42	2.8	0.2
CB length [μm]	125	225	450
CB width [μm]	30	27.5	50
CB thickness [μm]	4.0	3.0	2.0

**Support chip:** Silicon

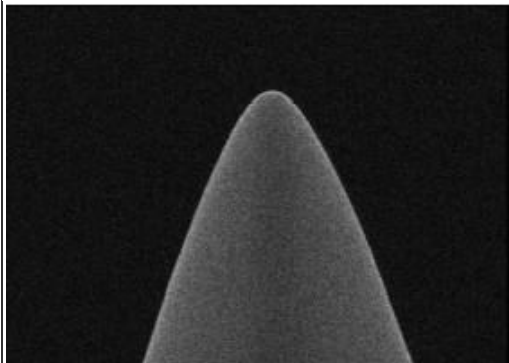
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## Rounded Tips R150



**Tip:** Silicon

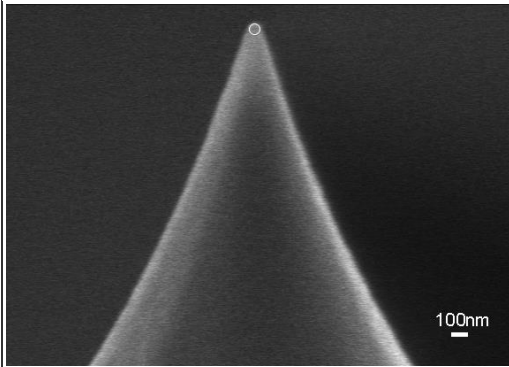
<b>Radius [nm]</b>	90 (from front) / 160 (from side)
<b>Height [μm]</b>	10 - 15

**Cantilevers:** Silicon. Different versions are available:

	SD-R150-NCL	SD-R150-FM	SD-R150-T3L450B
<b>Resonance Frequency [kHz]</b>	190	75	20
<b>Force Constant [N/m]</b>	48	2.8	0.7
<b>CB length [μm]</b>	225	225	450
<b>CB width [μm]</b>	37.5	27.5	52.5
<b>CB thickness [μm]</b>	7.0	3.0	3.0

**Support chip:** Silicon

## uniquprobe with Rounded Tips for Cell Imaging

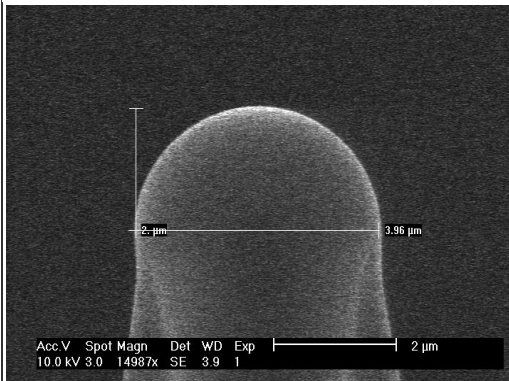


**This item has been commercially introduced and is therefore no more on the Special Developments List.**

**Product description:**

[www.nanosensors.com/uniquprobe-bioac-with-rounded-tips-for-cell-imagingqp-bioac-ci](http://www.nanosensors.com/uniquprobe-bioac-with-rounded-tips-for-cell-imagingqp-bioac-ci)

## Sphere Tips



**Tips:** Silicon / Silicon Oxide. Different versions are available:

	S	M	L
<b>Sphere diameter [μm]</b>	0.8	2.0	4.0
<b>Height [μm]</b>	10 - 15		

**Cantilevers:** Silicon. Different versions are available:

	SD-Sphere-NCH	SD-Sphere-FM	SD-Sphere-CONT
<b>Resonance Frequency [kHz]</b>	320	75	13
<b>Force Constant [N/m]</b>	42	2.8	0.2
<b>CB length [μm]</b>	125	225	450
<b>CB width [μm]</b>	30	28	50
<b>CB thickness [μm]</b>	4.0	3.0	2.0

**Support chip:** Silicon



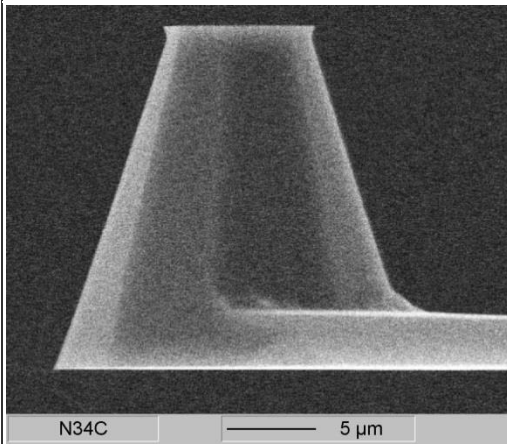
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## Large Plateau Tips



