

Version:
July 4, 2017



TOKEN

Select The Load Resistor

Token Electronics Industry Co., Ltd.

Taiwan: No.137, Sec. 1, Zhongxing Rd., Wugu District,
New Taipei City, Taiwan, R.O.C. 24872
Tel: +886 2981 0109 Fax: +886 2988 7487

China: 12F, Zhong Xing Industry Bld., Chuang Ye Road,
Nan Shan District, Shen Zhen City,
Guang Dong, China 518054
Tel: +86 755 26055363; Fax: +86 755 26055365

[Web: www.token.com.tw](http://www.token.com.tw)

[Email: rfq@token.com.tw](mailto:rfq@token.com.tw)



Select The Load Resistor

Table 1 - Photoelectric Characteristics (Ta=25°C) PT-IC-GC-3-PE-520

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photo Current	$I_{L(1)}$	$V_{cc}=5V$ $E_v=10Lux$	1.2	2.5	3.6	μA
	$I_{L(2)}$	$V_{cc}=5V$ $E_v=30Lux$	3.6	7.5	10.8	μA
	$I_{L(3)}$	$V_{cc}=5V$ $E_v=100Lux$	12	25	36	μA
Collector Dark Current	I_D	$V_{cc}=5V/85^\circ C$ $E_v=0Lux$	-	-	0.8	μA

Binning Table 2 - PT-IC-GC-3-PE-520 Batch BINNED GROUP

Batch BINNED GROUP ($T_{amb} = 25^\circ C$, unless otherwise specified)						
Parameter	Condition	Binned Group	Symbol	Min.	Max.	Unit
Photo Current	$E_v = 100 \text{ lux}$, CIE illuminant A, $V_{CE} = 5 \text{ V}$	A	I_{PCE}	12	23	μA
		B	I_{PCE}	19	36	μA

Token provides ambient light sensor for photodiode and phototransistor. For a given irradiance, the phototransistor may show a batch change of the output current due to the susceptibility of the wafer and the variability of the transistor gain. The lot-to-lot change of the photoelectric sensor is significantly lower because it is only caused by the variability of photosensitivity. Token provides phototransistor output (component) for its ambient light sensor in binned groups (Table 2). These groups can not be ordered separately, but each reel is labeled A, B, or C, which allows the user to select the appropriate load resistance to compensate for these wide tolerances.

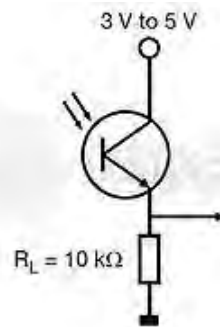


Figure 3 - Typical Optical Load Circuit

Select The Load Resistor

In order to minimize the output variability of the light sensor, the load resistance (R_L) requires the selection of the component to choose the load resistance (R_L) according to the sorted standard illuminance. The ambient light sensor and the transistor output of the typical optical circuit shown in Figure 3. For the PT-IC-GC-3-PE-520, 30 lux the typical output current is 7.5 μ A. At 100 lux, the typical output current is 25 μ A and the output current is in the range of 12 μ A to 36 μ A. By the previously mentioned binning components, the range of 100 lux is divided into two bins. Each bin should use a different load resistor, and the output is relatively consistent for a given lux level.

Suppose application detection ranges from 10 lux to \$1000 lux. Use a 10 K Ω load resistor to produce a voltage of 0.025 V to 2.5 V. The photocurrent of the voltage is equal to 2.5 μ A to 250 μ A.

Table 3 - Mean of Bin

Part Number	Bin	Photocurrent, I_{PCE} at 100 lux (μ A)		
		Min.	Mean	Max.
PT-IC-GC-3-PE-520	A	12	17.5	23
	B	19	27.5	36

- The purpose of selecting the resistance is to have the same output voltage for the average of each component, Table 3.

Table 4 - Load Resistor of Bin

Bin A	Bin B
$I_{PCE} = 17.5 \mu\text{A}$, $R_L = 10 \text{ k}\Omega$ $V = 17.5 \mu\text{A} \times 10 \text{ k}\Omega$ $V = 175 \text{ mV}$	$0.175 \text{ V} = 0.0000275 \text{ A} \times R_L$ $R_L = 0.175 \text{ V} / 0.0000275 \text{ A}$ $R_L = 6.36 \text{ k}\Omega$

- The PT-IC-GC-3-PE-520 overall tolerance is reduced from 12 to 36 by 12 to 23 by changing the resistance value based on the bin.