

# NPN Plastic Silicon Phototransistor

## OP593, OP598, OP793, OP798 Series



### Features:

- Dark blue epoxy package
- Wide receiving angle
- Variety of sensitivity ranges
- TO-18 equivalent package style

### Description:

Each device in this series consists of an NPN silicon phototransistor molded in a dark blue epoxy packages. The wide receiving angle (130°) of the **OP593** and **OP793** series devices provides relatively even reception over a large area. The narrow receiving angle (25°) of the **OP598** and **OP798** series devices provides a relatively small reception area.

*These devices are 100% production tested using infrared light for close correlation with OPTEK's GaAs and GaAlAs emitters.*

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

### Applications:

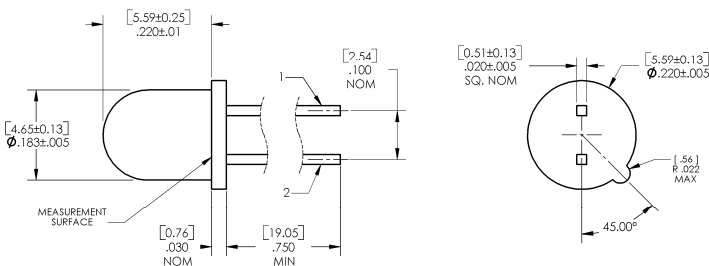
- Non-contact reflective or slotted sensor
- Assembly line automation
- Machine automation
- Machine Safety
- End of travel sensor
- Door sensor
- Safety Curtain



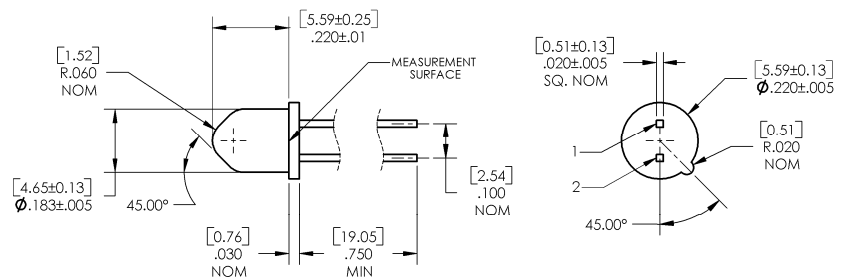
Pin #	Sensor
1	Collector
2	Emitter

Ordering Information			
Part Number	Sensor	Viewing Angle	Lead Length
OP593A	Transistor	130°	0.75"
OP593B			
OP593C			
OP598A			
OP598B	25°		
OP598C			
OP793A	R <sub>BE</sub> Transistor	130°	
OP793B			
OP793C			
OP793D			
OP798A	25°		
OP798B			
OP798C			
OP798D			

### OP593, OP793



### OP598, OP798



**OP555 - CONTAINS POLYSULFONE**  
 To avoid stress cracking, we suggest using ND Industries' **Vibra-Tite** for thread-locking. **Vibra-Tite** evaporates fast without causing structural failure in OPTEK's molded plastics.



DIMENSIONS ARE IN: [MILLIMETERS] INCHES

General Note  
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OPTEK Technology, Inc.  
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 www.optekinc.com | www.ttelectronics.com

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## Electrical Specifications

Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)	
Storage and Operating Temperature Range	$-40^\circ\text{C}$ to $+100^\circ\text{C}$
Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Continuous Collector Current	50 mA
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	$260^\circ\text{C}^{(1)}$
Power Dissipation	$250\text{ mW}^{(2)}$

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					$V_{CE} = 5\text{ V}$ . Light source is an unfiltered GaAlAs LED with a peak emission wavelength of 890 nm and $E_{e(APT)}$ of $1.7\text{ mW/cm}^2$ average within a .250" diameter aperture.
	OP593A	3.0	-	4	mA	
	OP593B	2.0	-	4		
	OP593C	1.0	-	4		
	OP598A	7.5	-	10		
	OP598B	5.0	-	10		
	OP598C	2.5	-	10		
	OP598C	2.45	-	10		
	OP793A		-	7.50		
	OP793B	1.65	-	4.55		
	OP793C	0.90	-	3.05		
	OP793D	0.90	-	7.50		
	OP798A	4.90	-	15.00		
	OP798B	3.30	-	9.20		
OP798C	1.90	-	6.10			
OP798D	1.90	-	15.00			
$I_{CEO}$	Collector-Dark Current	-	-	100	nA	$V_{CE} = 10\text{ V}$ , $E_E = 0$
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	30	-	-	V	$I_C = 100\ \mu\text{A}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage	5	-	-	V	$I_E = 100\ \mu\text{A}$
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	-	-	0.40	V	$I_C = 0.4\text{ mA}$ , $E_E = 1.7\text{ mW/cm}^2$