**Tip:** Silicon

<b>Plateau diameter [μm]</b>	8 - 12
<b>Height [μm]</b>	15

**Cantilevers:** Silicon. Different versions are available:

	SD-PL-NCH	SD-PL-NCL	SD-PL-FM	SD-PL-CONT
<b>Resonance Frequency [kHz]</b>	330	190	75	13
<b>Force Constant [N/m]</b>	42	48	2.8	0.2
<b>CB length [μm]</b>	125	225	225	450
<b>CB width [μm]</b>	30	37.5	27.5	50
<b>CB thickness [μm]</b>	4.0	7.0	3.0	2.0

**Support chip:** Silicon

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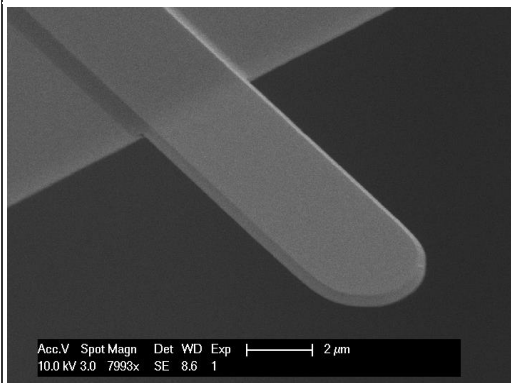
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## D) Ultra-Short Cantilevers

### Ultra-Short Tipless Cantilevers



**Tip:** none

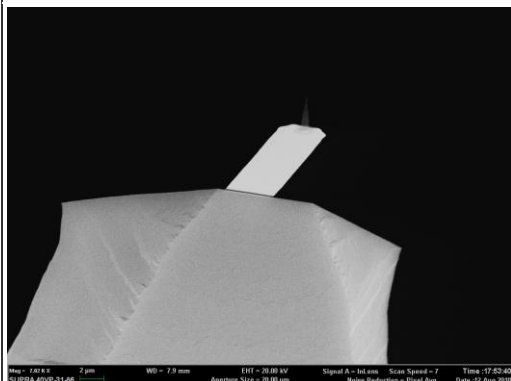
**Cantilevers:** Quartz-like. Different versions are available:

	SD-USC-F5-k30-TL	SD-USC-F2-k3-TL	SD-USC-F1.2-k7.3-TL
Resonance Frequency [kHz]	5'000	2'000	1'200
Force Constant [N/m]	30	3	7.3
CB length [μm]	10	10	20
CB width [μm]	5	5	10
CB thickness [μm]	0.68	0.28	0.67
Coating	30 nm Au on both sides		

	SD-USC-F1.5-k0.6-TL	SD-USC-F1.2-k0.15-TL	SD-USC-F0.3-k0.3-TL
Resonance Frequency [kHz]	1'500	1'200	330
Force Constant [N/m]	0.6	0.15	0.3
CB length [μm]	7	7	20
CB width [μm]	3	2	10
CB thickness [μm]	0.10	0.08	0.19
Coating	20 nm Au on both sides		30 nm Au on both sides

**Support chip:** Silicon

### Ultra-Short Silicon Nitride Cantilevers



These probes have been developed in collaboration with nanotools®



**Tip:** High Density Carbon / Diamond Like Carbon (HDC/DLC)

Radius [nm]	< 10
Height [μm]	> 2

**Cantilevers:** Silicon Nitride. Different versions are available:

	SD-USC-SiN 0.5MHz	SD-USC-SiN 1.2MHz	SD-USC-SiN 3MHz	SD-USC-SiN 6MHz
Resonance Frequency [kHz]	500	1'200	3'000	6'000
Force Constant [N/m]	0.2	0.4	0.9	45
CB length [μm]	13.5	6.8	4.2	9.5
CB width [μm]	4.5	4.5	2.3	4.5
CB thickness [μm]	0.10	0.06	0.06	0.50
Coating	40 nm Au on detector side	30 nm Au on detector side		70 nm Au on detector side

**Support chip:** Silicon

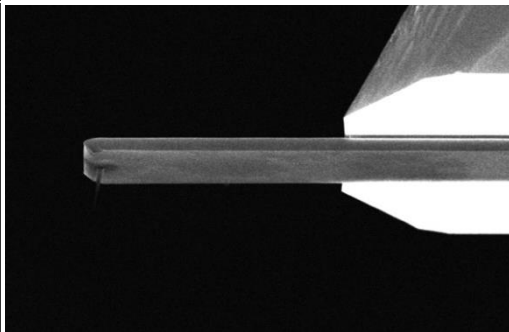
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## High Frequency Probes



