

# Plastic Infrared Emitting Diode

OP165, OP166 Series



## Features:

- T-1 (3 mm) package style
- Choice of narrow or wide irradiance pattern
- Choice of dome lens or flat lens
- Mechanically and spectrally matched to other OPTEK devices
- Higher power output than GaAs at equivalent drive currents
- 935 nm diode



## Description:

Each device in the **OP165** and **OP166** series is a high intensity gallium arsenide infrared emitting diode (GaAlAs) that is molded in an IR transmissive clear epoxy package with either a dome or flat lens. Devices feature narrow and wide irradiance patterns and a variety of electrical characteristics. The small T-1 package style makes these devices ideal for space-limited applications.

*OP165 and OP166 devices are mechanically and spectrally matched to the OP505 and OP535 series devices.*

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

## Applications:

- Space-limited applications
- Applications requiring coupling efficiency
- Battery-operated or voltage-limited applications

Ordering Information					
Part Number	LED Peak Wavelength	Output Power (mW/cm <sup>2</sup> ) Min / Max	I <sub>F</sub> (mA) Typ / Max	Total Beam Angle	Lead Length
OP165A	935 nm	1.95 / NA	20 / 50	18°	0.50"
OP165B		1.40 / 2.20			
OP165C		0.85 / 1.60			
OP165D		0.28 / NA			
OP165W		0.50 / NA		90°	
OP166A		1.95 / NA		18°	
OP166B		1.40 / 2.20			
OP166C		0.85 / 1.60			
OP166D		0.28 / NA			
OP166W		0.50 / NA		90°	



RoHS

General Note  
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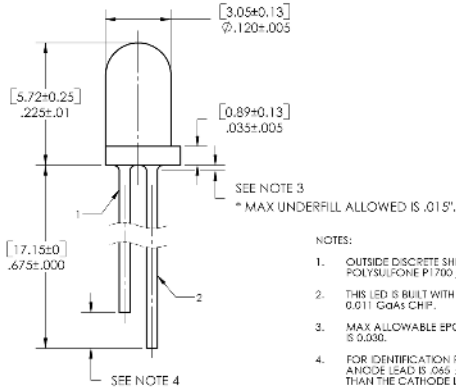
OPTEK Technology, Inc.  
1645 Wallace Drive, Carrollton, TX 75006 | Ph: +1 972 323 2200  
www.optekinc.com | www.ttelectronics.com

# Plastic Infrared Emitting Diode

## OP165, OP166 Series



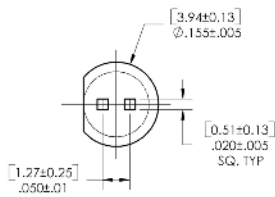
### OP165 (A, B, C, D)



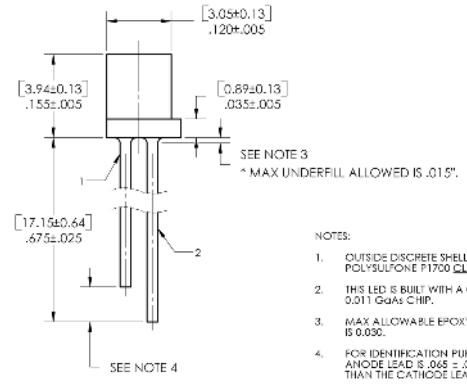
- NOTES:
1. OUTSIDE DISCRETE SHELL IS POLYSULFONE P1700 CLEAR.
  2. THIS LED IS BUILT WITH A 0.0011 X 0.011 GaAs CHIP.
  3. MAX ALLOWABLE EPOXY MINISCUS IS 0.030.
  4. FOR IDENTIFICATION PURPOSES, ANODE LEAD IS .065 ± .035 LONGER THAN THE CATHODE LEAD.

