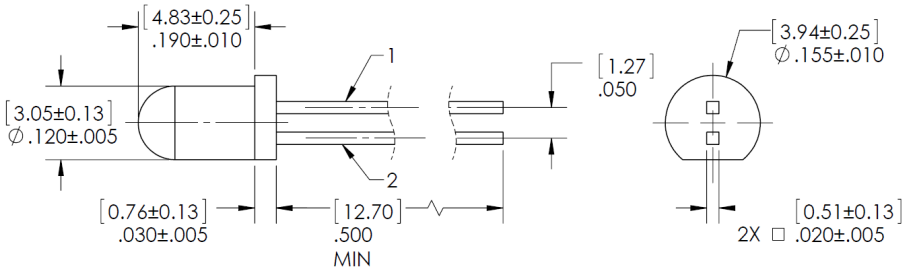
NPN Silicon Phototransistor

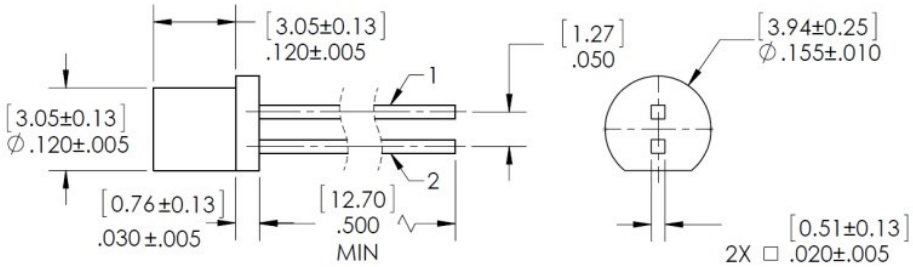
OP505, OP505W, OP506, OP506W
OP535, OP705

OP505, OP535, OP705

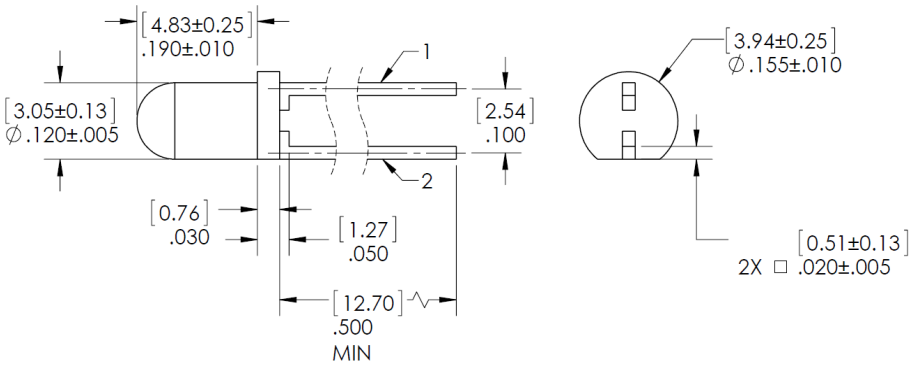


Pin #	Transistor
1	Emitter
2	Collector

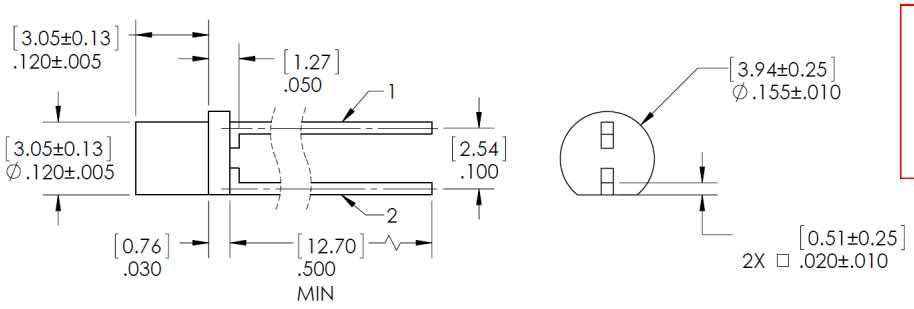
OP505W



OP506



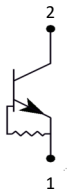
OP506W



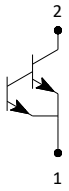
TOLERANCES ARE ± .010" [.25] UNLESS OTHERWISE STATED
DIMENSIONS ARE IN INCHES [MILLIMETERS]

OP505, OP506
OP505W, OP506W

OP705



OP535



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.