*These probes have been developed in collaboration with nanotools®*



**Tip:** High Density Carbon / Diamond Like Carbon (HDC/DLC)

<b>Radius [nm]</b>	< 10
<b>Height [μm]</b>	2.5

**Cantilevers:** Silicon Nitride. Different versions are available:

Hard cantilevers (for air)	SD-HFP-H27R	SD-HFP-H45R	SD-HFP-HU45R
<b>Resonance Frequency [kHz]</b>	2'700	4'500	4'500
<b>Force Constant [N/m]</b>	40	47	32
<b>CB length [μm]</b>	20	15	20
<b>CB width [μm]</b>	10	5	10
<b>CB thickness [μm]</b>	0.77	0.77	0.16
<b>CB cross-section</b>	rectangular	rectangular	U-profile
<b>Coating</b>	30 nm Al on detector side		

Soft cantilevers (for liquid)	SD-HFP-S04AuD	SD-HFP-S07AuD	SD-HFP-S08TiD
<b>Resonance Frequency</b>	360	660	800
<b>Force Constant [N/m]</b>	0.4	0.6	0.5
<b>CB length [μm]</b>	20	15	15
<b>CB width [μm]</b>	10	5	5
<b>CB thickness [μm]</b>	0.16	0.16	0.16
<b>CB cross-section</b>	rectangular		
<b>Coating</b>	30 nm Au on detector side		30 nm Ti on detector side

**Support chip:** Silicon

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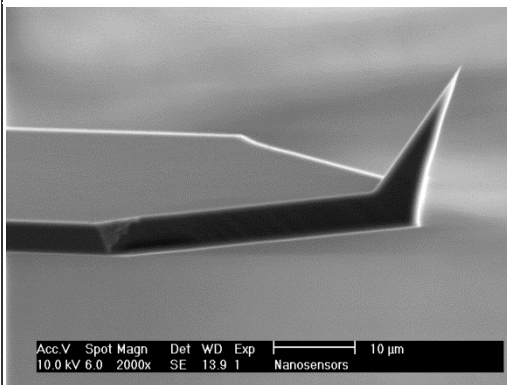
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## E) Special Probes

### AdvancedTEC™ with Alignment Grooves



**Tip:** Silicon

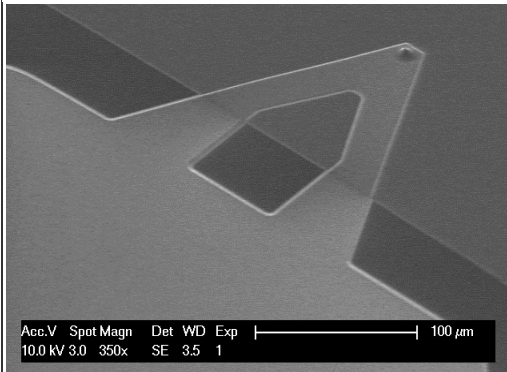
<b>Radius [nm]</b>	< 10
<b>Height [μm]</b>	15 - 20

**Cantilevers:** Silicon. Different versions are available:

	SD-ATEC-NCLwG	SD-ATEC-NCLwGR
<b>Resonance Frequency [kHz]</b>	155	155
<b>Force Constant [N/m]</b>	33	33
<b>CB length [μm]</b>	250	250
<b>CB width [μm]</b>	40	40
<b>CB thickness [μm]</b>	7.0	7.0
<b>Coating</b>	-	30 nm Al on detector side

**Support chip:** Silicon with Alignment Grooves

### Heart Beat Cantilevers (Bruker ScanAsyst™ compatible)



**This item has been commercially introduced and is therefore no more on the Special Developments List.**

**Product description:**

<http://www.nanosensors.com/uniqprobe-heart-beat-cantilever-for-scanasyst-and-peak-force-tapping-qp-hbc>

ScanAsyst™ is a trademark of Bruker.

