

Heimdall Package Window Size in Front of the IR Receiver Module

The window in front of the receiver should be sized in order to optimize the required viewing angle. A formula to calculate the optimal window size, given the required viewing angle, is presented below.

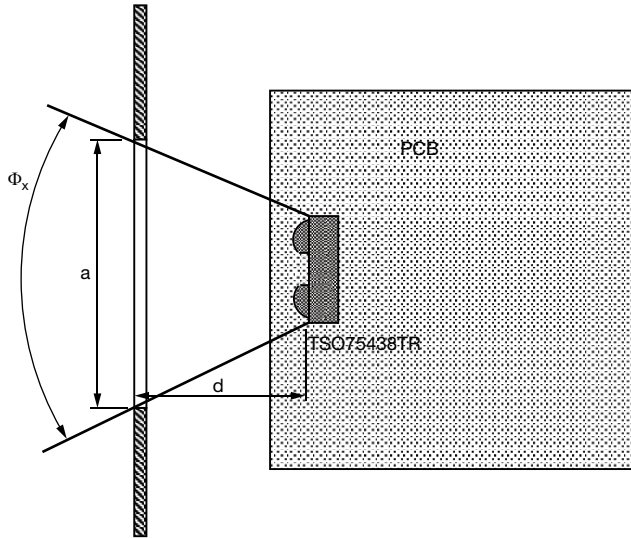


Fig. 1

a: horizontal window size

d: distance between bottom of the lens and the window

Φ_x : required total viewing angle. If the required viewing angle is $\pm 50^\circ$, Φ_x would be 100°

The minimum window width is:

$$a = 7 \text{ mm} + 2d \tan\left(\frac{\Phi_x}{2}\right)$$

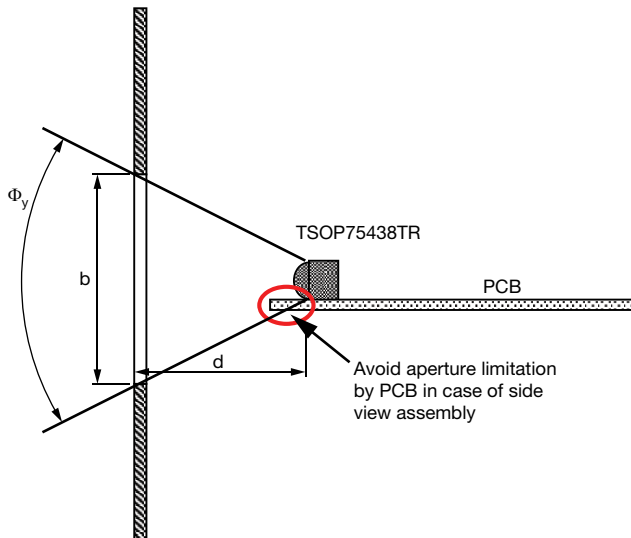


Fig. 2

b: vertical window size

d: distance between bottom of the lens and the window

Φ_y : required total viewing angle. If the required viewing angle is $\pm 40^\circ$, Φ_y would be 80°

The minimum window width is:

$$b = 2.5 \text{ mm} + 2d \tan\left(\frac{\Phi_y}{2}\right)$$

Example:

The horizontal receiving angle should be $\pm 60^\circ$ the vertical receiving angle should be $\pm 40^\circ$, the distance between window and IR receiver is 3 mm. In that case the minimum window size should be: 17.4 mm x 7.5 mm

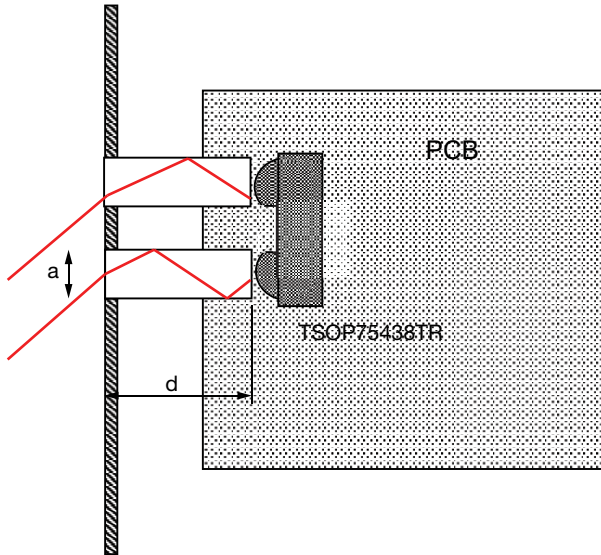
Calculation:

$$a = 7 \text{ mm} + 2 \times 3 \text{ mm} \times 1.73 = 17.4 \text{ mm}$$

$$b = 2.5 \text{ mm} + 2 \times 3 \text{ mm} \times 0.84 = 7.5 \text{ mm}$$

If the window size needs to be small then a light guide may be helpful to span the distance between front panel and IR receiver. There is some loss of optical power at the transition between IR receiver and light guide. In case the IR signal is applied from a wide off axis direction then the efficiency of the light guide is significantly less compared to a window (see above).

In order to have good coupling between light guide and IR receiver we recommend to keep the gap between light guide and the vertex of the lens of the TSOP75438 as short as possible.



- a: diameter of light guide
- b: length of light guide

We recommend a diameter of about $a = 2.5$ mm and a length of more than $d = 6$ mm for good efficiency and smooth directivity of the light guide.

Fig. 3

Please note that a light guide that is shorter than 3 times its thickness may have blind spots in the directivity characteristic. There could be a poor reception at a certain angle of incidence.