

# Plastic Infrared Emitting Diode

## OP165 Series, OP166A, OP166B



### 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
- 935 nm LED



### Description:

Each device in the **OP165** and **OP166** series is a high intensity gallium arsenide (GaAs) infrared emitting diode 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 sensor series devices.*

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

**Custom electrical, wire and cabling and connectors are available. Contact your local representative or OPTEK for more information.**

### 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 (Min)	
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		90°		
OP165W		0.50 / NA				
OP166A		1.95 / NA		18°		
OP166B		1.40 / 2.20				



RoHS

#### General Note

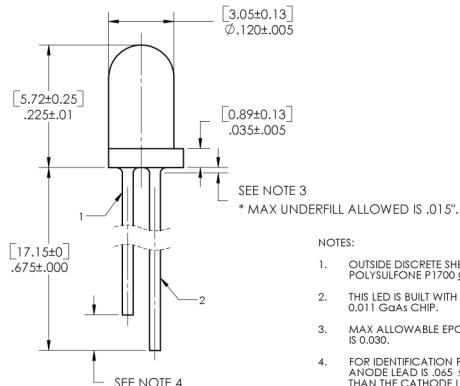
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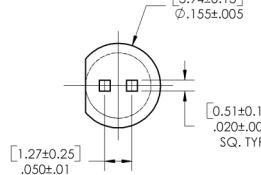
## OP165 Series, OP166A, OP166B



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



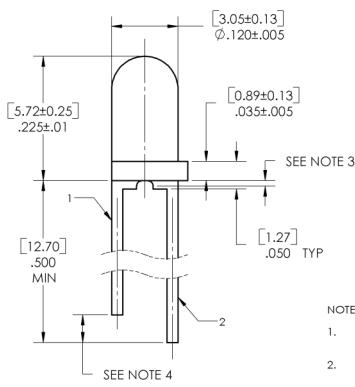
**DISCRETE PIN-OUT**



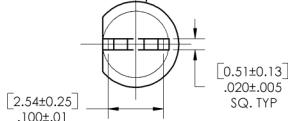
**OP166 (A, B)**

DIMENSIONS ARE IN:  
[MILLIMETERS]  
INCHES

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



**DISCRETE PIN-OUT**



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 Series, OP166A, OP166B



### Electrical Specifications

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

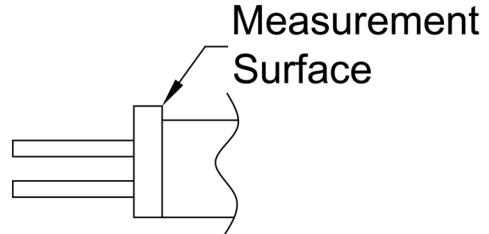
Storage and Operating Temperature Range	-40° C to +100° C
Reverse Voltage	2.0 V
Continuous Forward Current	50 mA
Peak Forward Current (1 $\mu s$ pulse width, 300 pps)	3.0 A
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	260° C
Power Dissipation <sup>(1)</sup>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

**Electrical Characteristics** ( $T_A = 25^\circ C$  unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>						
$E_{E(APT)}^{(2)}$	Apertured Radiant Incidence OP165A, OP166A	1.95	-	-	mW/cm <sup>2</sup>	$I_F = 20$ mA
$P_O$	Radiant Power Output OP165W	0.50	-	-	mW	$I_F = 20$ mA
$V_F$	Forward Voltage	1.00	-	1.60	V	$I_F = 20$ mA
$I_R$	Reverse Current	-	-	100	$\mu A$	$V_R = 2$ V
$\lambda_P$	Wavelength at Peak Emission	-	935	-	nm	$I_F = 10$ mA
B	Spectral Bandwidth between Half Power Points	-	50	-	nm	$I_F = 10$ mA
$\Delta\lambda_P/\Delta T$	Spectral Shift with Temperature OP165 (A, B, C, D), OP166 (A, B) OP165W	-	$\pm 0.30$	-	nm/ $^\circ C$	$I_F = \text{Constant}$
$\theta_{HP}$	Emission Angle at Half Power Points OP165 (A, B, C, D), OP166 (A, B) OP165W	-	18	-	Degree	$I_F = 20$ mA
$t_r$	Output Rise Time	-	1000	-	ns	$I_{F(PK)} = 100$ mA, PW = 10 $\mu s$ , D.C. = 10.0 %
$t_f$	Output Fall Time	-	500	-	ns	

