



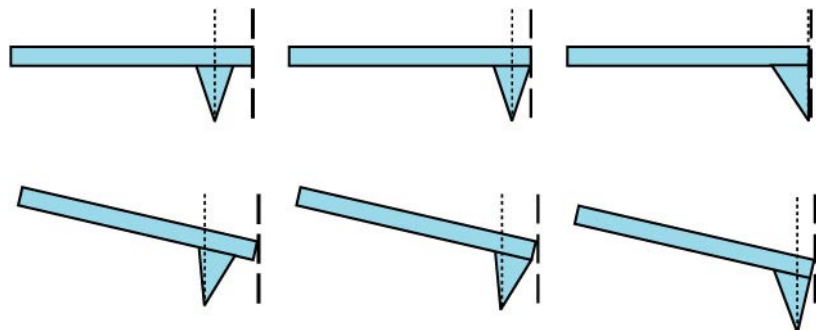
## AdvancedTEC™ Silicon-SPM-Sensors Advanced Tip at the End of the Cantilever

### ■ PRECISE Positioning through REAL Tip Visibility

NANOSENSORS AdvancedTEC™ Sensors are designed for high resolution imaging. They feature a tetrahedral tip that protrudes from the very end of the cantilever. This unique feature allows precise positioning and makes the AdvancedTEC™ the only AFM scanning probe in the world that offers **REAL TIP VISIBILITY FROM TOP**, even if the probe is tilted as a result of its mounting onto the AFM head. This feature makes them the premium choice for all applications where the tip has to be placed exactly on the point of interest and/or has to be visible (e.g. nanomanipulation).



*Other commercially available tip shapes:*



— — — End of Cantilever

..... Tip Position

⊛ 13° Tilted Probe due to its mounting onto the AFM Head

### ■ Tip Shape:

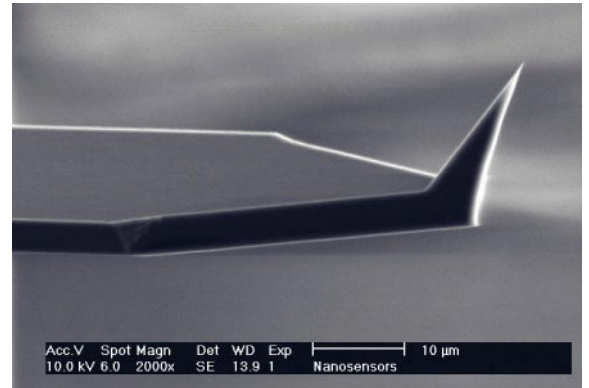
The AdvancedTEC™ Tip has a tetrahedral shape and protrudes from the very end of the cantilever. The tip height is 15-20  $\mu\text{m}$ . The half cone angles are  $< 12^\circ$  when viewed along the cantilever axis and  $8^\circ$  seen from the side. For the last micron the half cone angle is  $5^\circ$  and tapers to virtually zero at the very end of the tip. The tip radius of curvature is typically better than 10 nm (guaranteed 15 nm). The aspect ratio of the last 1.5  $\mu\text{m}$  is  $> 4:1$  when seen from front and side. Additionally the AdvancedTEC™ tip shape is defined by real crystal planes that result in highly reproducible geometries and extremely smooth surfaces.

Thanks to their very small half cone angles the tips of the AdvancedTEC™ Series show great performance on samples that have a small pattern size combined with steep sample features.

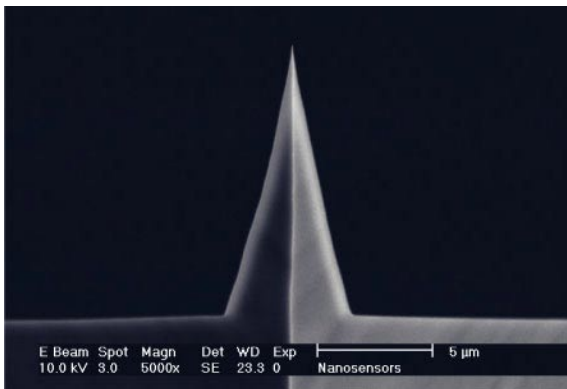


### ■ Tip Features at a Glance:

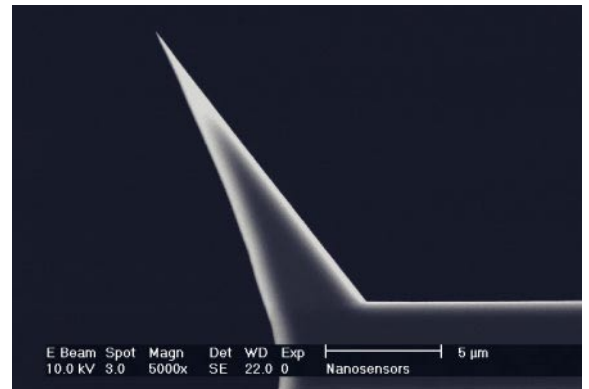
- Real tip visibility from top
- Tip height 15 - 20  $\mu\text{m}$
- Typical tip radius of curvature better than 10 nm
- Aspect ratio of the last 1.5  $\mu\text{m}$  of the tip > 4:1 (!seen from front and side!)
- Half cone angles
  - < 12° viewed along the cantilever axis
  - 8° seen from the side
- Tip shape is defined by real crystal planes  
highly reproducible geometries  
extremely smooth surfaces



