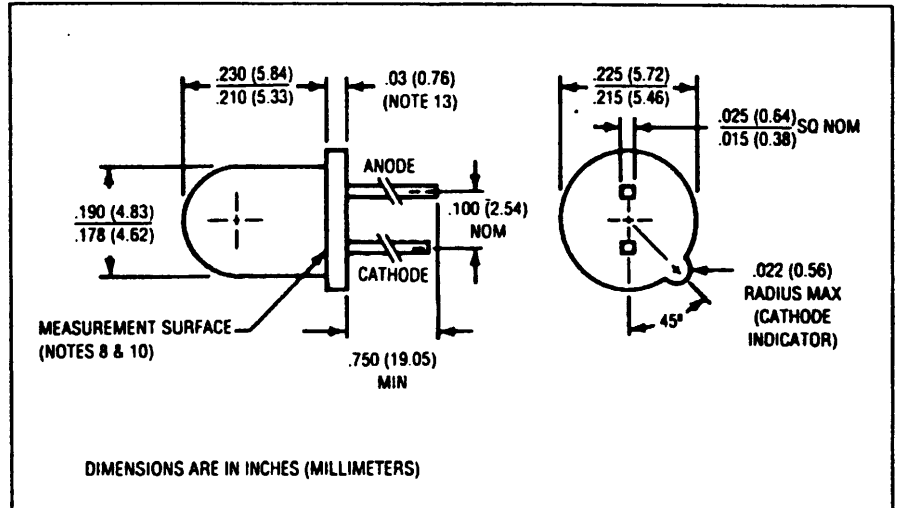
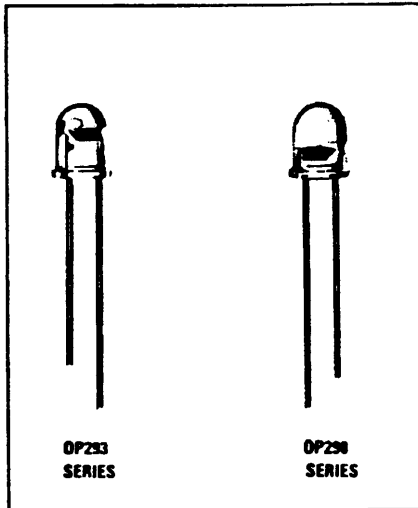


# GaAlAs Plastic Infrared Emitting Diodes

## Types OP293 and OP298 Series



### Features

- Wide irradiance pattern (OP293 series)
- Narrow irradiance pattern (OP298 series)
- Mechanically and spectrally matched to the OP593 and OP598 series phototransistors
- Variety of power ranges
- Significantly higher power output than GaAs at equivalent drive currents
- Wavelength matched to silicon's peak response
- Low cost replacement for TO-46 hermetic package

### Description

The OP293 and OP298 series devices are 890nm high intensity gallium aluminum arsenide infrared emitting diodes molded in IR transmissive packages. The broad irradiance pattern of the OP293 series provides relatively even illumination over a large area. The OP298 series is focused with an emission angle of 25°.

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

Reverse Voltage .....	2.0V
Continuous Forward Current, Free Air .....	100mA <sup>(2)</sup>
Continuous Forward Current, Board Mounted .....	133mA <sup>(3)</sup>
Continuous Forward Current, Full Heat Sink .....	200mA <sup>(4)</sup>
Peak Forward Current (25 μs pulse width) .....	2.0A
Maximum Duty Cycle (250 μs pulse width, @ 2 A) .....	5.0%
Storage and Operating Temperature Range .....	-40°C to +100°C
Lead Soldering Temperature [1/16 inch (1.6mm) from case for 5 sec with soldering iron] .....	260°C <sup>(1)</sup>
Power Dissipation, Free Air .....	142mW <sup>(2)</sup>
Power Dissipation, Board Mounted .....	200mW <sup>(3)</sup>
Power Dissipation, Full Heat Sink .....	400mW <sup>(4)</sup>

