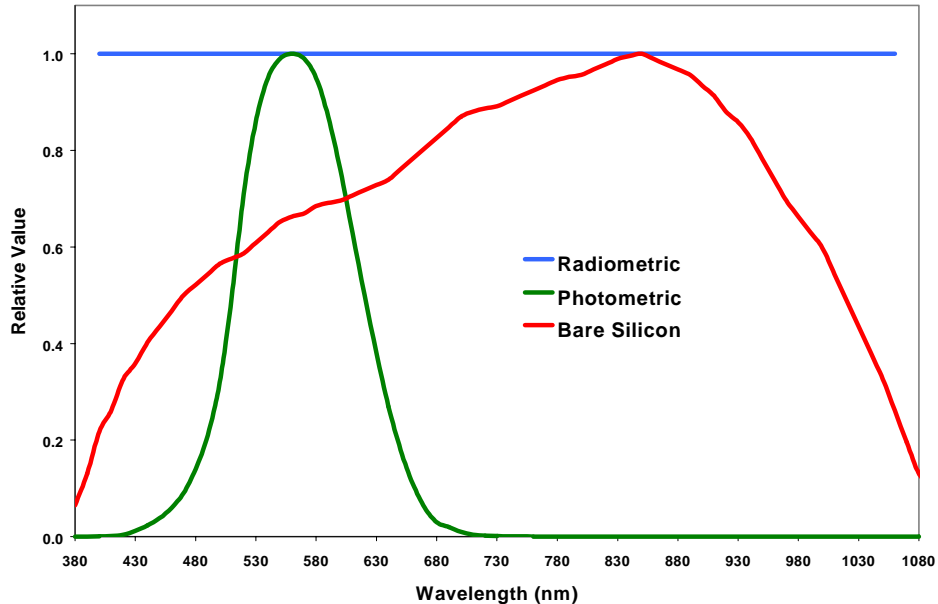


# Technical Note: 121

**Question:** What is the difference between Photometric and Radiometric measurements, and which one should I use for machine vision applications?



**Answer:** Radiometric measurements should be used for all machine vision applications; and any others that involve CCD, CMOS or other silicon based detectors. Radiometric measurements provide an equal weighting value for all wavelengths of light, independent of whether the human eye can see them. Photometric measurements are restricted to those wavelengths that are perceptible by the human eye. Photometric measurements are made using a radiometric detector (flat response - blue curve) in combination with a photometric filter (green curve) that emulates the response curve of the human eye. Most silicon based detectors (red curve - typical sensor) have a sensitivity curve that is much different than that of the human eye.

## **FYI:**

Effective use of radiometric measurements may require additional calculations. If an intensity or signal value comparison is to be made using an identical lamp technology and the same sensor responsivity, then direct radiometric measurements will provide highly accurate comparisons. If either the sensor or lamp to be compared are not the same, then the resulting radiometric values must be multiplied (weighted) by the convolution of the sensor curve and the lamp spectral power distribution. This convolution requires multiplying the curve values at each wavelength and summing the results, and can be done in a spreadsheet (see white paper). One last note: check your camera sensitivity curve, response curves vary significantly and may be quite different from the typical curve shown above.

### **Illumination Technologies, Inc.**