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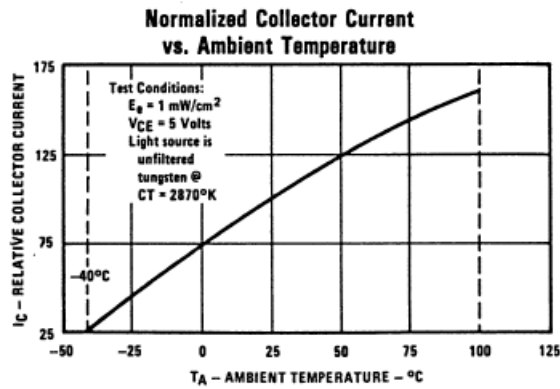
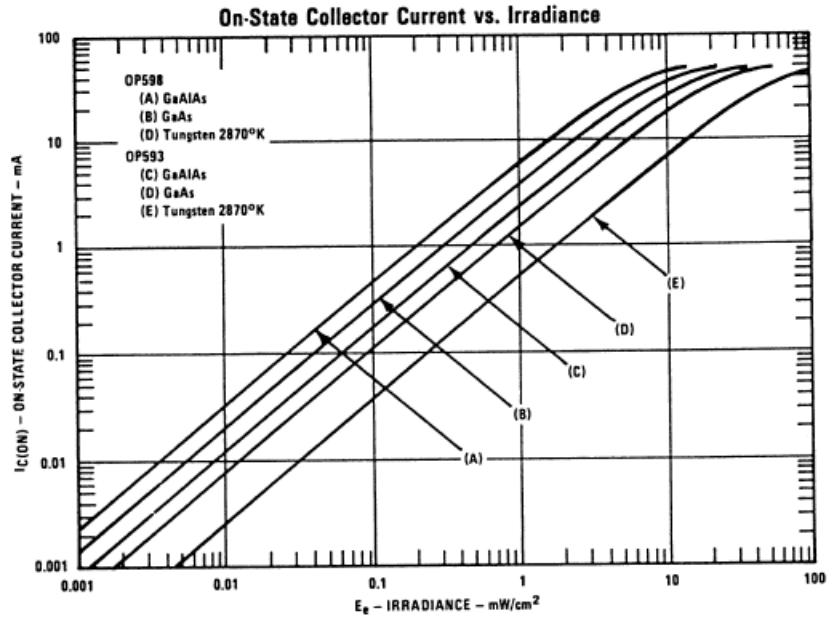
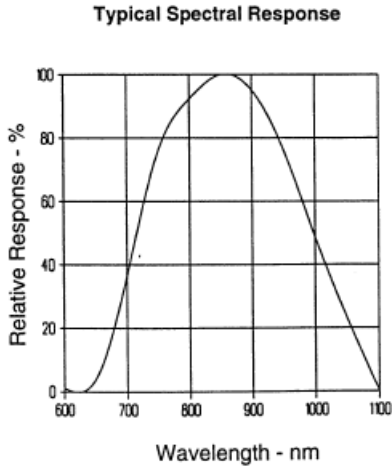
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## Performance

OP593, OP598



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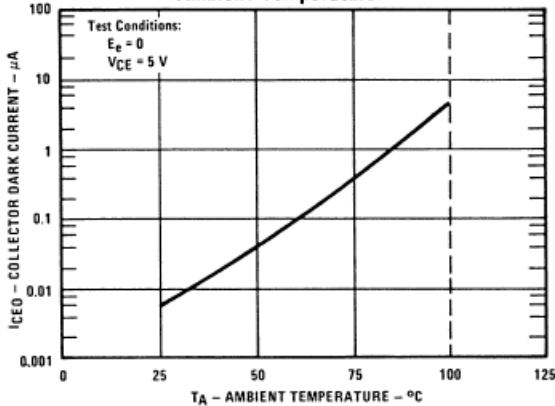
OP593, OP598, OP793, OP798 Series



