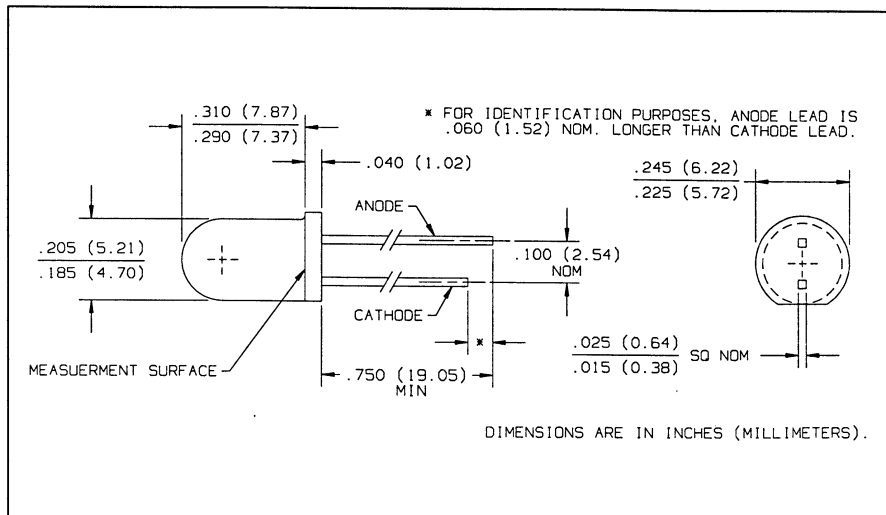
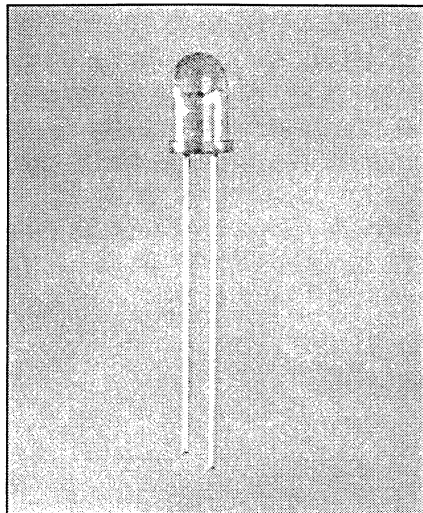


GaAlAs Plastic Infrared Emitting Diodes

Types OP290, OP291, OP292 Series



Features

- Wide irradiance pattern
- Significantly higher power output than GaAs at equivalent drive currents
- T-1 3/4 package style
- UL recognized, File No. S2047

Description

The OP290, OP291, and OP292 are gallium aluminum arsenide infrared emitting diodes molded in IR transmissive plastic packages. The OP290 is specified under pulse conditions to 1.5 amps and can be used up to 5 amps. The OP291 is specified under pulse conditions to 100mA and is intended for use as low cost plastic replacements for TO-46 hermetic units. The OP292 is specified under pulse conditions to 20 mA and is intended for use in low current applications. The wavelength is centered at 890 nm and closely matches the spectral response of silicon phototransistors. Each of these unit types is categorized into three ranges of apertured power output. They are also completely characterized for ease of system design. Silver-copper lead frames offer excellent thermal characteristics.

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

| | |
|--|---|
| Reverse Voltage OP290..... | 5.0 V |
| OP291..... | 2.0 V |
| OP292..... | 5.0 V |
| Continuous Forward Current..... | 150 mA ⁽¹⁾ |
| Peak Forward Current OP290 (25 μs pulse width)..... | 5.0 A |
| OP291 (100 μs pulse width)..... | 2.0 A |
| OP292 (100 μs pulse width)..... | 1.00 A |
| Maximum Duty Cycle OP290 (25 μs pulse width, @ 5 A)..... | 1.25% ⁽²⁾ |
| Storage and Operating Temperature Range..... | -40°C to $+100^\circ\text{C}$ |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec with soldering iron]..... | 260°C ⁽³⁾ |
| Power Dissipation, Free Air..... | 333 mW ⁽⁴⁾ |
| Power Dissipation, Board Mounted..... | 533 mW ⁽⁵⁾ |
| Power Dissipation, Full Heat Sink..... | 1.11 W ⁽⁶⁾ |

Notes:

