

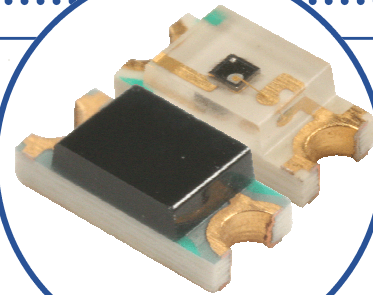
# Silicon Photo Darlington in Miniature 1206 SMD Package

## OP520DA, OP521DA



### Features:

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



### Descriptions:

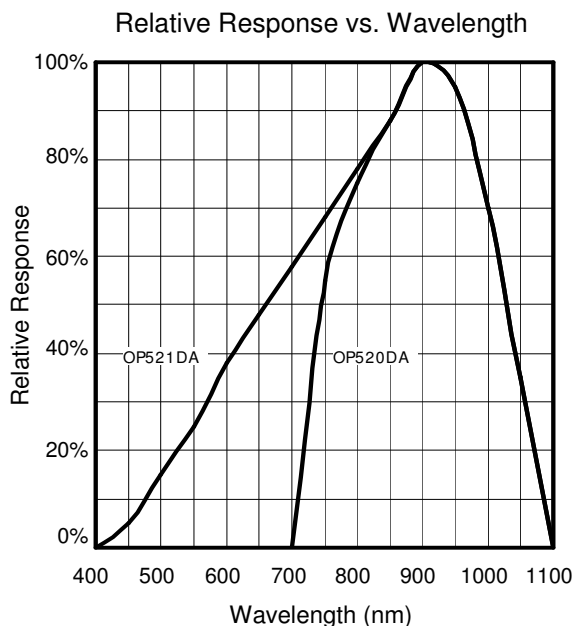
The **OP520DA** and **OP521DA** are NPN silicon photo darlington mounted in miniature 1206 SMD packages. Both the **OP520DA** and **OP521DA** have a flat lens however, the **OP520DA** lens are opaque to shield the device from ambient light unlike the lens of the **OP521DA**. These sensors are packaged in compact 1206 size chip carriers that are compatible with most automated mounting equipment. The **OP520DA** and **OP521DA** are mechanically and spectrally matched to the OP250 series infrared LEDs.

Since these devices have a flat window lens, they enable a wide acceptance angle. It is packaged in a plastic leadless chip carrier which is compatible for new applications with that need smaller dimension packages for automated mounting and detection equipment with new innovative designs. **OP520DA** and **OP521DA** are 100% production tested using infrared light for close correlation with Optek GaAs and GaAlAs emitters. Photo darlington devices are normally used in application where light signals are low and more current gain is needed than in comparison to the standard phototransistors.

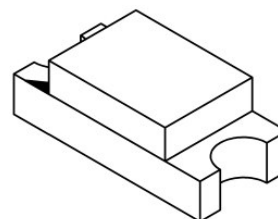
### Applications

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

| Ordering Information |                  |               |             |
|----------------------|------------------|---------------|-------------|
| Part Number          | Sensor           | Viewing Angle | Lead Length |
| <b>OP520DA</b>       | Photo Darlington | 150°          | N/A         |
| <b>OP521DA</b>       | Photo Darlington |               |             |



OP520DA, OP521DA



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 $T_A = 25^\circ\text{C}$ unless otherwise noted

|                             |                       |
|-----------------------------|-----------------------|
| Storage Temperature Range   | -40° C to +100° C     |
| Operating Temperature Range | -25° C to +85° C      |
| Lead Soldering Temperature  | 260° C <sup>(1)</sup> |
| Collector-Emitter Voltage   | 35V                   |
| Emitter-Collector Voltage   | 5 V                   |
| Collector Current           | 30 mA                 |
| Power Dissipation           | 100 mW <sup>(2)</sup> |

