

# Plastic Infrared Emitting Diode

OP168F, OP169, OP268F, OP269 Series



## Features:

- Flat lens for wide radiation angle (OP168, OP268)
- Integral lens for narrow beam angle (OP169, OP269)
- Easily stackable on 0.100" (2.54 mm) hole centers
- Mechanically and spectrally matched to other OPTEK devices



## Description:

Each diode in this series is molded into an end-looking plastic package. The package for all **OP168F** and **OP268F** devices is black, whereas the package for all **OP169** and **OP269** packages is clear. **OP168F** and **OP169** devices are GaAs. **OP268F** and **OP269** devices are GaAlAs.

The **OP268FPS** is an 850nm gallium aluminum arsenide infrared emitting diode molded in a end-looking miniature plastic package. The advantage of this emitter is that it emits photons from a 0.004" area that is aligned with the package optical centerline. Unlike other GaAlAs emitters, this device performs more like an ideal point source and is suitable for use with lenses to create collimated light sources that can be used in a variety of applications.

Due to their small size, all diodes in this series offer considerable design flexibility.

*The OP168F and OP268F series are mechanically and spectrally matched to the OP508F series phototransistor and the OP538F series photodarlington. The OP169 and OP269 series are mechanically and spectrally matched to the OP509 series phototransistors.*

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

For custom screening contact your OPTEK representative.

## Applications:

- Space-limited applications
- Excellent design flexibility
- PCBoard mounted slotted switch
- PCBoard interrupter

| Ordering Information |                     |                  |             |
|----------------------|---------------------|------------------|-------------|
| Part Number          | LED Peak Wavelength | Total Beam Angle | Lead Length |
| OP168FA              | 935 nm              | 104°             | 0.50"       |
| OP168FB              |                     |                  |             |
| OP168FC              |                     |                  |             |
| OP169A               | 935 nm              | 18°              |             |
| OP169B               |                     |                  |             |
| OP169C               |                     |                  |             |
| OP268FA              | 890 nm              | 104°             |             |
| OP268FB              |                     |                  |             |
| OP268FC              |                     |                  |             |
| OP268FPS             | 850 nm              | 50°              |             |
| OP269A               | 890 nm              | 18"              |             |
| OP269B               |                     |                  |             |
| OP269C               |                     |                  |             |



RoHS

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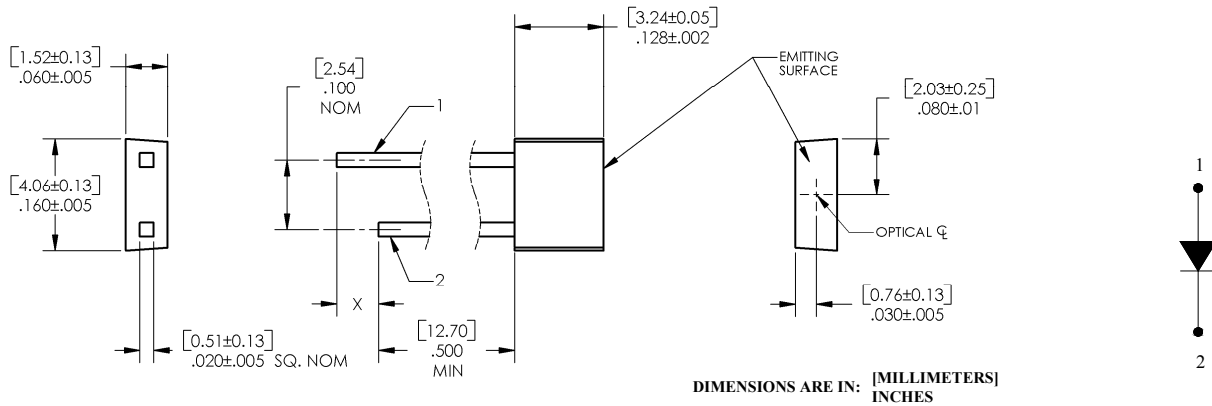
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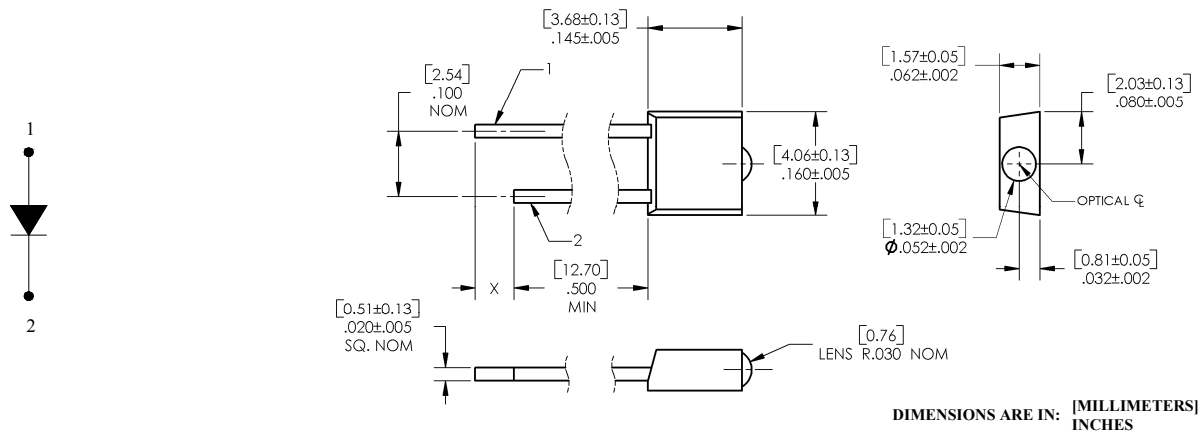


