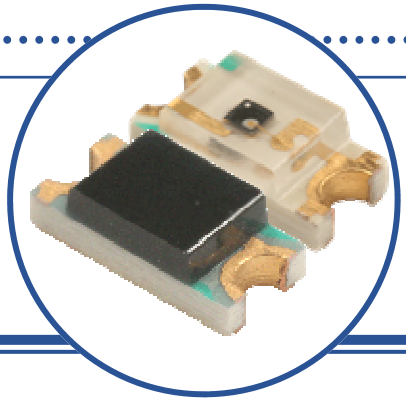
# Silicon Phototransistor in Miniature SMT Package

TT electronics
OPTEK Technology

## OP520, OP521

- High Photo Sensitivity
- Fast Response Time
- 1206 Package Size
- Opaque or Water Clear Flat Lens

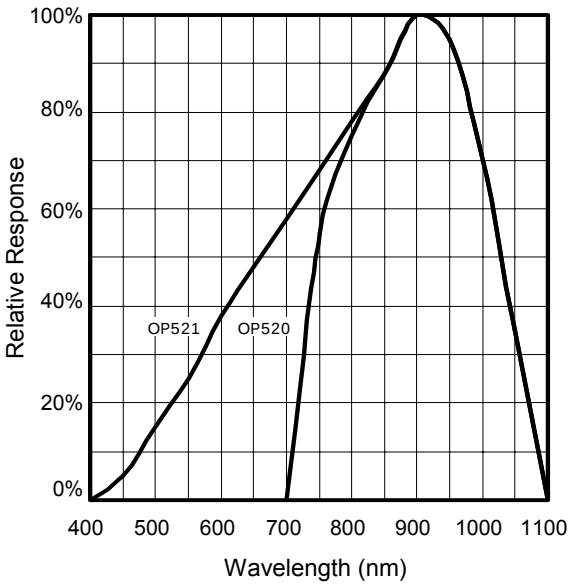


The OP520 and OP521 are NPN silicon phototransistor mounted in miniature SMT packages. Both the OP520 and OP521 have a flat lens however, the OP520 lens is opaque to shield the device from stray light. These sensors are packaged in 1206 size chip carriers that are compatible with most automated mounting equipment. The OP520 and OP521 are mechanically and spectrally matched to the OP250 series infrared LEDs.

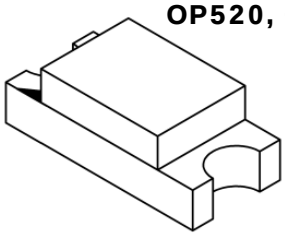
### Applications

- Non-Contact Position Sensing
- Datum detection
- Machine automation
- Optical encoders

Relative Response vs. Wavelength




**OP520, OP521**



RoHS

Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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## Absolute Maximum Ratings

$T_A$ = 25° C unless otherwise noted

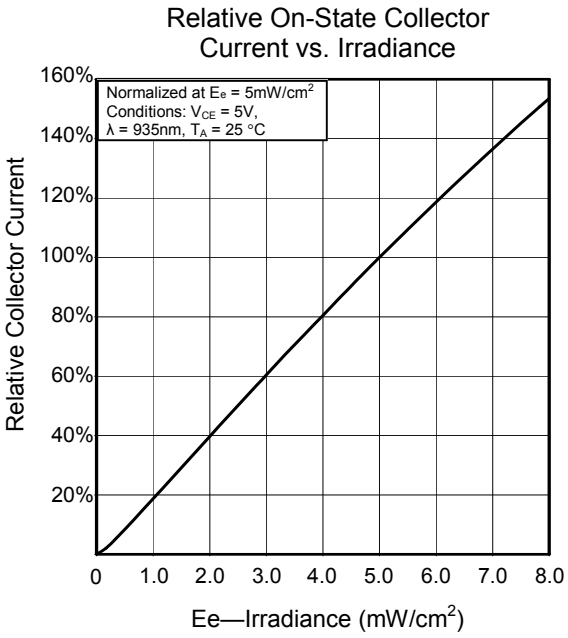
| | |
|---|---|
| Storage Temperature Range | -40° C to +85° C |
| Operating Temperature Range | -25° C to +85° C |
| Lead Soldering Temperature | 260° C(1) |
| Collector-Emitter Voltage | 30 V |
| Emitter-Collector Voltage | 5 V |
| Collector Current | 20 mA |
| Power Dissipation | 75 mW(2) |

