



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



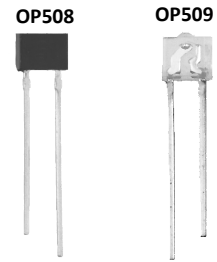
NPN Silicon Phototransistor

OP508F, OP509 Series



Features:

- Flat lensed for wide acceptance angle (OP508F)
- Lensed for high sensitivity (OP509)
- Easily stackable on 0.100" (2.54 mm) hole centers
- Inexpensive plastic package
- Mechanically and spectrally matched to OP168 and OP268 series of infrared emitting diodes



Description:

Each device in the **OP508F** series consists of a NPN silicon phototransistor mounted in a flat, black plastic “end-looking” package. The flat sensing surface allows an acceptance half-angle of 60° when measured from the optical axis to the half power point.

Each device in the **OP509** series consists of a NPN silicon phototransistor mounted in a lensed, clear plastic “end-looking” package. The lensing effect of the package allows an acceptance half-angle of 25° when measured from the optical axis to the half power point.

OP508F and **OP509** series devices can be mounted on 0.100" (2.54 mm) hole centers, which makes them an ideal low-cost alternate to hermetic OP600 sensors. ***OP508F** and **OP509** series devices are mechanically and spectrally matched to the OP168F and OP268F series of infrared emitting diodes.*

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

For custom versions of the **OP508F**, **OP509** and **OP538F** series devices please contact your OPTEK representative.

Applications:

- Applications requiring a wide acceptance angle
- Applications requiring high sensitivity
- Space-limited applications

| Ordering Information | | | |
|----------------------|-----------------|---------------|-------------|
| Part Number | Sensor | Viewing Angle | Lead Length |
| OP508FA | Phototransistor | 120° | 0.50" |
| OP508FC | | | |
| OP509A | | 50° | |
| OP509B | | | |
| OP509C | | | |



RoHS

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

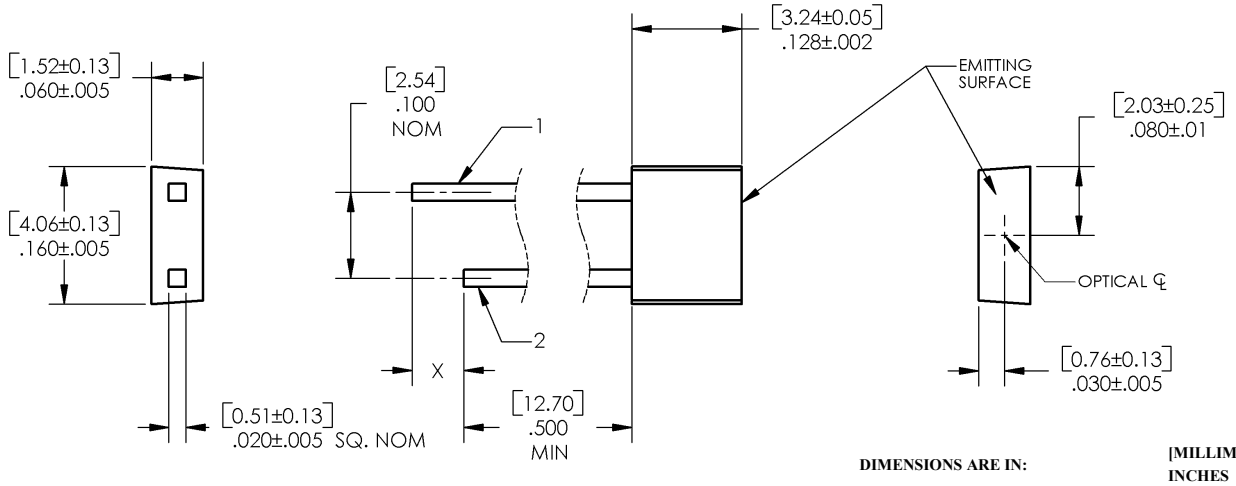
OPTEK Technology, Inc.
1645 Wallace Drive, Carrollton, TX 75006 | Ph: +1 972 323 2200
www.optekinc.com | www.ttelectronics.com

