



**THE DATASHEET OF  
OP593A**



# NPN Plastic Silicon Phototransistor

## OP593, OP598 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** series devices provides relatively even reception over a large area. The narrow receiving angle (25°) of the **OP598** 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:

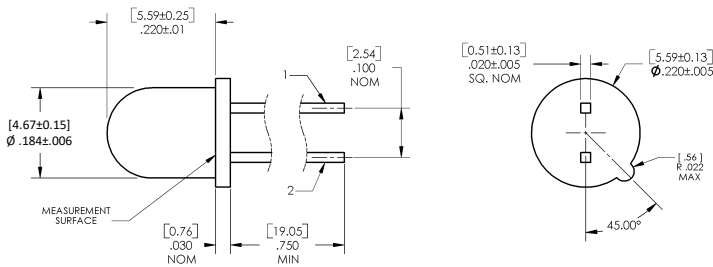
- Non-contact reflective or slotted sensor
- Assembly line automation
- Machine automation
- Machine Safety
- End of travel sensor
- Door sensor
- Safety Curtain



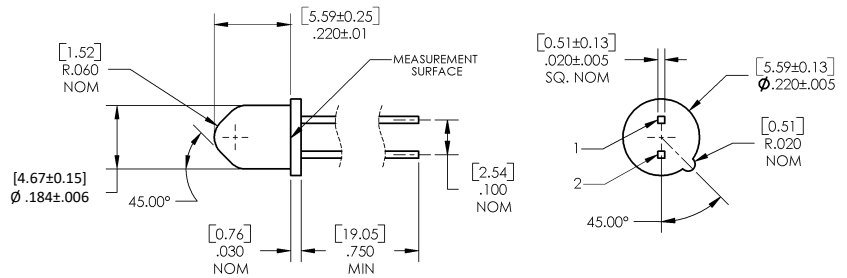
Pin #	Sensor
1	Collector
2	Emitter

Ordering Information				
Part Number	Sensor	Viewing Angle	Lead Length	
OP593A	Transistor	130°	0.75"	
OP593B				
OP593C (Obsolete)				
OP598A				25°
OP598B				
OP598C				
OP798A (Obsolete)	R <sub>BE</sub> Transistor	25°		
OP798B (Obsolete)				
OP798C (Obsolete)				
OP798D (Obsolete)				
OP798E (Obsolete)				

**OP593**



**OP598**



DIMENSIONS ARE IN: [MILLIMETERS] INCHES

### General Note

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OP593, OP598 Series



## Electrical Specifications

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Storage and Operating Temperature Range	-40° C to +100° 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° C <sup>(1)</sup>
Power Dissipation	250 mW <sup>(2)</sup>

**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 mW/cm <sup>2</sup> average within a .250" diameter aperture.
	OP593A	3.0	-	4	mA	
	OP593B	2.0	-	4		
	OP598A	7.5	-	10		
	OP598B	5.0	-	10		
OP598C	2.5	-	10			
$I_{CEO}$	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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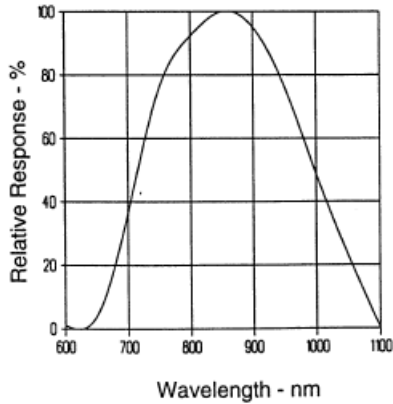
OP593, OP598 Series



