

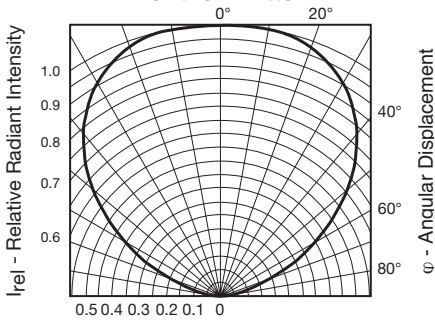


# DID YOU KNOW? WINDOW DESIGN FOR OPTICAL SENSORS

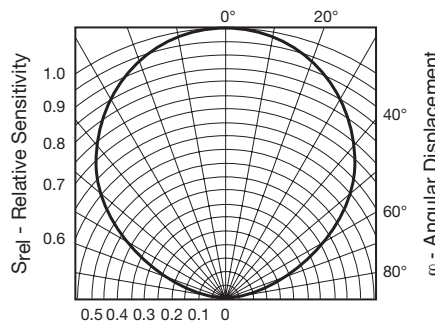
A critical factor when designing in an integrated proximity and ambient light sensor is the window design. These sensors depend on light being emitted and received. They are typically placed behind a tinted plastic material at varying depths from its surface. The infrared and visible light transmittance of this material is really important, as is the size of the window opening.

To design the optimum window size, the only dimension that the design engineer needs to consider is the distance from the top surface of the sensor to the outside surface of the window. This dimension will determine the size of the detection zone. The angle of half intensity of the emitter and the angle of half sensitivity of the PIN photodiode are  $\pm 55^\circ$ , as shown in Figure 1 and Figure 2.

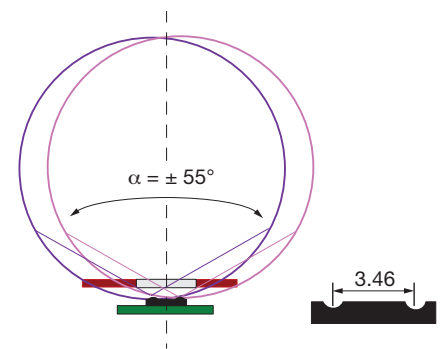
**Fig. 1 - Angle of the Half Intensity of the Emitter**



**Fig. 2 - Angle of the Half Sensitivity of the PIN Photodiode**



**Fig. 3 - Emitter and Detector Angle and Distance**

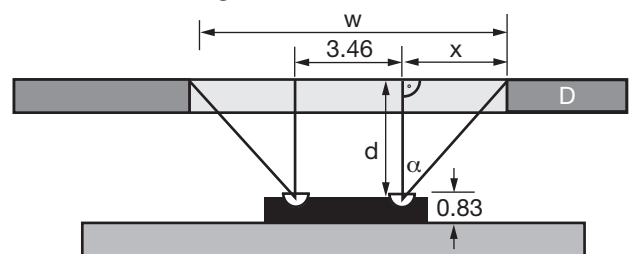


The center of the sensor and center of the window should be aligned as shown in Figure 3. Assuming the detection zone is a cone-shaped region with an angle of  $\pm 40^\circ$ , Figure 4 shows the dimensions for the distance from the top surface of the sensor to the outside surface of the glass,  $d$ , and the width of the window,  $w$ . The distance from the center of the infrared emitter to the center of the PIN photodiode is 3.46 mm. The height of the sensor is 0.83 mm. The results represent the ideal width of the window. The mechanical design of the device may not allow for this size

A window size calculator is available for all our optical sensors, receivers, and transceivers at

[www.vishay.com/optoelectronics/opto-window-area-calculator/](http://www.vishay.com/optoelectronics/opto-window-area-calculator/)

**Fig. 4 - Window Dimensions**



<b>d (mm)</b>	<b>x (0.84 d)</b>	<b>w (3.46 + 2 x)</b>
0.5	0.42	4.30
1.0	0.84	5.14
1.5	1.26	6.02
2.0	1.68	6.82
2.5	2.10	7.66
3.0	2.52	8.50