NPN Silicon Phototransistor

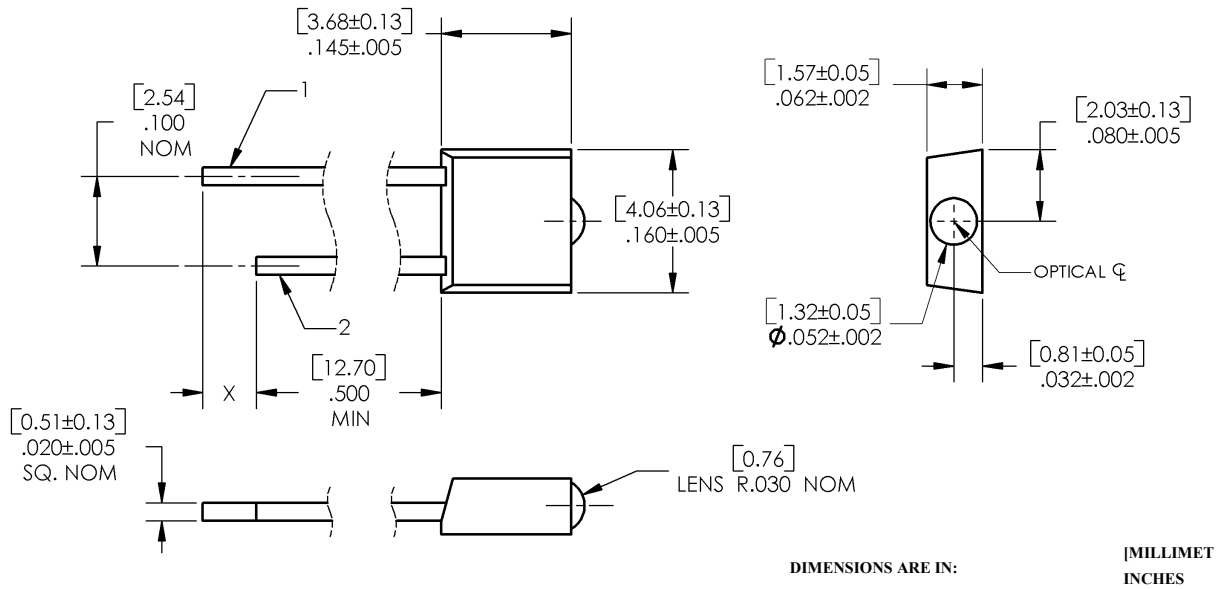
OP508F, OP509 Series



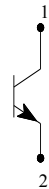
OP508F (A, C)



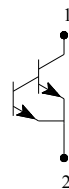
OP509 (A, B)



OP508F & OP509



OP538



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

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

OPTEK Technology, Inc.
1645 Wallace Drive, Carrollton, TX 75006 | Ph: +1 972 323 2200
www.optekinc.com | www.ttelectronics.com

NPN Silicon Phototransistor

OP508F, OP509 Series



Electrical Specifications

| Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted) | |
|---|---|
| Storage and Operating Temperature Range | -40°C to $+100^\circ\text{C}$ |
| Collector-Emitter Voltage | 30 V |
| Emitter-Collector Voltage | 5 V |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron] | $260^\circ\text{C}^{(1)}$ |
| Power Dissipation | $100\text{ mW}^{(2)}$ |

| Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|---|--------------|--------|--------|---------------------|--|
| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
| $I_{C(ON)}$ | On-State Collector Current | | | 20.00 | | $V_{CE} = 5.0\text{ V}$, $E_E = 5\text{ mW/cm}^2^{(3)}$ |
| | OP509A (Dome Lens) | 5.70 | - | - | | |
| | OP508FA (Flat Lens) | 2.70 | - | 10.60 | mA | |
| | OP509B (Dome Lens) OP508FC (Flat Lens) | 1.40 0.34 | - - | - - | | |
| $I_C/\Delta T$ | Relative I_C Change with Temperature | - | 1.00 | - | %/ $^\circ\text{C}$ | $V_{CE} = 5\text{ V}$, $E_E = 1.0\text{ mW/cm}^2^{(3)}$, $\lambda = 890\text{ nm}$ |
| I_{CEO} | Collector-Dark Current | | | 100 | | $V_{CE} = 10.0\text{ V}$, $E_E = 0^{(4)}$ |
| | OP508F & OP509 OP538F | - - | - - | 225 | nA | |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage OP508F & OP509 | 30 | - | - | V | $I_C = 1.00\text{ mA}$, $E_E = 0$ |
| $V_{(BR)ECO}$ | Emitter-Collector Breakdown Voltage | 5 | - | - | V | $I_E = 100\text{ }\mu\text{A}$ |
| $V_{CE(SAT)}$ | Collector-Emitter Saturation Voltage | | | 0.4 | V | $I_C = 300\text{ }\mu\text{A}$, $E_E = 5\text{ mW/cm}^2^{(3)}$ |
| | OP508F | - | - | 0.4 | V | |
| | OP509 | - | - | 0.4 | V | $I_C = 250\text{ }\mu\text{A}$, $E_E = 5\text{ mW/cm}^2^{(3)}$ |

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 $1.33\text{ mW}/^\circ\text{C}$ above 25°C .
3. Light source is an unfiltered GaAs or GaAlAs LED with a peak emission wavelength of 935 or 890 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 formula $I_{CEO} = 10^{(0.040 T_A - 3.4)}$, where T_A is ambient temperature in $^\circ\text{C}$.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

OPTEK Technology, Inc.
1645 Wallace Drive, Carrollton, TX 75006 | Ph: +1 972 323 2200
www.optekinc.com | www.ttelectronics.com

NPN Silicon Phototransistor

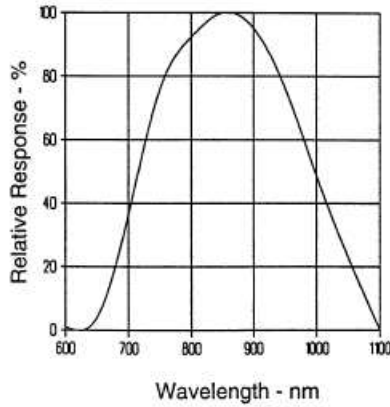
OP508F, OP509 Series



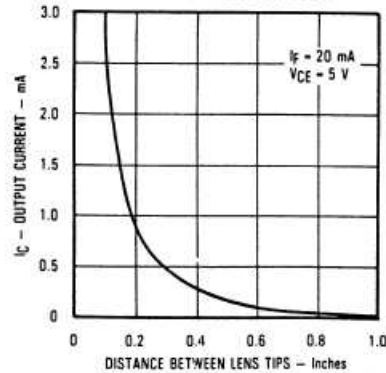
Performance

OP508FA, OP508FC, OP508FD

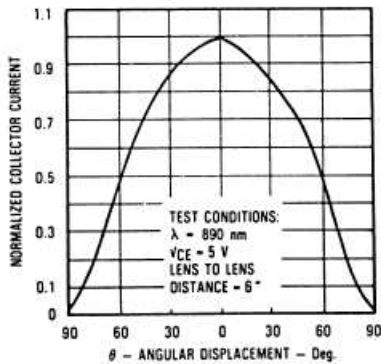
Typical Spectral Response



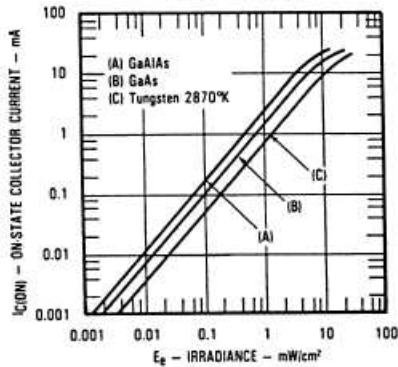
Coupling Characteristics of OP168F and OP508F



