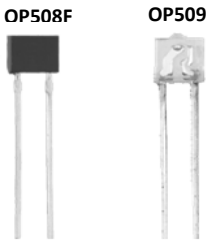
NPN Silicon Phototransistor

OP508FA, OP509A, OP509B



Features:

- Flat lensed for wide acceptance angle (OP508FA)
- Lensed for high sensitivity (OP509)
- Easily stackable on 0.100” (2.54 mm) hole centers
- Inexpensive plastic package
- Mechanically and spectrally matched to OP168F and OP268F series of infrared emitting diodes

Description:

The **OP508FA** consists of an 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 an 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.

OP508FA 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. **OP508FA** and **OP509** series devices are mechanically and spectrally matched to the OP168F and OP268F series of infrared emitting diodes.

Please refer to Application Bulletin 210 for additional thermal design information.

*For custom versions of the **OP508FA and OP509** 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"
OP509A		50°	
OP509B			

RoHS

General Note
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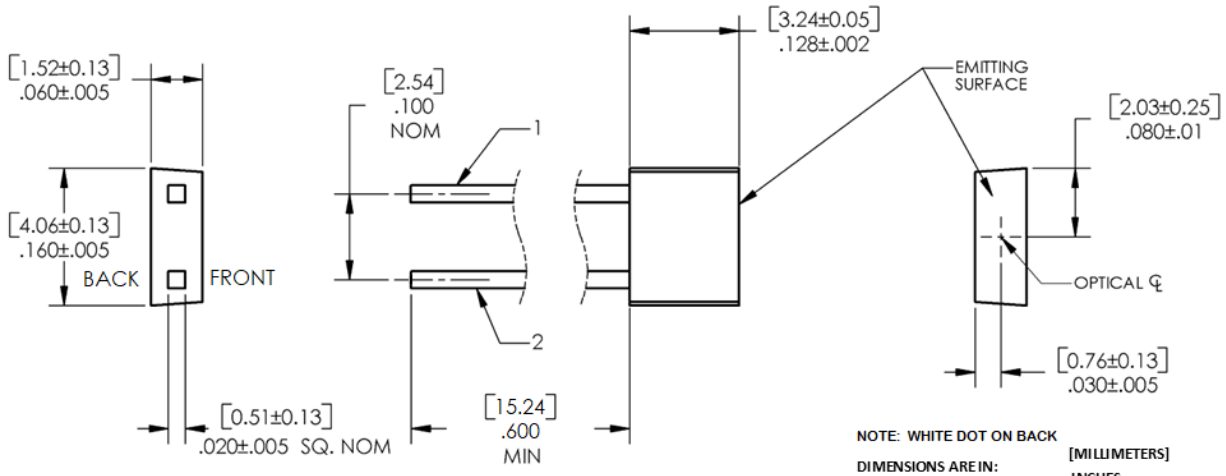
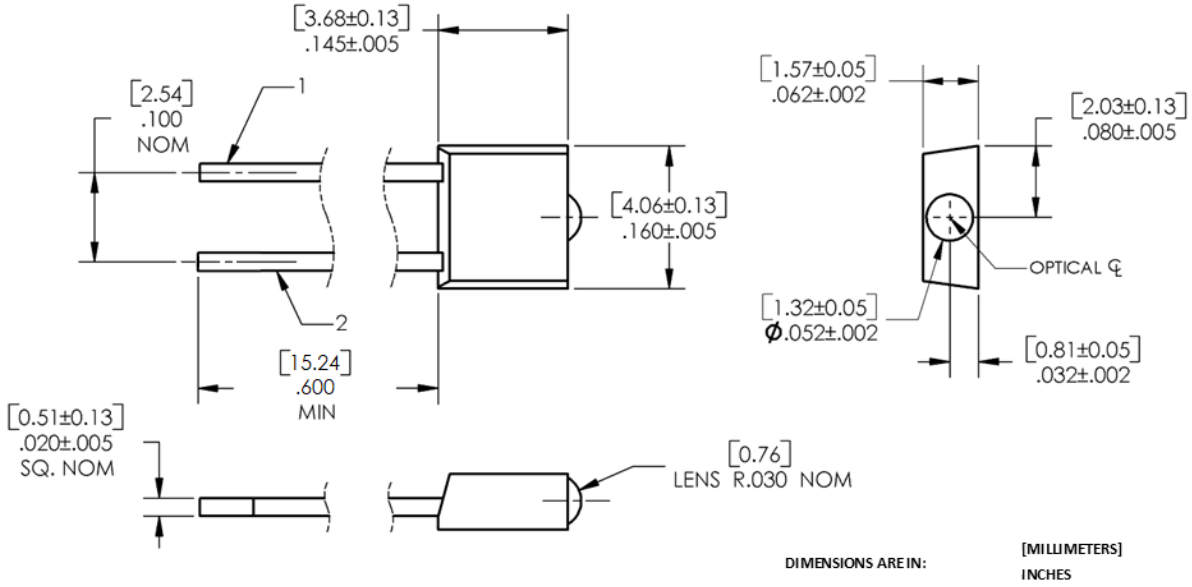
Packaging

