

Silicon Phototransistor and Photo Darlington in 1210 SMD Package

OP525, OP525DA, OP525F



Features:

- High Speed and High photo sensitivity
- Fast response time
- 1210 package size
- High Current Gain
- Water clear and black lens choices
- Narrow Viewing Receiving Angle
- Compatible with IR Reflow soldering process
- Moisture Sensitivity Level: MSL3



Description:

These devices consist of an NPN silicon phototransistor and photo darlington mounted in a miniature SMD package with a 1210 size chip carrier that is compatible with most automated mounting and position sensing equipment.

The **OP525** devices have a 1.8mm domed lens and viewing acceptance angle of 25° with higher collector current gains due to the lenses on package. The **OP525** and **OP525DA** have a water clear lens that senses ambient light to higher wavelengths for applications from 450nm to 1120nm. The **OP525F** has a black domed lens to reduce ambient light noise.

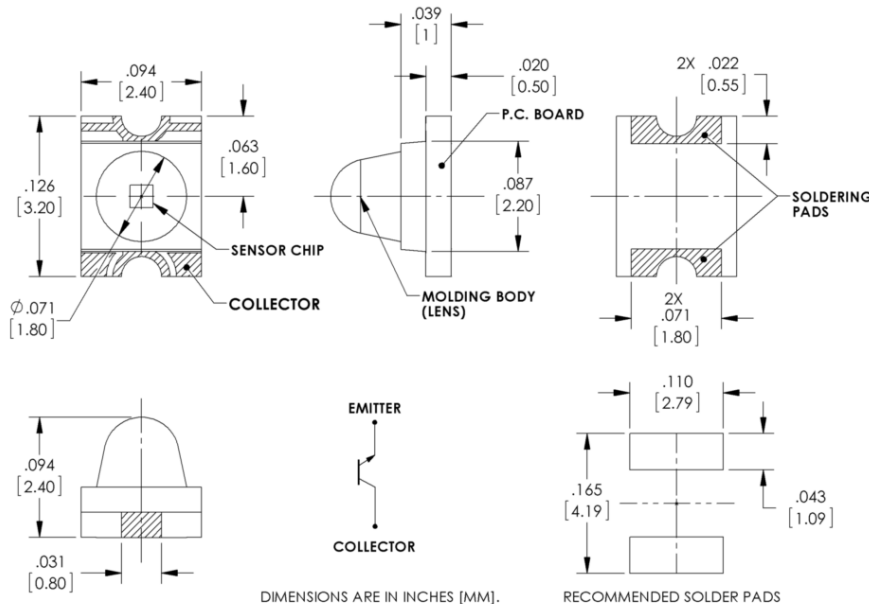
The **OP525** series are tested using infrared light for close correlation with Optek GaAs and GaAlAs emitters. Photo darlington devices are normally used in application where light signals are low and more current gain is needed than is possible with phototransistors.

Applications:

- Non-contact position sensing
- Datum detection
- Machine automation
- Optical encoders
- Reflective and transmissive sensors

| Ordering Information | | |
|----------------------|------------------|---------------|
| Part Number | Sensor | Viewing Angle |
| OP525 | Phototransistor | 25° |
| OP525DA | Photo Darlington | 25° |
| OP525F | Phototransistor | 25° |

