

## Available Measurements in Image-Pro Plus

1. **Angle:** Reports the angle between the vertical axis and the major axis of the ellipse equivalent to the object (i.e., an ellipse with the same area, first and second degree moments), where  $0^\circ \leq \text{Angle}^\circ \leq 180^\circ$ . The vertical angle is  $0^\circ$ , unless an offset has been set with the Calibration command.
2. **Area:** Reports the area of each object (minus any holes). The area comprised of pixels having intensity values within the selected range is reported unless the Fill Holes option has been enabled. If Fill Holes is enabled, all pixels within the object perimeter are included in the area measurement.
3. **Area/Box:** Reports the ratio between the area of each object, and the area of its imaginary bounding box, as determined by Area of Object / Area of Box.
4. **Area (Polygon):** Reports the area of the polygon that defines the object's outline.
5. **Aspect:** Reports the ratio between the major axis and the minor axis of the ellipse equivalent to the object (i.e., an ellipse with the same area, first and second degree moments), as determined by Major Axis/Minor Axis. Aspect is always  $\geq 1$ .
6. **Average Diameter:** Reports the average length of diameters measured at  $5^\circ$  intervals around the centroid of each object.
7. **Box Height:** Reports the height of the bounding box along the major axis (i.e., the bounding box is the smallest rectangle that completely encompasses the whole object).
8. **Box Length:** Reports the length of the bounding box along the major axis (i.e., the bounding box is the smallest rectangle that completely encompasses the whole object).
9. **Box Width:** Reports the width of the bounding box along the major axis (i.e., the bounding box is the smallest rectangle that completely encompasses the whole object).
10. **Box X/Y:** Reports the ratio between the width (X) and height (Y) of each object's imaginary bounding box, as determined by Box Width / Box Height.  $\cup$  **Centroid X:** Reports the X-coordinate position of the centroid of the object from the left side of the image.
11. **Centroid Y:** Reports the Y coordinate position of the centroid pixel of the object from the top of the image.
12. **Center Mass-X:** Reports the X-coordinate position of the centroid of the object based on intensity measurements.
13. **Center Mass-Y:** Reports the Y coordinate position of the centroid pixel based on intensity measurements.

14. **Class:** Reports the class number to which the object belongs. This value will only be reported if the objects have been previously classified using the Single Variable Class command. If they have not, a Class measurement will not appear on the Measurements data sheet.
15. **Cluster:** A cluster is a group of objects defined by an AOI. Cluster reports the number of individual objects contained within the outline.
16. **Clumpiness:** Derived from Heterogeneity measurement. The fractions of heterogeneous pixels remaining in an object after an erosion process. It reflects the object texture.
17. **Count (adjusted):** Reports the size-weighted object count. Only works when “clean border” flag is turned on.
18. **Dendrites/Dendritic Length:** Reports the number of dendrites (1-pixel thick open branches) and the total length of all the dendrites. Measurements made of dendrite number and dendrite length should be performed on objects which have been skeletonized, or “thinned” using the Thinning filter in Filters: Morphological. Dendrite measurements performed on non-thinned objects may return unacceptable results.
19. **Density Blue:** Reports the mean blue value for the measured object in a true color image.
20. **Density Green:** Reports the mean Green value for the measured object in a true color image.
21. **Density Red:** Reports the mean red value for the measured object in a true color image.
22. **Density Sum:** Reports the sum of the intensity values of all the pixels of a counted object.
23. **Diameter (max):** Reports the length of the longest line joining two outline points and passing through the centroid.
24. **Diameter (mean):** Reports the average length of the diameters measured at two-degree intervals joining two outline points and passing through the centroid.
25. **Diameter (min):** Reports the length of the shortest line joining two outline points and passing through the centroid.
26. **Feret (max):** Reports the longest caliper (feret) length.
27. **Feret (mean):** Reports the shortest caliper (feret) length.
28. **Feret (min):** Reports the average caliper (feret) length.

29. **Fractal Dimension:** Reports the fractal dimension of the object's outline.
30. **Heterogeneity:** Reports the fraction of pixels that vary more than 10% from the average intensity of the object.
31. **Holes:** Reports the number of holes inside an object. A "hole" is defined as any contiguous set of pixels within an object that have intensity values outside the selected range for objects. If the Fill Holes option is set, this value will be 0.
32. **Hole Area:** Reports the area of holes within an object. A "hole" is defined as any contiguous set of pixels within an object that have intensity values outside the selected range for objects. If the Fill Holes option is set, this value will be 0.
33. **Hole Ratio:** Reports the ratio of the object area excluding holes, to the total area of the object, as determined by  $\text{Area} / (\text{Area} + \text{Holes Area})$ . Remember, when a Hole measurement is selected, Area is the area of the object less the area of the holes. If the Fill Holes option is set, this value will be 1.
34. **Integrated Optical Density (IOD):** Reports the average intensity/density of each object. This value will be expressed in terms of the current intensity/density mode and calibration.
35. **Major Axis:** Reports the length of the main axis of the ellipse equivalent to the object (i.e., an ellipse with the same area, first and second-degree moments).
36. **Minor Axis:** Reports the length of the minor axis of the ellipse equivalent to the object (i.e., an ellipse with the same area, first and second-degree moments).
37. **Max Diameter:** Reports the length of the longest line that can be drawn to pass through the centroid position and join two points on each object's perimeter.
38. **Min Diameter:** Reports the length of the shortest line that can be drawn to pass through the centroid position and join two points on each object's perimeter.
39. **Max Radius:** Reports the maximum distance between each object's centroid pixel position and its perimeter.
40. **Min Radius:** Reports the minimum distance between each object's centroid pixel position and its perimeter.
41. **Max Density:** Reports the maximum intensity or density inside the object.
42. **Min Density:** Reports the minimum intensity or density inside the object.

43. **Margination:** Reports the distribution of intensity between the center of an object and the edge of the object.
44. **Perimeter:** Measurement to report the length of the outline of each object using a polygonal outline. The perimeter of interior holes is not included in this measurement.
45. **Perimeter2:** Old measurement from version 3.0. Faster but less accurate than current perimeter measurement. Reports the length of the outline of each object. When holes are outlined, the perimeters of the holes are added to the perimeter of the object.