OP508F (A) (Black Plastic Package)



OP509 (A, B) (Lensed Clear Plastic Package)



OP508FA & OP509

Pin #	Transistor
1	Collector
2	Emitter

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Electrical Specifications

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

Storage and Operating Temperature Range	-40° C to +100° 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] (1)	260° C
Power Dissipation (2)	100 mW

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

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$ (3)	On-State Collector Current OP509A (Dome Lens) OP508FA (Flat Lens) OP509B (Dome Lens)	 5.70 2.70 1.40	 - - -	 20.00 - 10.60	mA	V_{CE} = 5.0 V, E_E = 5 mW/cm^2
I_C/Δ_T (3)	Relative I_C Charge with Temperature	-	1.00	-	%/° C	V_{CE} = 5.0 V, E_E = 1.0 mW/cm^2 λ = 890 nm
I_{CEO} (4)	Collector-Dark Current	-	-	100	nA	V_{CE} = 10.0 V, E_E = 0
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	I_C = 1.00 mA, E_E = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5	-	-	V	I_E = 100 µA
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage OP508FA	-	-	0.4	V	I_C = 300 µA, E_E = 5 mW/cm^2
	OP509A & B	-	-	0.4	V	I_C = 250 µA, E_E = 5 mW/cm^2

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 1.07 mW/° 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 ° C.

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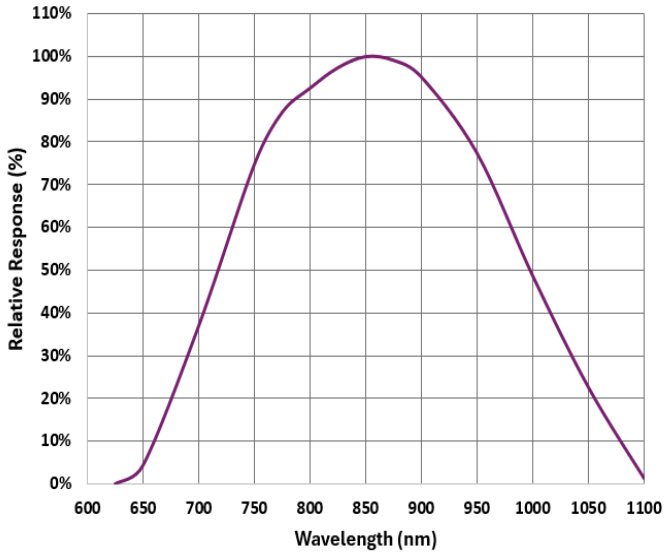
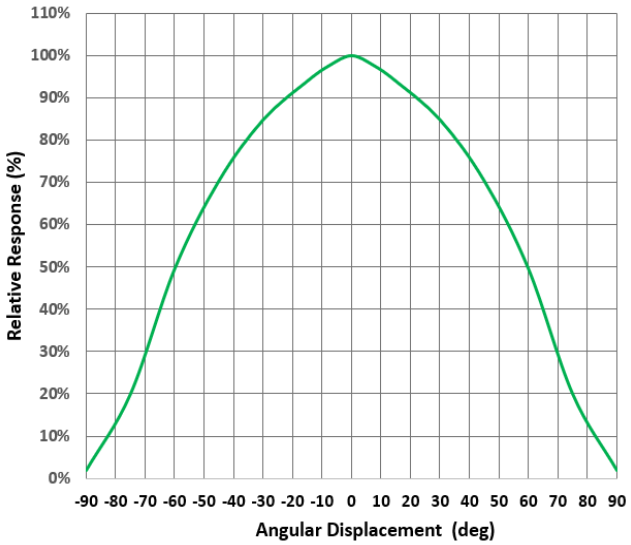
Typical Performance