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NPN Silicon Phototransistor

OP505, OP505W, OP506, OP506W
OP535, OP705

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, OP705)	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)	260° C
Power Dissipation	100 mW (2)
Emitter Reverse Current (OP705 series only)	10 mA
Collector DC Current (OP705 series only)	30 mA

Electrical Characteristics (T_A = 25° C unless otherwise noted)
OP505, OP506, OP505W, OP506W, OP705

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$	On-State Collector Current					
	OP505A, OP506A	4.30	-	-	mA	V_{CE} = 5 V, E_e = 0.50 mW/cm^2 , Note 3
	OP505B, OP506B	2.15	-	5.95		
	OP505C, OP506C	1.10	-	3.00		
	OP505D	0.55	-	-		
	OP705A	3.95	-	12.00	mA	V_{CE} = 5 V, E_e = 0.50 mW/cm^2, Note 3
	OP505W, OP506W	0.10	-	-	mA	V_{CE} = 5 V, E_e = 0.75 mW/cm^2, Note 3
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage OP505, OP506, OP705	-	-	0.40	V	I_C = 250 µA, E_E = 0.5 mW/cm^2, Note 3
	OP505W, OP506W	-	-	0.40	V	I_C = 50 µA, E_E = 0.75 mW/cm^2, Note 3
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
	OP705	0.4	-	-	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
E_{KP}	Knee Point Irradiance (OP705)	-	0.02	-	mW/cm^2	V_{CE} = 5 V, Note 4

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 1.33 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) The knee point irradiance is defined as the irradiance required to increase Ic(on) to 50 µA.

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Electrical Specifications

Electrical Characteristics (T_A = 25° C unless otherwise noted)
OP535

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
$I_{C(ON)}$	On-State Collector Current OP535A OP535B	 10.5 3.5	 - -	 - 32.0	mA	V_{CE} = 5 V, E_E = 0.13 mW/cm^2, Note 3
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	-	-	1.10	V	I_C = 400 µA, E_E = 0.13 mW/cm^2 , Note 3
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

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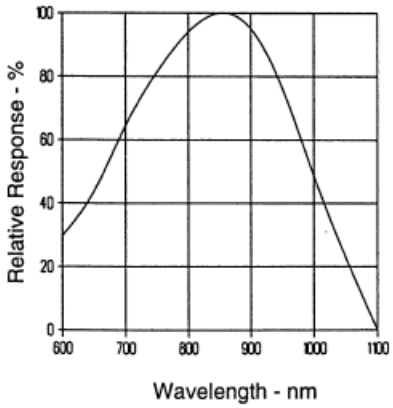
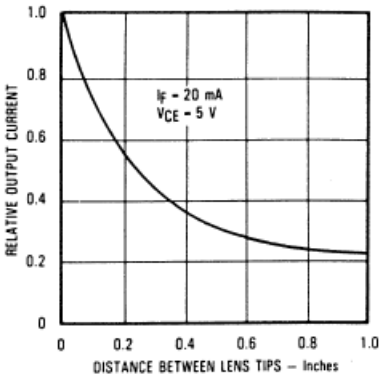
Performance

OP505A, OP505B, OP505C, OP505D

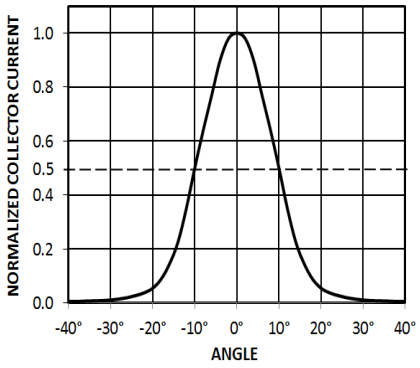
Typical Spectral Response



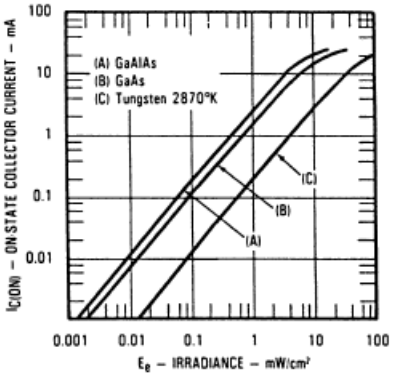
Coupling Characteristics OP165 and OP505