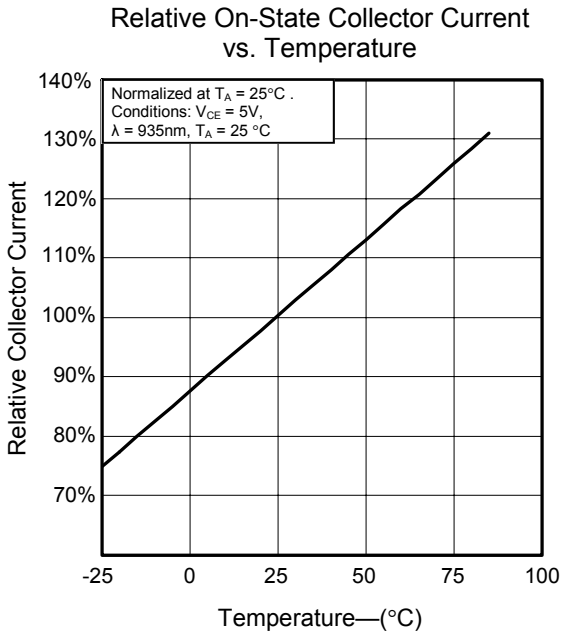
Notes:
1. Solder time less than 5 seconds at temperature extreme.
2. De-rate linearly at 2.17 mW/° C above 25° C.

## Electrical Characteristics ($T_A$ = 25°C unless otherwise noted)

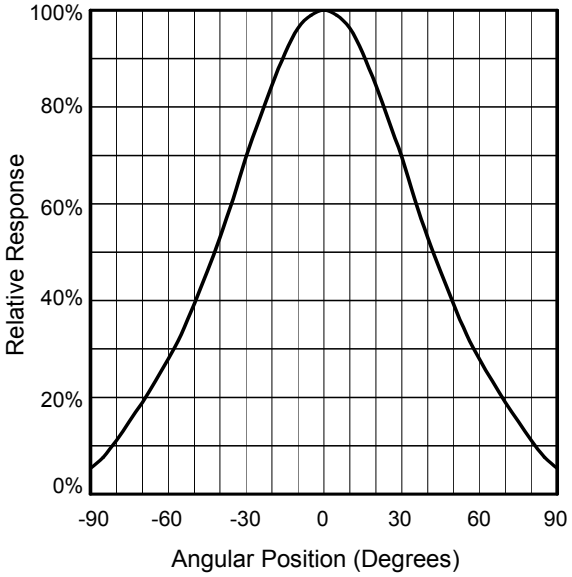
| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | CONDITIONS |
|---|---|---|---|---|---|---|
| $I_{C(ON)}$ | On-State Collector Current | 0.25 | | | mA | $V_{CE}$ = 5.0V, $E_e$ = 5.0mW/cm$^2$ (3) |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | | | 0.4 | V | $I_C$ = 100µA, $E_e$ = 5.0mW/cm$^2$ (3) |
| $I_{CEO}$ | Collector-Emitter Dark Current | | | 100 | nA | $V_{CE}$ = 5.0V, $E_e$ = 0 (4) |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage | 30 | | | V | $I_C$ = 100µA, $E_e$ = 0 |
| $V_{(BR)ECO}$ | Emitter-Collector Breakdown Voltage | 5 | | | V | $I_E$ = 100µA, $E_e$ = 0 |
| $t_r$, $t_f$ | Rise and Fall Times | | 15 | | µs | $I_C$ = 1mA, $R_L$ = 1KΩ |

3. Light source is an unfiltered GaAs LED with a peak emission wavelength of 935nm and a radiometric intensity level which varies less than 10% over the entire lens surface of the phototransistor being tested.
4. To Calculate typical collector dark current in µA, use the formula $I_{CEO} = 10^{(0.04\ T_A - 3/4)}$ where $T_A$ is the ambient temperature in ° C.