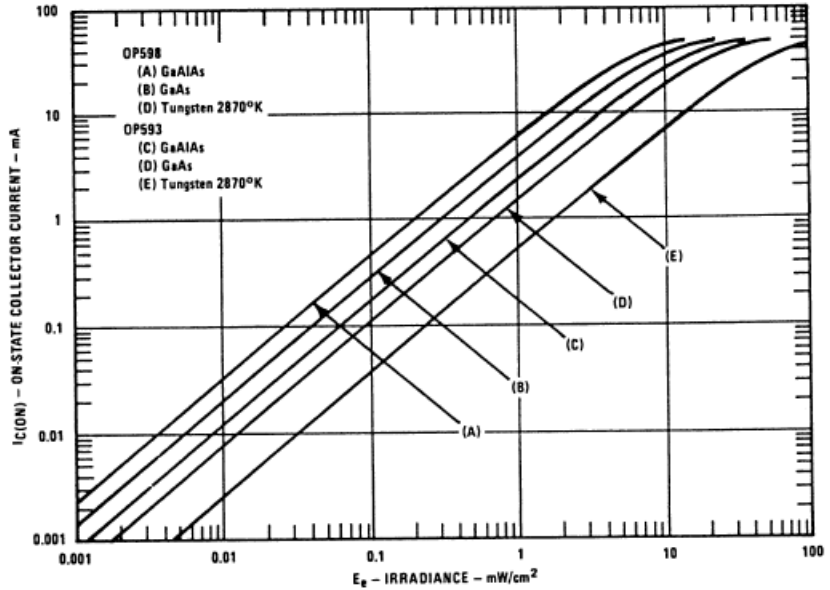
## Performance

OP593, OP598

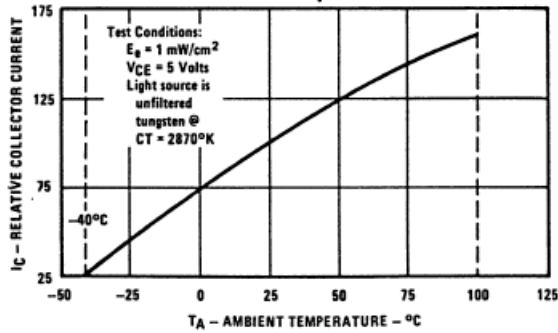
Typical Spectral Response



On-State Collector Current vs. Irradiance



Normalized Collector Current vs. Ambient Temperature



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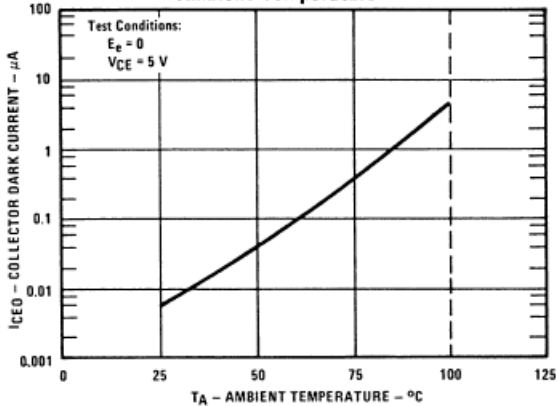
# NPN Plastic Silicon Phototransistor

OP593, OP598 Series

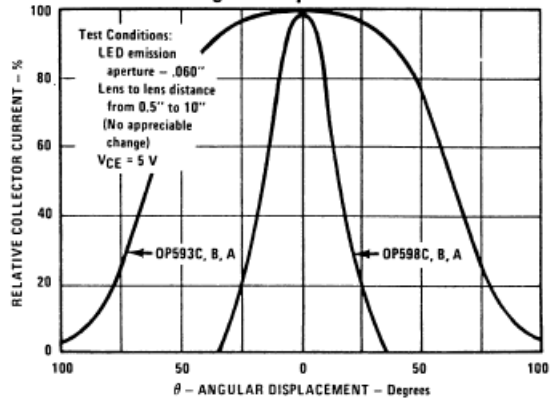


## Performance OP593, OP598

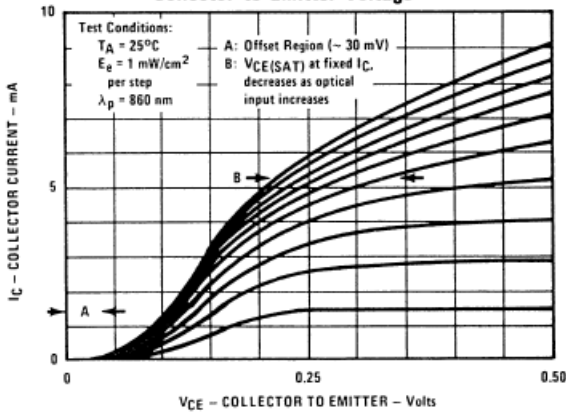
Collector Dark Current vs. Ambient Temperature