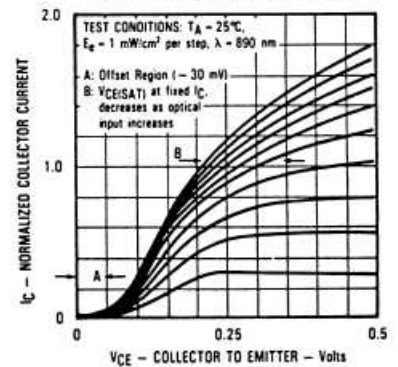
Normalized Collector Current vs. Angular Displacement



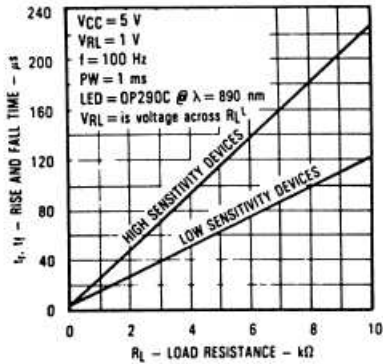
On-State Collector Current vs. Irradiance



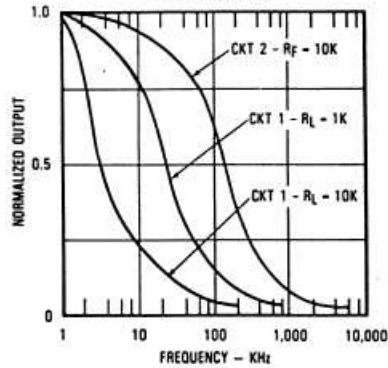
Normalized Collector Current vs. Collector to Emitter Voltage



