

# NPN Phototransistor

OP800SL Series, OP800WSL Series

OP830SL Series, OP830WSL Series



## Features:

- TO-18 hermetically sealed package
- Mechanically and spectrally matched to OP130 and OP230 LEDs
- TX and TXV process available (see Hi-Rel section)
- Choice of narrow or wide receiving angle
- Variety of sensitivity ranges
- Enhanced temperature range

## Description:

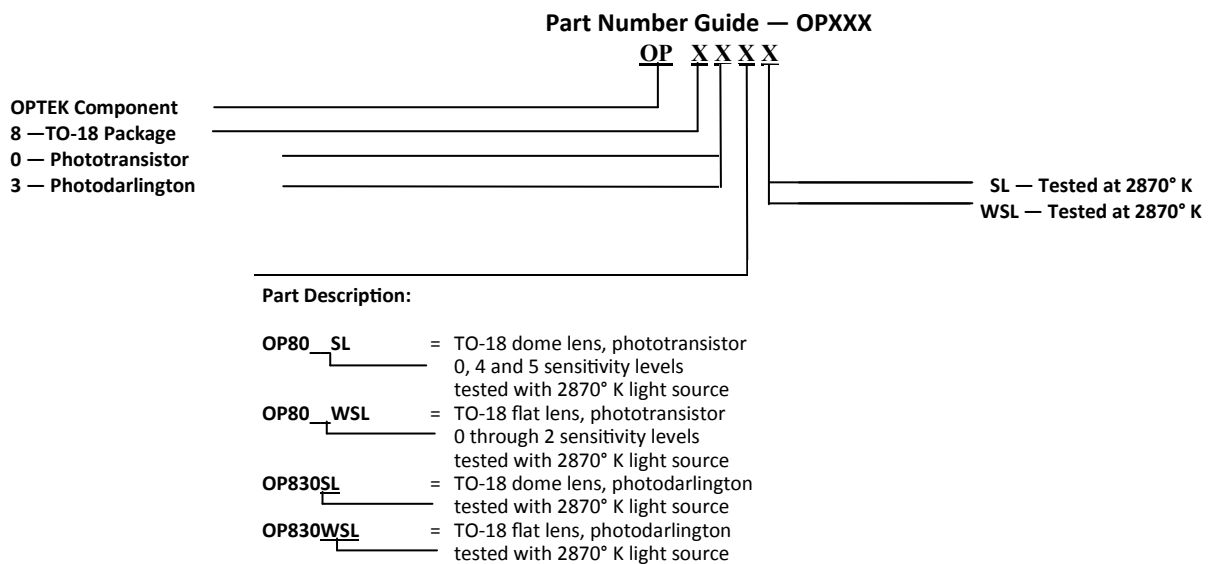
Each device in this series consists of a NPN silicon phototransistor mounted in a hermetically sealed TO-18 package that offers high power dissipation and superior hostile environment operation. The **OP800SL**, **OP804SL**, **OP805SL** and **OP830SL** devices have a narrow receiving angle that provides excellent on-axis coupling and a bonded base lead that enables conventional transistor biasing. The **OP800WSL**, **OP801WSL**, **OP802WSL** and **OP830WSL** all have a wide receiving angle that provides relatively even reception over a large area.

Devices are 100% production tested using an infrared light source for close correlation with OPTEK's GaAs and GaAlAs emitters. *The OP800SL and devices are mechanically and spectrally matched to OP130 and OP230 series LEDs. The OP800WSL devices are mechanically and spectrally matched to OP130W and OP230W series devices.*

Please refer to Application Bulletins 208 and 210 for additional design information and reliability (degradation) data.

## Applications:

- Space-limited applications
- Hostile environment applications
- Applications requiring high power dissipation