## OP168F (A, B, C), OP268F (A, B, C, PS)



| Pin # | LED<br>X=0.060" (1.5 mm) |
|-------|--------------------------|
| 1     | Anode                    |
| 2     | Cathode                  |

## OP169 (A, B, C), OP269 (A, B, C)



| Pin # | LED<br>X=0.060" (1.5 mm) |
|-------|--------------------------|
| 1     | Anode                    |
| 2     | Cathode                  |

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## Electrical Specifications

| Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)                                     |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    |                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------|
| Storage and Operating Temperature Range                                                                         |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | $-40^\circ\text{C}$ to $+100^\circ\text{C}$                                                            |
| Reverse Voltage                                                                                                 |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | 2.0 V                                                                                                  |
| Continuous Forward Current                                                                                      |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | 50 mA                                                                                                  |
| Peak Forward Current (1 $\mu\text{s}$ pulse width, 300 pps)<br>OP168, OP169, OP268, OP269 (A, B, C)<br>OP268FPS |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | 3.0 A<br>100 mA                                                                                        |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron] <sup>(1)</sup>      |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | 260 $^\circ\text{C}$                                                                                   |
| Power Dissipation <sup>(2)</sup>                                                                                |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    | 100 mW                                                                                                 |
| Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)                                   |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    |                                                                                                        |
| SYMBOL                                                                                                          | PARAMETER                                                                                                                                                                         | MIN                                                                                                              | TYP                                                                       | MAX                                                                                      | UNITS              | TEST CONDITIONS                                                                                        |
| Input Diode                                                                                                     |                                                                                                                                                                                   |                                                                                                                  |                                                                           |                                                                                          |                    |                                                                                                        |
| $E_{E(APT)}^{(3)}$                                                                                              | Apertured Radiant Incidence<br>OP168FA<br>OP168FB<br>OP168FC<br><br>OP169A<br>OP169B<br>OP169C<br><br>OP268FA<br>OP268FB<br>OP268FC<br>OP268FPS<br><br>OP269A<br>OP269B<br>OP269C | 0.48<br>0.43<br>0.27<br><br>0.18<br>0.11<br>0.03<br><br>0.64<br>0.45<br>0.36<br>0.10<br><br>0.58<br>0.42<br>0.34 | -<br>-<br>-<br><br>-<br>-<br>-<br><br>-<br>-<br>-<br>-<br><br>-<br>-<br>- | -<br>0.73<br>-<br><br>-<br>0.22<br>-<br><br>-<br>0.99<br>-<br>0.90<br><br>-<br>0.82<br>- | mW/cm <sup>2</sup> | $I_F = 20\text{ mA}$<br>Aperture = .081" dia.<br>Distance = .400" from tip of lens to aperture surface |
| $V_F$                                                                                                           | Forward Voltage<br>OP168, OP169<br>OP268, OP269<br>OP268FPS                                                                                                                       | -<br>-<br>-                                                                                                      | -<br>-<br>-                                                               | 1.40<br>1.50<br>1.80                                                                     | V                  | $I_F = 20\text{ mA}$                                                                                   |
| $I_R$                                                                                                           | Reverse Current<br>OP168, OP169, OP268, OP269<br>OP268FPS                                                                                                                         | -<br>-                                                                                                           | -<br>-                                                                    | 100<br>20                                                                                | $\mu\text{A}$      | $V_R = 2.0\text{ V}$                                                                                   |
| $\lambda_p$                                                                                                     | Wavelength at Peak Emission<br>OP168, OP169<br>OP268, OP269<br>OP268FPS                                                                                                           | -<br>-<br>-                                                                                                      | 935<br>890<br>850                                                         | -<br>-<br>-                                                                              | nm                 | $I_F = 20\text{ mA}$                                                                                   |

