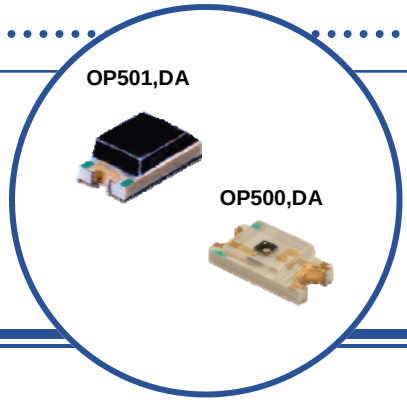
Silicon Phototransistor and Photo Darlington in Miniature 0805 SMD Package

OP500, OP501, OP500DA, OP501DA

TT electronics
OPTEK Technology

Features:

- High photo sensitivity
- Fast response time
- 0805 package size
- Phototransistor or Photo Darlington Output
- Choice of opaque or water clear flat lens



Description:

Each of these devices consists of a NPN silicon phototransistor mounted in a miniature SMT package with a 0805 size chip carrier that is compatible with most automated mounting and position sensing equipment.

Both **OP500, OP500DA** and **OP501, OP501DA** have a flat lens. **OP501** and **OP501DA** has an opaque lens that shields the device from stray light, whereas **OP500** and **OP500DA** has a water clear lens. All devices have a wide viewing acceptance angle and higher collector current than devices without lenses especially on the **OP500DA** and **OP501** which incorporate photo darlington die instead on the standard transistor.

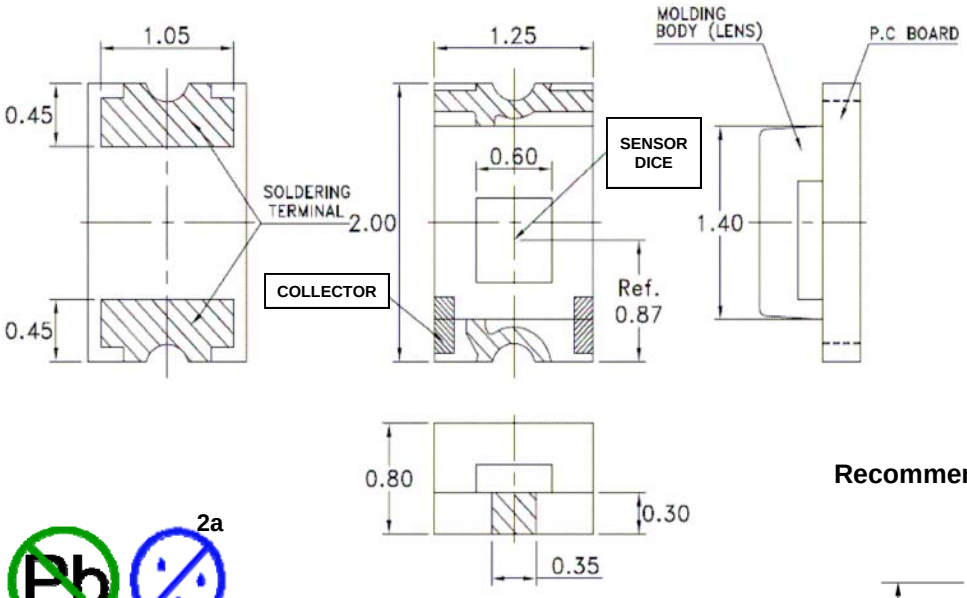
OP500, **OP501**, **OP500DA** and **OP501DA** *are mechanically and spectrally matched to the OP200 series infrared LEDs.*

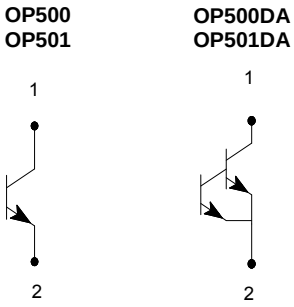
Applications:

- Non-contact position sensing
- Datum detection
- Machine automation
- Optical encoders

Ordering Information			
Part Number	**Sensor**	**Viewing Angle**	**Lead Length**
OP500	Phototransistor	150°	N/A
OP501			
OP500DA	Photo Darlington	150°	
OP501DA			