General Note  
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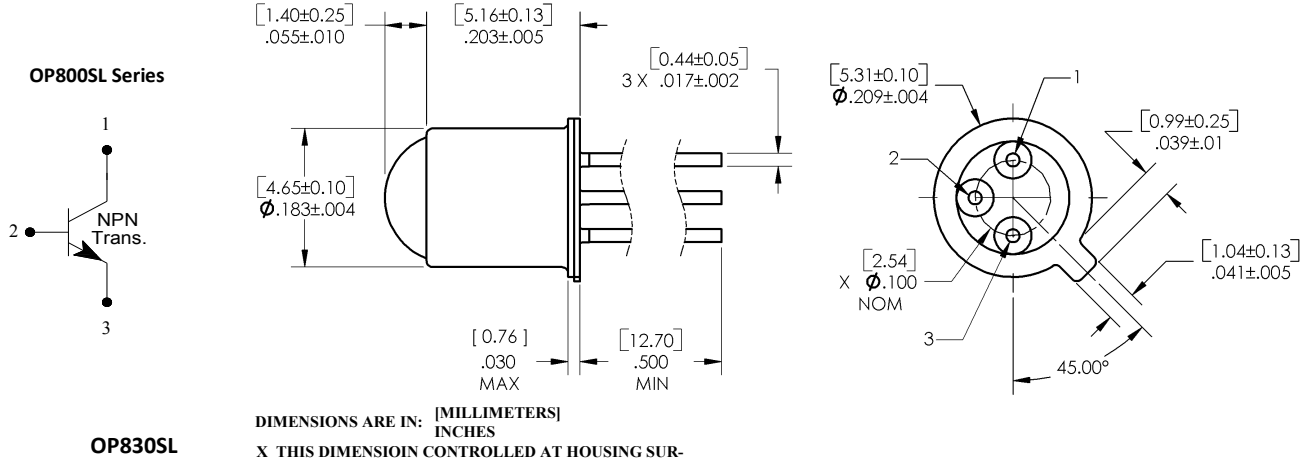
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OP800SL Series, OP800WSL Series

OP830SL Series, OP830WSL Series

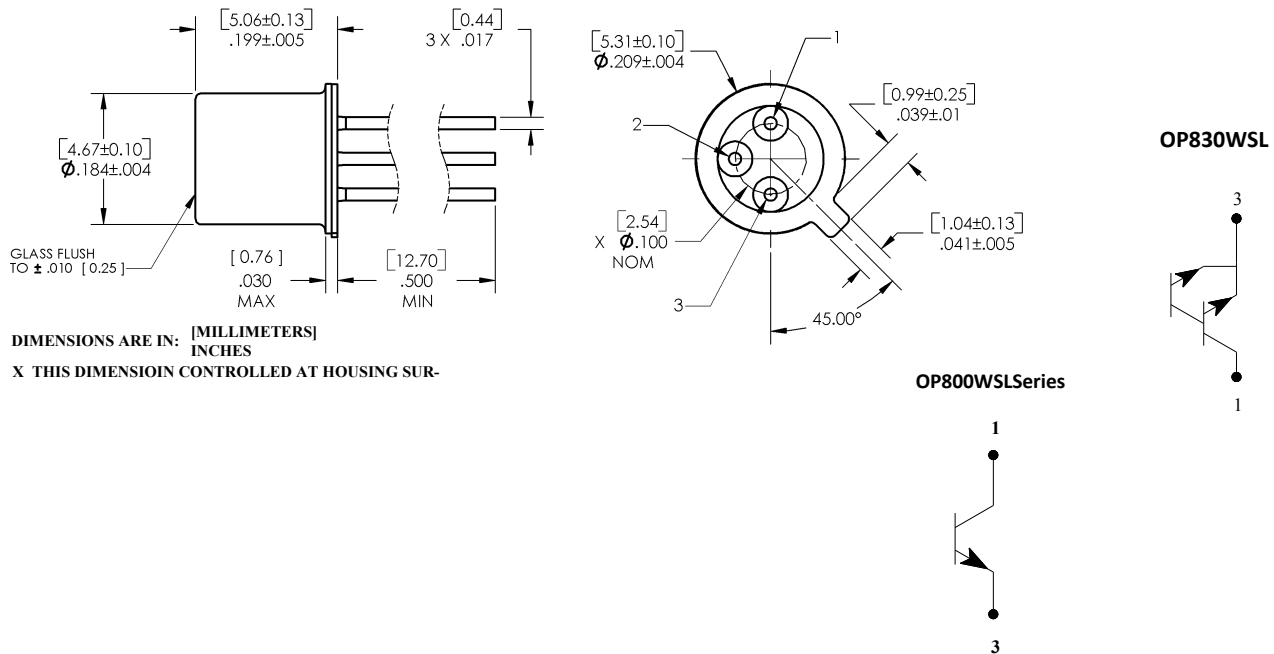


## OP800SL, OP830SL



| Pin # | OP80X ___ | OP830 ___ |
|-------|-----------|-----------|
| 1     | Collector | Collector |
| 2     | Base      | —         |
| 3     | Emitter   | Emitter   |