Notes:

- Derate linearly 1.07 mW/ $^\circ C$  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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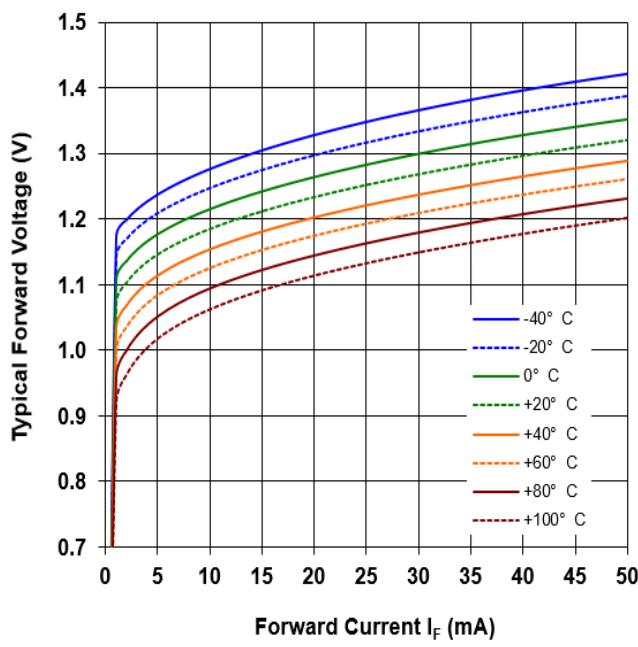
## OP165 Series, OP166A, OP166B