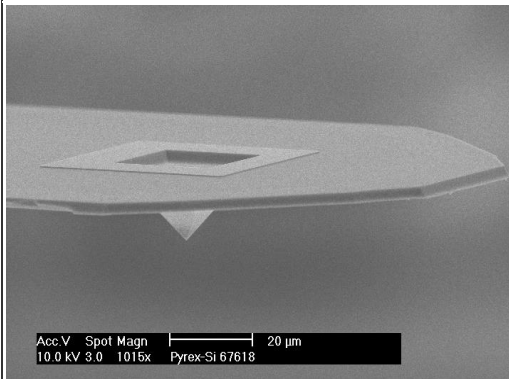
# Special Developments List (version 4.6)

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## Hollow SiO<sub>2</sub> Tip on Silicon Cantilevers



**Tip:** Hollow SiO<sub>2</sub>

<b>Radius [nm]</b>	150 (with 250 nm Al coating)
<b>Height [μm]</b>	16
<b>Setback [μm]</b>	75
<b>Coating</b>	250 nm Al (optional)

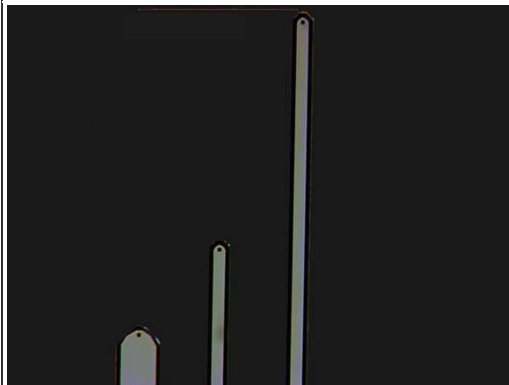
**Cantilevers:** Silicon. Different versions are available:

	SD-HTT-NC	SD-HTT-CONT
<b>Resonance Frequency [kHz]</b>	58	11
<b>Force Constant [N/m]</b>	43	0.6
<b>CB length [μm]</b>	400	400
<b>CB width [μm]</b>	150	150
<b>CB thickness [μm]</b>	7.5	1.8

**Support chip:** Pyrex glass

## Pierced Cantilever Probes

Tipless Cantilevers with Hole for Sphere gluing



**Tip:** Hole instead of tip

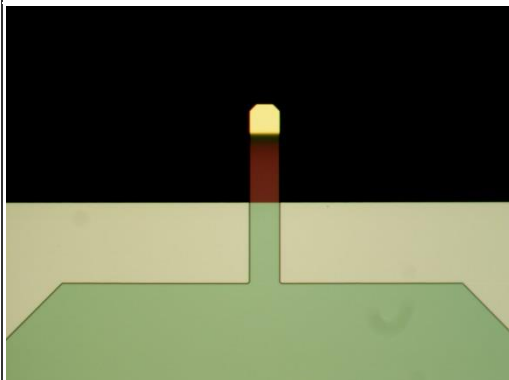
<b>Size [μm]</b>	4 x 4
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**Cantilevers:** Silicon. Multi-cantilevers chip with 3 cantilevers:

	SD-PD-TRI NCH	SD-PD-TRI FM	SD-PD-TRI CONT
<b>Resonance Frequency [kHz]</b>	330	75	13
<b>Force Constant [N/m]</b>	42	2.8	0.2
<b>CB length [μm]</b>	100	210	500
<b>CB width [μm]</b>	50	30	30
<b>CB thickness [μm]</b>	2.7	2.7	2.7

**Support chip:** Silicon

## uniqprobe Tipless Cantilevers



**Tip:** none

**Cantilevers:** Quartz-like. Different versions are available:

	SD-qp-CONT-TL	SD-qp-SCONT-TL
<b>Shape of the cantilevers</b>	rectangular	
<b>Resonance Frequency [kHz]</b>	32	13
<b>Force Constant [N/m]</b>	0.1	0.01
<b>CB length [μm]</b>	130	130
<b>CB width [μm]</b>	40	40
<b>CB thickness [μm]</b>	0.75	0.35
<b>Coating detector side</b>	Partial coating: 60 nm Au*	

\* Optionally available without coating (**uncoated cantilevers are transparent!**)

**Support chip:** Silicon. with Alignment Grooves

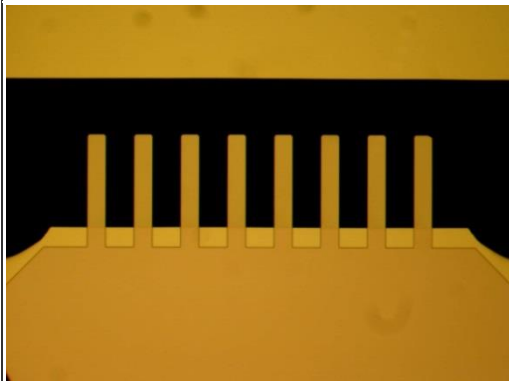
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## uniqprobe Tipless Cantilevers Arrays



