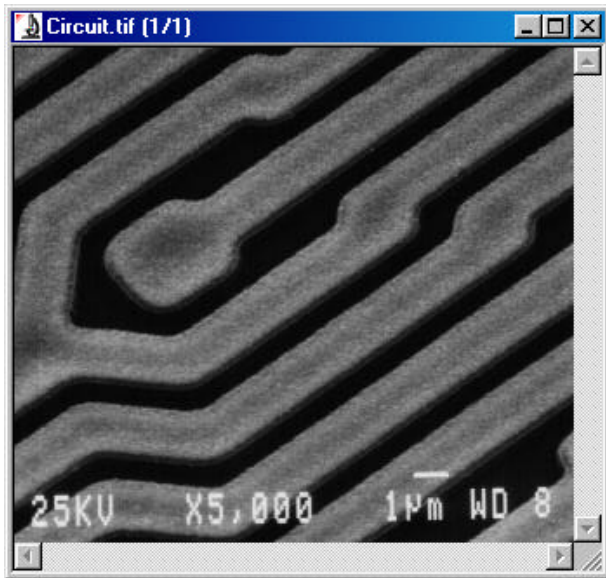


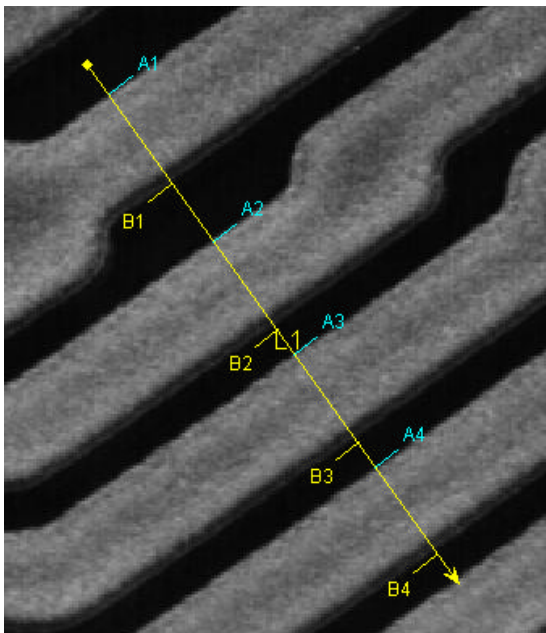
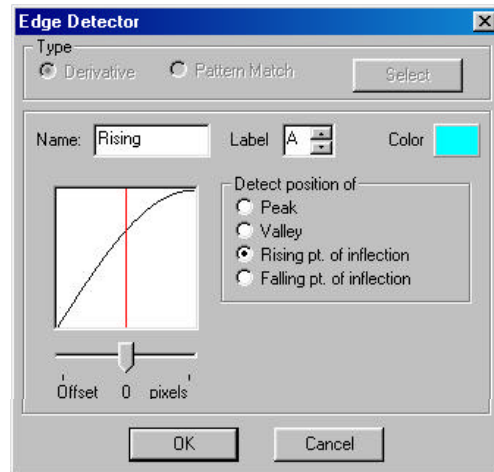
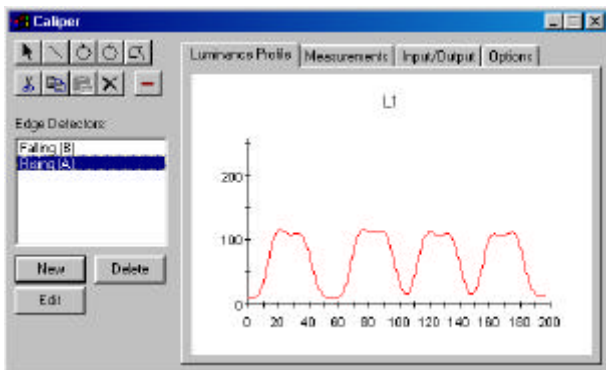
## Measurements with the Caliper Tool



The Caliper, or Edge Detection tool, is used to:

- ?? Define a line or shape called a sampling tool and place it on the image,
- ?? Create edge detectors that will find edges along the length of the sampling tool,
- ?? Derive distance measurements based upon the detection and location of the edges.

