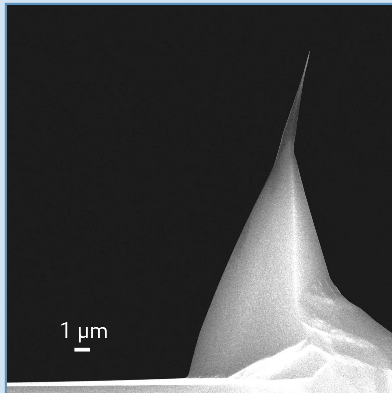
Extreme Aspect Ratio

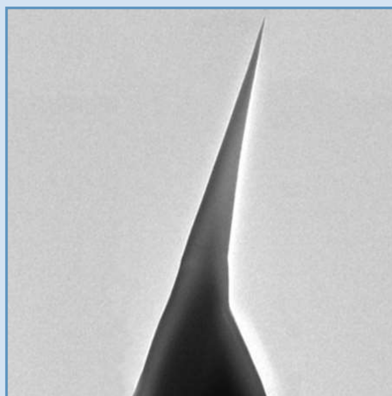
Provided with **TrueDimensions™** Online access to key probe parameters for every individual tip

Type: EBD8-600A | EBD6-400A EBD4-200A | EBD2-100A

High performance replacement for FIB silicon AFM tips
Extreme aspect ratio EBD AFM tip solutions for extended depth profiling capabilities combine the mechanical stability of a precisely fabricated conical shape and the durability of high-density diamond-like carbon for enhanced and long-lasting tip performance.



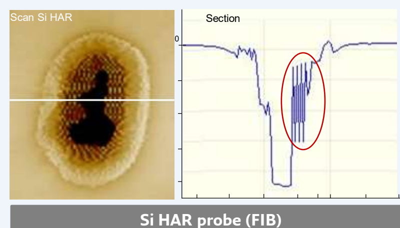
EBD6-400A side view SEM image.


Side view TEM image explicitly revealing the EBD6-400A tip shape uniformity and homogeneity.

Features

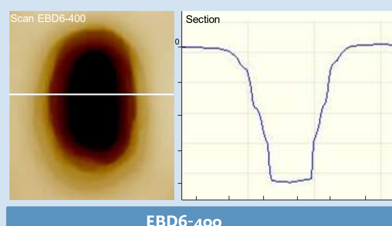
- **Extreme aspect shape.** 2000 nm to 8000 nm long AFM tips with an aspect ratio up to >10 for extended depth profiling.
- **Precise orientation.** Tilt compensated for enhanced feature bottom accessibility and reliable high-resolution inspection of steep structures.
- **Excellent stability.** Conical shape optimized for accurate measurement performance even on sharpest feature edges.
- **Improved throughput.** Outstanding tip material durability for enhanced tip lifetime and reduced cost per measurement.
- **Quality guaranteed.** 100% quality control for every individual tip. Online datasheets including individual dimensional values available 24/7 via QR code.

Application example



AFM trench recorded with a state-of-the-art Si HAR tip: both the scan (left) and the corresponding profile (right) exhibit considerable dithering on trench edges (red circle). Tapping Mode, 256x256 , scan rate 0.2 Hz.

nanotools Extreme Aspect Ratio AFM tips are specially designed and fabricated to overcome inspection accuracy limitations arising from tip-sample sidewall interactions. This effect becomes critical especially on feature discontinuities such as trench edges (see image on the left recorded with an EBD6-400A).



Trench scan (left) and the corresponding depth profile (right) measured with an EBD6-400A AFM tip showing accurate feature characteristics.
Tapping Mode, 256x256 , scan rate 0.2 Hz.