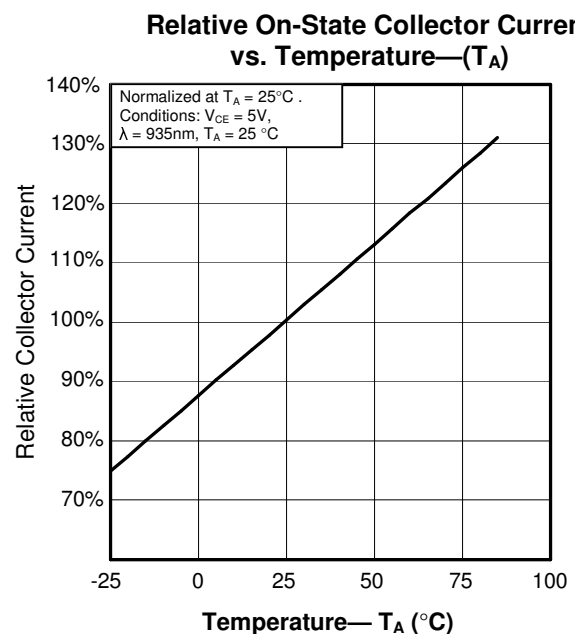
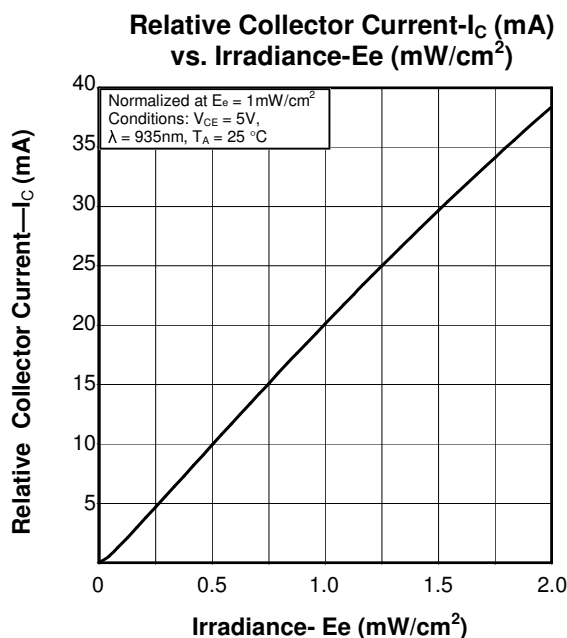
### Notes:

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

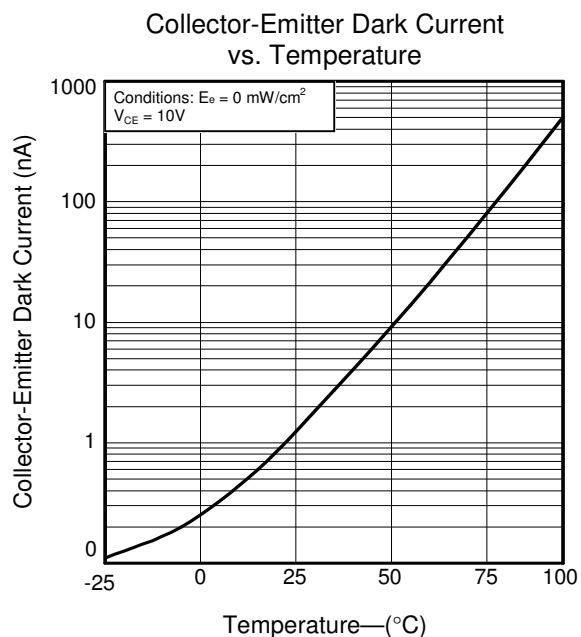
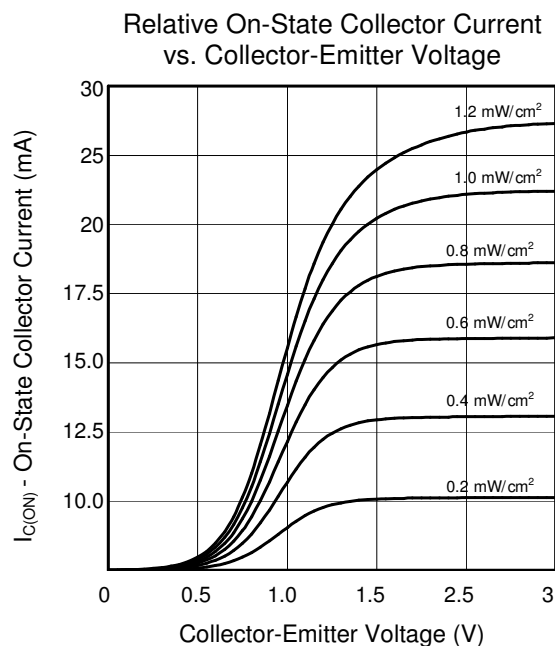
## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| SYMBOL        | PARAMETER                            | MIN  | TYP | MAX  | UNITS         | CONDITIONS                                                        |
|---------------|--------------------------------------|------|-----|------|---------------|-------------------------------------------------------------------|
| $I_{C(ON)}$   | On-State Collector Current           | 10.0 |     |      | mA            | $V_{CE} = 5.0\text{V}$ , $E_e = 0.5\text{mW/cm}^2$ <sup>(3)</sup> |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage |      |     | 1.7  | V             | $I_C = 1\text{mA}$ , $E_e = 5.0\text{mW/cm}^2$ <sup>(3)</sup>     |
| $I_{CEO}$     | Collector-Emitter Dark Current       |      |     | 200  | nA            | $V_{CE} = 5.0\text{V}$ , $E_e = 0$ <sup>(4)</sup>                 |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage  | 35   |     |      | V             | $I_C = 100\mu\text{A}$ , $E_e = 0$                                |
| $V_{(BR)ECO}$ | Emitter-Collector Breakdown Voltage  | 5    |     |      | V             | $I_E = 100\mu\text{A}$ , $E_e = 0$                                |
| $\lambda$     | Spectral range of sensitivity        |      |     |      |               | $V_{CE} = 5.0\text{V}$                                            |
|               | OP521DA                              | 400  |     | 1100 | nm            |                                                                   |
|               | OP520DA                              | 700  |     | 1100 | nm            |                                                                   |
| $t_r, t_f$    | Rise and Fall Times                  |      | 50  |      | $\mu\text{s}$ | $I_C = 1\text{mA}$ , $R_L = 1\text{K}\Omega$                      |

