NPN Silicon Phototransistor / Photodarlington

OP505, OP505W, OP506, OP506W
OP535

Features:

- T-1 package style
- Variety of sensitivity ranges
- Choice of narrow or wide receiving angle
- Small package size ideal for space-limited applications
- 0.050” [1.27 mm] or 0.100” [2.54 mm] Lead spacing

Description:

The OP505 and OP506 series devices are NPN silicon phototransistors; the OP535 is a photodarlington transistor. All of the devices are molded in a blue-tinted T-1 (3 mm) polysulfone package.

All parts except those with a “W” suffix have a narrow receiving angle that provides excellent on-axis coupling. The OP505W and OP506W devices have the widest receiving angle and provide relatively even reception over a large area.

Devices are 100% production tested, using infrared light for close correlation with Optek’s GaAs and GaAlAs emitters.

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

Please see your OPTEK representative for custom versions of these devices.

Applications:

- Space-limited applications
- Interruptive applications to detect media which is semi-transparent to infrared light

Ordering Information

Part Number	Sensor	Viewing Angle	Lead Spacing	Lead Length
OP505A	Transistor	20°	0.050” [1.27 mm]	0.50" [12.7 mm]
OP505B				
OP505C				
OP505W		90°		
OP506A		20°	0.100” [2.54 mm]	
OP506B				
OP506W		90°		
OP535A	Darlington	20°	0.050” [1.27 mm]	
OP535B				

RoHS

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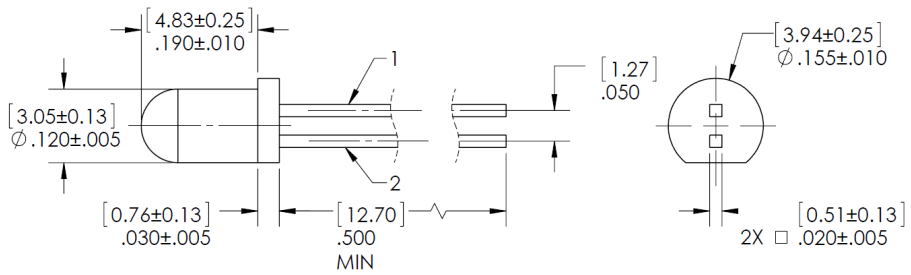
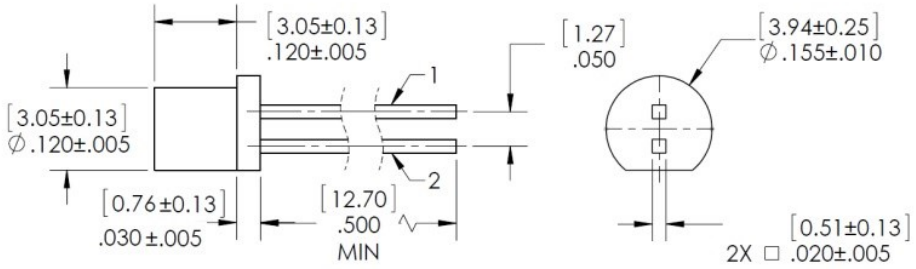
OP535