#### DISCRETE PIN-OUT

- 1 CATHODE
- 2 ANODE



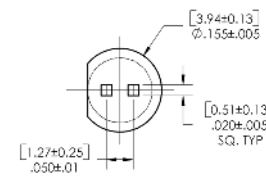
### OP165W



- NOTES:
1. OUTSIDE DISCRETE SHELL IS POLYSULFONE P1700 CLEAR.
  2. THIS LED IS BUILT WITH A 0.011 X 0.011 GaAs CHIP.
  3. MAX ALLOWABLE EPOXY MINISCUS IS 0.030.
  4. FOR IDENTIFICATION PURPOSES, ANODE LEAD IS .065 ± .035 LONGER THAN THE CATHODE LEAD.

#### DISCRETE PIN-OUT

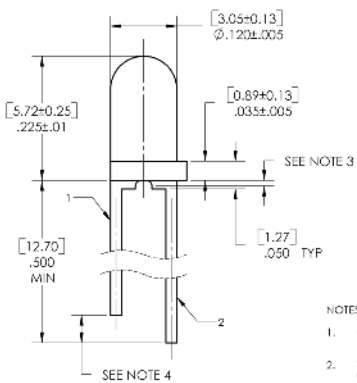
- 1 CATHODE
- 2 ANODE



DIMENSIONS ARE IN: [MILLIMETERS] [INCHES]

### OP166 (A, B, C, D)

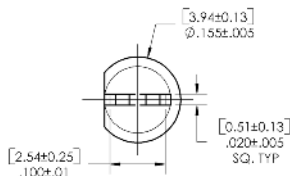
\* MAX UNDERFILL ALLOWED IS .015".  
 \*\* ELBOW OF LEADFRAME NOT MORE THAN .005" FROM FLANGE.



- NOTES:
1. OUTSIDE DISCRETE SHELL IS POLYSULFONE P1700 CLEAR.
  2. THIS LED IS BUILT WITH A 0.0011 X 0.011 GaAs CHIP.
  3. MAX ALLOWABLE EPOXY MINISCUS IS 0.030.
  4. FOR IDENTIFICATION PURPOSES, ANODE LEAD IS .050 MIN. LONGER THAN THE CATHODE LEAD.

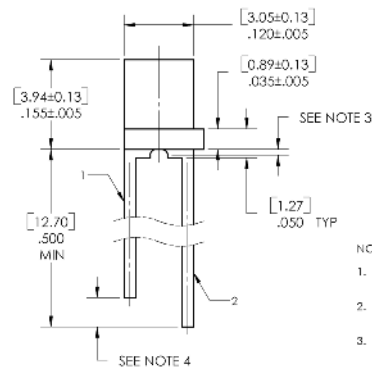
#### DISCRETE PIN-OUT

- 1 CATHODE
- 2 ANODE



### OP166W

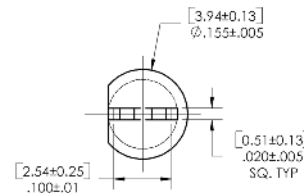
\* MAX UNDERFILL ALLOWED IS .015".  
 \*\* ELBOW OF LEADFRAME NOT MORE THAN .005" FROM FLANGE.



- NOTES:
1. OUTSIDE DISCRETE SHELL IS POLYSULFONE P1700 CLEAR.
  2. THIS LED IS BUILT WITH A 0.011 X 0.011 GaAs CHIP.
  3. MAX ALLOWABLE EPOXY MINISCUS IS 0.030.
  4. FOR IDENTIFICATION PURPOSES, ANODE LEAD IS .050 MIN. LONGER THAN THE CATHODE LEAD.

#### DISCRETE PIN-OUT

- 1 CATHODE
- 2 ANODE



Pin #	LED
1	Cathode
2	Anode

**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.

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OP165, OP166 Series



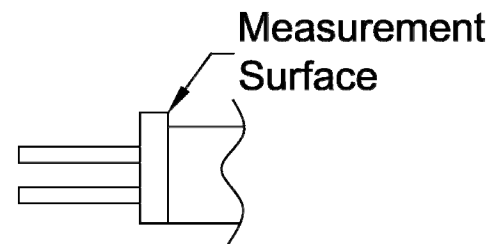
## Electrical Specifications

Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)	
Storage and Operating Temperature Range	-40°C to +100°C
Reverse Voltage	2.0 V
Continuous Forward Current	50 mA
Peak Forward Current (1 $\mu\text{s}$ pulse width, 300 pps)	3.0 A
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	260°C
Power Dissipation	100 mW <sup>(1)</sup>

Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>						
$E_{E(APT)}$	Apertured Radiant Incidence OP165A, OP166A	1.95	-	-	mW/cm <sup>2</sup>	$I_F = 20\text{ mA}^{(2)}$
$P_O$	Radiant Power Output OP165W, OP166W	0.50	-	-	mW	$I_F = 20\text{ mA}$
$V_F$	Forward Voltage	-	-	1.60	V	$I_F = 20\text{ mA}$
$I_R$	Reverse Current	-	-	100	$\mu\text{A}$	$V_R = 2\text{ V}$
$\lambda_p$	Wavelength at Peak Emission	-	935	-	nm	$I_F = 10\text{ mA}$
B	Spectral Bandwidth between Half Power Points	-	50	-	nm	$I_F = 10\text{ mA}$
$\Delta\lambda_p/\Delta T$	Spectral Shift with Temperature OP165, OP166 (A, B, C, D) OP165W, OP166W	-	-	-	nm/°C	$I_F = \text{Constant}$
$\theta_{HP}$	Emission Angle at Half Power Points OP165, OP166 (A, B, C, D) OP165W, OP166W	-	18	-	Degree	$I_F = 20\text{ mA}$
$t_r$	Output Rise Time	-	1000	-	ns	$I_{F(PK)} = 100\text{ mA}$ , PW=10 $\mu\text{s}$ , D.C.=10.0%
$t_f$	Output Fall Time	-	500	-	ns	

**Notes:**

- Derate linearly 1.33 mW/°C above 25°C
- $E_{E(APT)}$  is a measurement of the average apertured radiant incidence upon a sensing area 0.081" (2.06 mm) in diameter, perpendicular to and centered on the mechanical axis of the lens, and 0.590" (14.99 mm) from the measurement surface.  $E_{E(APT)}$  is not necessarily uniform within the measured areas.



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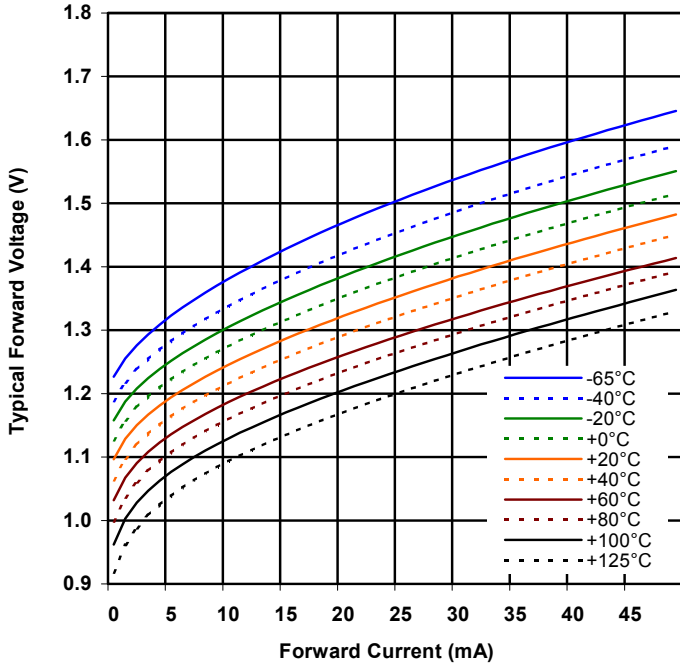
OP165, OP166 Series