**Tip:** none

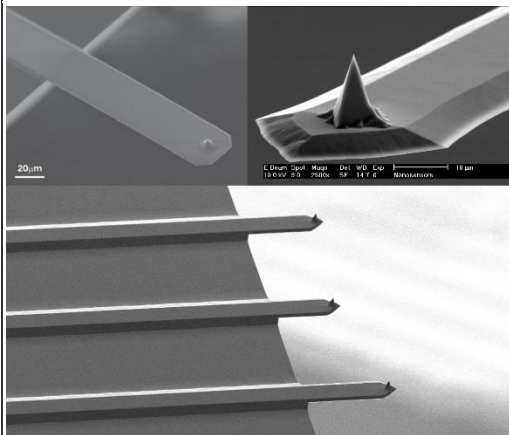
**Cantilevers:** Quartz-like. Different versions are available:

	SD-qp-TL8a	SD-qp-TL8b
Shape of the cantilevers	rectangular	
Resonance Frequency [kHz]	4.0	2.3
Force Constant [N/m]	0.02	0.004
CB length [μm]	500	500
CB width [μm]	100	100
CB thickness [μm]	1.2	0.7
Number of cantilevers	8	8
Pitch [μm]	250	250
Coating sample facing side	30 nm Au*	
Coating detector side	20 nm Au*	

\* Optionally available without coating (**uncoated cantilevers are transparent!**)

**Support chip:** Silicon. Dimensions: L = 3.4 m; l = 3.1 mm; t = 315 μm

## MAC Mode Cantilevers for Keysight / Agilent / Molecular Imaging



**Tips:** Different versions are available:

	SD-MAC-Type2 SD-MAC-Type9	SD-MAC-Type7 SD-MAC-Type8
Material	Silicon	Quartz-like
Radius [nm]	< 10	< 10
Height [μm]	10 – 15	7

**Cantilevers:** Different versions are available:

	SD-MAC-Type2	SD-MAC-Type7	SD-MAC-Type8
Material	Silicon	Quartz-like	Quartz-like
Resonance Frequency [kHz]	75	43	48
Force Constant [N/m]	2.8	0.14	0.3
CB length [μm]	225	125	125
CB width [μm]	30	35	35
CB thickness [μm]	3.0	0.75	1.0

SD-MAC-Type9			
	CB 1	CB 2	CB 3
Material	Silicon		
Resonance Frequency [kHz]	90	130	65
Force Constant [N/m]	1.0	2.0	0.6
CB length [μm]	110	90	130
CB width [μm]	32.5	32.5	32.5
CB thickness [μm]	1.0	1.0	1.0

**Support chip:** Silicon



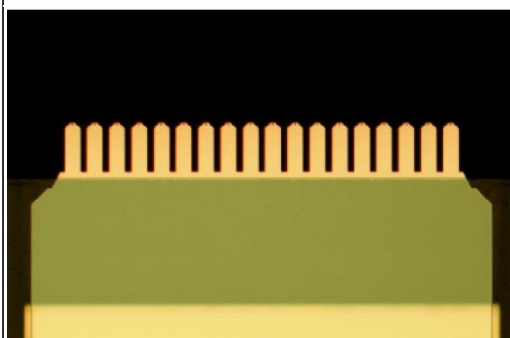
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### Silicon Nitride Arrays with Tips (Nanolnk, Inc® compatible)



**Tip:** Silicon Nitride

<b>Radius [nm]</b>	< 10
<b>Height [μm]</b>	3.5

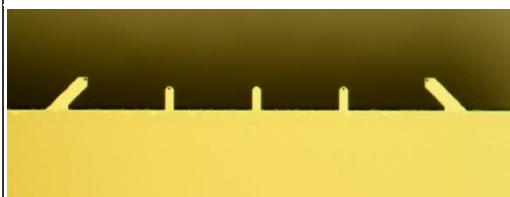
**Cantilevers:** Silicon Nitride. Different versions are available:

	SD-PNP-Array1	SD-PNP-Array2 up / down left-right	SD-PNP-Array3
<b>Shape of the cantilevers</b>	rectangular		triangular
<b>Resonance Frequency [kHz]</b>	70	30 / 17-30	70
<b>Force Constant [N/m]</b>	0.5	0.2 / 0.07-0.2	0.3
<b>CB length [μm]</b>	100	150 / 200-150	100
<b>CB width [μm]</b>	40	50 / 45-50	2x 14
<b>CB thickness [μm]</b>	0.55	0.55	0.55
<b>Number of cantilevers</b>	18	18 / 3-3	12
<b>Pitch [μm]</b>	60	70 / 70-70	66
<b>Coating</b>	60 nm Au on detector side		

Nanolnk, Inc® is a registered trademark of Nanolnk, Inc.