OP505, OP535



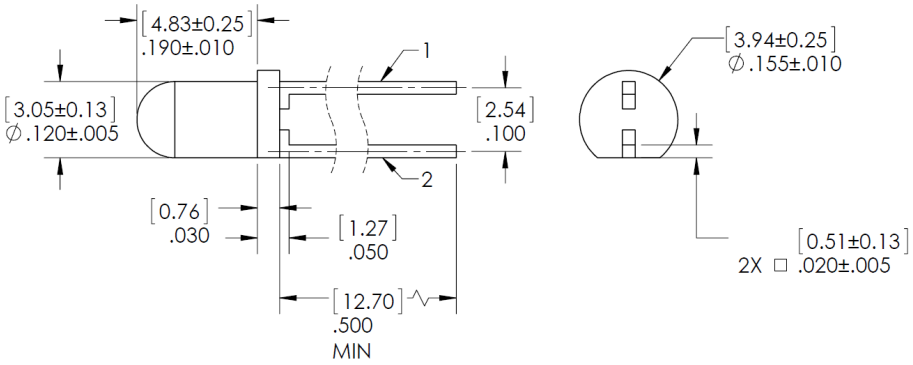
Pin #	Transistor
1	Emitter
2	Collector

OP505W

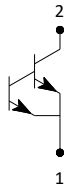


OP505, OP506
OP505W, OP506W

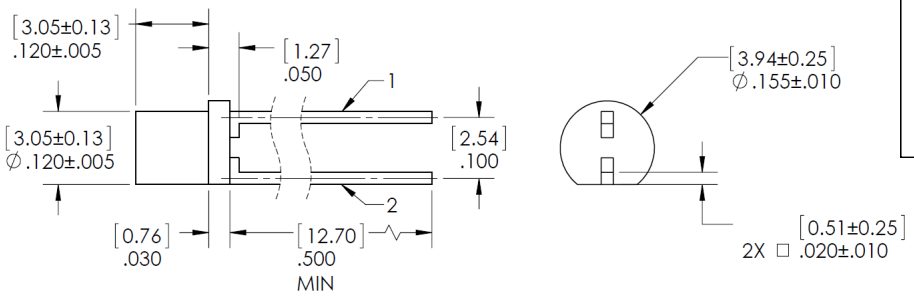
OP506



OP535



OP506W



CONTAINS POLYSULFONE

Methanol and isopropanol alcohols
are recommended cleaning agents.
Housings are soluble in chlorinated hydrocarbons and keytones.
Highly activated or water soluble fluxes may damage body.
Testing reagents before use is recommended prior to use.

TOLERANCES ARE ± .010" [.25] UNLESS OTHERWISE STATED
DIMENSIONS ARE IN INCHES [MILLIMETERS]

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Electrical Specifications

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

Storage & Operating Temperature Range	-40° C to +100° C
Collector-Emitter Voltage (OP505, OP506, OP505W, OP506W)	30 V
Collector-Emitter Voltage (OP535)	15 V
Emitter-Collector Voltage (OP505 and OP506 series only)	5.0 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)

OP505, OP506, OP505W, OP506W

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$ (3)	On-State Collector Current OP505A, OP506A OP505B, OP506B OP505C	 4.30 2.15 1.10	 - - -	 - 5.95 3.00	mA	V_{CE} = 5 V, E_E = 0.50 mW/cm^2
	OP505W, OP506W	0.10	-	-	mA	V_{CE} = 5 V, E_E = 0.75 mW/cm^2
$V_{CE(SAT)}$ (3)	Collector-Emitter Saturation Voltage OP505, OP506	 -	 -	 0.40	 V	 I_C = 250 µA, E_E = 0.5 mW/cm^2
	OP505W, OP506W	-	-	0.40	V	I_C = 50 µA, E_E = 0.75 mW/cm^2
I_{CEO}	Collector-Dark Current	-	-	100	nA	V_{CE} = 10 V, E_E = 0
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	I_C = 100 µA, E_E = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage OP505, OP506	 5	 -	 -	 V	 I_E = 100 µA, E_E = 0
$\Delta I_C/\Delta T$	Relative I_C Changes with Temperature	-	1.00	-	% / ° C	V_{CE} = 5 V, E_E = 1.0 mW/cm^2

Notes:

(1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering. A maximum of 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 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.

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Electrical Specifications

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

OP535

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$ (3)	On-State Collector Current OP535A OP535B	 10.5 3.5	 - -	 - 32.0	mA	V_{CE} = 5 V, E_E = 0.13 mW/cm^2
$V_{CE(SAT)}$ (3)	Collector-Emitter Saturation Voltage	-	-	1.10	V	I_C = 400 µA, E_E = 0.13 mW/cm^2
I_{CEO}	Collector-Dark Current	-	-	100	nA	V_{CE} = 10 V, E_E = 0
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	15.0	-	-	V	I_C = 1.0 mA, E_E = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5.0	-	-	V	I_E = 100 µA, E_E = 0

Notes:

(1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering. A maximum of 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 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.