- (1) Derate linearly 1.67 mA/ $^\circ\text{C}$ above 25°C (Free-Air). When used with heat sink (See Note 5) derate linearly 2.07 mA/ $^\circ\text{C}$ above 65°C (Normal use).
- (2) Refer to graph of Maximum Peak Pulse Current vs. Pulse Width.
- (3) RMA flux is recommended. Duration can be extended to 10 sec max. when soldering. Max. 20 grams force may be applied to the leads when flow soldering.
- (4) Measured in Free-Air. Derate linearly 3.33 mW/ $^\circ\text{C}$ above 25°C .
- (5) Mounted on 1/16" (1.6 mm) thick PC board with each lead soldered through 80 mil square lands 0.250" (6.35 mm) below flange of device. Derate linearly 5.33 mW/ $^\circ\text{C}$ above 62.5°C .
- (6) Immersed in silicone fluid to simulate infinite heat sink. Derate linearly 11.1 mW/ $^\circ\text{C}$ above 95°C .
- (7) 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.
- (8) $E_{e(\text{APT})}$ is a measurement of the average apertured radiant energy incident upon a sensing area 0.250" (6.35 mm) in diameter perpendicular to and centered on the mechanical axis of the lens and 0.500" (12.7 mm) from the measurement surface. $E_{e(\text{APT})}$ is not necessarily uniform within the measured area.
- (9) Typical total Power Out (P_o) @ $I_F = 20\text{ mA}$ pulsed all units is 3.6 mW, @ $I_F = 100\text{ mA}$ is 19 mW, and @ $I_F = 1.5\text{ A}$ is 240 mW.
- (10) Measured at the end of a 10 msec. voltage soak.
- (11) This dimension is held to within ± 0.005 " on the flange edge and may vary ± 0.020 " in the area of the leads.
- (12) Cathode lead is 0.070" nom shorter than anode lead.

Types OP290, OP291, OP292 Series

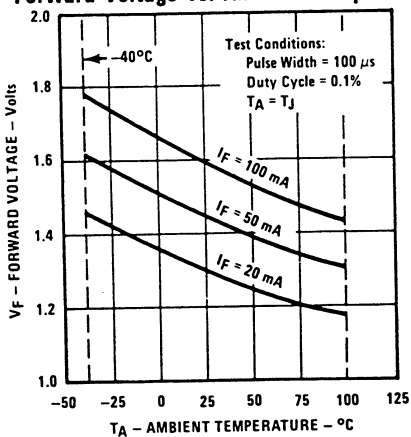
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

INFRARED
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DIODES

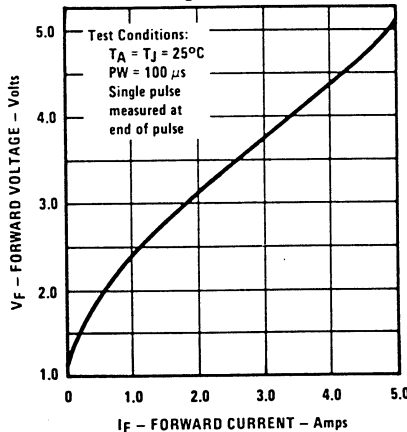
| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS | |
|----------------------------|--|-------------|-------|-----|----------------------------|--|-----------------------------------|
| $E_e(\text{APT})$ | Apertured Radiant Incidence *OP290 series is measured into a 30° cone with the aperture 0.5" from the device measurement surface | OP290C | 150 | | | mW/cm^2 | $I_F = 1.50\text{ A}^{(7)(8)(9)}$ |
| | | OP290B | 180 | | 300 | mW/cm^2 | $I_F = 1.50\text{ A}^{(7)(8)(9)}$ |
| | | OP290A | 210 | | | mW/cm^2 | $I_F = 1.50\text{ A}^{(7)(8)(9)}$ |
| | | OP291C | 10 | | | mW/cm^2 | $I_F = 100\text{ mA}^{(7)(8)(9)}$ |
| | | OP291B | 13 | | 26 | mW/cm^2 | $I_F = 100\text{ mA}^{(7)(8)(9)}$ |
| | | OP291A | 16 | | | mW/cm^2 | $I_F = 100\text{ mA}^{(7)(8)(9)}$ |
| V_F | Forward Voltage | OP290 | | | 4.00 | V | $I_F = 1.50\text{ A}^{(7)}$ |
| | | OP291 | | | 2.00 | V | $I_F = 100\text{ mA}^{(7)}$ |
| | | OP292 | | | 1.75 | V | $I_F = 20\text{ mA}^{(7)}$ |
| I_R | Reverse Current | OP290/OP292 | | | 10 | μA | $V_R = 5\text{ V}^{(10)}$ |
| | | OP291 | | | 100 | μA | $V_R = 2\text{ V}^{(10)}$ |
| λ_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 | | $\text{nm}/^\circ\text{C}$ | $I_F = \text{Constant}$ | |
| θ_{HP} | Emission Angle at Half Power Points | | 50 | | Deg. | $I_F = 20\text{ mA}$ | |
| t_r | Output Rise Time | | 500 | | ns | $I_{F(\text{PK})} = 100\text{ mA}$, PW = 10 μs , D.C. = 10% | |
| t_f | Output Fall Time | | 250 | | ns | | |