#### Notes:

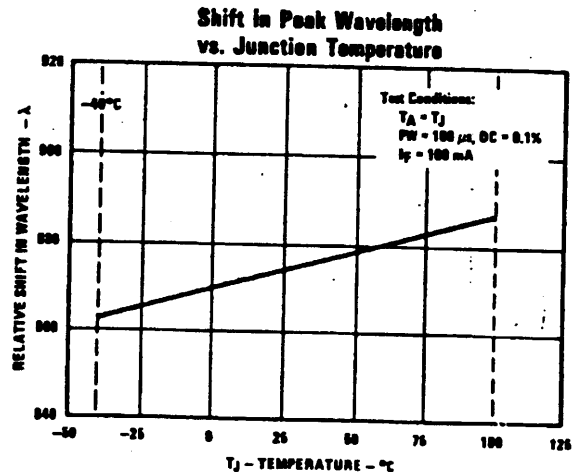
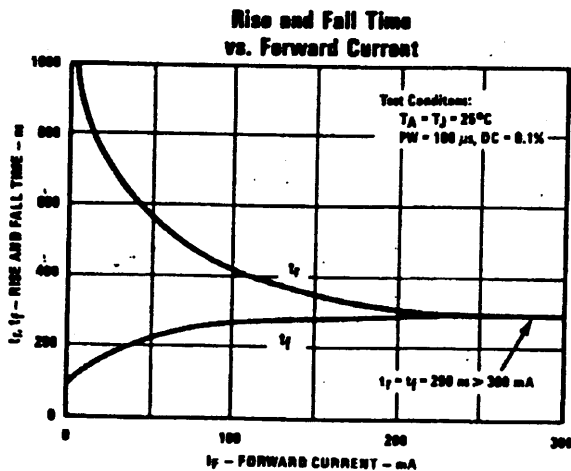
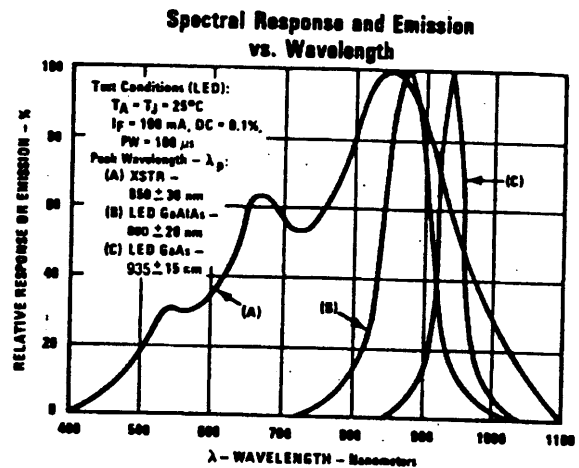
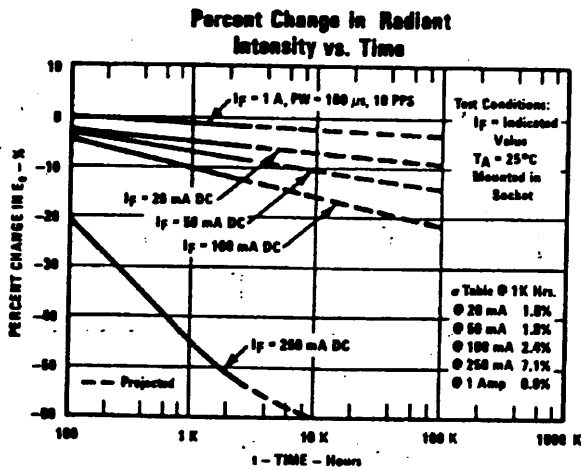
- (1) RMA flux is recommended. Duration can be extended to 10 sec max. when flow soldering. Max. 20 grams force may be applied to the leads when soldering.
- (2) Measured in Free-Air. Derate power dissipation linearly 1.43 mW/°C above 25°C.
- (3) Mounted on 1/16" (1.6mm) thick PC board with each lead soldered through 80 mil square lands 0.250" (6.35mm) below flange of device. Derate power dissipation linearly 2.00 mW/°C above 25°C. (Normal Use)
- (4) Immersed in silicone fluid to simulate infinite heat sink. Derate power dissipation linearly 2.50 mW/°C above 25°C.
- (5) Measurement is taken at the end of a single 100 μs pulse. Heating due to increased pulse rate or pulse width will cause a decrease in reading.
- (6) E<sub>av(APT)</sub> is a measurement of the average apertured radiant energy incident upon a sensing area 0.250" (6.35mm) in diameter perpendicular to and centered on the mechanical axis of the lens and 0.420" (10.7mm) from the measurement surface. E<sub>av(APT)</sub> is not necessarily uniform within the measured area.
- (7) Typical Total Power Out (P<sub>o</sub>) @ I<sub>F</sub> = 100mA pulsed on OP293C = 13 mW; OP293B = 18 mW; OP293A = 22 mW.
- (8) E<sub>av(APT)</sub> is a measurement of the average apertured radiant energy incident upon a sensing area 0.250" (6.5mm) in diameter perpendicular to and centered on the mechanical axis of the lens and 1.429" (36.30mm) from the measurement surface. E<sub>av(APT)</sub> is not necessarily uniform within the measured area.
- (9) For press fit, drill 0.184 ± 0.001" diameter hole.
- (10) This dimension is held to within ± 0.005" on the flange edge and may vary ± 0.020" in the area of the leads.
- (11) Cathode lead is 0.070" nom shorter than anode lead.