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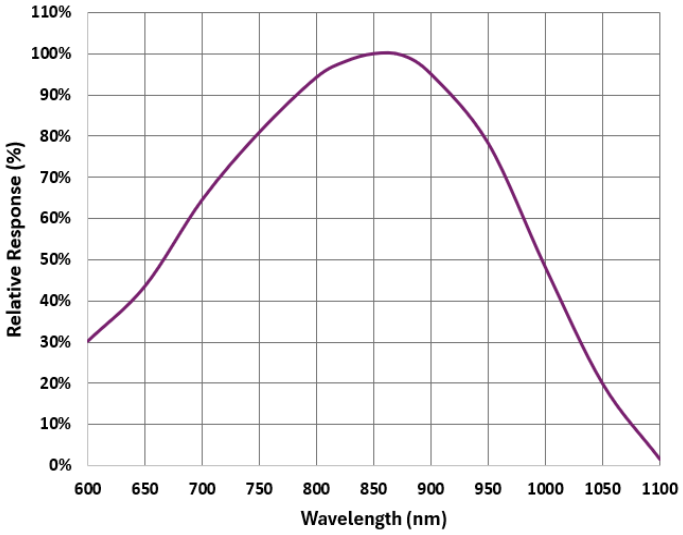
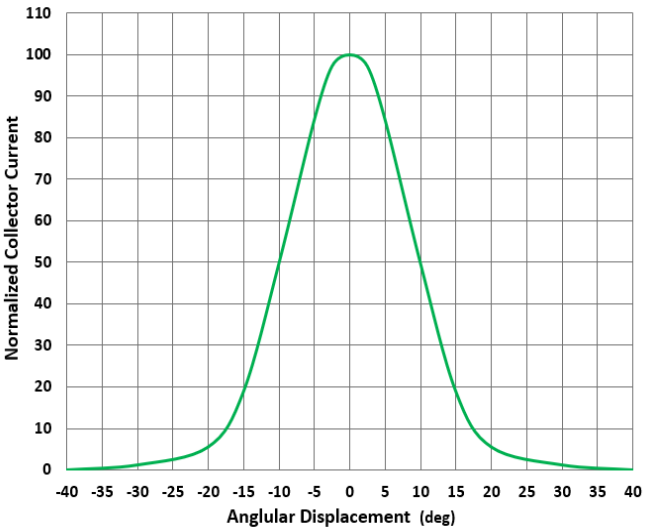
Typical Performance