## OP800WSL, OP830WSL



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# NPN Phototransistor

OP800SL Series, OP800WSL Series

OP830SL Series, OP830WSL Series



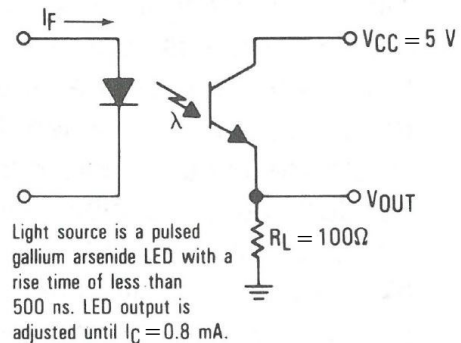
## Electrical Specifications

| Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)                 |   |
|---|---|
| Storage Temperature Range   | $-65^\circ\text{C}$ to $+150^\circ\text{C}$ |
| Operating Temperature Range   | $-65^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Collector-Base Voltage (applies to OP800SL only - does not apply to OP800WSL)               | 30 V  |
| Collector-Emitter Voltage<br>OP800 (SL, WSL)<br>OP830 (SL, WSL)                             | 30 V<br>15 V                                |
| Emitter-Base Voltage (applies to OP800 (SL, WSL) only)                                      | 5 V   |
| Emitter-Collector Voltage (applies to all OP800 and OP830 devices)                          | 5 V   |
| Continuous Collector Current  | 50 mA                                       |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron] | $260^\circ\text{C}^{(1)}$                   |
| Power Dissipation   | $250\text{ mW}^{(2)}$                       |

### Notes:

1. RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering. A maximum 20 grams force may be applied to the leads when soldering.
2. Derate linearly  $2.5\text{ mW}/^\circ\text{C}$  above  $25^\circ\text{C}$ .
3. Junction temperature maintained at  $25^\circ\text{C}$ .
4. Light source is an unfiltered tungsten bulb operating at  $CT = 2870\text{ K}$ .

## Switching Time Test Circuit



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# NPN Phototransistor

OP800SL Series, OP800WSL Series

OP830SL Series, OP830WSL Series



## Electrical Specifications

| Electrical Characteristics (T <sub>A</sub> = 25° C unless otherwise noted) |   |                                       |                            |                             |       |   |
|--|---|---------------------------------------|----------------------------|-----------------------------|-------|---|
| SYMBOL   | PARAMETER   | MIN                                   | TYP                        | MAX                         | UNITS | TEST CONDITIONS   |
| I <sub>C(ON)</sub> <sup>(3)</sup>  | On-State Collector Current  |                                       |                            |                             |       |   |
|  | OP800SL<br>OP804SL<br>OP805SL<br>OP800WSL<br>OP801WSL<br>OP802WSL | 0.5<br>7.0<br>15<br>0.3<br>0.5<br>2.5 | -<br>-<br>-<br>-<br>-<br>- | -<br>22<br>-<br>3<br>2<br>3 | mA    | V <sub>CE</sub> = 5 V, E <sub>E</sub> = 5 mW/cm <sup>2(3)(4)</sup>                            |
|  | OP830SL<br>OP830WSL   | 15<br>4                               | -<br>-                     | -<br>-                      |       | V <sub>CE</sub> = 5 V, E <sub>E</sub> = 0.5 mW/cm <sup>2(3)(4)</sup>                          |
| I <sub>CEO</sub>   | Collector Dark Current  |                                       |                            |                             |       |   |
|  | OP800 (SL, WSL)<br>OP830 (SL, WSL)                                | -<br>-                                | -<br>-                     | 100<br>1                    | nA    | V <sub>CE</sub> = 10 V, E <sub>E</sub> = 0  |
| V <sub>(BR)CEO</sub>   | Collector-Emitter Breakdown Voltage                               |                                       |                            |                             |       |   |
|  | OP800 (SL, WSL)<br>OP830 (SL, WSL)                                | 30<br>15                              | -<br>-                     | -<br>-                      | V     | I <sub>C</sub> = 100 μA   |
| V <sub>(BR)CBO</sub>   | Collector-Base Breakdown Voltage<br>[applies to OP800SL only]     | 30                                    | -                          | -                           | V     | I <sub>C</sub> = 100 μA   |
| V <sub>(BR)ECO</sub>   | Emitter-Collector Breakdown Voltage                               | 5.0                                   | -                          | -                           | V     | I <sub>E</sub> = 100 μA   |
| V <sub>(BR)EBO</sub>   | Emitter-Base Breakdown Voltage<br>[applies to OP800SL only]       | 5.0                                   | -                          | -                           | V     | I <sub>E</sub> = 100 μA   |
| V <sub>CE(SAT)</sub> <sup>(3)</sup>  | Collector-Emitter Saturation Voltage                              |                                       |                            |                             |       |   |
|  | OP800WSL  | -                                     | -                          | 0.4                         | V     | I <sub>C</sub> = 0.15 mA, E <sub>E</sub> = 0.5 mW/cm <sup>2(4)</sup>                          |
|  | OP800SL   | -                                     | -                          | 0.4                         | V     | I <sub>C</sub> = 0.4 mA, E <sub>E</sub> = 5 mW/cm <sup>2(4)</sup>                             |
|  | OP830SL   | -                                     | -                          | 1.2                         | V     | I <sub>C</sub> = 0.15 mA, E <sub>E</sub> = 0.5 mW/cm <sup>2(4)</sup>                          |
|  | OP830WSL  | -                                     | -                          | 1.2                         | V     | I <sub>C</sub> = 1.0 mA, E <sub>E</sub> = 0.5 mW/cm <sup>2(4)</sup>                           |
| t <sub>r</sub>   | Rise Time   | -                                     | 7                          | -                           | μs    | V <sub>CC</sub> = 5 V, I <sub>C</sub> = 0.80 mA,<br>R <sub>L</sub> = 100 Ω (See Test Circuit) |
| t <sub>f</sub>   | Fall Time   | -                                     | 7                          | -                           | μs    |   |