OP508FA

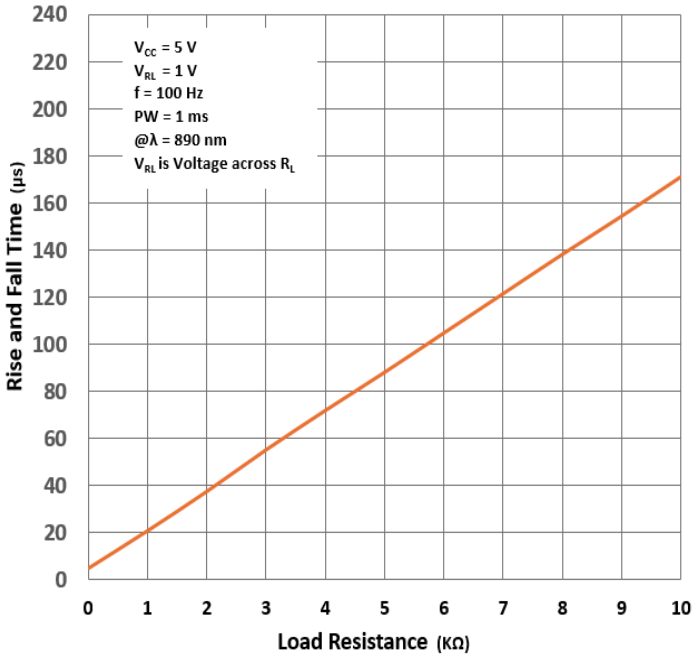
Typical Spectral Response



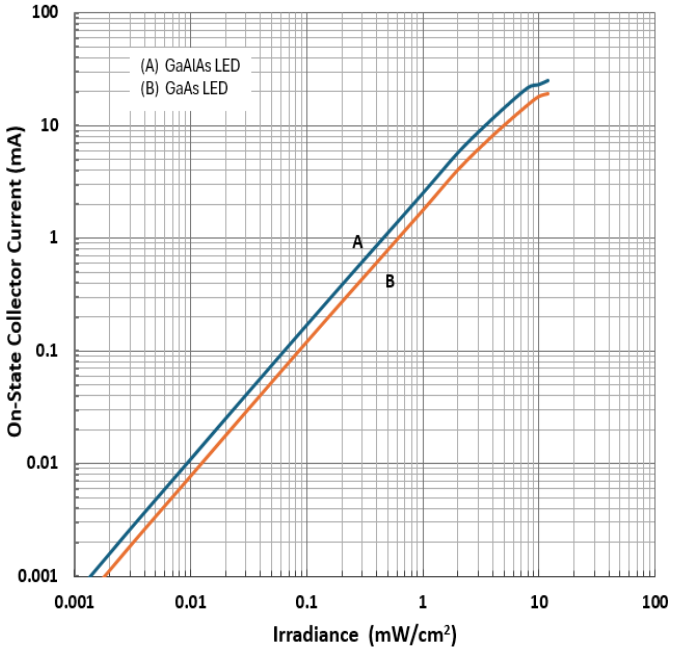
Normalized Collector Current vs Angular Response