OP505A, OP505B, OP505C

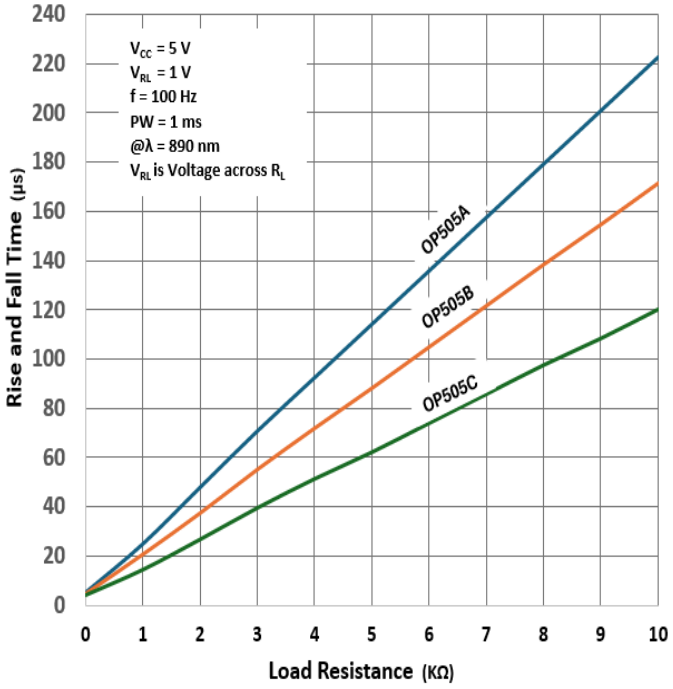
Typical Spectral Response



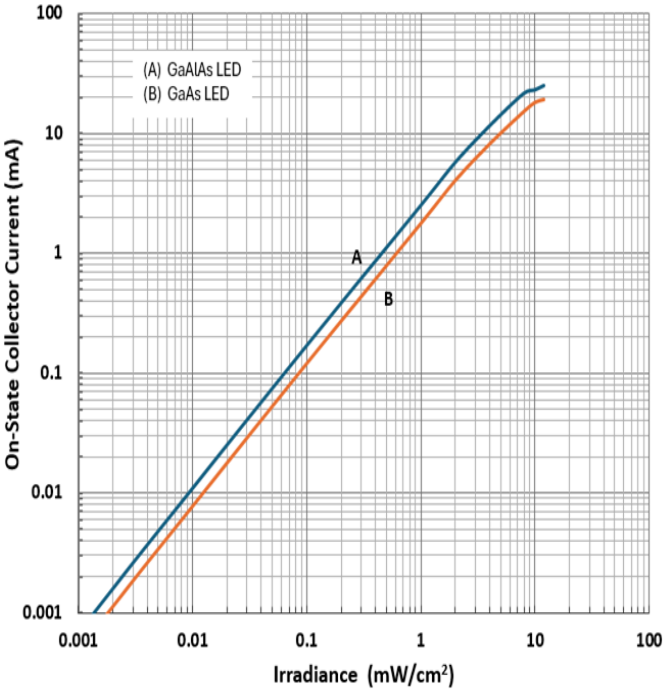
Normalized Collector Current vs Angular Displacement



Rise and Fall Times vs Load Resistance



On-State Collector Current vs Irradiance



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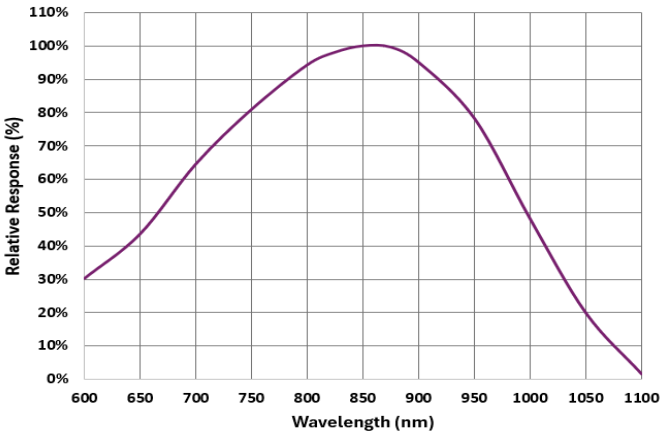
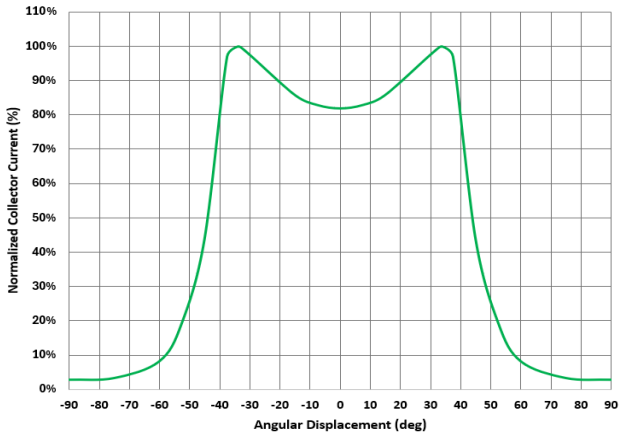
Typical Performance