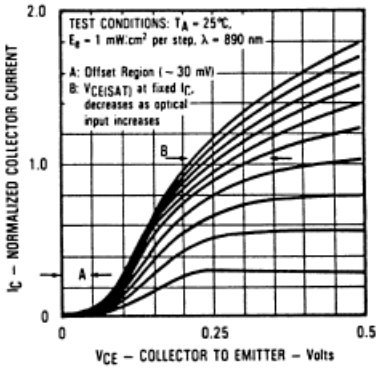
Normalized Collector Current vs. Angular Displacement



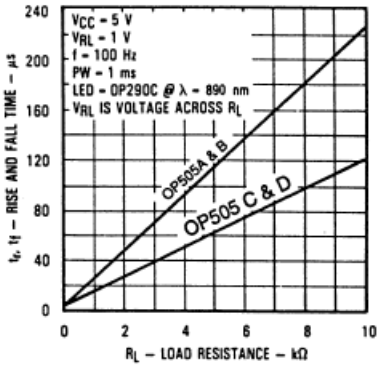
On-State Collector Current vs. Irradiance



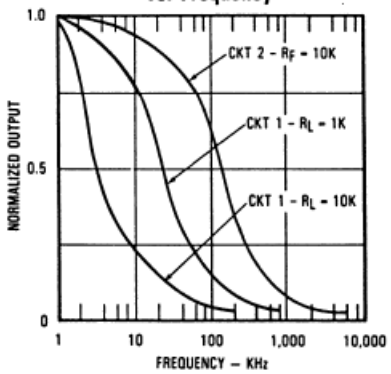
Normalized Collector Current vs. Collector to Emitter Voltage



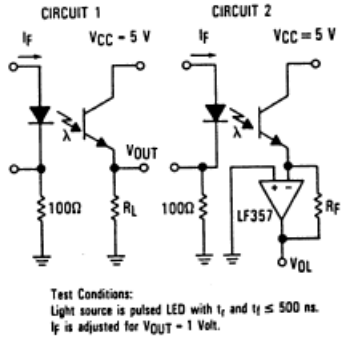
Rise and Fall Time vs. Load Resistance



Normalized Output vs. Frequency



Switching Time Test Circuit



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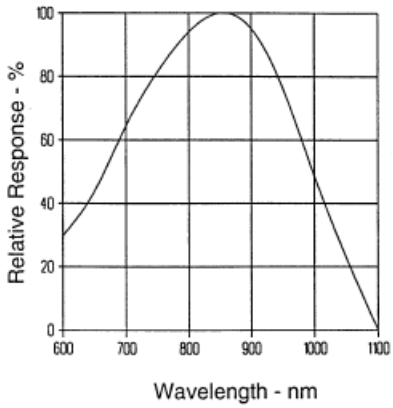
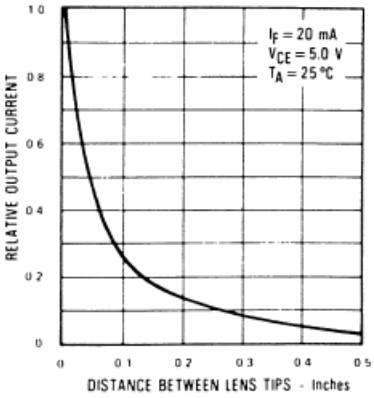
Performance