Typical Performance Curves

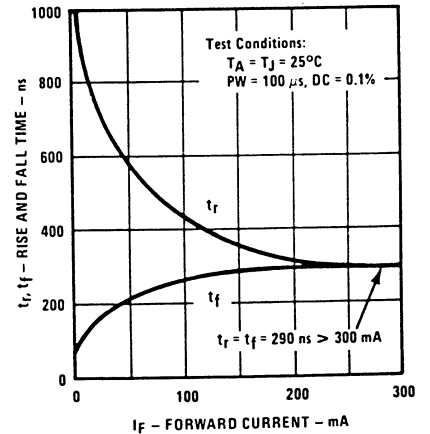
Forward Voltage vs. Ambient Temperature



Forward Voltage vs. Forward Current



Rise and Fall Times vs. Forward Current



Thermal Parameters

| Type Units | RTHJA ($^\circ\text{C}/\text{W}$) | | | CTH ($10^{-5}\text{ W}/^\circ\text{C}$) | τ_{TH} (10^{-2} s) | K |
|------------|-------------------------------------|-----------------------|-----------------------------------|---|------------------------------------|-------|
| | Free Air ⁽¹⁾ | Normal ⁽²⁾ | Infinite Heat Sink ⁽³⁾ | | | |
| All | 300 | 188 | 90 | 1.42 | 0.263 | 0.008 |

Refer to Application Bulletin 105 for use of these constants.