OP505W

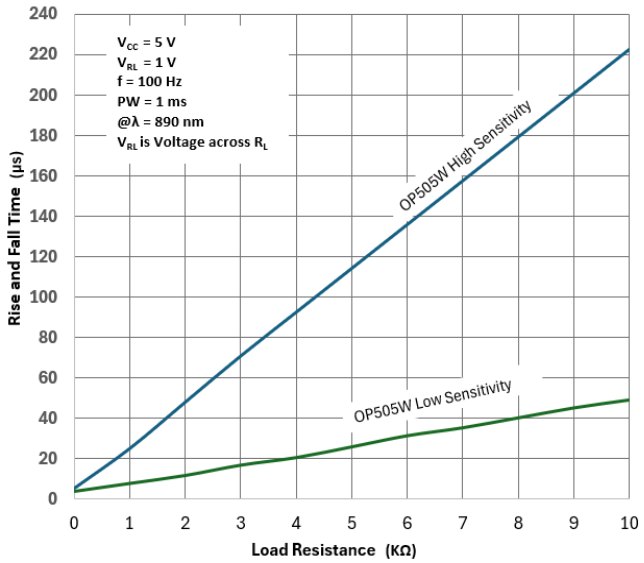
Typical Spectral Response



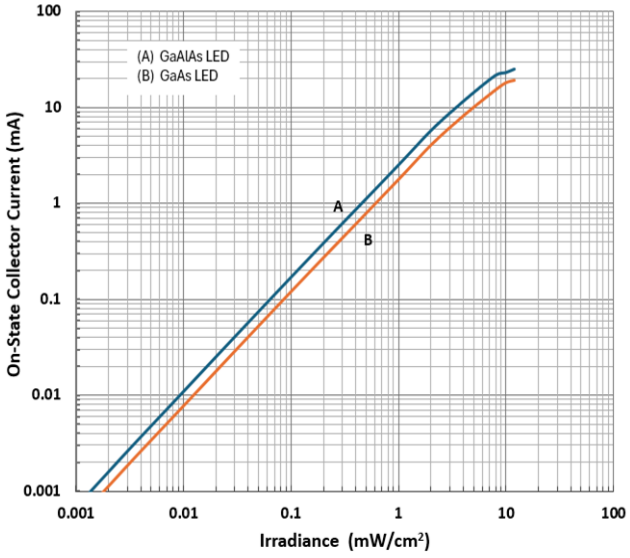
Normalized Collector Current vs Angular Displacement