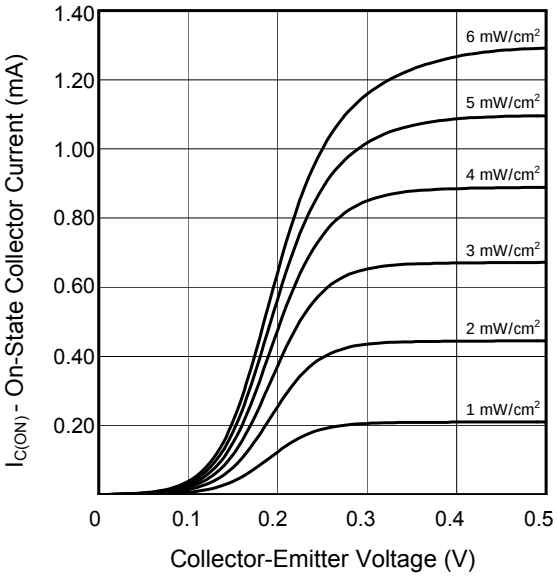


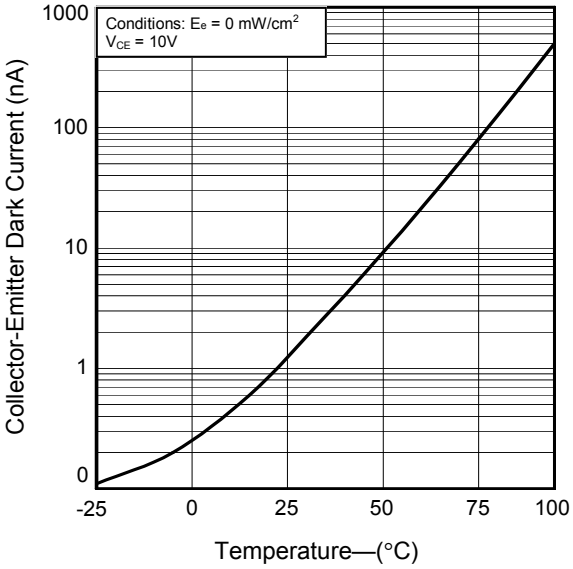
Relative Response vs.
Angular Position

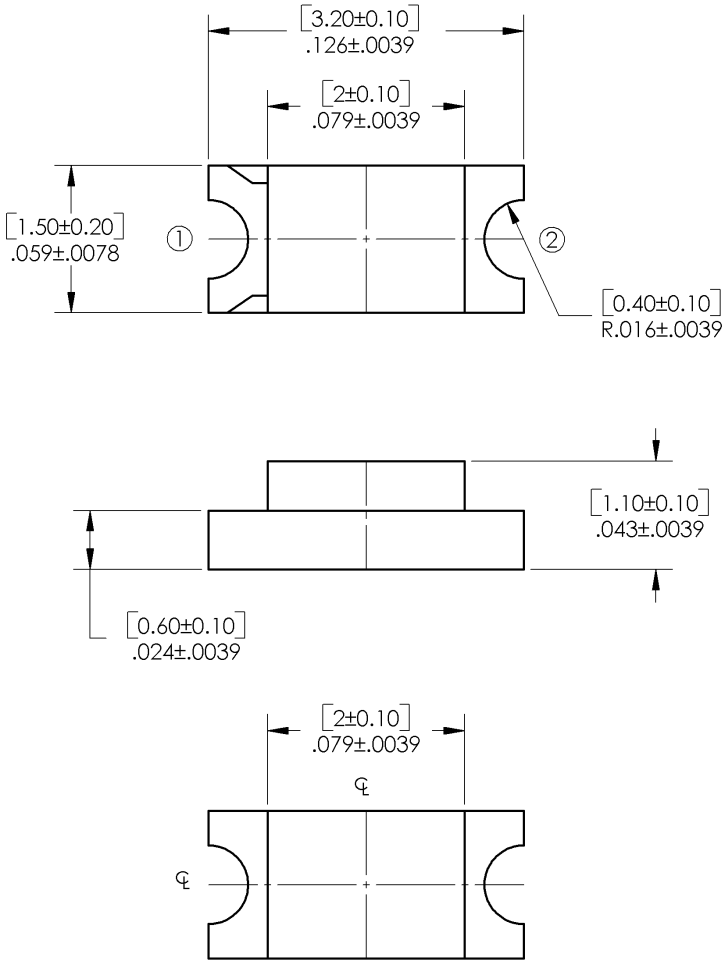



Relative On-State Collector Current
vs. Collector-Emitter Voltage




Collector-Emitter Dark Current
vs. Temperature






| PIN | FUNCTION |
|---|---|
| 1 | Collector |
| 2 | Emitter |

DIMENSIONS ARE IN INCHES AND [MILLIMETERS].

**RECOMMENDED SOLDER PADS**