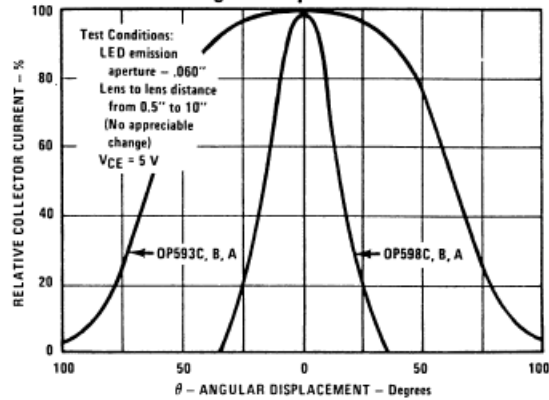
## Performance

OP593, OP598

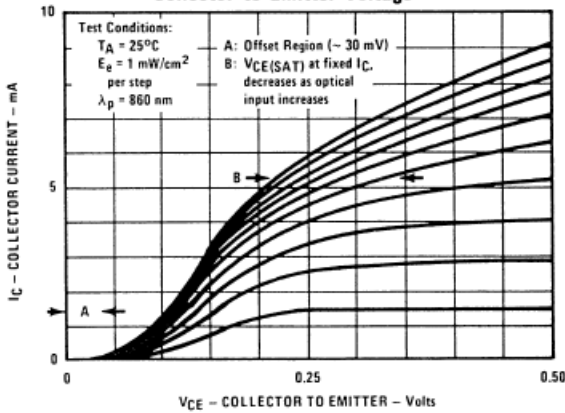
Collector Dark Current vs. Ambient Temperature



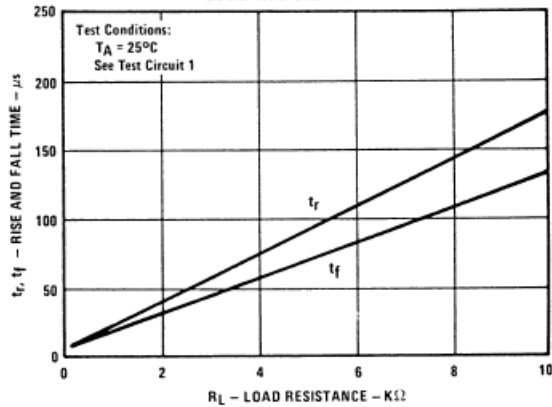
Relative Collector Current vs. Angular Displacement



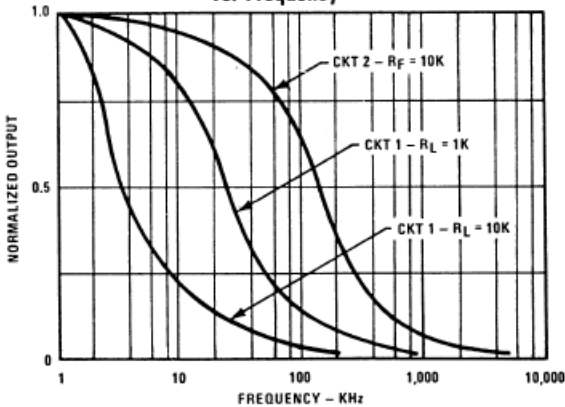
Collector Current vs. Collector to Emitter Voltage