OP505W

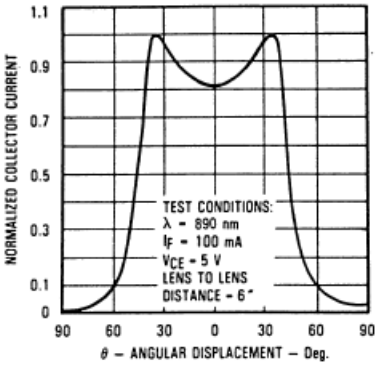
Typical Spectral Response



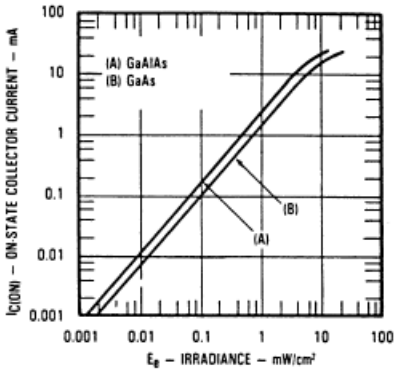
Coupling Characteristics of OP165W and OP505W



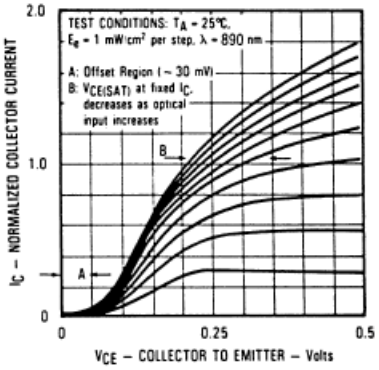
Normalized Collector Current vs. Angular Displacement



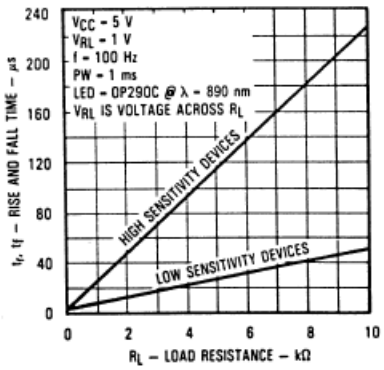
On-State Collector Current vs Irradiance



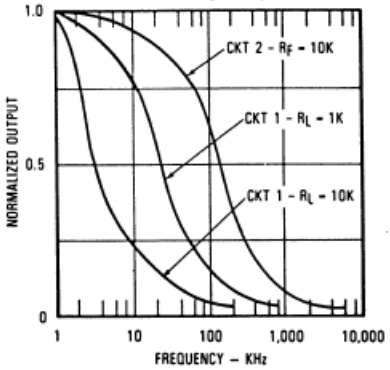
Normalized Collector Current vs. Collector to Emitter Voltage



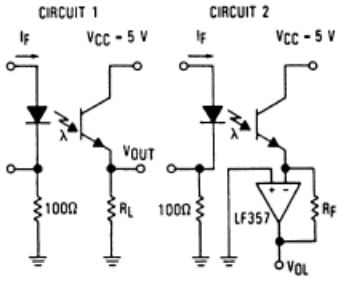
Rise and Fall Time vs. Load Resistance



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.

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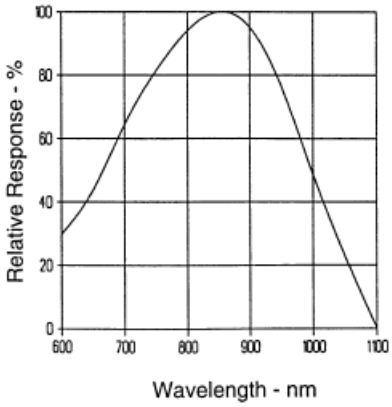
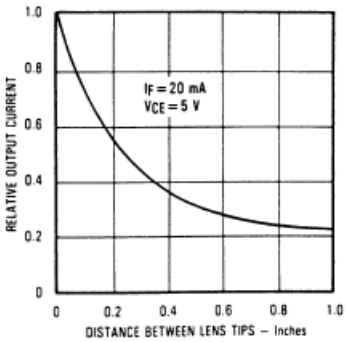
Performance