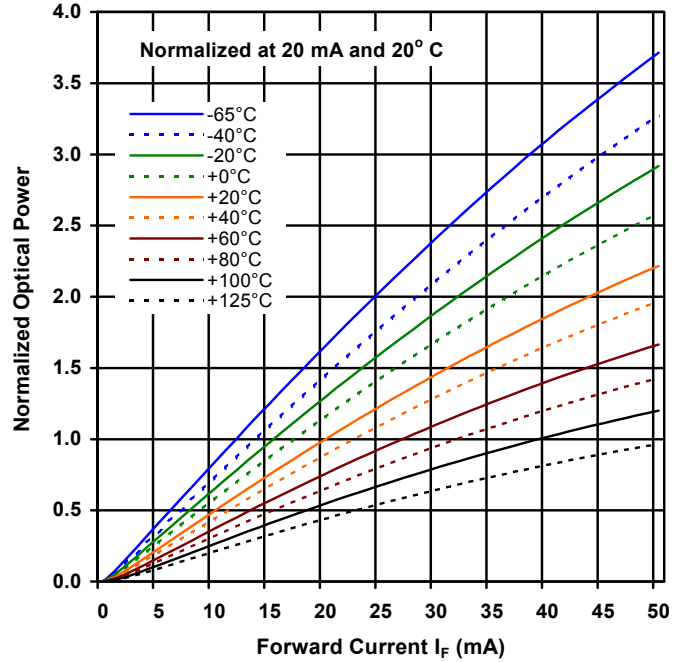
## Performance

OP165, OP166 (A, B, C, D, W)

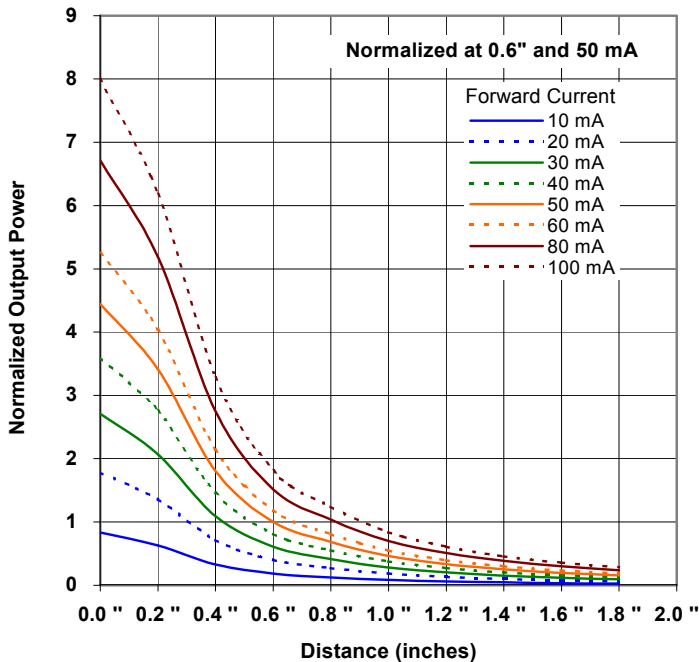
Forward Voltage vs Forward Current vs Temperature



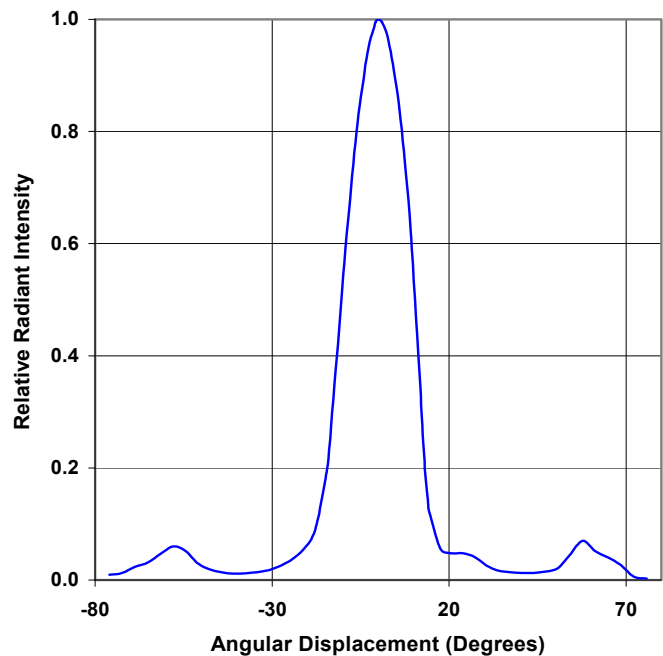
Optical Power vs  $I_F$  vs Temp



Distance vs Output Power vs Forward Current



Relative Radiant Intensity vs Angular Displacement



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