Rise and Fall Times vs Load Resistance



On-State Collector Current vs Irradiance



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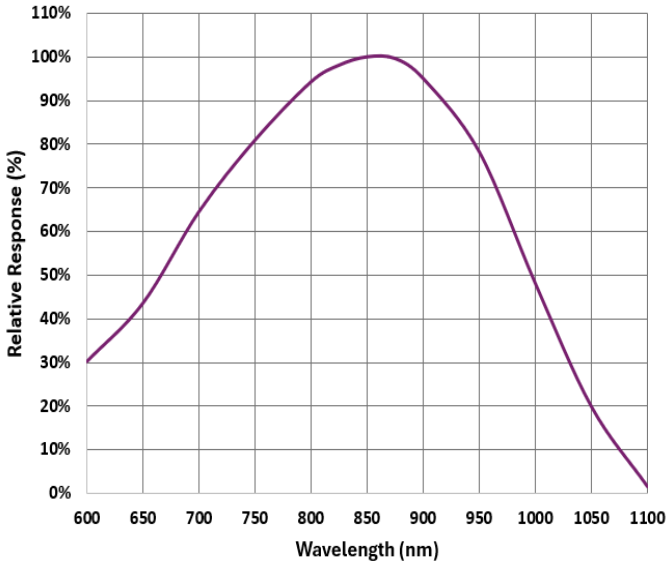
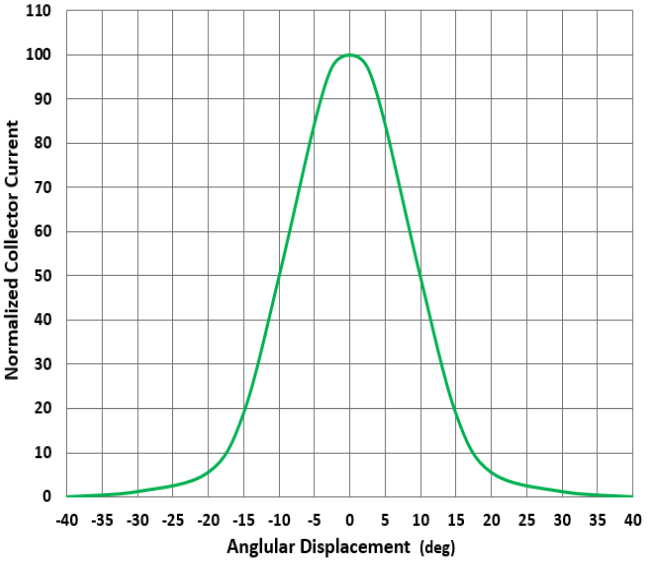
Typical Performance

OP506A, OP506B

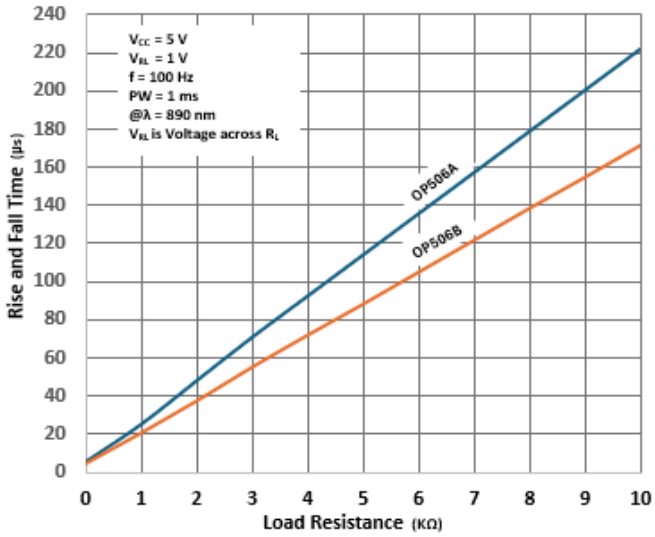
Typical Spectral Response



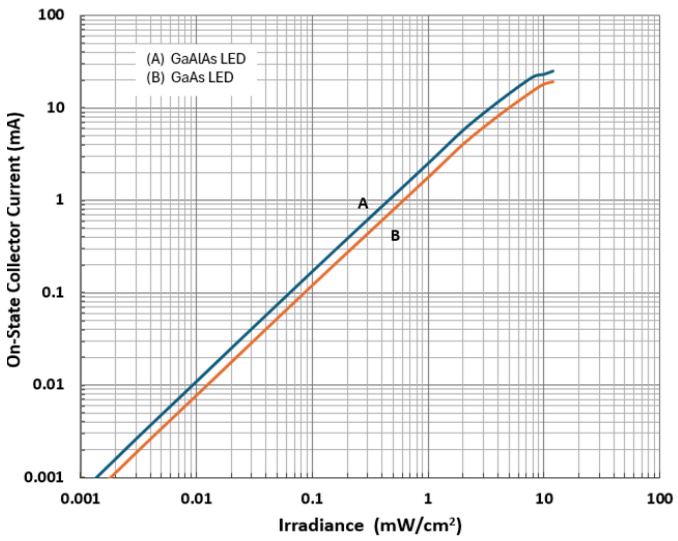
Normalized Collector Current vs Angular Displacement