# Types OP293 and OP298 Series

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS	
$E_e(\text{APT})$	Apertured Radiant Incidence* *OP293 is measured with a $30^\circ$ cone angle at $0.420^\circ$ *OP298 is measured with a $10^\circ$ cone angle at $1.429^\circ$	OP293C	10.0			$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(6)(7)}$
		OP293B	13.0		26.0	$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(6)(7)}$
		OP293A	16.0			$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(6)(7)}$
		OP298C	1.8			$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(7)(8)}$
		OP298B	2.4		4.8	$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(7)(8)}$
		OP298A	3.0			$\text{mW}/\text{cm}^2$	$I_F = 100\text{mA}^{(5)(7)(8)}$
$V_F$	Forward Voltage			2.0	V	$I_F = 100\text{mA}^{(5)}$	
$I_R$	Reverse Current			100	$\mu\text{A}$	$V_R = 2.0\text{V}$	
$\lambda_p$	Wavelength at Peak Emission		890		nm	$I_F = 10\text{mA}$	
B	Spectral Bandwidth Between Half Power Points		80		nm	$I_F = 10\text{mA}$	
$\Delta\lambda_p/\Delta T$	Spectral Shift with Temperature		+0.18		$\text{nm}/^\circ\text{C}$	$I_F = \text{Constant}$	
$\theta_{HP}$	Emission Angle at Half Power Points	OP293	60		Deg.	$I_F = 20\text{mA}$	
		OP298	25		Deg.	$I_F = 20\text{mA}$	
$t_r$	Output Rise Time		500		ns	$I_F(\text{PK}) = 100\text{mA}$ , $\text{PW} = 10\mu\text{s}$ , D.C. = 10.0%	
$t_f$	Output Fall Time		250		ns		

## Typical Performance Curves



Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

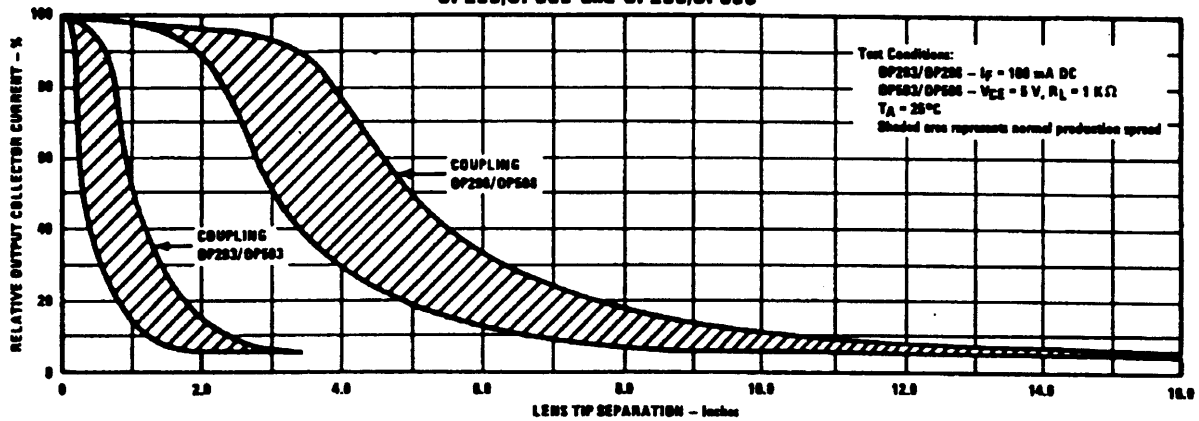
Optek Technology, Inc. 1215 W. Crosby Road Carrollton, Texas 75006 (214) 222-2200 FAX (214) 222-2201