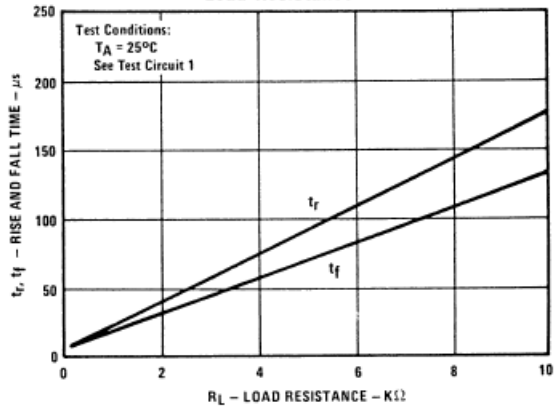
Relative Collector Current vs. Angular Displacement



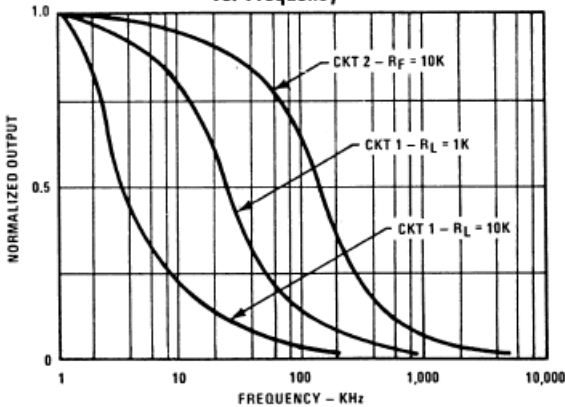
Collector Current vs. Collector to Emitter Voltage