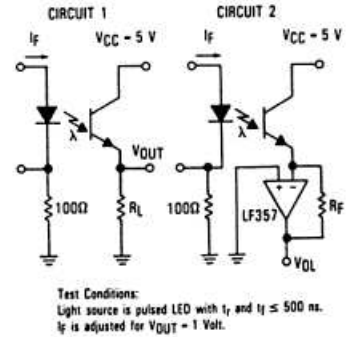
Rise and Fall Time vs. Load Resistance



Normalized Output vs. Frequency



Switching Time Test Circuit



General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

NPN Silicon Phototransistor

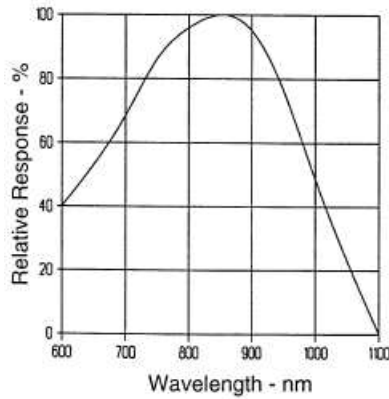
OP508F, OP509 Series



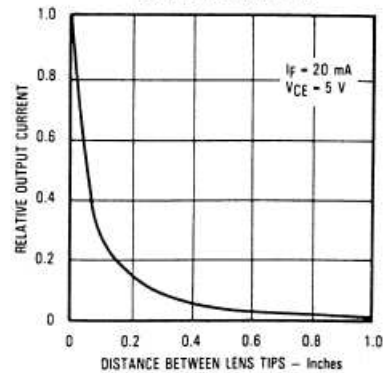
Performance

OP509A, OP509B, OP509D

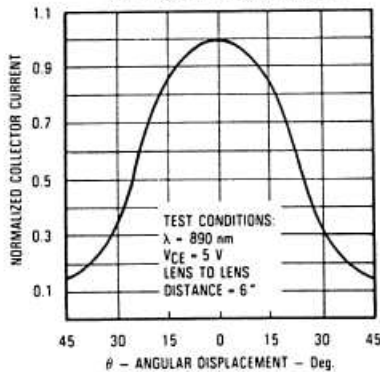
Typical Spectral Response



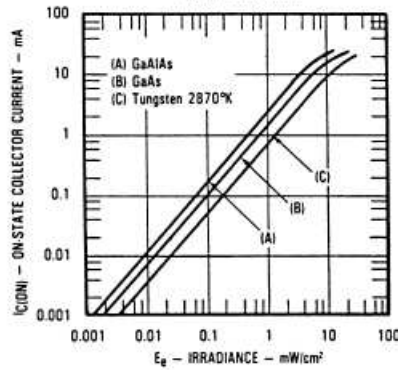
Coupling Characteristics of OP169 and OP509



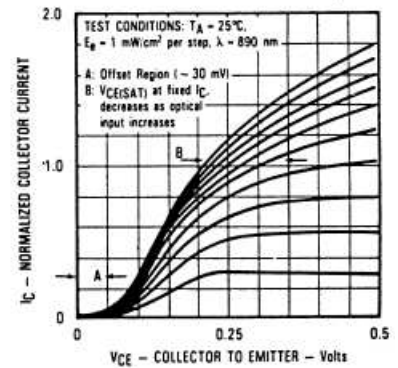
Normalized Collector Current vs. Angular Displacement



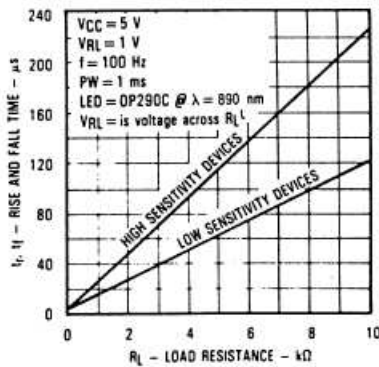
On-State Collector Current vs. Irradiance



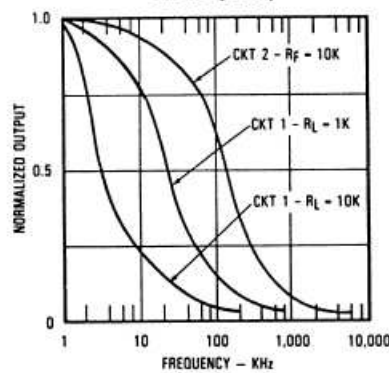
Normalized Collector Current vs. Collector to Emitter Voltage



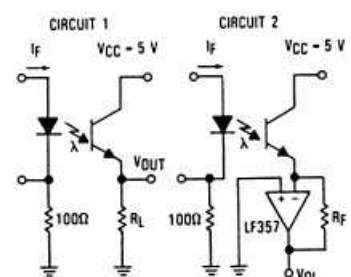
Rise and Fall Time vs Load Resistance



Normalized Output vs. Frequency



Switching Time Test Circuit



Test Conditions:
Light source is pulsed LED with t_r and $t_f \leq 500$ ns.
 I_f is adjusted for $V_{OUT} = 1$ Volt.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

NPN Silicon Phototransistor

OP508F, OP509 Series



| Issue | Change Description | Approval | Date |
|-------|--|----------|------------------------|
| | Used PDFs from PDF Catalog to write new data sheet. | | June 1996 |
| A | Wrote data sheet using above PDFs and information from some unreleased Publisher files (see USED folder). Transferred to new TT Electronics template. | | 04/04/06 8/2016 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

General Note
 TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.
 © TT electronics plc

OPTEK Technology, Inc.
 1645 Wallace Drive, Carrollton, TX 75006 | Ph: +1 972 323 2200
 www.optekinc.com | www.ttelectronics.com