The Derivative method of edge detection uses the 1<sup>st</sup>- and 2<sup>nd</sup>-order derivatives of the luminance profile to detect peaks, valleys, rising points of inflection, and falling points of inflection. The Pattern Match method uses a pattern-matching template of luminance values. Markers are placed at locations in the image that most closely match the pattern in the template. In these examples, the Derivative method is used.

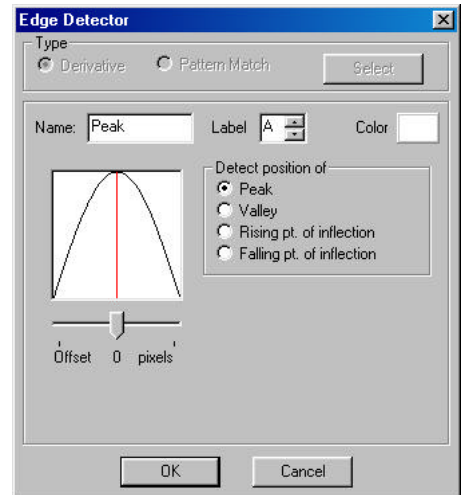
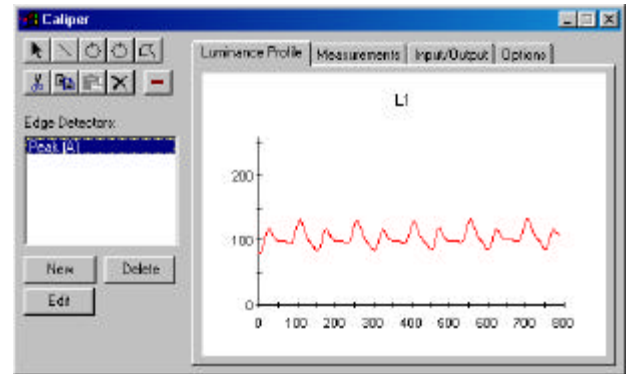
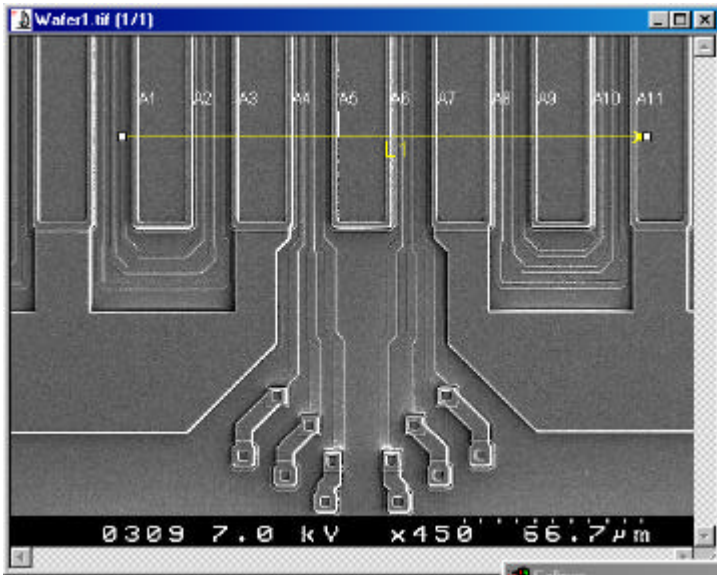


Measurements	
	A - B
1	34.10
2	33.69
3	33.16
4	32.23
Min	32.23
Max	34.10
Mean	33.30
StdDev	0.70
Samples	4.00

The tabbed dialog pages contain selections that allow refinement of the edge detection and measurement operations and direct the output to a file, printer, or spreadsheet. The sampling tools are used to create the Luminance Profile and include a Line tool, Clockwise Circle tool, C-Clockwise Circle tool, and Polygon/Polyline tool. An Add/Delete Marker tool is also available in the Caliper tools for the manual addition or deletion of edges.

In the first example, the distances between markers of two different edge detectors were calculated [A-B, or the distances between each Rising Point of Inflection (A) and the following Falling Point of Inflection (B)]. The B to B, B to A, or A to A distances could also be calculated.

The next example illustrates measurements between adjacent markers of the same type of edge detector and uses the Peak Edge Detector.



The Caliper software window displays the 'Measurements' tab. A table lists measurements for 10 markers. The columns are labeled '1' through '10' and 'A - A'.

	A - A
1	80.78
2	68.00
3	80.00
4	70.00
5	78.00
6	70.00
7	82.00
8	68.00
9	82.00
10	66.00