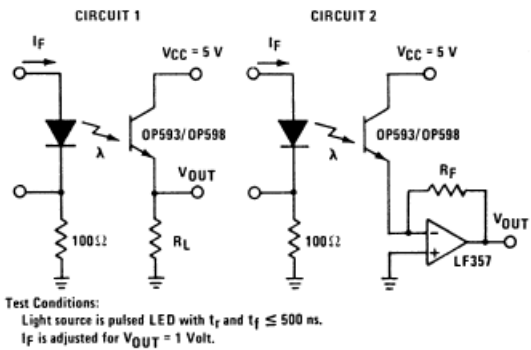
Rise and Fall Time vs. Load Resistance



Normalized Output vs. Frequency



Switching Time Test Circuit



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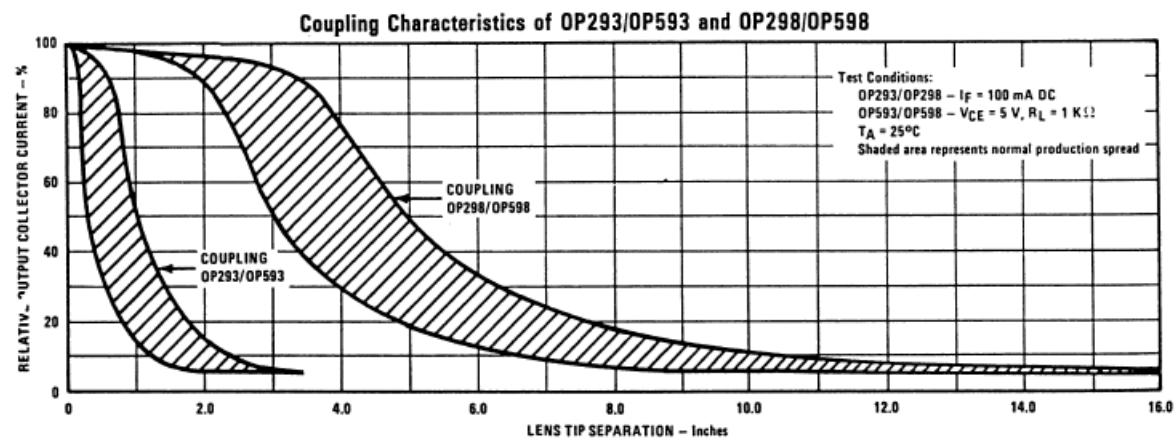
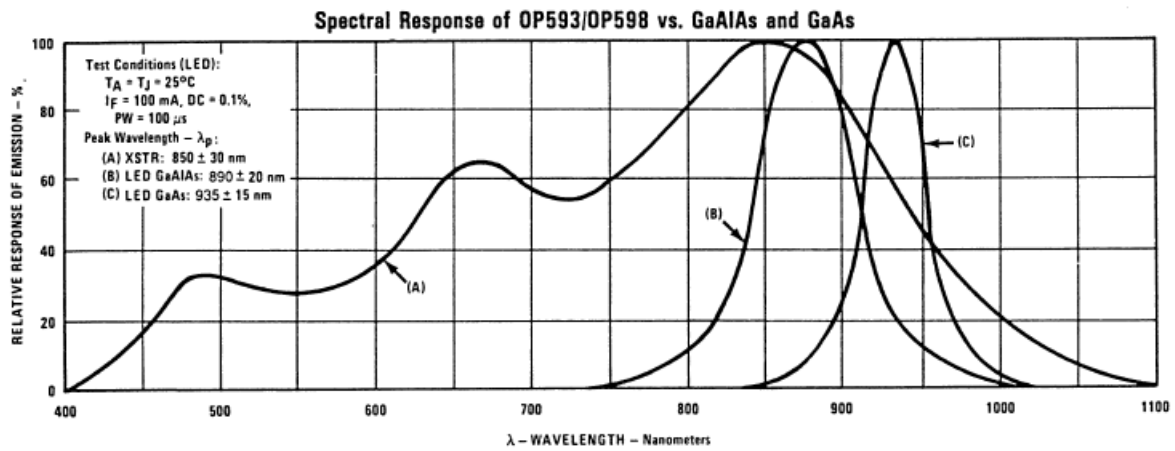
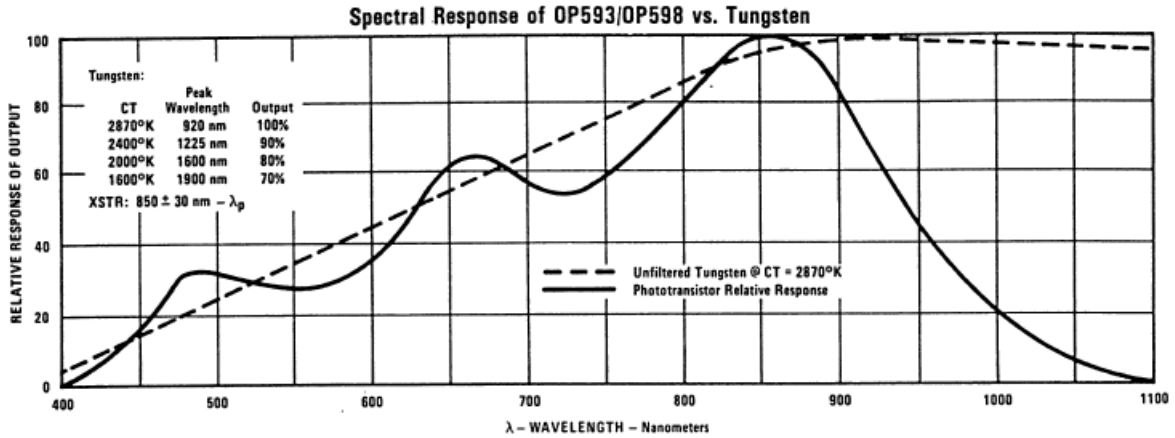
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## Performance

OP593, OP598



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