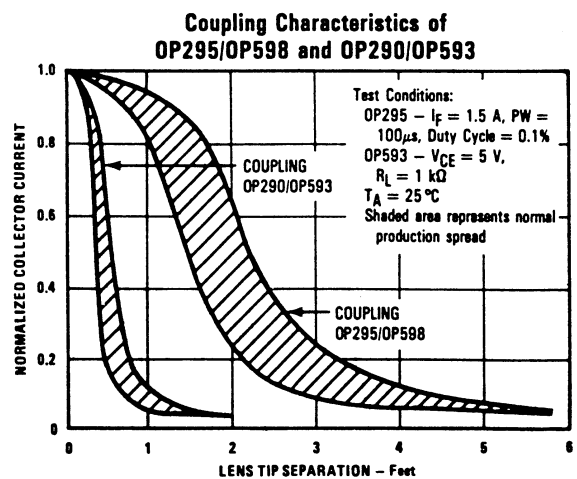
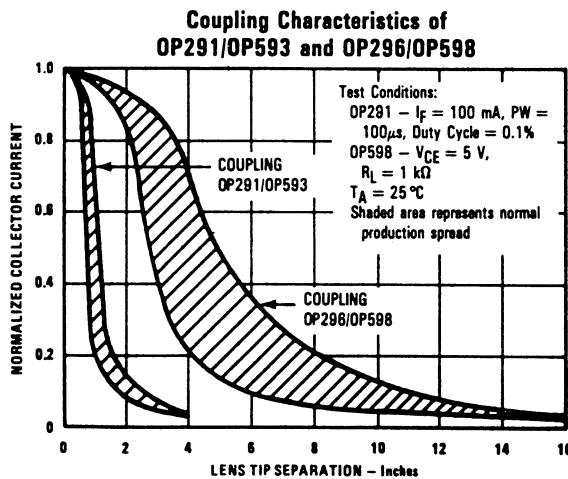
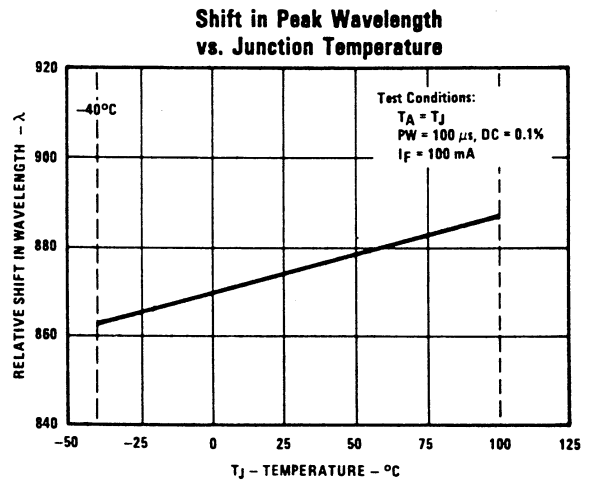
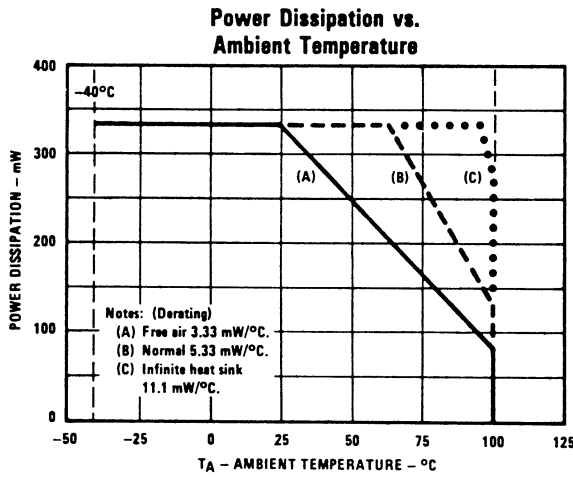
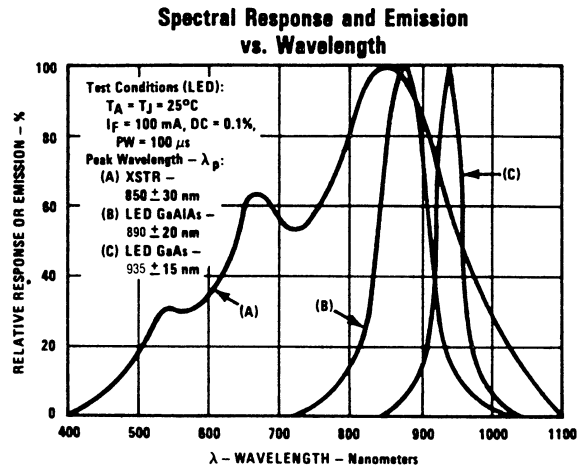
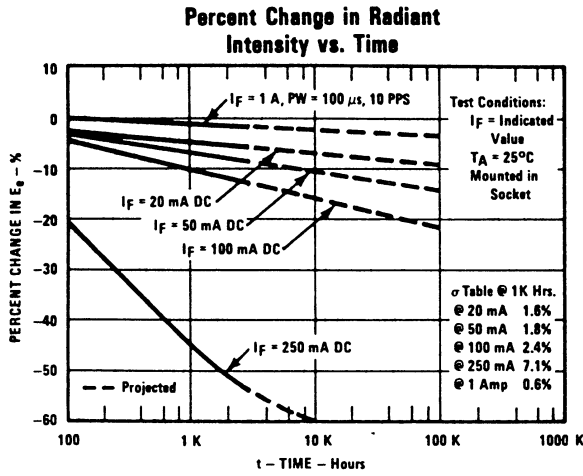
Notes to Thermal Parameters

- 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 land areas are 0.080 inches square. This simulates normal use.
- Unit immersed in circulating silicone fluid holding $T_{\text{CASE}} = 25^\circ\text{C}$. This simulates an infinite heat sink.