**Notes:**

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2. Derate linearly 2.5 mW/° C above 25° C.
3. Junction temperature maintained at 25° C.
4. Light source is an unfiltered tungsten bulb operating at CT = 2870 K or equivalent infrared source.

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OP800SL Series, OP800WSL Series

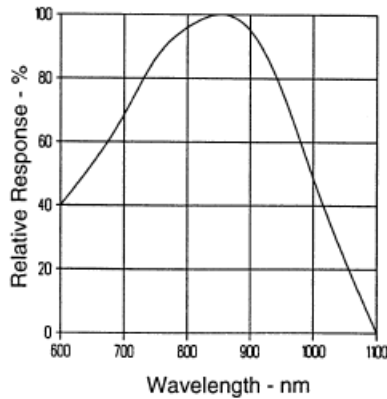
OP830SL Series, OP830WSL Series



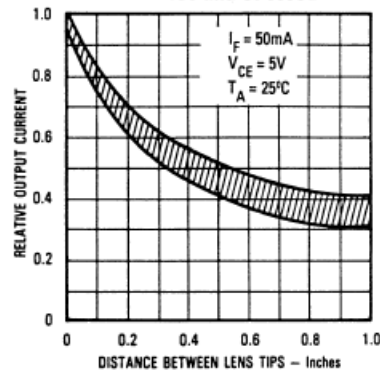
## Performance

### OP800SL Series

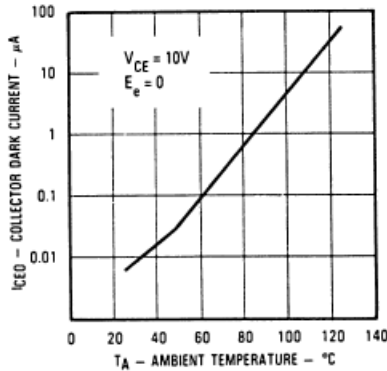
Typical Spectral Response



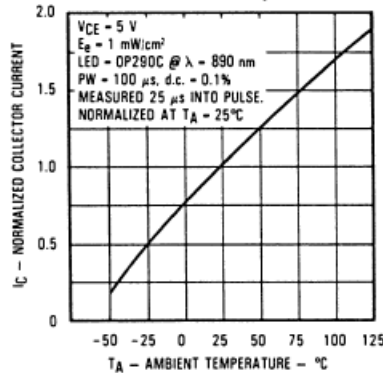
Coupling Characteristics of OP130 and OP800SL