OP506A, OP506B, OP506C

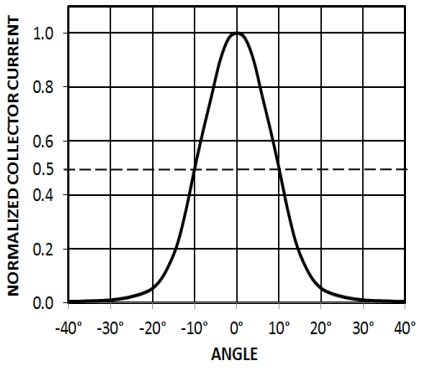
Typical Spectral Response



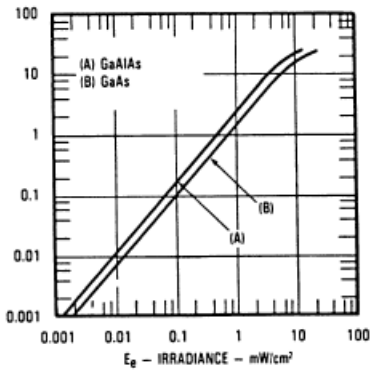
Coupling Characteristics of OP166 and OP506



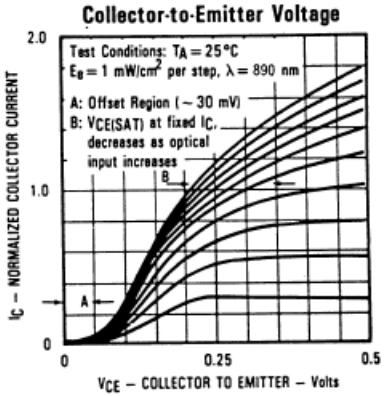
Normalized Collector Current vs. Angular Displacement



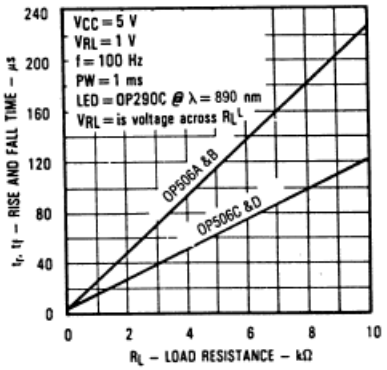
On-State Collector Current vs Irradiance



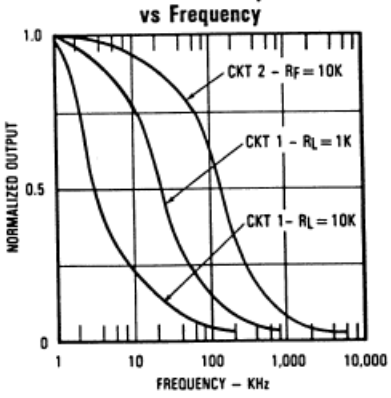
Normalized Collector Current vs Collector-to-Emitter Voltage



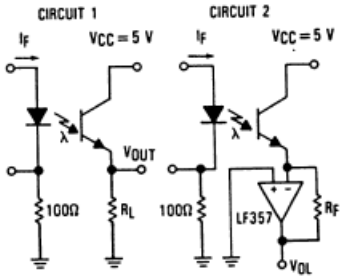
Rise and Fall Time vs Load Resistance



Normalized Output vs Frequency



Switching Time Test Circuit

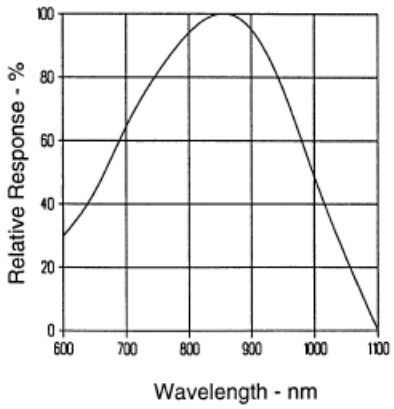


Test Conditions:
Light source is pulsed LED with t_r and $t_f \leq$ 500 ns.
I_F is adjusted for V_{OUT} = 1 Volt.