Rise and Fall Times vs Load Resistance



On-State Collector Current vs Irradiance



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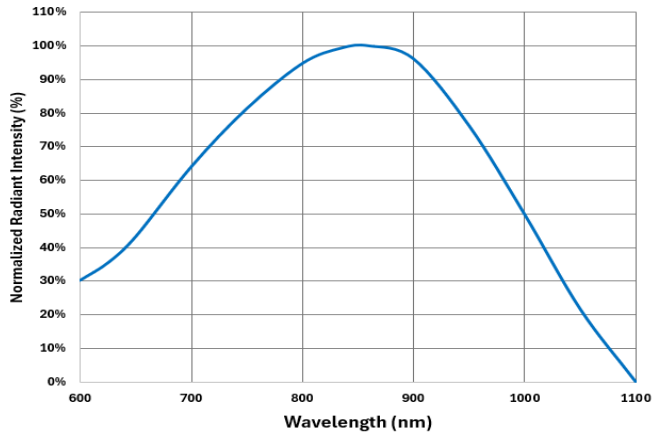
Typical Performance

OP506W

Typical Spectral Response



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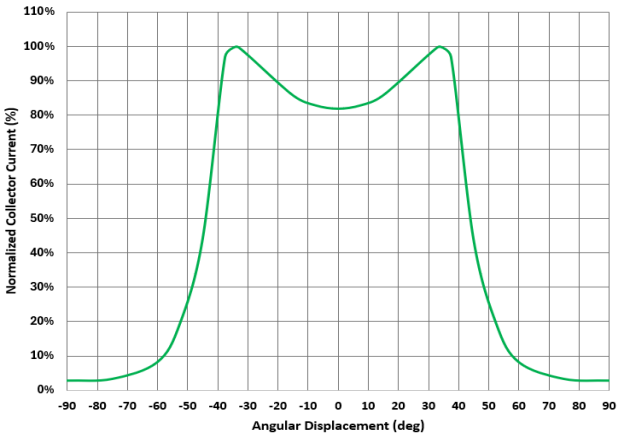
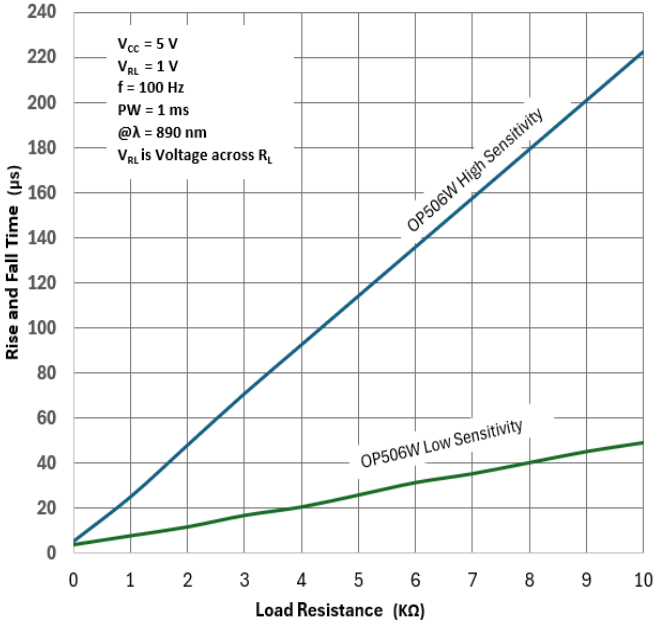
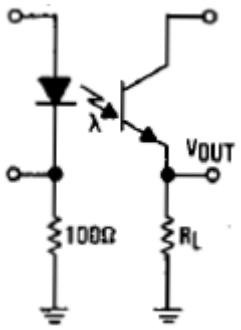