OP525 and OP525F



| Pin # | Transistor |
|-------|------------|
| 1 | Collector |
| 2 | Emitter |



RoHS

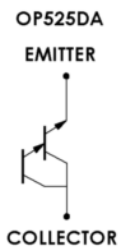
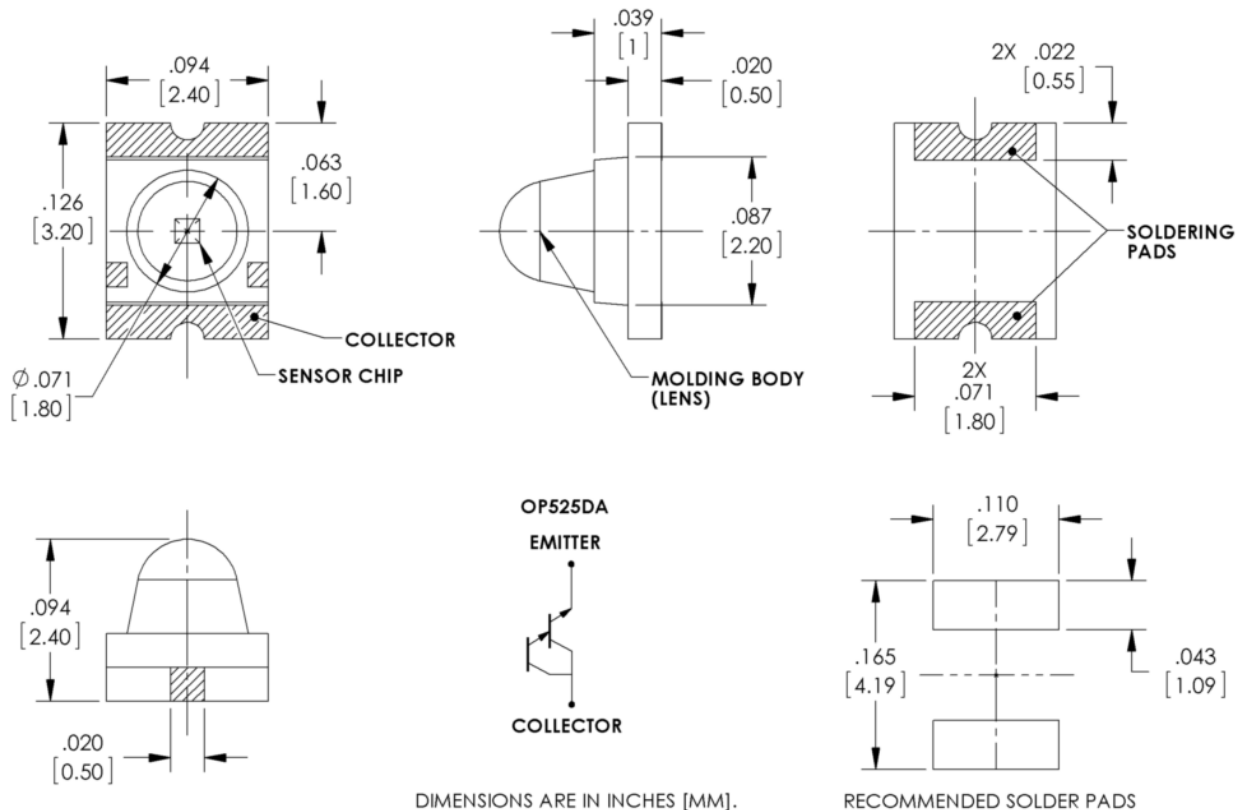
OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

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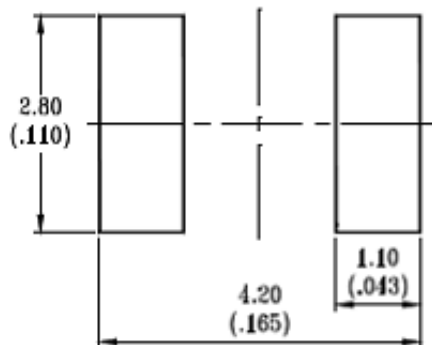


OP525DA Package Dimensions



| Pin # | Transistor |
|-------|------------|
| 1 | Collector |
| 2 | Emitter |

Recommended Solder Pad Patterns



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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 | -40° C to +80° C |
| Lead Soldering Temperature ⁽¹⁾ | 260° C |
| Collector-Emitter Voltage OP525, OP525F OP525DA | 30 V 35 V |
| Emitter-Collector Voltage | 5 V |
| Collector Current OP525, OP525F OP525DA | 20 mA 30 mA |
| Power Dissipation ⁽²⁾ OP525, OP525F OP525DA | 75 mW 100 mW |

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

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|--------|-----------|-----|-----|-----|-------|-----------------|
|--------|-----------|-----|-----|-----|-------|-----------------|