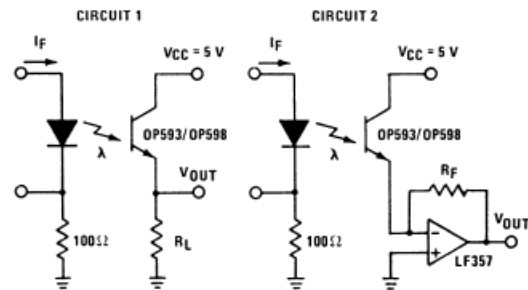
Rise and Fall Time vs. Load Resistance



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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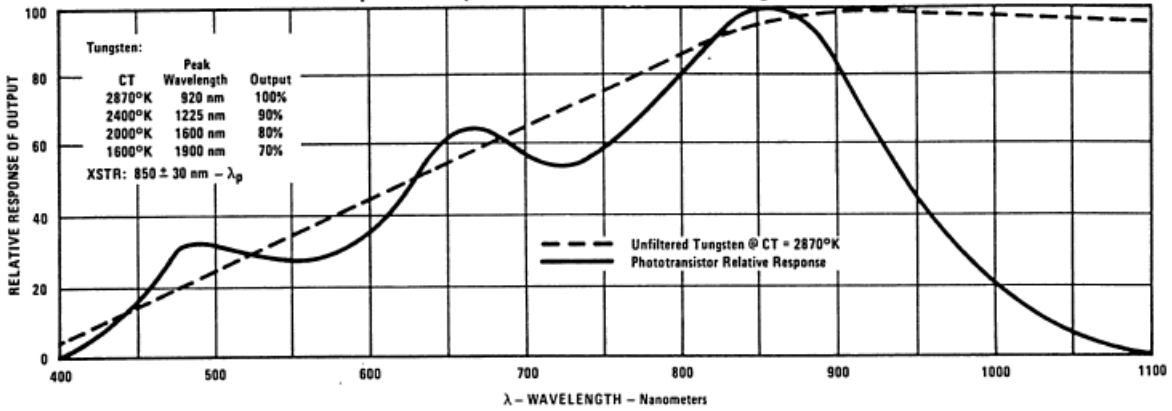
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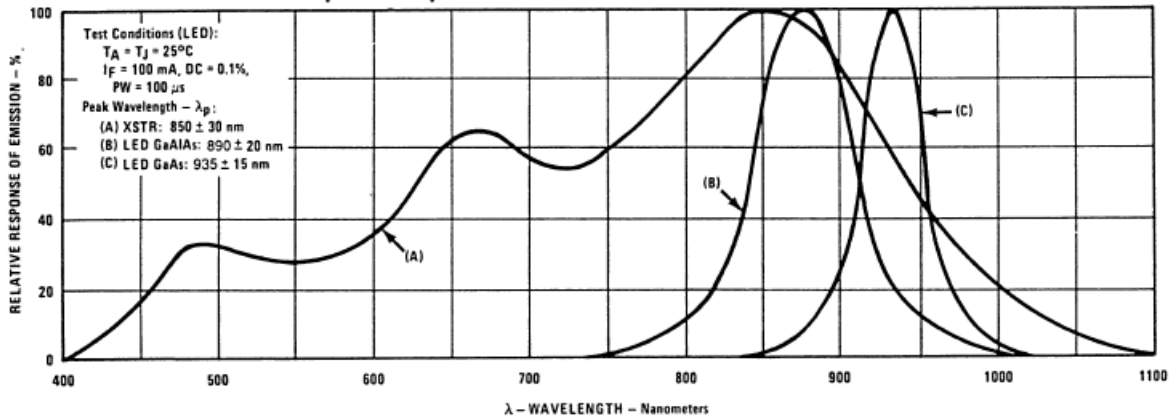


## Performance

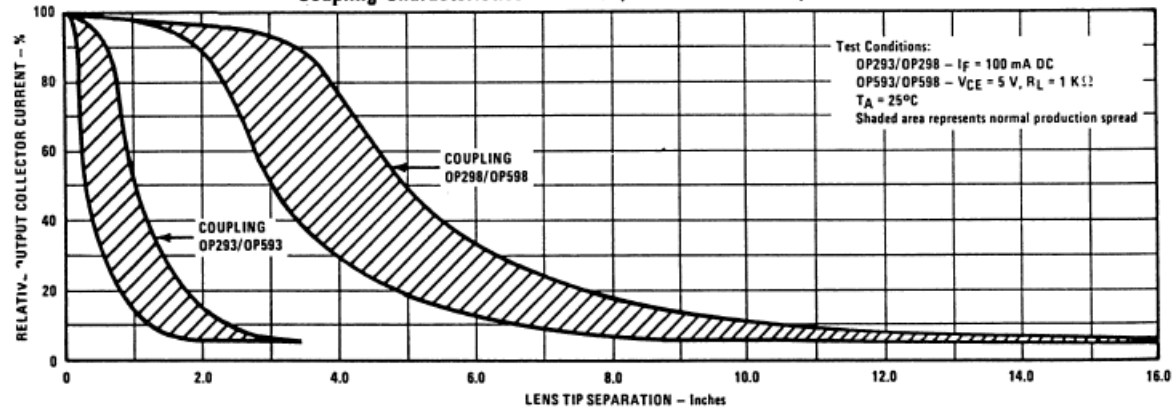
OP593, OP598  
Spectral Response of OP593/OP598 vs. Tungsten



Spectral Response of OP593/OP598 vs. GaAlAs and GaAs



Coupling Characteristics of OP293/OP593 and OP298/OP598



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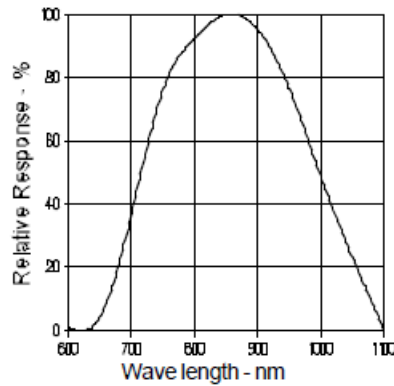
OP593, OP598, OP793, OP798 Series