NT_EBD8-600_v0020
NT_EBD6-400_v0030
NT_EBD4-200_v0040
NT_EBD2-100_v0040

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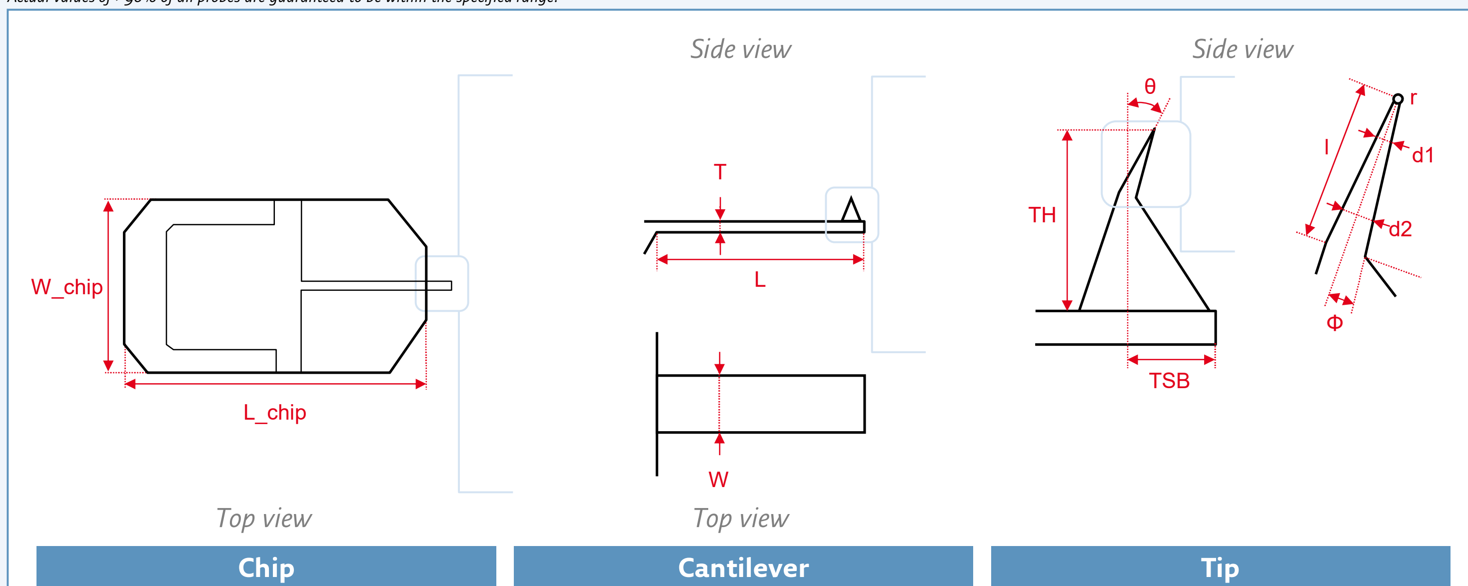
Technical specifications

Part number	NT_EBD8-600_v0020	NT_EBD6-400_v0030	NT_EBD4-200_v0040	NT_EBD2-100_v0040
Tip				
Material	HDC/DLC	HDC/DLC	HDC/DLC	HDC/DLC
Length / l	8000 nm (6000-8000 nm)	6000 nm (4000-6000 nm)	4000 nm (3000-4000 nm)	2000 nm (2000-3000 nm)
Width / d1	100 nm [1] (80-120 nm)	100 nm [1] (80-120 nm)	100 nm [1] (80-120 nm)	100 nm [2] (90-110 nm)
Width / d2	600 nm [3] (580-620 nm)	400 nm [4] (380-420 nm)	200 nm [5] (180-220 nm)	n/a
Half cone angle / Φ	<3° (AR>10)	<3° (AR>10)	<3° (AR>10)	<5° (AR>6)
Sharpness / r	<5 nm (<10 nm)	<5 nm (<10 nm)	<5 nm (<10 nm)	<5 nm (<10 nm)
Tilt compensation / θ	12° (±1°)	12° (±1°)	12° (±1°)	12° (±1°)
Total tip height / TH	21 µm (18-23 µm)	19 µm (15-20 µm)	19 µm (15-20 µm)	17 µm (12-18 µm)
Tip set back / TSB	15 µm (5-25 µm)	15 µm (5-25 µm)	15 µm (5-25 µm)	15 µm (5-25 µm)
Cantilever				
Material	Si	Si	Si	Si
Shape	NT-RTESPA	NT-RTESPA	NT-RTESPA	NT-RTESPA
Length / L	120 µm (±5 µm)	120 µm (±5 µm)	120 µm (±5 µm)	120 µm (±5 µm)
Width / W	30 µm (±2 µm)	30 µm (±2 µm)	30 µm (±2 µm)	30 µm (±2 µm)
Thickness / T	4.4 µm (±0.5 µm)	4.4 µm (±0.5 µm)	4.4 µm (±0.5 µm)	4.4 µm (±0.5 µm)
Force constant [6] / k	40 N/m (±20 N/m)	40 N/m (±20 N/m)	40 N/m (±20 N/m)	40 N/m (±20 N/m)
Resonance frequency [6] / f	320 kHz (±50 kHz)	320 kHz (±50 kHz)	320 kHz (±50 kHz)	320 kHz (±50 kHz)
Tip side coating	none	none	none	none
Back side coating	reflex	reflex	reflex	reflex
Chip				
Length / L_chip	3400 µm	3400 µm	3400 µm	3400 µm
Width / W_chip	1600 µm	1600 µm	1600 µm	1600 µm
Thickness / T_chip	315 µm	315 µm	315 µm	315 µm
Alignment grooves	no	no	no	no

[1] measured at 1000 nm from tip apex | [2] measured at 550 nm from tip apex | [3] measured at 5000 nm from tip apex | [4] measured at 3000 nm from tip apex | [5] measured at 2000 nm from tip apex.
n/a: specification not applicable for this product | [6] Resonance frequency f extracted from LDV measurements; cantilever stiffness k calculated from the (measured) cantilever geometry.
Actual values of >90% of all probes are guaranteed to be within the specified range.



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