- 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 photo darlington being tested.
- To Calculate typical collector dark current in  $\mu\text{A}$ , use the formula  $I_{CEO} = 10^{(0.04 T_A - 3/4)}$  where  $T_A$  is the ambient temperature in °C.



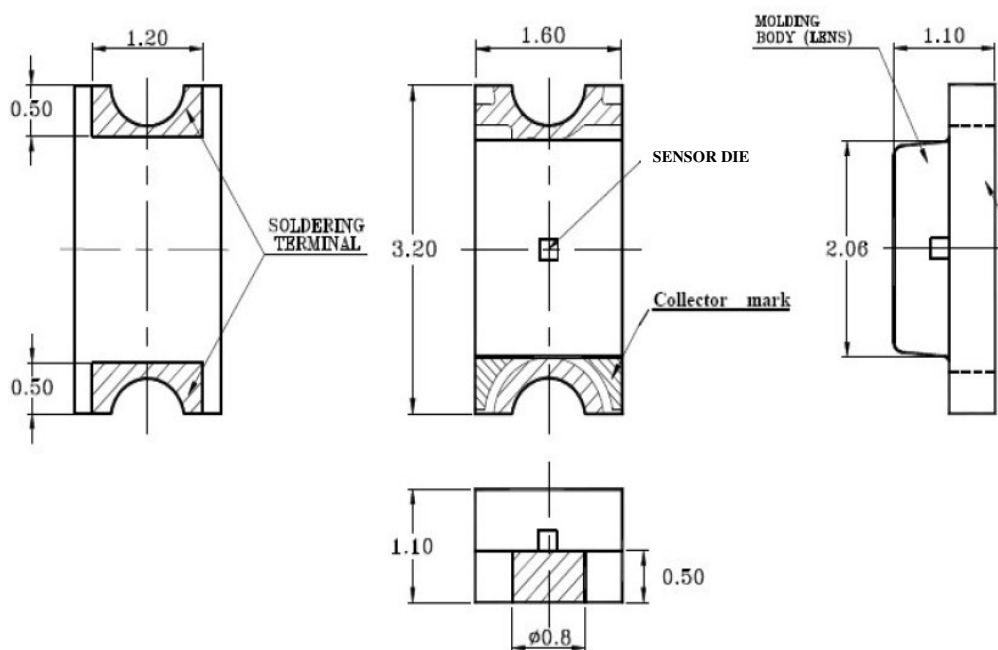
OP520DA, OP521DA



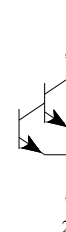
# Silicon Photo Darlington in Miniature 1206 SMD Package OP520DA, OP521DA



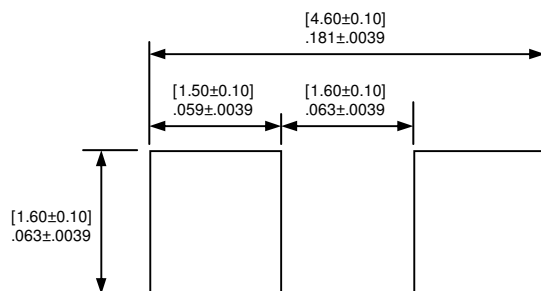
## Package Dimensions



OP520DA, OP521DA



### RECOMMENDED SOLDER PADS



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