AdvancedTEC 3D View



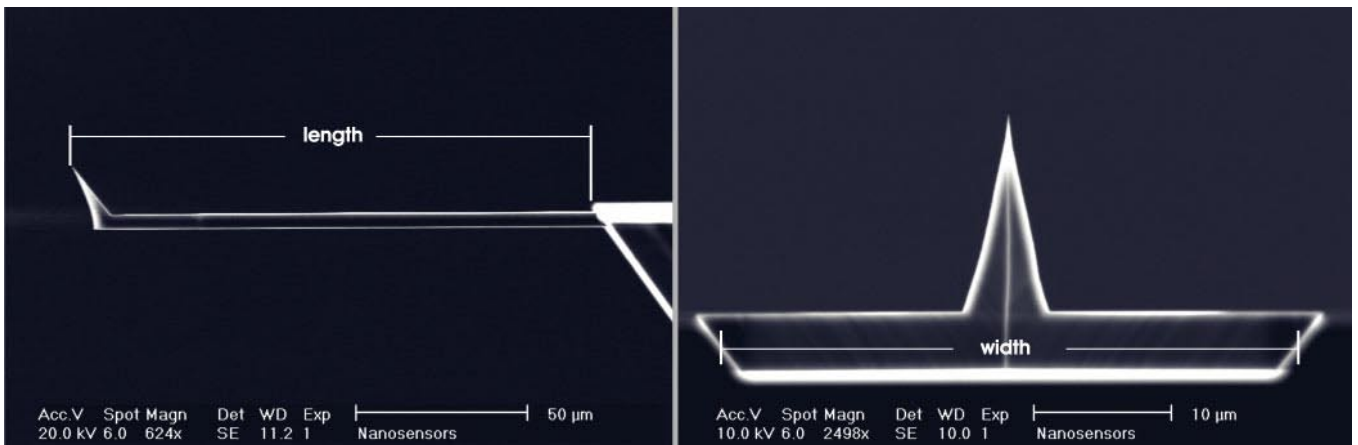
AdvancedTEC Front View



AdvancedTEC Side View

### ■ Cantilever:

The AdvancedTEC™ has a rectangular cantilever that ends in a triangular shape. The cross section of the cantilever is trapezoidal. Depending on the application the cantilever geometry ranges from 160  $\mu\text{m}$  to 450  $\mu\text{m}$  in length, 20  $\mu\text{m}$  to 50  $\mu\text{m}$  in width and 1  $\mu\text{m}$  to 6  $\mu\text{m}$  in thickness.

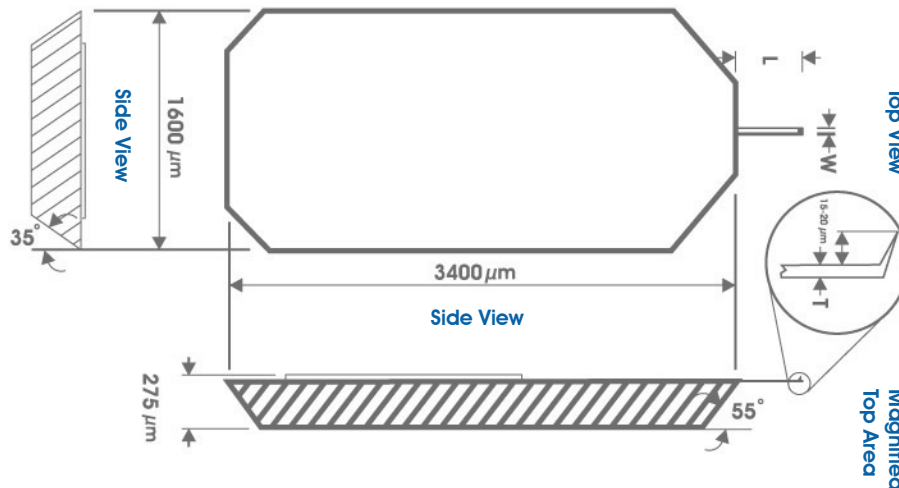


AdvancedTEC Dimensions



## ■ Holder:

The cantilever is fixed to a silicon holder which can be seen in the sketch of the SPM sensor assembly. The holder as an integral part of the sensor is designed for manipulating the sensor and fixing it to the SPM. The geometric dimensions of the holder are very reproducible enabling the replacement of sensors without major readjustment of the detector.



Please note that the AdvancedTEC™ product series is NOT compatible with the alignment chip for the Pointprobe®-Series

## ■ Material Features

NANOSENSORS™ Silicon-SPM-Sensors are manufactured from highly doped, single crystal silicon which leads to unique features:

Silicon is a well-known and established material for semiconductor technology.

The high conductivity of the doped silicon avoids electrostatic charging. The resistivity is as low as 0.01 - 0.025 Ohm\*cm.

The fabrication out of bulk material results in a monolithic design of holder, cantilever and tip. This avoids any intrinsic stress and leads to absolutely straight cantilevers. Even if ambient temperature changes, no bending of the cantilever with uncontrolled forces will occur.

The chemically inert silicon allows the application in fluids or electrochemical cells.

	Type	Application	Force Constant / [N/m] (typical)	Resonance Frequency / [kHz] (typical)
Contact	ATEC-CONT	Contact Mode	0.2	15
Non Contact	ATEC-NC	Non Contact / Tapping Mode™	45	335
Special	ATEC-FM	Force Modulation Mode	2.8	85



The World Leader in Scanning Probes

 **NANOSENSORS™**

**NANOSENSORS™, Rue Jaquet-Droz 1, Case Postale 216, CH-2002 Neuchâtel, Switzerland**  
e-mail: [info@nanosensors.com](mailto:info@nanosensors.com)

**[www.nanosensors.com](http://www.nanosensors.com)**

NANOSENSORS™ is a trademark of NanoWorld AG - Copyright by NanoWorld AG