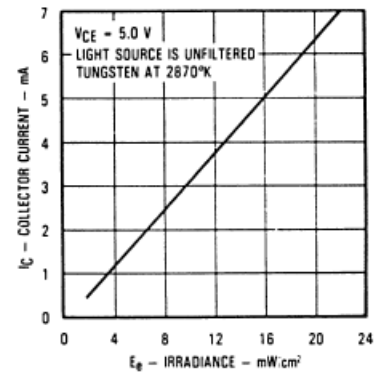
Collector Dark Current vs. Ambient Temperature



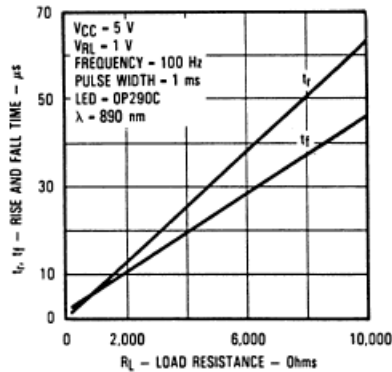
Normalized Collector Current vs. Ambient Temperature



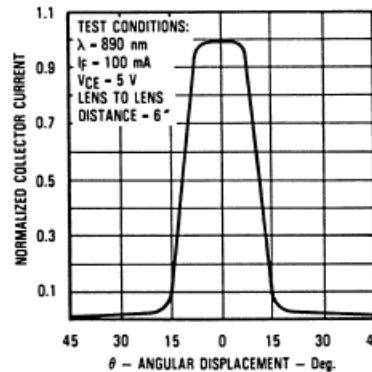
Collector Current vs. Irradiance



Rise and Fall Time vs. Load Resistance



Normalized Collector Current vs. Angular Displacement



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# NPN Phototransistor

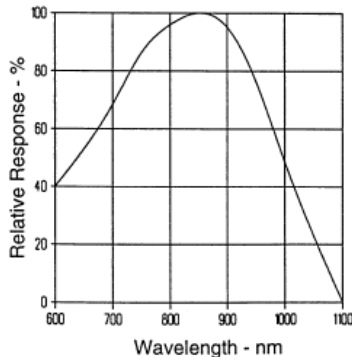
OP800SL Series, OP800WSL Series  
 OP830SL Series, OP830WSL Series



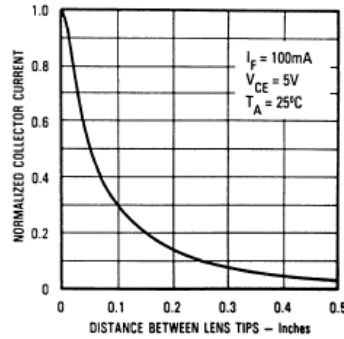
## Performance

### OP800WSL Series

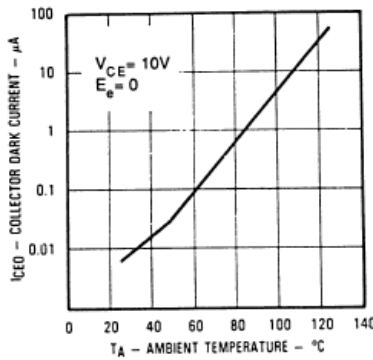
Typical Spectral Response



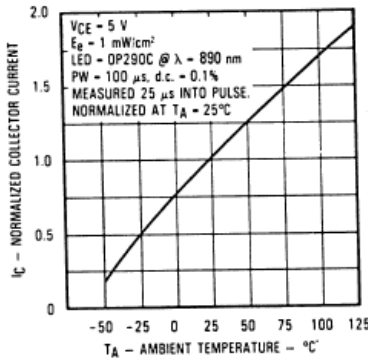
Coupling Characteristics of OP130W and OP800W



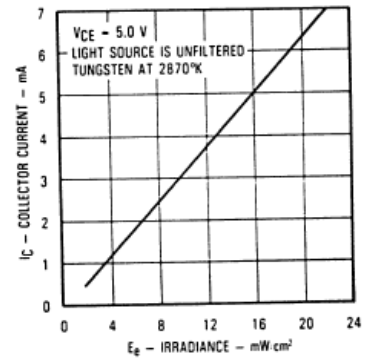
Collector Dark Current vs. Ambient Temperature