### Notes:

1. RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering. A maximum of 20 grams force may be applied to the leads when soldering.
2. Derate linearly 1.33 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
3. For OP168 (FA, FB, FC) and OP268 (FA, FB, FC),  $E_{E(APT)}$  is a measurement of the average apertured radiant energy incident upon a sensing area 0.081" (2.06 mm) in diameter perpendicular to and centered on the mechanical axis of the lens and 0.400" (10.16 mm) from the measurement surface. For OP169 (A, B, C) and OP269 (A, B, C),  $E_{E(APT)}$  is a measurement of the average apertured radiant energy incident upon a sensing area 0.180" (4.57 mm) in diameter perpendicular to and centered on the mechanical axis of the lens and 0.653" (16.6 mm) from the lens tip. NOTE:  $E_{E(APT)}$  is a measurement of the *average* radiant intensity within the cone formed by the above conditions.  $E_{E(APT)}$  is not necessarily uniform within the measured area.

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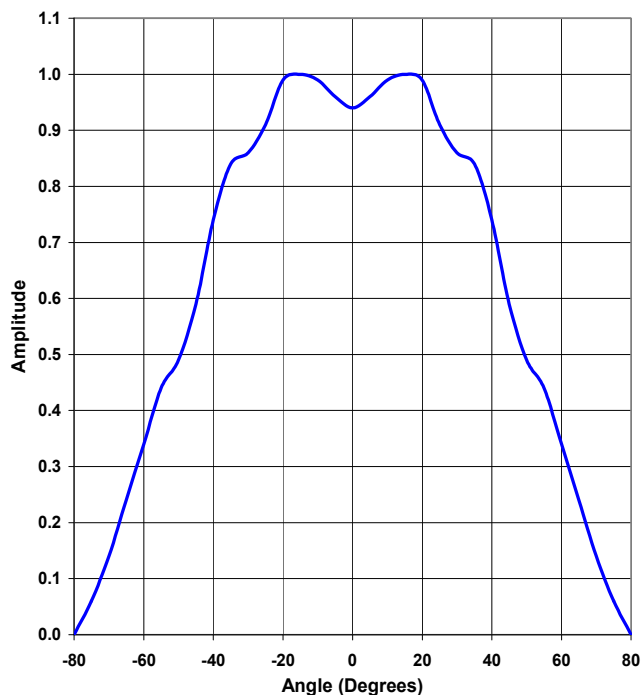
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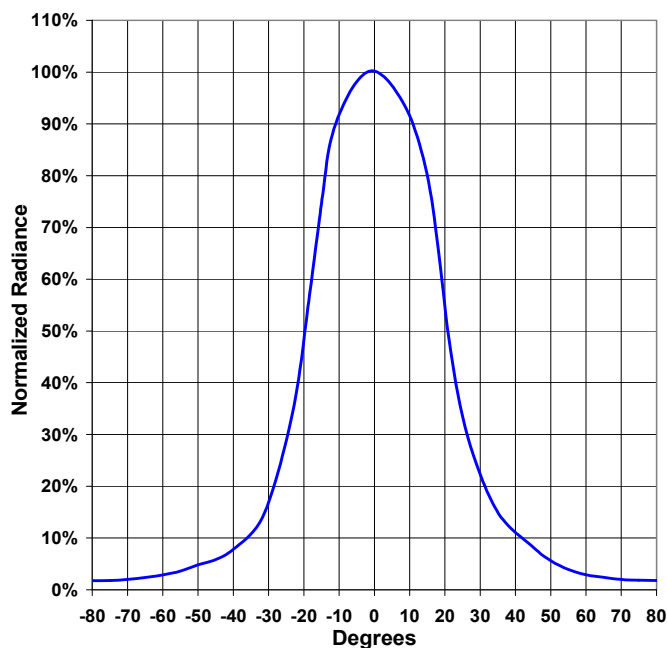
## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted—for reference only)