Input Diode

| | | | | | | |
|----------------|--|--------------------|-------------|-------------|---------------|--|
| $I_{C(ON)}$ | On-State Collector Current OP525F OP525 OP525DA | 2.0 1.0 10.0 | - - - | - - - | mA | $V_{CE} = 5.0\text{ V}, E_E = 0.5\text{ mW/cm}^2$ $V_{CE} = 5.0\text{ V}, E_E = 1.5\text{ mW/cm}^2$ ⁽³⁾ $V_{CE} = 5.0\text{ V}, E_E = 0.15\text{ mW/cm}^2$ ⁽³⁾ |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage OP525, OP525F OP525DA | - - | - - | 0.4 1.7 | V | $I_C = 100\ \mu\text{A}, E_E = 1.0\text{ mW/cm}^2$ ⁽³⁾ $I_C = 1\text{ mA}, E_E = 0.5\text{ mW/cm}^2$ ⁽³⁾ |
| I_{CEO} | Collector-Emitter Dark Current OP525, OP525F OP525DA | - | - | 100 200 | nA | $V_{CC} = 10.0\text{ V}$ ⁽⁴⁾ |
| $V_{BR(CEO)}$ | Collector-Emitter Breakdown Voltage OP525, OP525F OP525DA | 30 35 | - | - | V | $I_C = 100\ \mu\text{A}, E_E = 0$ $I_C = 1\text{ mA}, E_E = 0$ |
| $V_{BR(ECO)}$ | Emitter-Collector Breakdown Voltage OP525, OP525F OP525DA | 5 5 | - - | - - | V | $I_E = 100\ \mu\text{A}, E_E = 0$ $I_E = 100\ \mu\text{A}, E_E = 0$ |
| t_r, t_f | Rise and Fall Times OP525, OP525F OP525DA | - | 15 50 | - - | μs | $I_C = 1\text{ mA}, R_L = 1\text{K}\Omega$ $I_C = 1\text{ mA}, R_L = 1\text{K}\Omega$ |
| $\lambda\ 0.5$ | Spectral Bandwidth OP525F | 750 | - | 1100 | nm | - |

Notes:

- Solder time less than 5 seconds at temperature extreme.
- Derate linearly at 1.33 mW/° C above 25° C.
- Light source is an unfiltered GaAs LED with a peak emission wavelength of 935 nm and a radiometric intensity level which varies less than 10% over the entire lens surface of the phototransistor being tested.
- To calculate typical collector dark current in μA , use the formula $I_{CEO} = 10^{(0.04 t - 3)}$, where T_A is the ambient temperature in ° C.

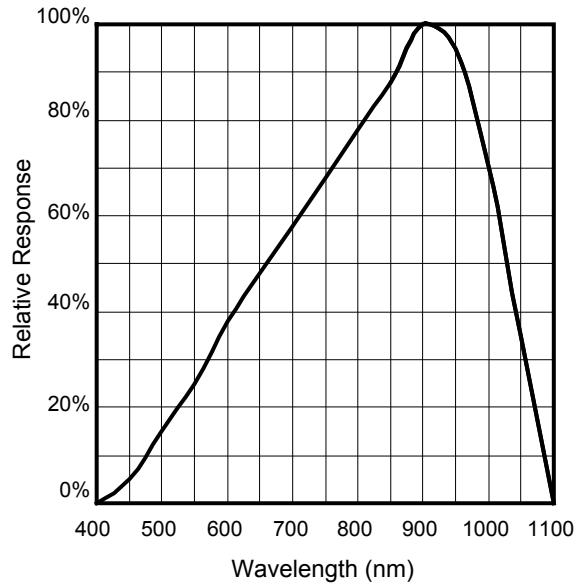
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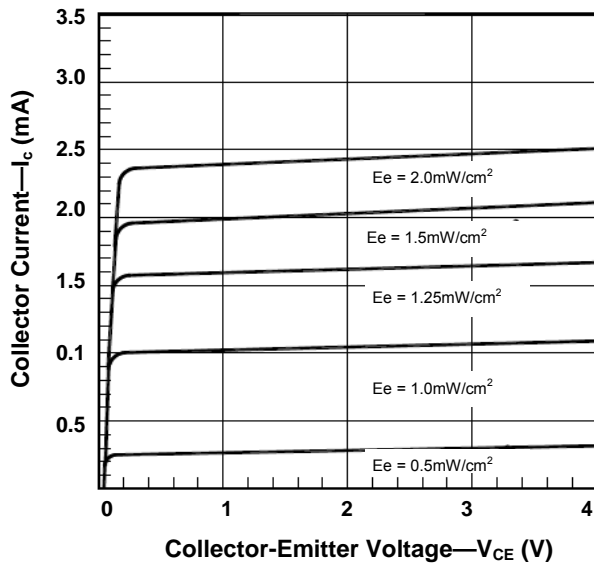
OP525 and OP525DA