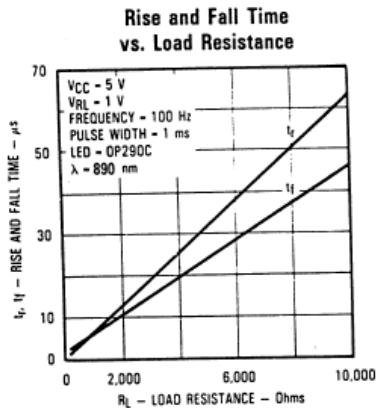
Normalized Collector Current vs. Ambient Temperature



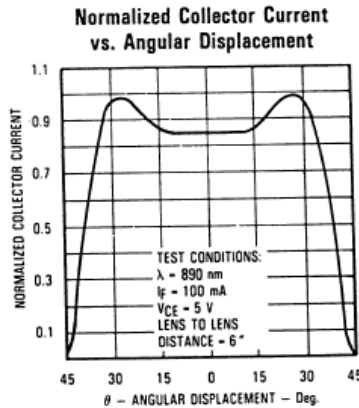
Collector Current vs. Irradiance



Rise and Fall Time vs. Load Resistance



Normalized Collector Current vs. Angular Displacement



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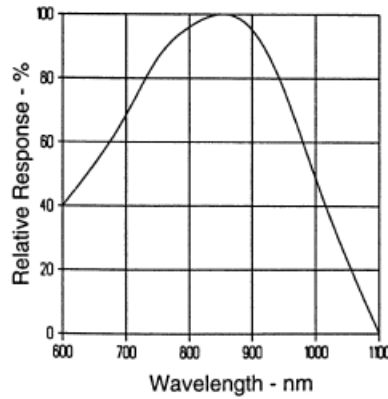
OP800SL Series, OP800WSL Series  
 OP830SL Series, OP830WSL Series



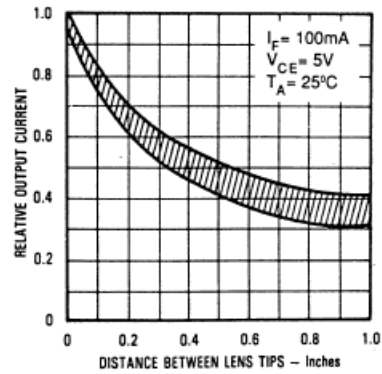
## Performance

OP830SL Series

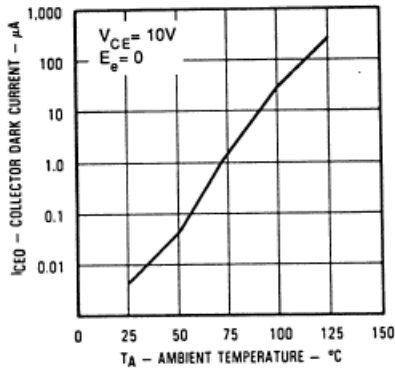
Typical Spectral Response



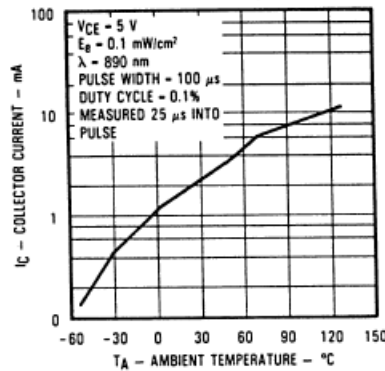
Coupling Characteristics of OP130 and OP830



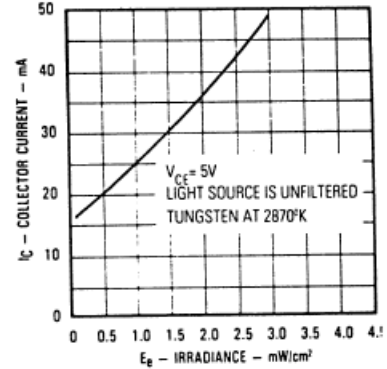
Collector Dark Current vs. Ambient Temperature



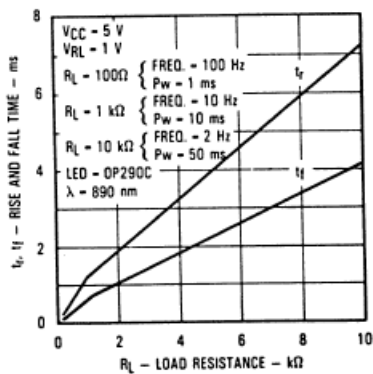
Collector Current vs. Ambient Temperature