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 (972)323-2200 Fax (972)323-2396

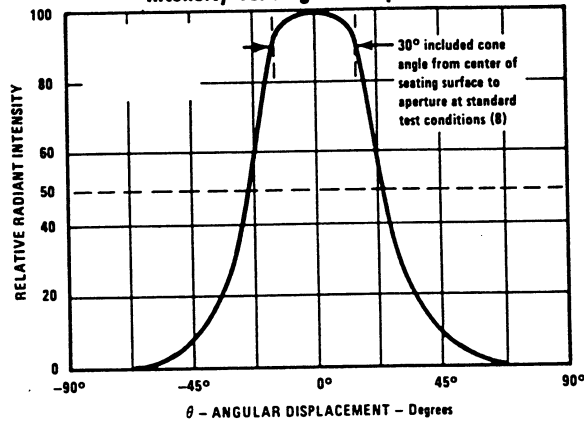
Typical Performance Curves



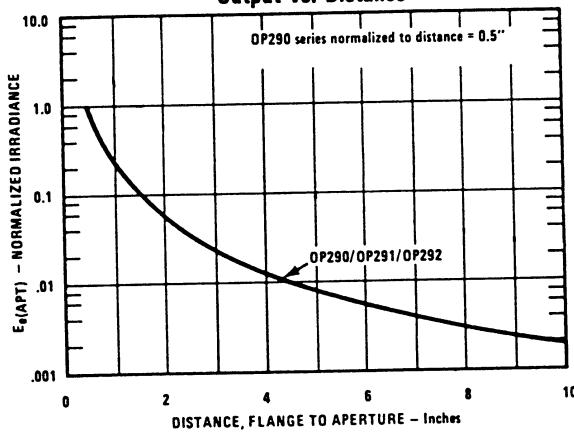
Types OP290, OP291, OP292 Series

Typical Performance Curves

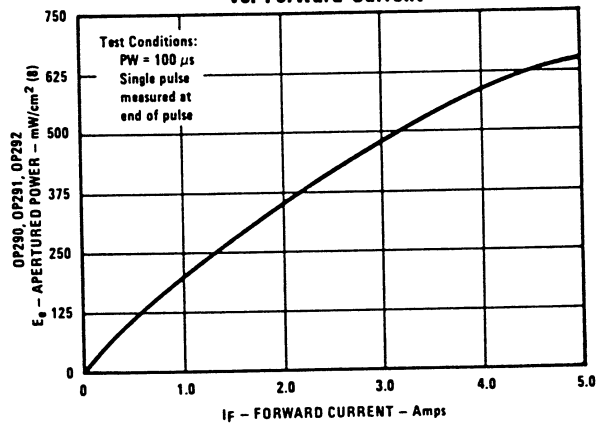
OP290/OP291/OP292 Relative Radiant Intensity vs. Angular Displacement



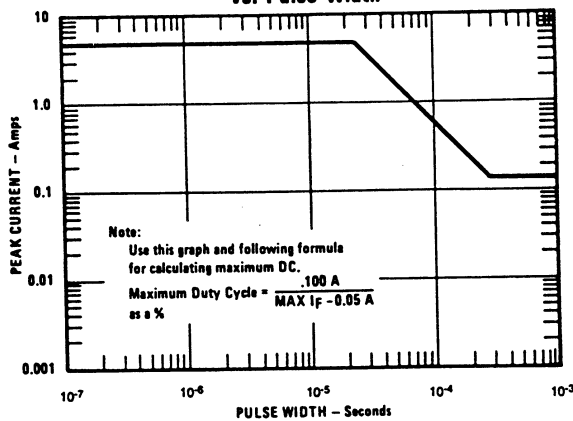
Percent Change in Apertured Power Output vs. Distance



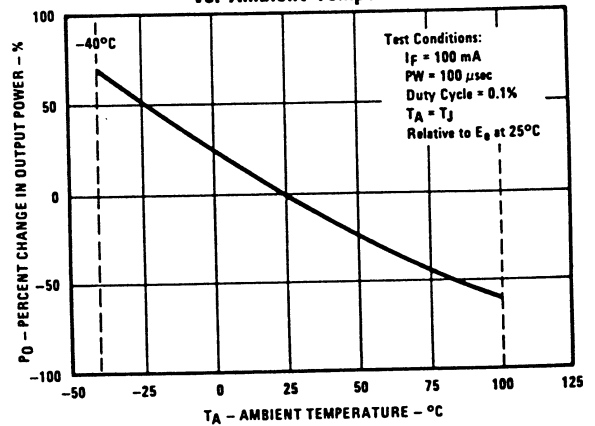
Power Output or Radiant Incidence vs. Forward Current



Maximum Peak Pulse Current vs. Pulse Width



Percent Change in Power Output vs. Ambient Temperature



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