| SYMBOL                       | PARAMETER                                                                              | MIN                   | TYP                                                                  | MAX                   | UNITS                | TEST CONDITIONS                                                            |
|------------------------------|----------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------|-----------------------|----------------------|----------------------------------------------------------------------------|
| <b>Input Diode</b>           |                                                                                        |                       |                                                                      |                       |                      |                                                                            |
| B                            | Spectral Bandwidth between Half Power Points<br>OP168, OP169, OP268FPS<br>OP268, OP269 | -<br>-                | 50<br>80                                                             | -<br>-                | nm                   | $I_F = 10\text{ mA}$                                                       |
| $\Delta\lambda_p / \Delta T$ | Spectral Shift with Temperature<br>OP168, OP169,<br>OP268, OP269                       | -<br>-                | $\pm 0.30$<br>$\pm 0.18$                                             | -<br>-                | nm/ $^\circ\text{C}$ | $I_F = \text{Constant}$                                                    |
| $\theta_{HP}$                | Emission Angle at Half Power Points<br>OP168<br>OP169<br>OP268<br>OP268FPS<br>OP269    | -<br>-<br>-<br>-<br>- | $104^\circ$<br>$46^\circ$<br>$104^\circ$<br>$50^\circ$<br>$46^\circ$ | -<br>-<br>-<br>-<br>- | Degree               | $I_F = 20\text{ mA}$                                                       |
| $t_r$                        | Rise Time<br>OP168, OP169<br>OP268, OP269<br>OP268FPS                                  | -<br>-<br>-           | 1000<br>500<br>10                                                    | -<br>-<br>-           | ns                   | $I_{F(PK)} = 100\text{ mA}$ , $PW = 10\text{ }\mu\text{s}$ , $D.C. = 10\%$ |
| $t_f$                        | Fall Time<br>OP168, OP169<br>OP268, OP269<br>OP268FPS                                  | -<br>-<br>-           | 500<br>250<br>10                                                     | -<br>-<br>-           | ns                   | $I_{F(PK)} = 100\text{ mA}$ , $PW = 10\text{ }\mu\text{s}$ , $D.C. = 10\%$ |

Beam Angle OP168 & OP268 Package



Beam Angle OP169 & OP269 Package



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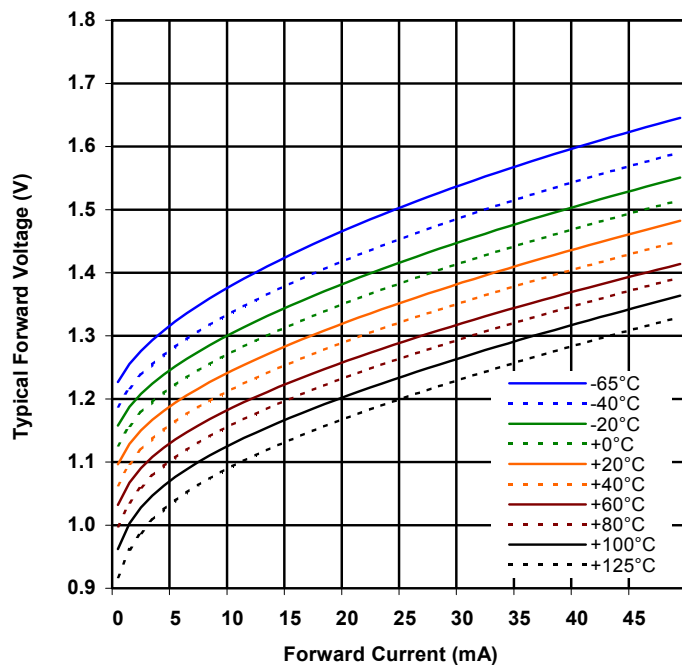
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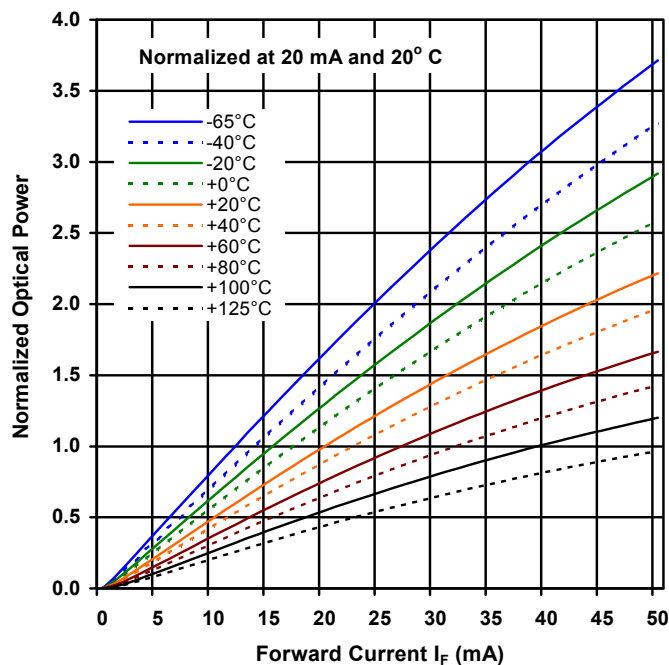
## Performance