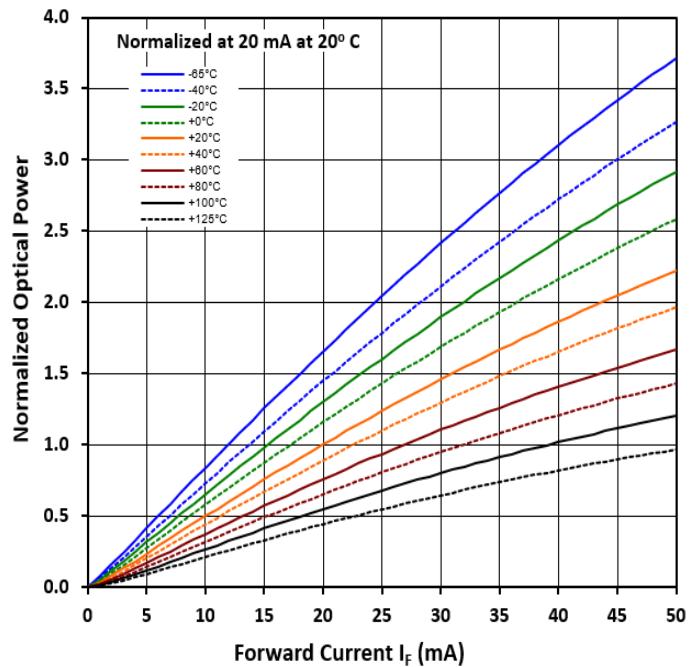
### Typical Performance

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

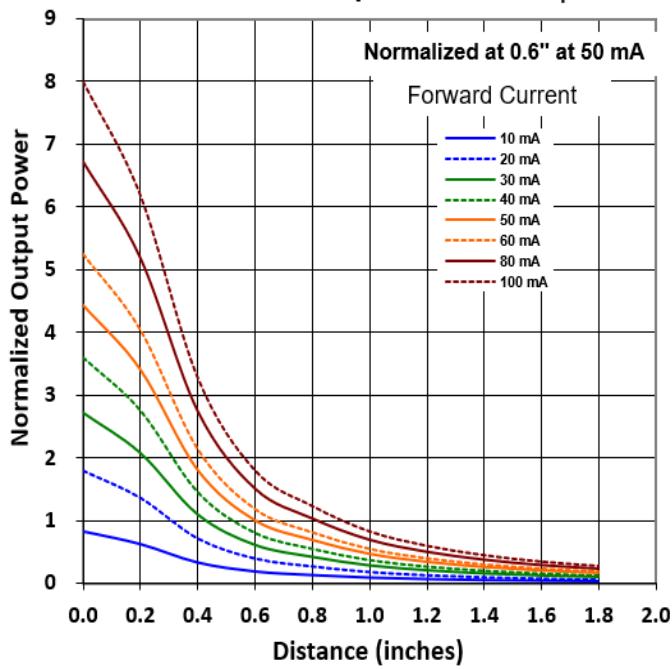
LED Forward Current vs Forward Voltage vs Temp