**Support chip:** Pyrex glass

### nAmbition Silicon Nitride Arrays



**Tip:** Silicon Nitride

<b>Radius [nm]</b>	< 15
<b>Height [μm]</b>	3.5

**Cantilevers:** Silicon Nitride. Different versions are available:



	SD-nAmbition-Array5 Reference CB (45° tilted) / Measurement CB	SD-nAmbition-Array10 Reference CB (45° tilted) / Measurement CB
<b>Shape of the cantilevers</b>	rectangular	
<b>Resonance Frequency [kHz]</b>	23 / 94	11 / 42
<b>Force Constant [N/m]</b>	0.03 / 0.17	0.01 / 0.05
<b>CB length [μm]</b>	100 / 50	144 / 75
<b>CB width [μm]</b>	30 / 20	30 / 20
<b>CB thickness [μm]</b>	0.24	0.24
<b>Number of cantilevers</b>	2 / 3 (1 without tip)	2 / 8 (1 without tip)
<b>Pitch [μm]</b>	200	100
<b>Coating</b>	30 nm Au on both sides	

**Support chip:** Pyrex glass

# Special Developments List (version 4.6)

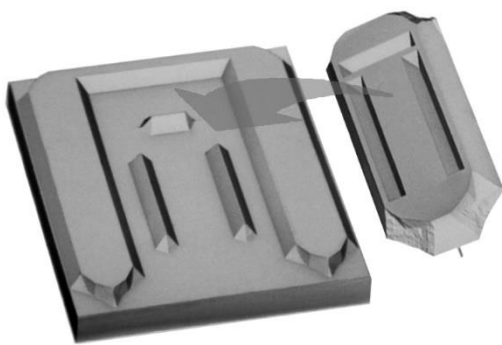
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## F) Diverse (AFM related)

### Alignment Chip



#### Alignment Chip features:

- reproducible positioning of the probe
- easy tip exchange without readjustment of cantilever deflection system
- fits on all NANOSENSORS™ AFM probes of the PointProbe® Plus and PointProbe® Plus XY-Alignment Series
- high stability because of a chromium coating

	<b>SD-ALIGN</b>
Dimensions [µm]	3400 x 2900
Thickness without probe [µm]	525
Thickness with mounted probe [µm]	700
Tip repositioning accuracy (same probe) [µm]	± 2
XY-Align. Series: Tip repositioning accuracy (any probe) [µm]	± 8

### 2D100 Pitch-Standard



**Chip:** Silicon

Chip size [mm]	5 x 7
Active area size [µm]	100 x 100

#### Lattice:

Pitch [nm]	100
Accuracy of pyramid position [nm]	± 10
Accuracy of pyramid pitch (10x10 µm² scan) [%]	± 0.1
Accuracy of pyramid pitch (100x100 µm² scan) [%]	±0.01

#### Pyramids:

Edge length of square pyramids [nm]	approx.. 50
Sidewall angle (versus wafer surface) [°]	54.7
Accuracy of sidewall angle [°]	± 0.5
Depth of pyramids [nm]	approx.. 35

# Special Developments List (version 4.6)

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## 2D300 Pitch-Standard



**Chip:** Silicon

Chip size [mm]	5 x 7
Active area size [μm]	100 x 100

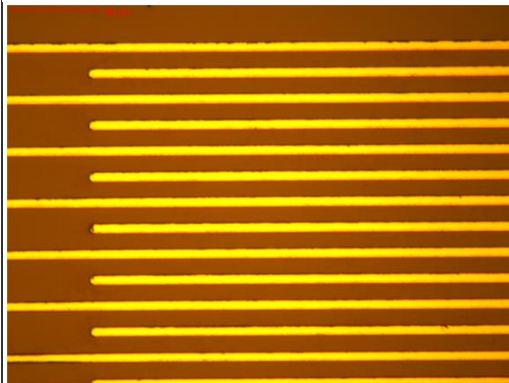
**Lattice:**

Pitch [nm]	300
Accuracy of pyramid position [nm]	± 10
Accuracy of pyramid pitch (10x10 μm² scan) [%]	± 0.1
Accuracy of pyramid pitch (100x100 μm² scan) [%]	±0.01

**Pyramids:**

Edge length of square pyramids [nm]	approx.. 50
Sidewall angle (versus wafer surface) [°]	54.7
Accuracy of sidewall angle [°]	± 0.5
Depth of pyramids [nm]	approx.. 35