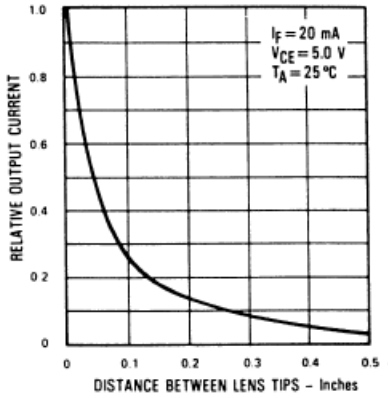
Performance

OP506W

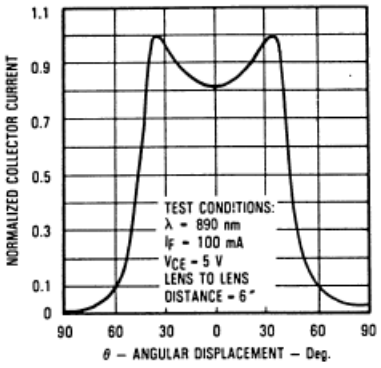
Typical Spectral Response



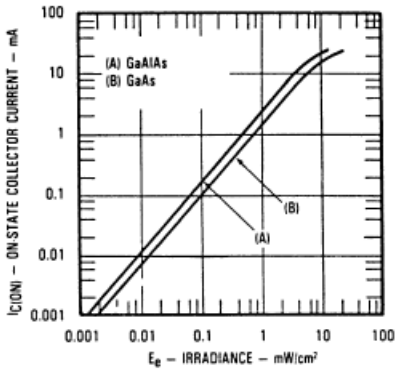
Coupling Characteristics



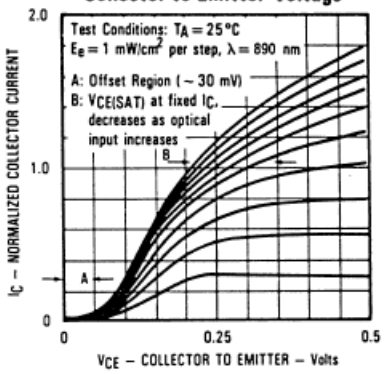
Normalized Collector Current vs. Angular Displacement



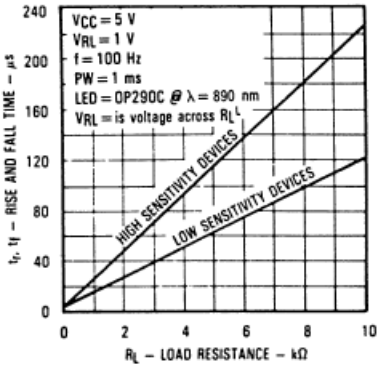
On-State Collector Current vs Irradiance



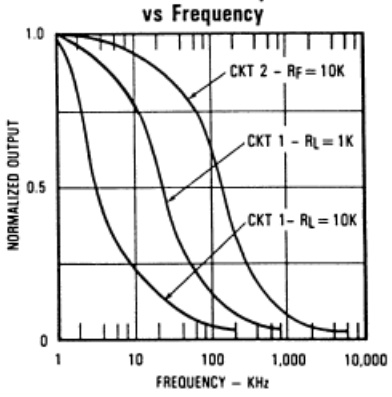
Normalized Collector Current vs Collector-to-Emitter Voltage



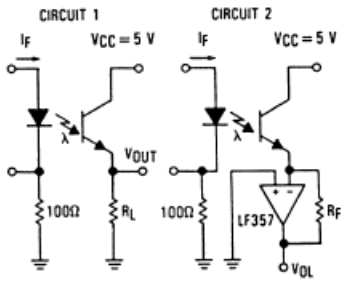
Rise and Fall Time vs Load Resistance



Normalized Output vs Frequency



Switching Time Test Circuit



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

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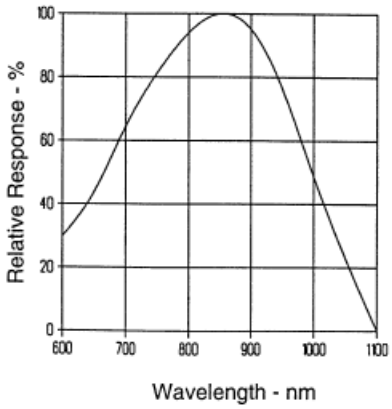
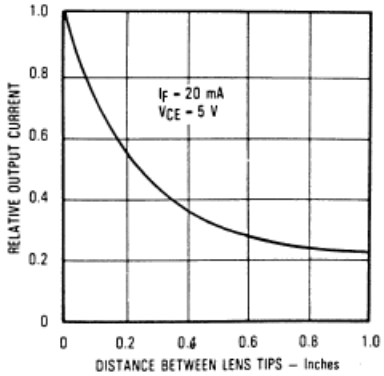
Performance