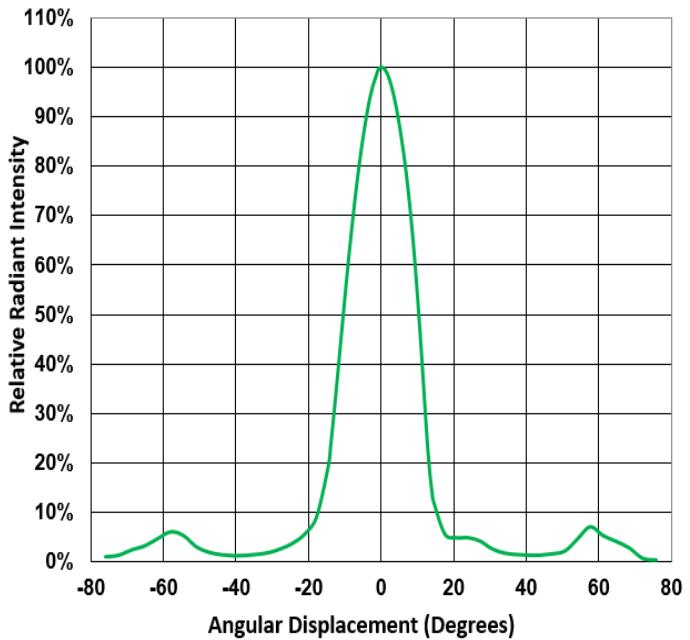
Optical Power vs  $I_F$  vs Temperature



Distance vs Output Power vs  $I_F$



Radiant Intensity vs Angular Displacement



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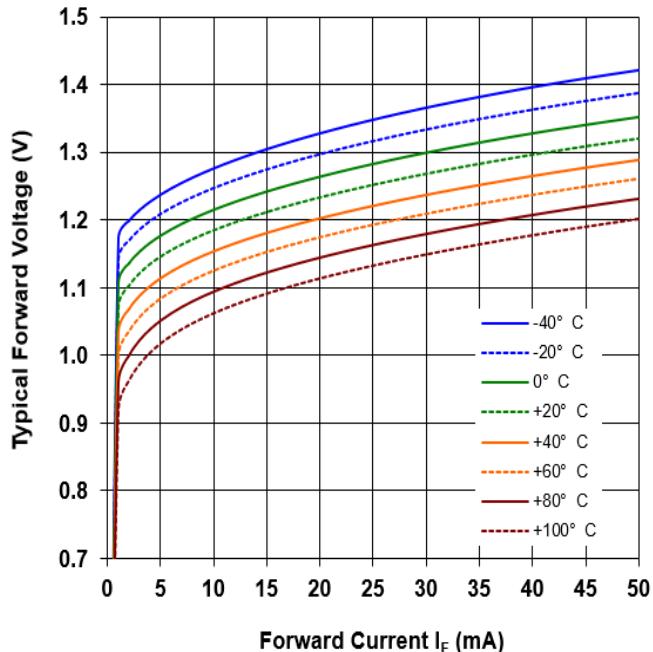
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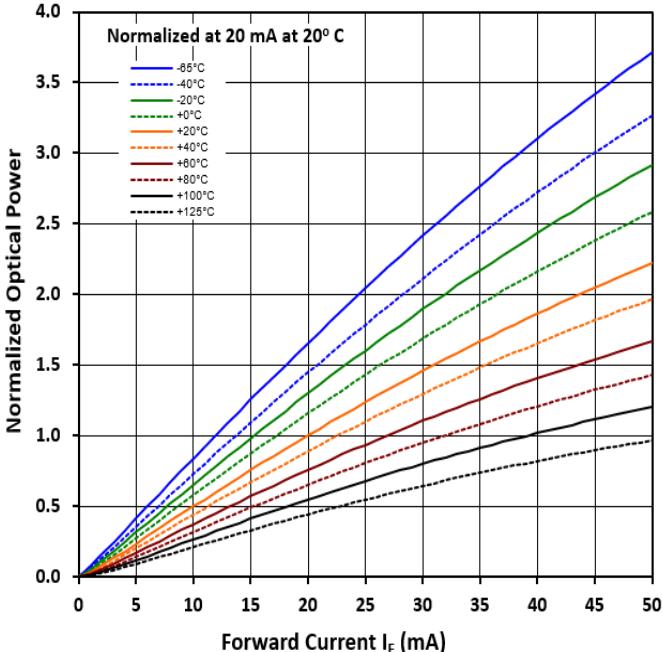
### Typical Performance

OP165(W)

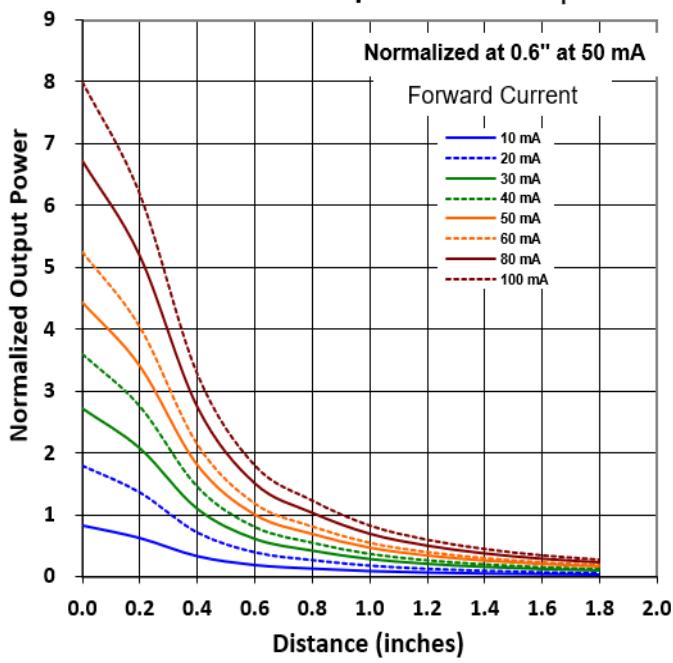
LED Forward Current vs Forward Voltage vs Temp



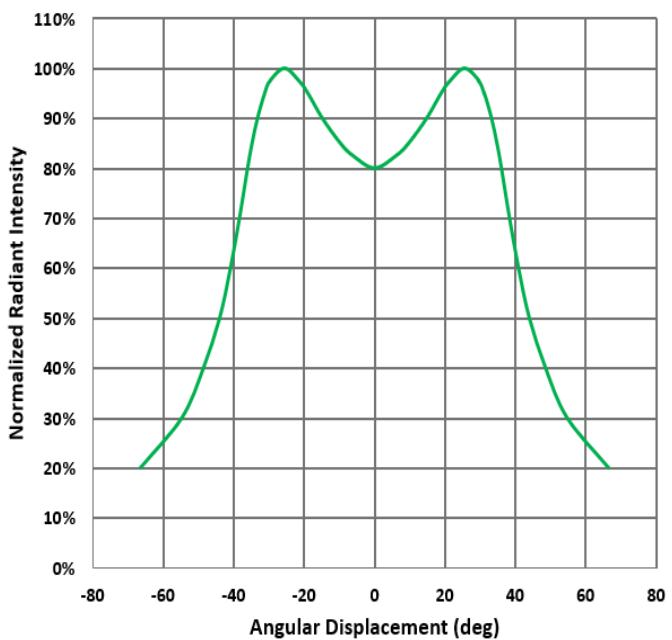
Optical Power vs I<sub>F</sub> vs Temperature