Rise and Fall Times vs Load Resistance



On-State Collector Current vs Irradiance



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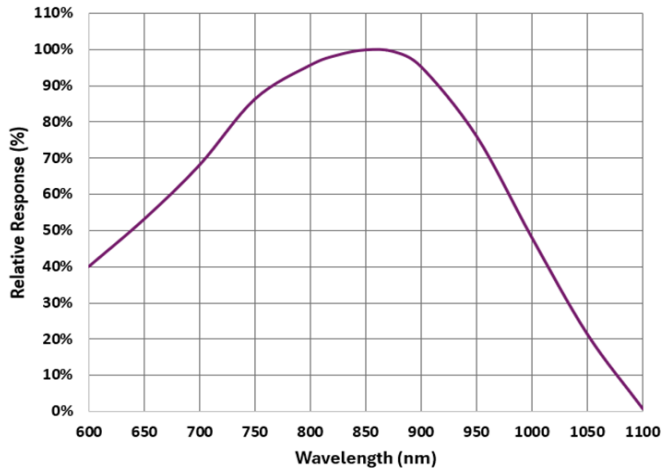
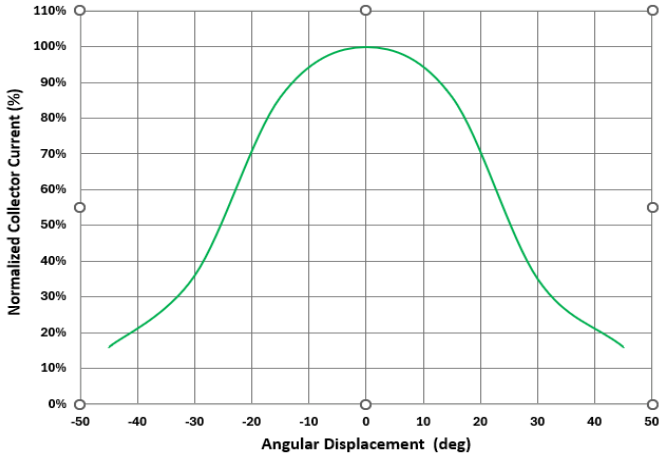
Typical Performance

OP509A, OP509B

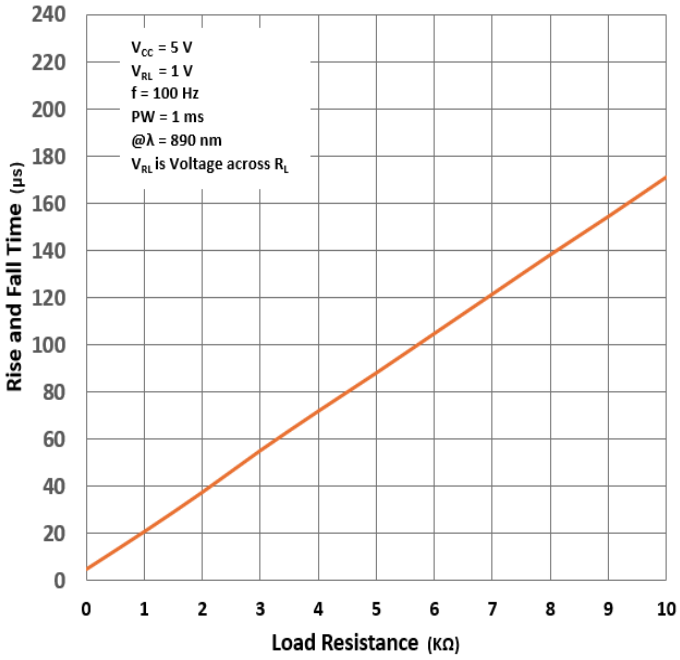
Typical Spectral Response



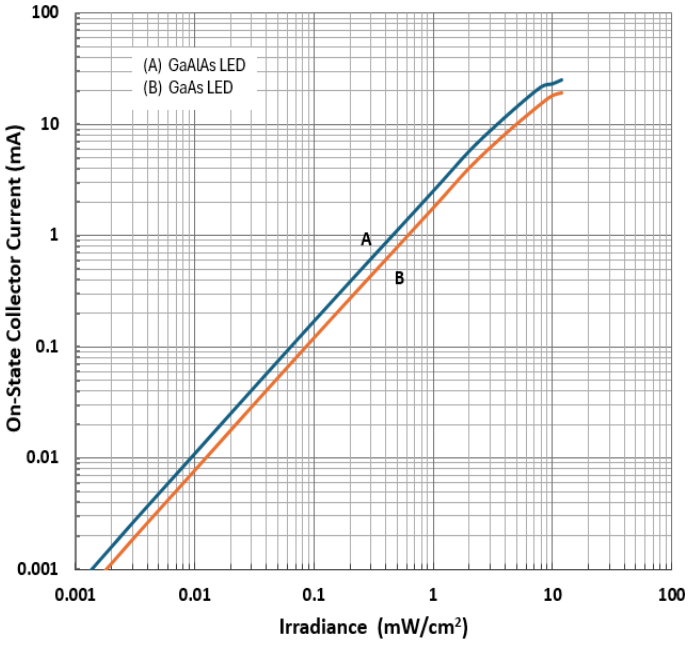
Normalized Collector Current vs Angular Displacement



Rise and Fall Times vs Load Resistance



On-State Collector Current vs Irradiance



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