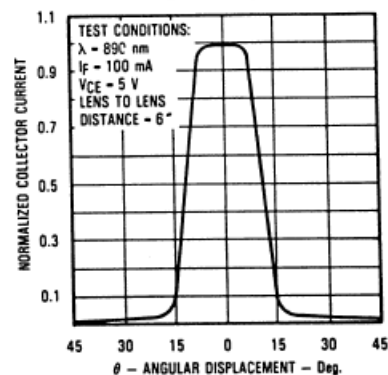
Collector Current vs. Irradiance



Rise and Fall Time vs. Load Resistance



Normalized Collector Current vs. Angular Displacement



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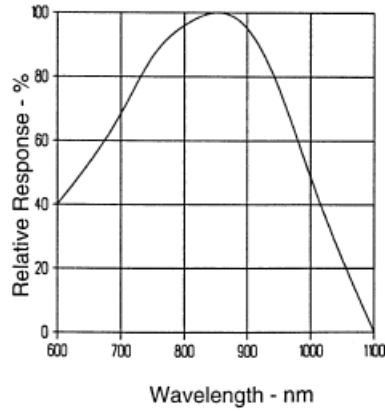
OP800SL Series, OP800WSL Series  
OP830SL Series, OP830WSL Series



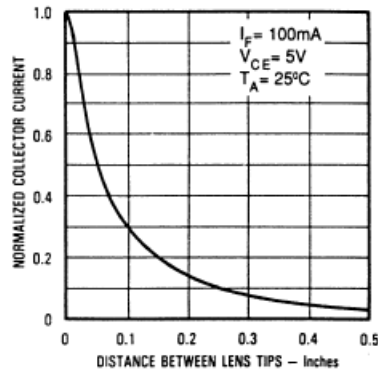
## Performance

OP830WSL Series

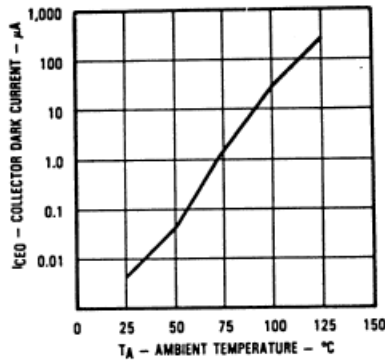
Typical Spectral Response



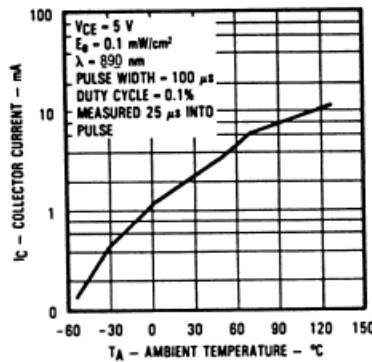
Coupling Characteristics of OP130W and OP830WSL



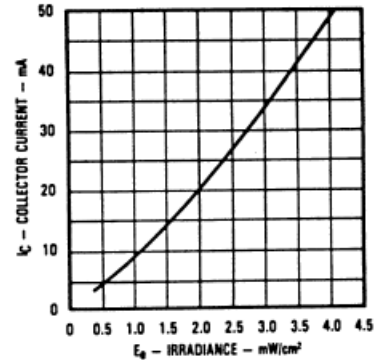
Collector Dark Current vs. Ambient Temperature



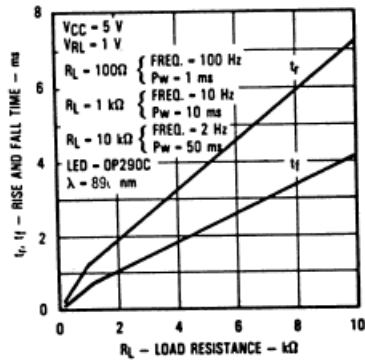
Collector Current vs. Ambient Temperature



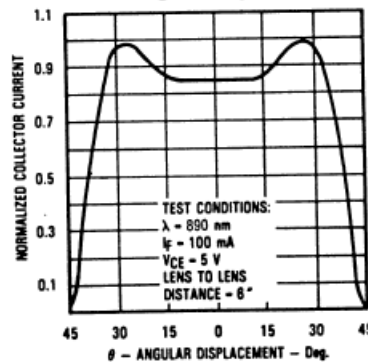
Collector Current vs. Irradiance



Rise and Fall Time vs. Load Resistance



Normalized Collector Current vs. Angular Displacement



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## JONHON

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