

# Photodiode as current source

## Student Group

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Fig. 2: Inverting Op-Amp: Photo Diode BPW 34 S



Fig. 3: Inverting Op-Amp: Diagramms of BPW 34 S

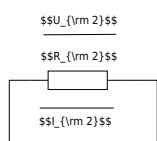


Fig. 4: Inverting Op-Amp: Photo Diode as current source

$$U_{DD} \approx 10\text{V}, U_{SS} \approx -10\text{V}$$

We assume a good illuminated room of 300 lx, illuminated by a white LED. White light is a mixture of many wavelengths across the visible spectrum, roughly 380 to 780 nm. For a typical white LED, the spectrum usually comes from a blue LED chip with a peak around 450 nm, plus a broader phosphor emission that spreads across green, yellow, and red wavelengths. For an easier calculation, we take a mean value of 500 nm which is close to the peak value that comes from the blue LED (in reality a greenish light) and 300 lx for the illumination.

In figure 3 we can see that the sensitivity of the photo diode at 500 nm is only 30%. The maximum current (100%) at 300 lx is around 30  $\mu\text{A}$ .

Now we can calculate the current we expect from the diode at 300 lx:

Complete the arrows in the schematic of the circuit.

Take the values for  $U_1, U_2, U_{OUT}$  from .

Use these values to calculate the sum of the voltages at node  $N_{12}$ .

Compare your result by measurement.

$$U_1 \approx$$

$$U_2 \approx$$

$$U_{OUT} \approx$$

Calculated  $U_{R2}$

Measured  $U_{R2}$

What are your results?

$\dots$

$\dots$

$\dots$

What will happen if you short-circuit  $R_2$ ?  
Try it and explain your results.

$\dots$

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