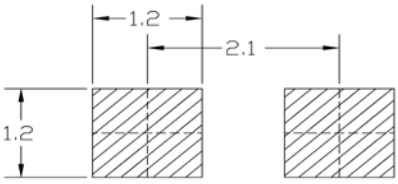
OP500, OP501, OP500DA, OP501DA





Pin #	Transistor
1	Collector
2	Emitter

Recommended Solder Pad Patterns



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RoHS Moisture

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

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Storage Temperature Range	-40° C to +100° C
Operating Temperature Range	-25° C to +85° C
Lead Soldering Temperature[1]	260° C
Collector-Emitter Voltage OP500, OP501 OP500DA, OP501DA	 30 V 35 V
Emitter-Collector Voltage	5 V
Collector Current OP500, OP501 OP500DA, OP501DA	 20 mA 32 mA
Power Dissipation[2] OP500, OP501 OP500DA, OP501DA	 75 mW 100 mW

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

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
$I_{C(ON)}$	On-State Collector Current OP500, OP501 OP500DA, OP501DA	 0.1 10.0	 - -	 - -	mA	 V_{CE} = 5.0 V, E_E = 0.15 mW/cm^2 [3] V_{CE} = 5.0 V, E_E = 0.15 mW/cm^2 [3]
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage OP500, OP501 OP500DA, OP501DA	 - -	 - -	 0.3 1.0	V	 I_C = 100 µA, E_E = 1.0 mW/cm^2 [3] I_C = 1 mA, E_E = 0.15 mW/cm^2 [3]
I_{CEO}	Collector-Emitter Dark Current	-	-	100	nA	V_{CC}= 5.0 V [4]
$V_{BR(CEO)}$	Collector-Emitter Breakdown Voltage OP500, OP501 OP500DA, OP501DA	 30 35	 -	 -	V	 I_C= 100 µA, E_E = 0
$V_{BR(ECO)}$	Emitter-Collector Breakdown Voltage OP500, OP501 OP500DA, OP501DA	 5 5	 - -	 - -	V	 I_E= 100 µA, E_E = 0 I_C= 100 µA, E_E = 0
t_r, t_f	Rise and Fall Times OP500, OP501 OP500DA, OP501DA	 -	 15 50	 - 60	µs	 I_C= 1 mA, R_L = 1KΩ I_C= 1 mA, R_L = 1KΩ

Notes:
1. Solder time less than 5 seconds at temperature extreme.
2. Derate linearly at 2.17 mW/° C above 25° C.
3. 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.
4. To calculate typical collector dark current in µA, use the formulate $I_{CEO} = 10^{(0.04\,t\,-\,¾)}$, where T_A is the ambient temperature in ° C.

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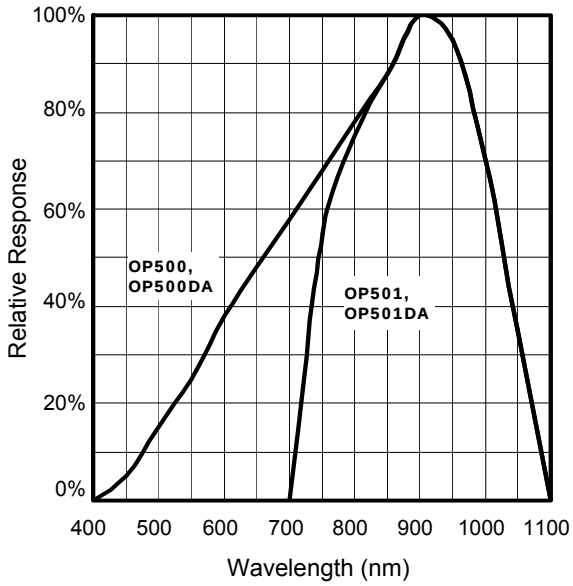
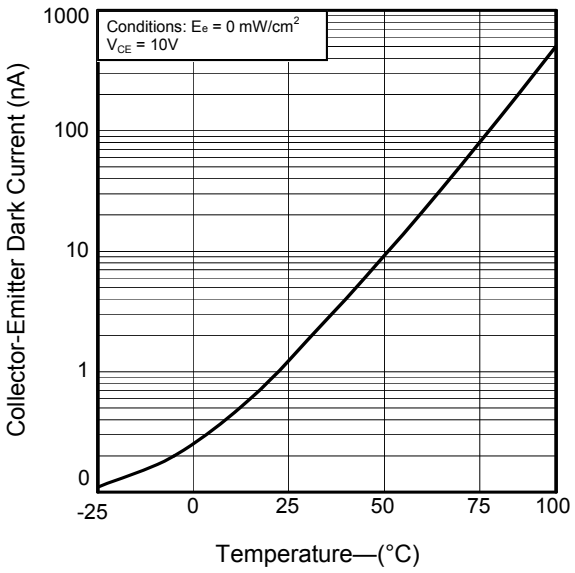
Relative Response vs. Wavelength