OP535A, OP535B, OP535D

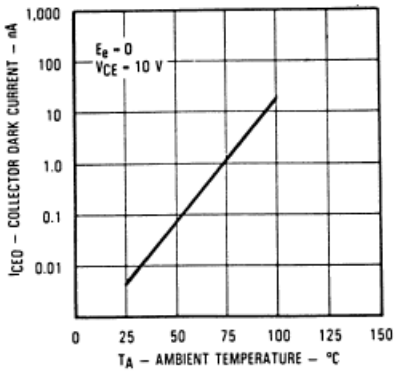
Typical Spectral Response



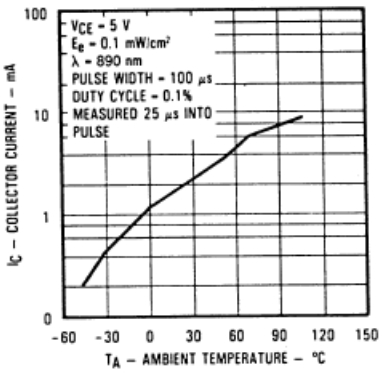
Coupling Characteristics of OP165 and OP535



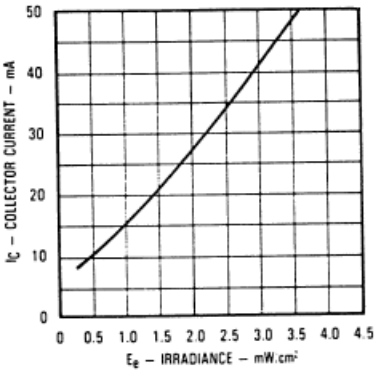
Collector Dark Current vs. Ambient Temperature



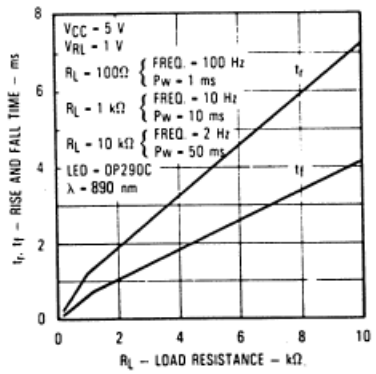
Collector Current vs. Ambient Temperature



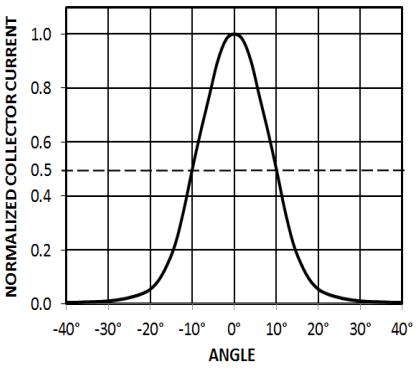
Collector Current vs. Irradiance



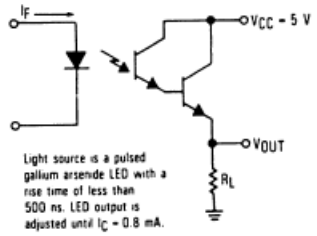
Rise and Fall Time vs. Load Resistance



Normalized Collector Current vs. Angular Displacement



Switching Time Test Circuit



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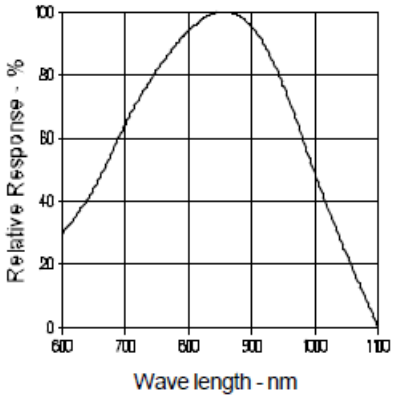
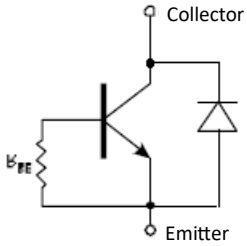
Performance