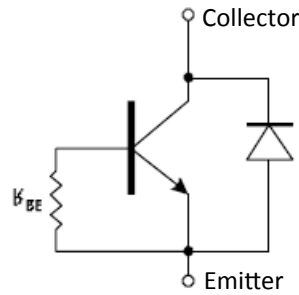
## Performance

OP793, OP798

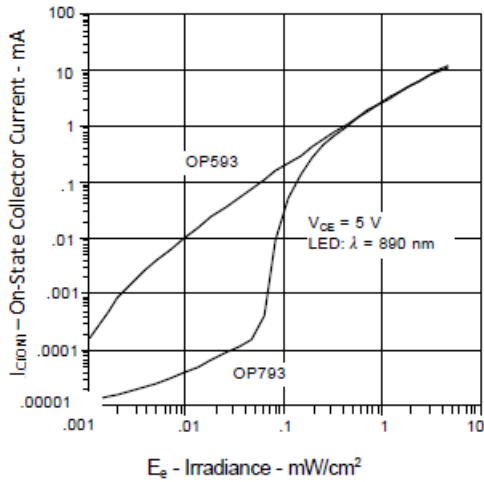
Typical Spectral Response



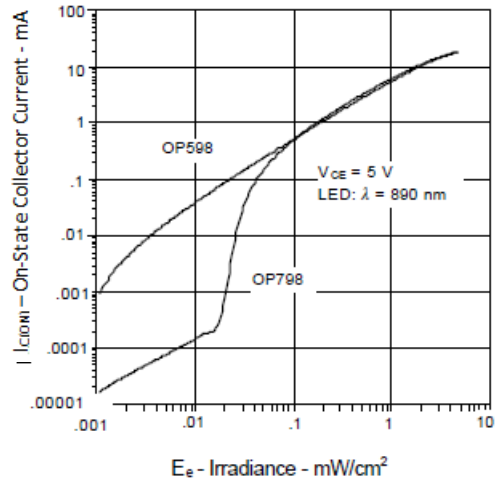
Schematic



On-State Collector Current vs. Irradiance



On-State Collector Current vs. Irradiance



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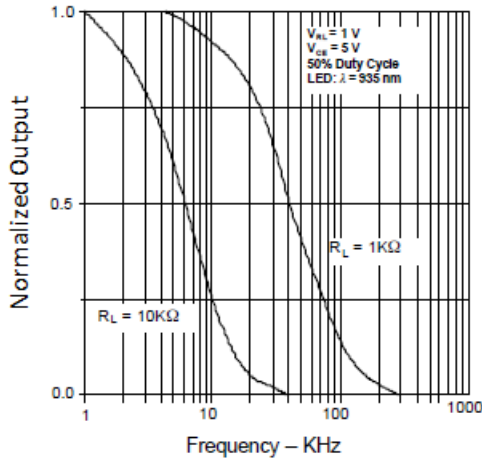
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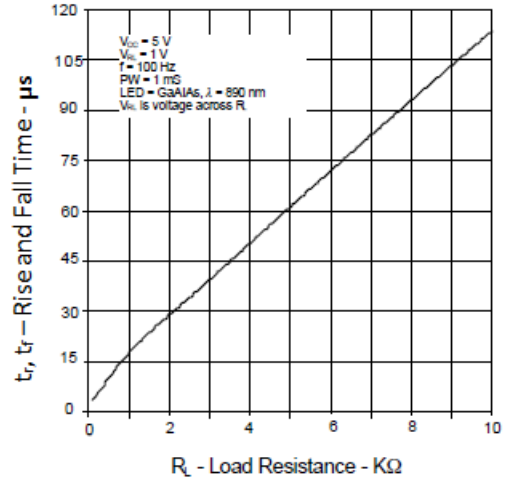
## Performance

OP793, OP798

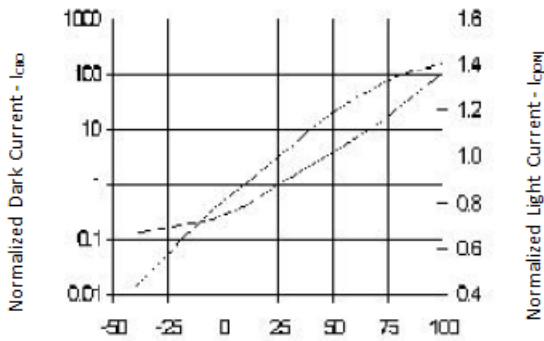
Normalized Output vs. Frequency



Typical Rise and Fall Time vs. Load Resistance



Normalized Light and Dark Current vs. Ambient Temperature



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