## SECM Reference Sample



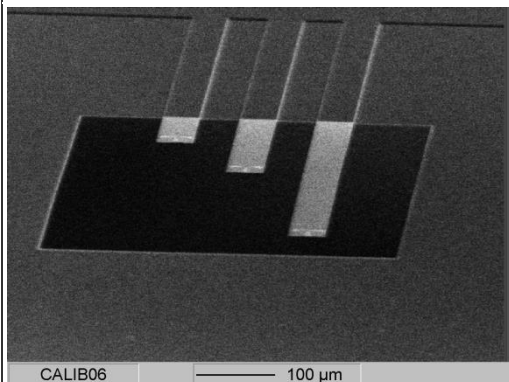
**Chip:** Silicon

Chip size [mm]	10 x 10
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**Test Patterns:** Gold

Thickness [nm]	30
Contact pads size [μm]	2000 x 4400
Line widths fine pattern [μm]	10 / 5 / 3 / 5 / 10

## CalibLever



**Tip:** none

**Cantilevers:** Multi-cantilevers chip with 3 cantilevers:

	SD-CalibLever CB450	SD-CalibLever CB200	SD-CalibLever CB80
Resonance Frequency [kHz]	14	65	330
Force Constant [N/m]	0.21	2.1	25
CB length [μm]	465	215	95
CB width [μm]	50	50	50
CB thickness [μm]	2.15	2.15	2.15

**Support chip:** Silicon

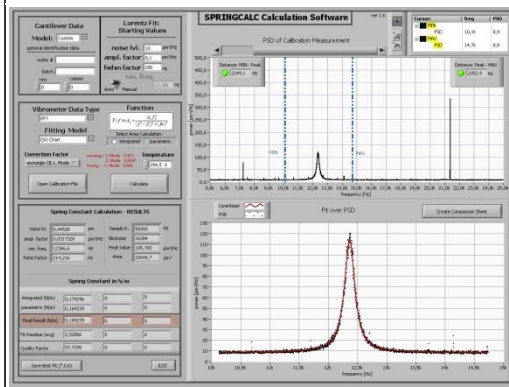
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## Characterization of Cantilevers (by Thermal Tune)



### Characterization of the mechanical properties of cantilevers by Thermal Tune (measured with a *laser vibrometer*)

**Data:** Resonance Frequency  
Force Constant  
Quality Factor (Q-Factor)

**Accuracy:** Resonance Frequency: better than 0.03 %  
Force Constant: better than 10 %  
Quality Factor (Q-Factor): better than 3 %

**Limitation:** Force Constant < 1 N/m

**Calibration:** with certified Force Standard

# Special Developments List (version 4.6)

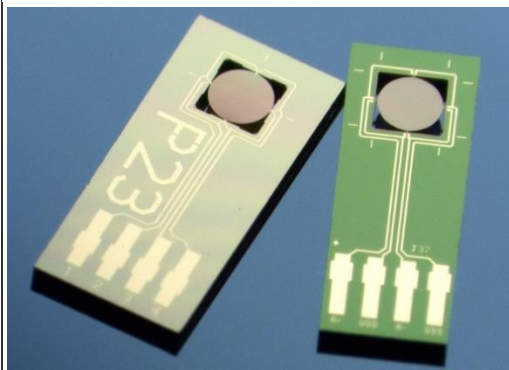
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## G) Nanomechanical Sensors

### Membrane-type Surface-stress Sensor (SD-MSS)



**Type:**

Silicon membrane platform supported with four beams on which piezoresistors are embedded.

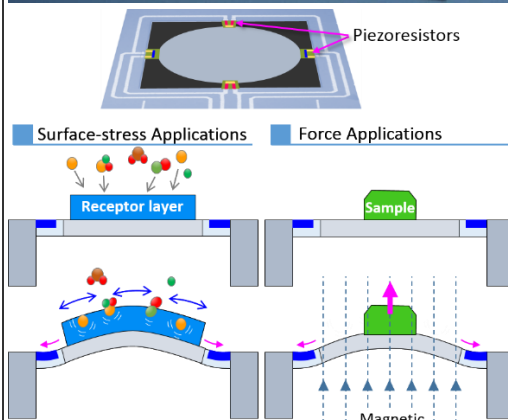
**Applications:**

**SD-MSS-1K, SD-MSS-1K2G:** Electronic nose, gas/odor sensing, human breath analysis e.g., for cancer research (note: for these applications, an appropriate receptor layer must be coated on the membrane by user).

