



OPERATING / APPLICATION NOTE

EOS offers a variety of quadrant detectors, including silicon photodiodes for the UV-visible and InGaAs photodiodes for the NIR spectral ranges. These devices consist of four independent photodiode elements on a single chip (four independent anodes, common cathode). They find best application in beam centering and nulling, with sensing of sub-micron beam movement around the centerpoint possible. Because each element behaves like a typical photodiode they can be used over a wide range of power levels and/or a wide range of electrical bandwidths, unlike the non-delineated PSD devices that require higher power levels and modest frequencies. NEP calculations and sensitivity/bandwidth trade-offs can be made in a straightforward manner based on the electrical characteristics of each quadrant.

Using the quadrants as position sensors is a little more complicated. Two-dimensional position sensing is only possible as long as the beam is illuminating all four quadrants. It can be viewed as a comparison of the geometrical areas being illuminated in each quadrant. This makes the calculations dependent on the beam size and shape. Obviously if the beam spot size is small compared to the overall detector it could move onto a single quadrant and all position information other than identifying which quadrant would be lost. Lateral movement of $\frac{1}{2}$ the beam diameter less the element spacing creates this condition. This makes matching the beam size and the detector size very important. Other considerations such as the expected magnitude of the movement, the relative size of the gap (or dead space) between quadrant elements, and the beam uniformity must also be accounted for.

In addition to the quadrant photodiode components, EOS offers integrated modules containing four transimpedance amplifiers to give four analog voltage outputs. Gain values can be specified to cover applications ranging from high sensitivity low frequency measurements to lower gain, wide bandwidth cases. Consult the factory for details.