OP705A

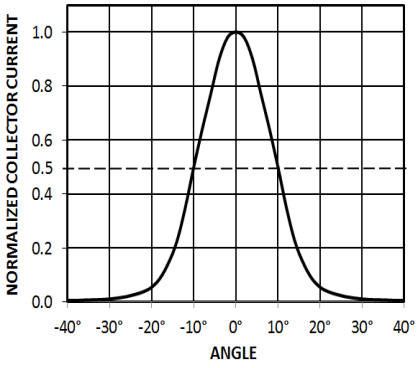
Typical Spectral Response



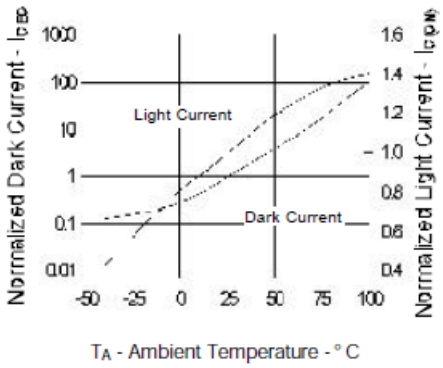
Schematic



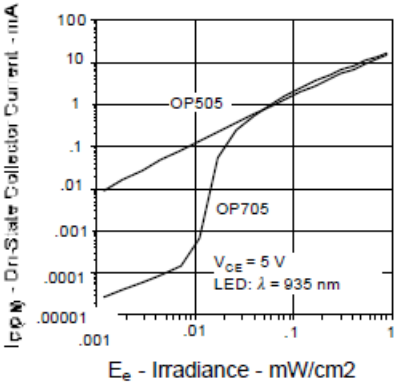
Normalized Collector Current vs. Angular Displacement



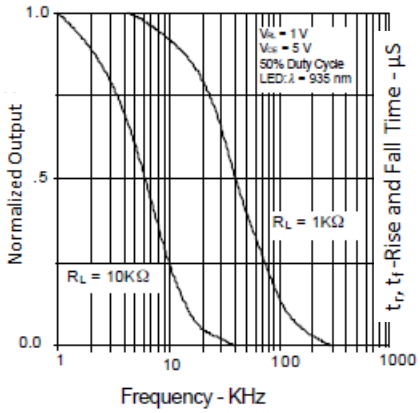
Normalized Light and Dark Current vs. Ambient Temperature



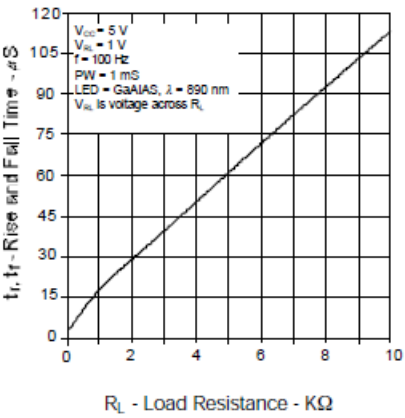
On-State Collector Current vs. Irradiance



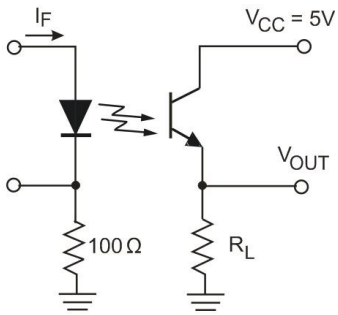
Normalized Output vs. Frequency



Typical Rise and Fall Time vs. Load Resistance



Switching Time Test Circuit



Test Conditions:
Light Source is pulsed LED with tr and tf ≤ 500nS.
I_F is adjusted for V_{OUT} = 1Volt.