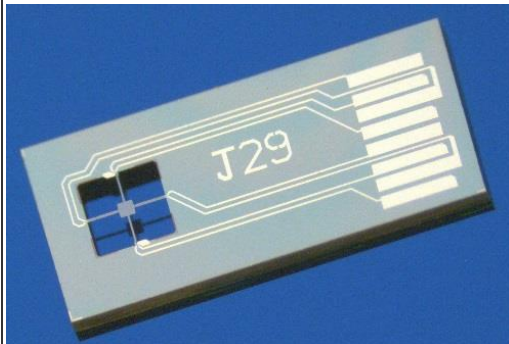
**SD-MSS-1KTM:** Nanomechanical sensing, material assessment, torque magnetometry, force sensing, etc.

**Working Principle:**

Surface-stress yielded by the coated receptor layer absorbing gas/odor molecules, or force/torque applied on the membrane deforms the membrane and the supporting beams, which induces resistance change of the piezoresistor. By measuring the resistance change, the magnitude of the target parameter can be estimated.



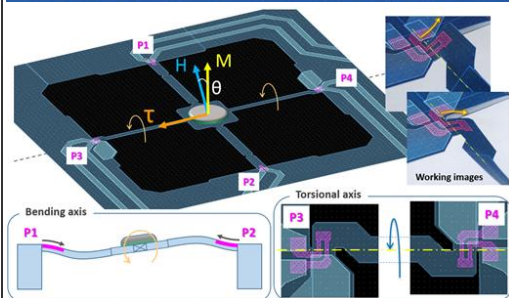
	SD-MSS-1K	SD-MSS-1K2G	SD-MSS-1KTM
Membrane diameter [μm]	1000 (round)		200 (square)
Membrane thickness [μm]	5.2 (typical)	2.8 (typical)	
Chip dimensions [mm]	5.5 x 2.0 x 0.3	5.5 x 2.5 x 0.3	
Resistance value [kΩ]	2 – 15	2 – 6	0.3 – 1.2
Electric configuration	Full bridge, 4 pads, 0.5 mm pitch		Separated, 8 pads, 0.25(0.5) mm pitch
Coating	No		



**Easy Plug-in Connection:**

These sensors fit to a commercial FPC (Flexible Printed Circuit) / FFC (Flexible Flat Cable) connectors with 0.5 mm pitch.

For more information please visit <http://mss-sensor.com>





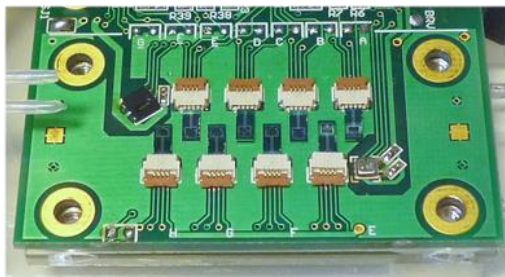
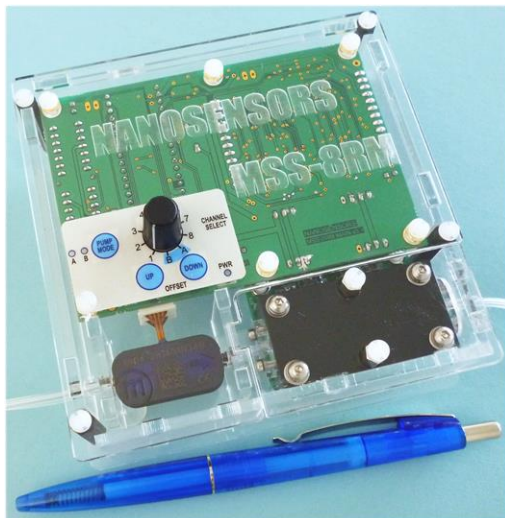
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## MSS 8 Channel Readout Module (SD-MSS-8RM)



**MSS 8 Channel Readout Module (MSS-8RM)** is a basic electronic module to operate and to readout **NANOSENSORS™ MSS**, up to 8 sensors simultaneously, under a hardware configuration for electronic nose/odor sensing. **MSS-8RM** contains two air pumps and users can examine self-prepared **MSS** under different gas flow conditions.

**MSS-8RM** is designed as simple as possible so that users can learn about a basic electronic-nose system and further improve the system performance. It has the followings features.

- **Arduino** microcontroller board and software
- Two air pumps integrated
- Two discrete sensors (Sensirion SHT21, Bosch BME280) integrated
- Only USB power
- 10 SD-MSS chips (SD-MSS-1K2G) included in the package

**Note that MSS-8RM does not include any data processing functions to distinguish one sample from the other. You will get raw numerical data of the sensor responses under different conditions as final output.**

For more information please visit <http://mss-sensor.com>