# Types OP293 and OP298 Series

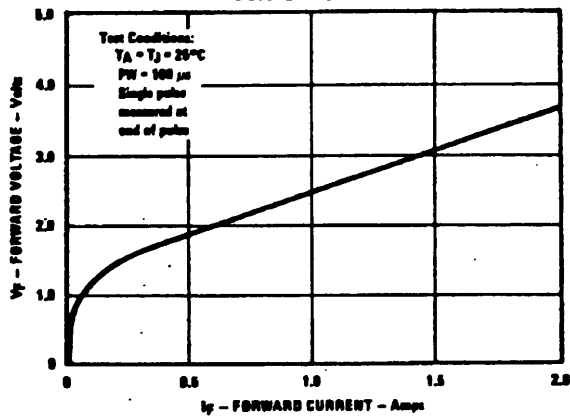


## Typical Performance Curves

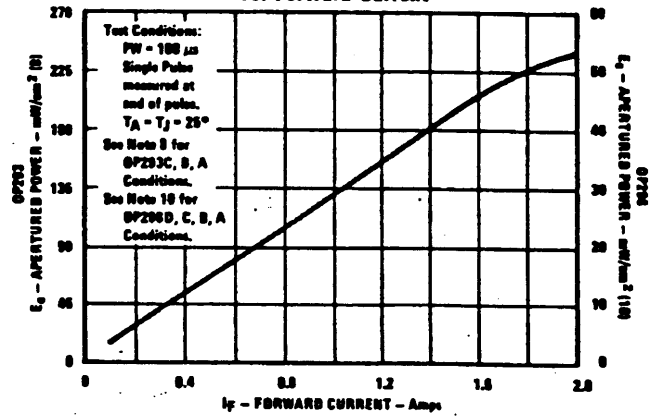
**Coupling Characteristics of  
OP293/OP593 and OP298/OP598**



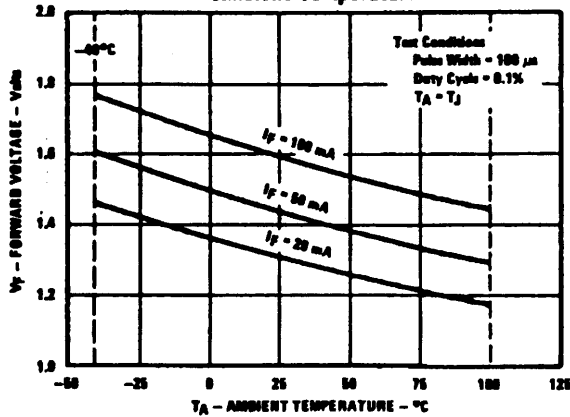
**Forward Voltage vs.  
Forward Current**



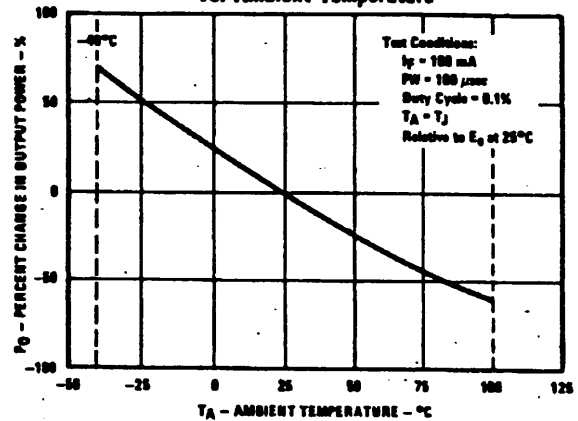
**Apertured Power OP293/OP298  
vs. Forward Current**