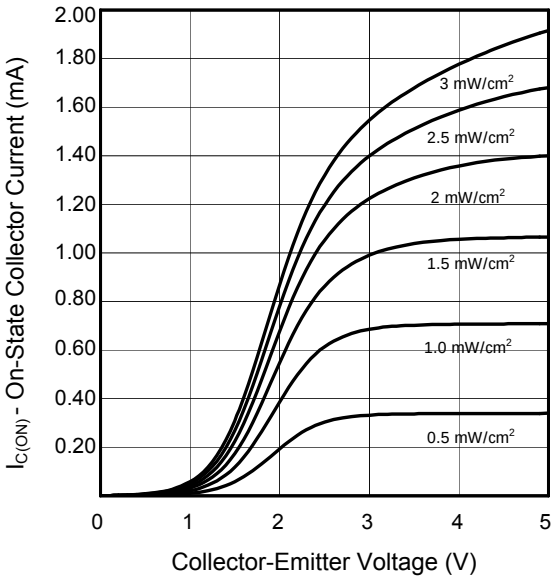


OP500, OP501

Collector-Emitter Dark Current vs. Temperature-T_A

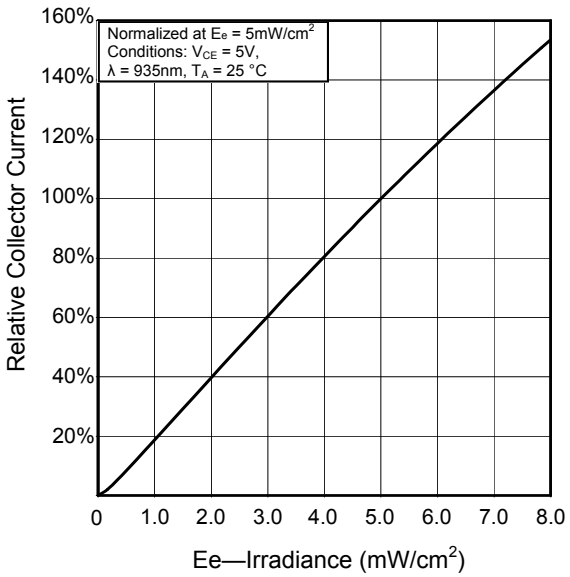


Relative On-State Collector Current – Ic (mA) vs. Collector-Emitter Voltage—V_{CE} (V)

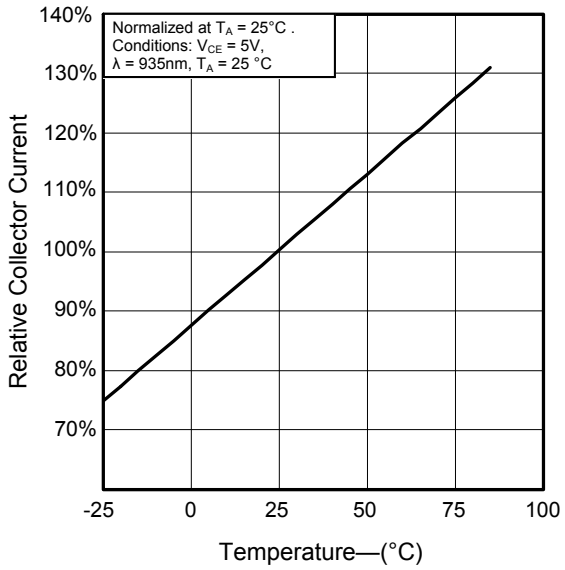


OP500, OP501

Relative On-State Collector Current vs. Irradiance—Ee (mW/cm²)