Rise and Fall Times vs Load Resistance



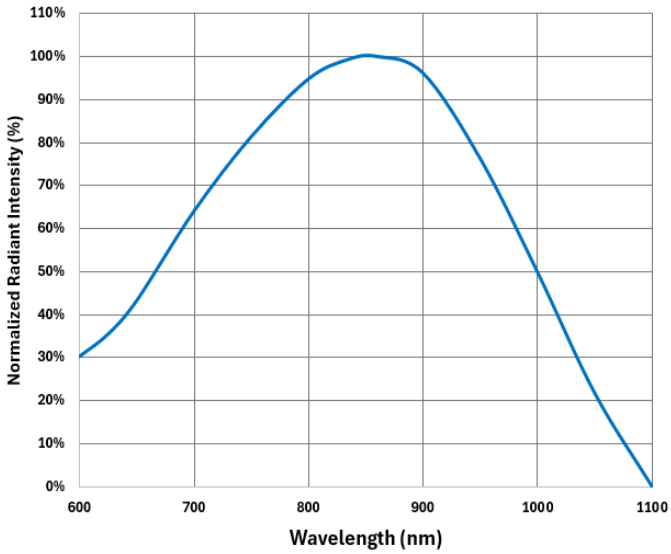


Test Circuit

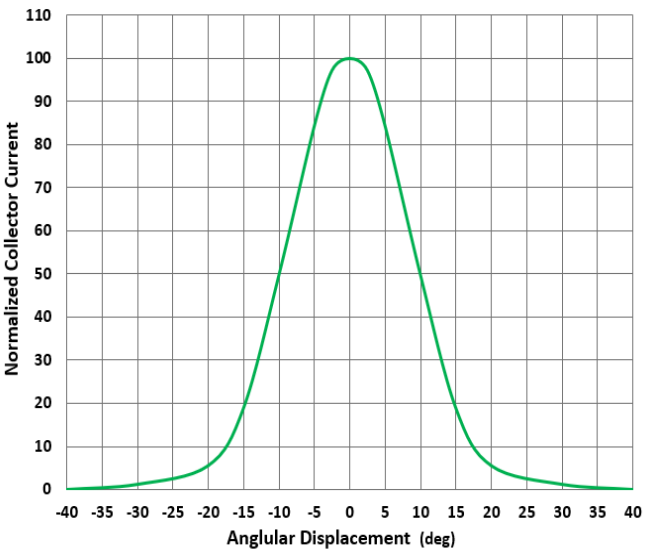
Typical Performance

OP535A, OP535B

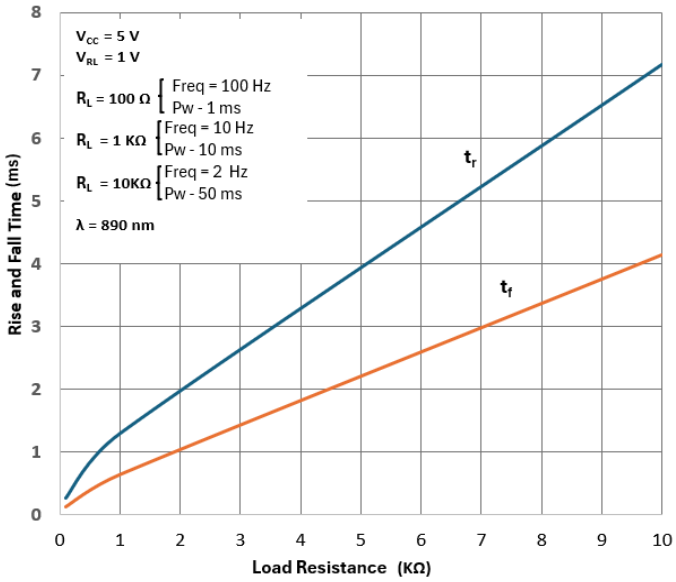
Typical Spectral Response



Normalized Collector Current vs Angular Displacement



Rise and Fall Times vs Load Resistance



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