**Forward Voltage vs.  
Ambient Temperature**

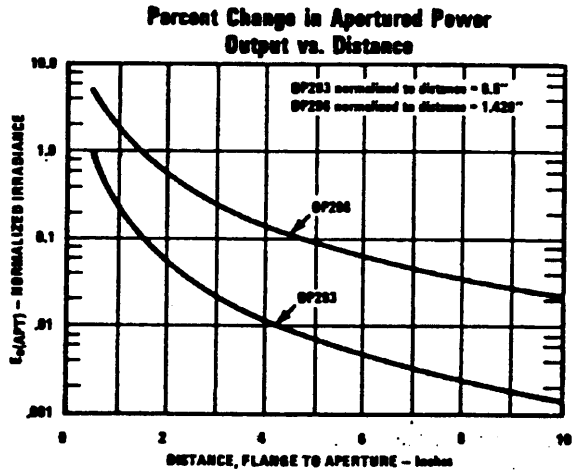
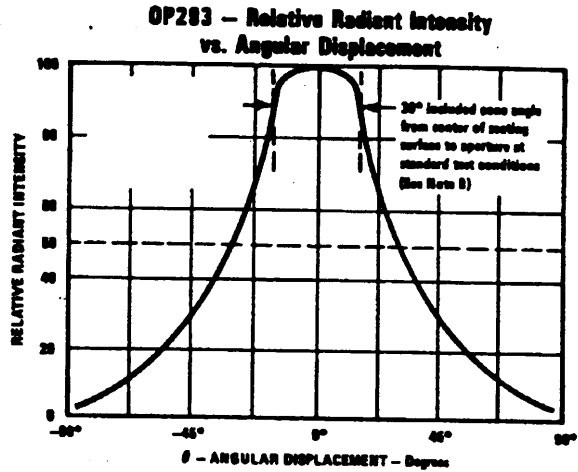
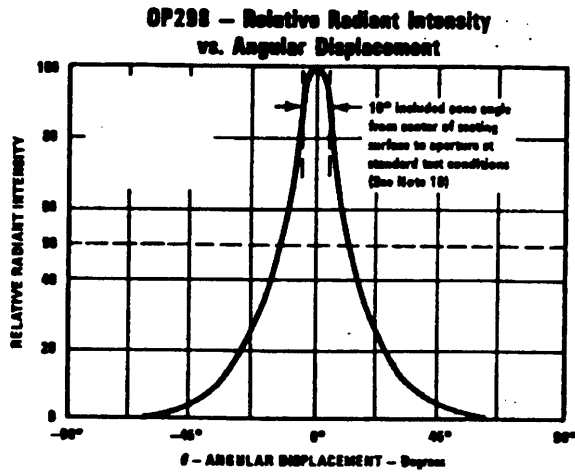


**Percent Change in Power Output  
vs. Ambient Temperature**



# Types OP293 and OP298 Series

## Typical Performance Curves



## Thermal Parameters

Type Unit	$R_{THJA}$ (°C/W)			$C_{TN}$ (10 <sup>-3</sup> W/°C)	$T_{TN}$ (10 <sup>-2</sup> d)	K
	Free Air <sup>(1)</sup>	Normal <sup>(2)</sup>	Infinite Heat Sink <sup>(3)</sup>			
AR	700	500	250	4.0	1.5	0.008

**Notes:**

- Heat transfer minimized by holding unit in still air with minimum heat transferred through leads by conduction.
- Unit mounted in double sided printed circuit board 0.250 inches (6.35 mm) below plastic. The lead area are 0.008 inches square. This simulates normal use.
- Unit immersed in circulating silicone fluid holding TCASE @ 25°C. This simulates an infinite heat sink.

Refer to Application Bulletin 200 for use of these constants.