Distance vs Output Power vs I<sub>F</sub>



Radiant Intensity vs Angular Displacement



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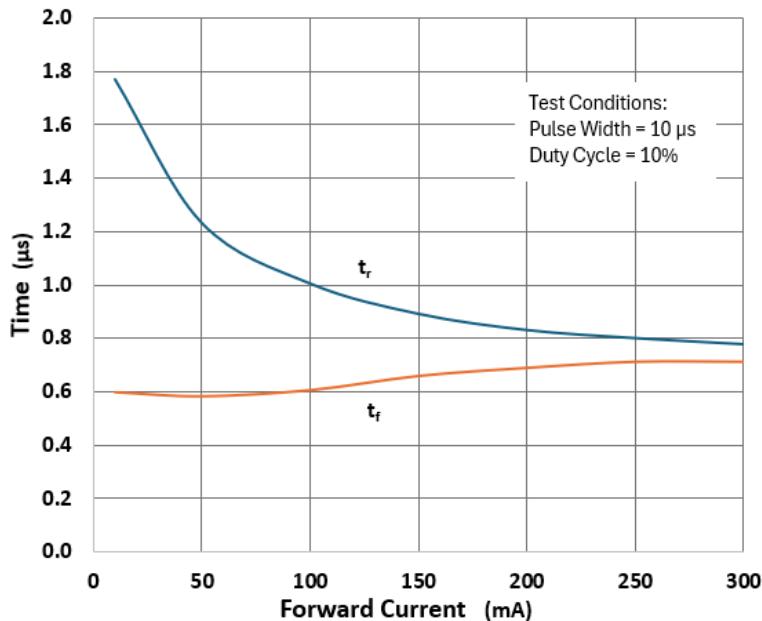
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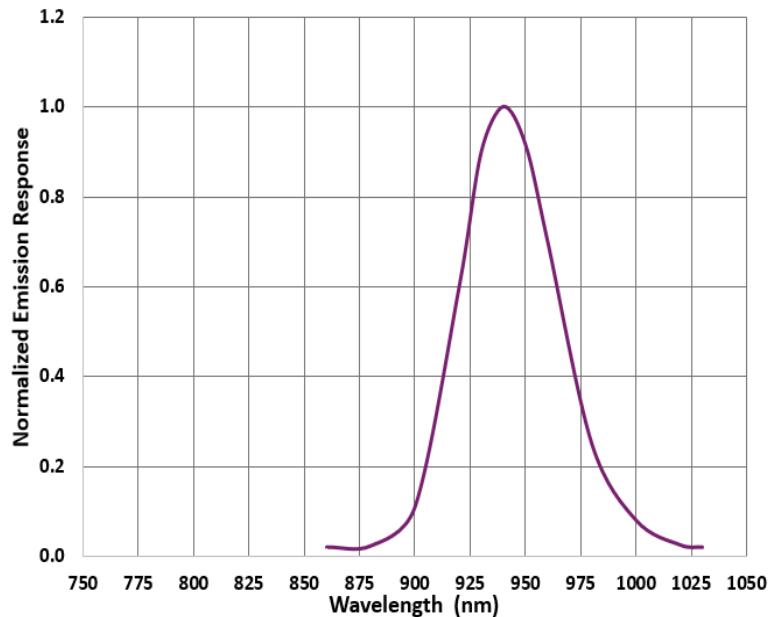
### Typical Performance

OP165, OP166, OP165W

#### Rise and Fall Time vs Forward Current



#### GaAs LED Spectral Output



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