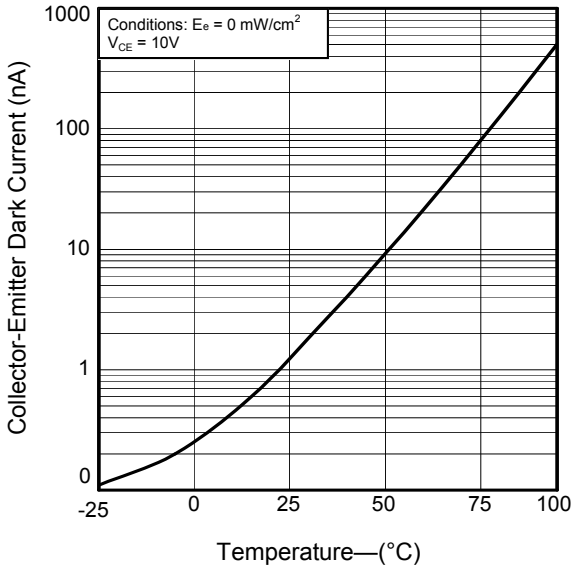


Relative On-State Collector Current-IC (mA) vs. Temperature-T_A

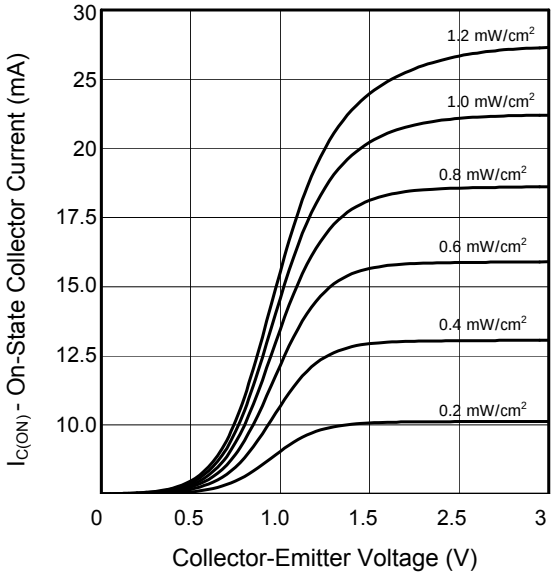


OP500DA, OP501DA

Collector-Emitter Dark Current vs. Temperature-T_A



Relative On-State Collector Current – Ic (mA) vs. Collector-Emitter Voltage—V_{CE} (V)



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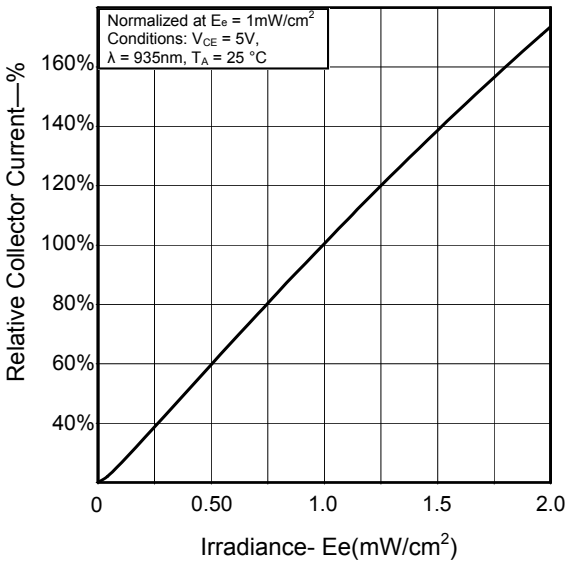
OP500DA, OP501DA

Relative On-State Collector Current vs. Irradiance—Ee (mW/cm^2)



Relative On-State Collector Current-IC (mA) vs. Temperature-T_A