Relative Response vs. Wavelength

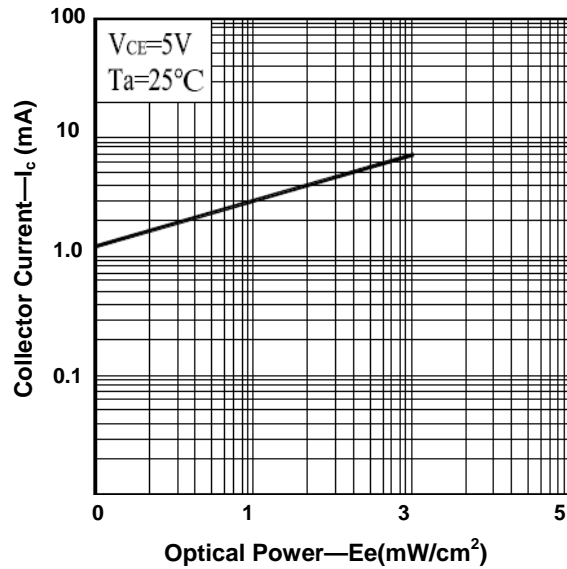


OP525

Collector Current— I_C (mA) vs
Collector-Emitter Voltage V_{CE} (V)



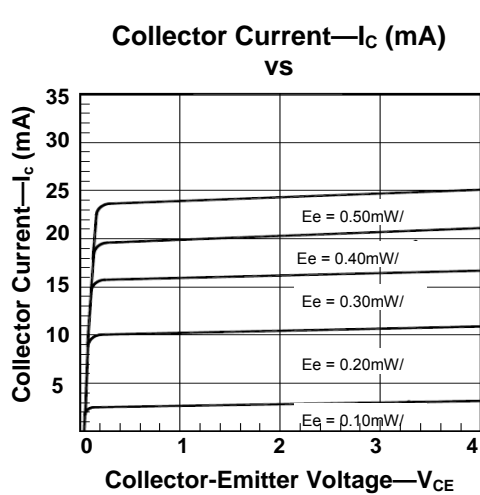
Collector Current— I_C (mA) vs
Optical Power— E_e (mW/cm²)



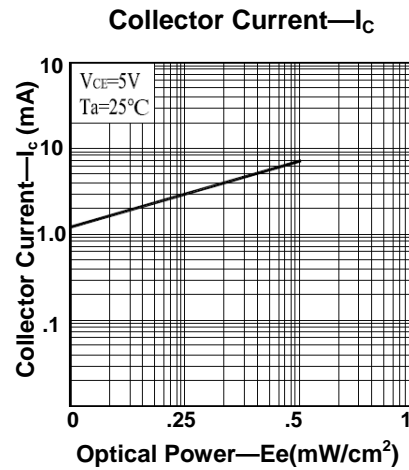
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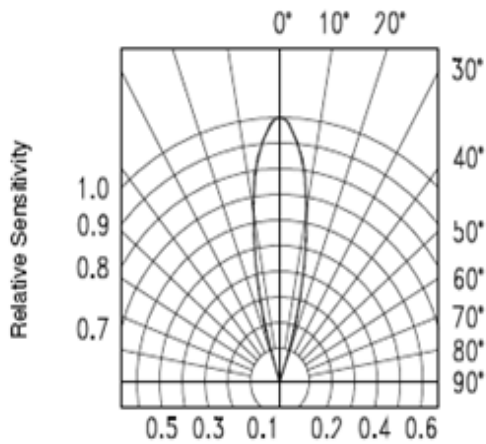


OP525DA

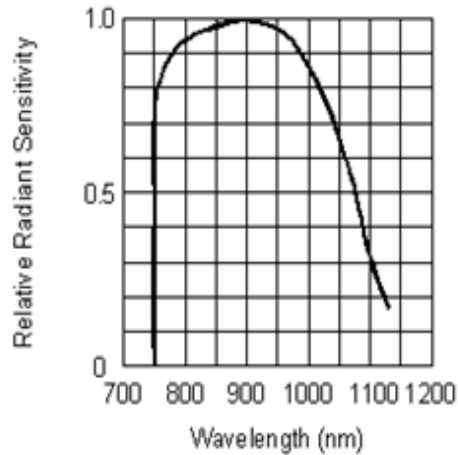


OP525F

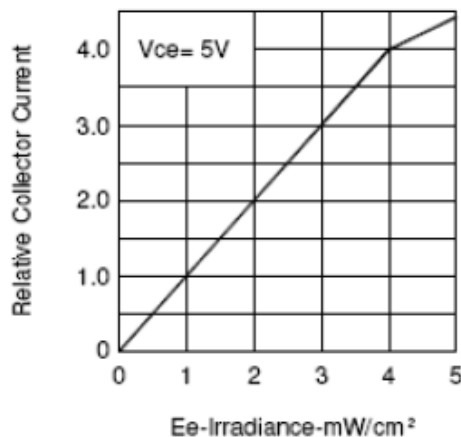
Sensitivity Chart



**Spectral Sensitivity
Relative Response Vs. Wavelength**



Relative Collector Current vs. Irradiance



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