OP168 (FA, FB, FC), OP169 (A, B, C)

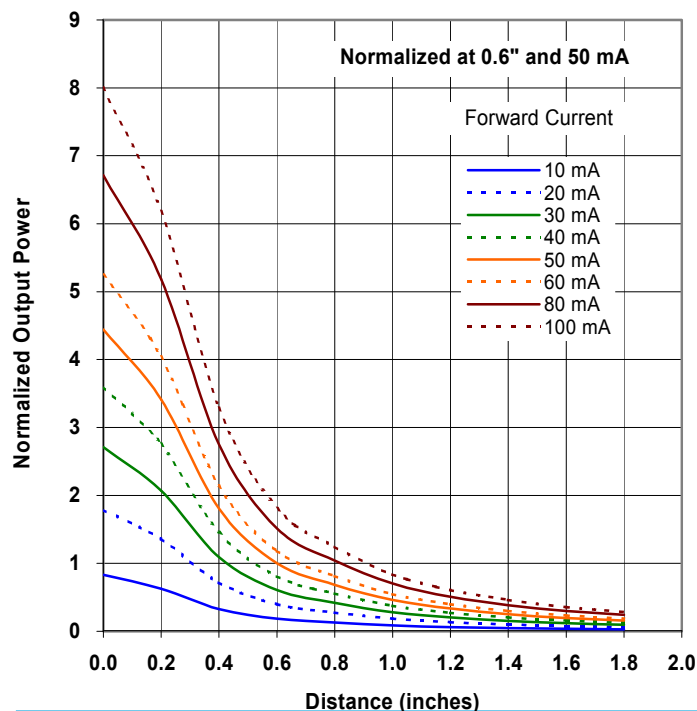
Forward Voltage vs Forward Current vs Temperature



Optical Power vs  $I_F$  vs Temp



Distance vs Output Power vs Forward Current



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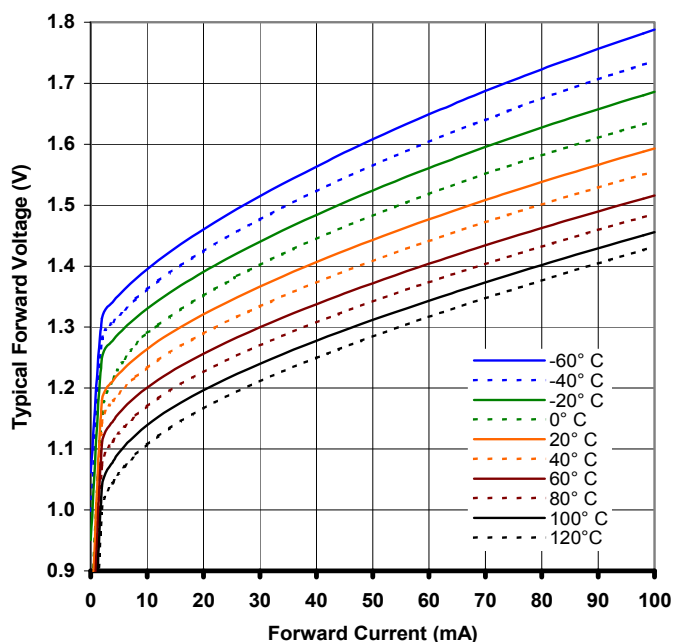
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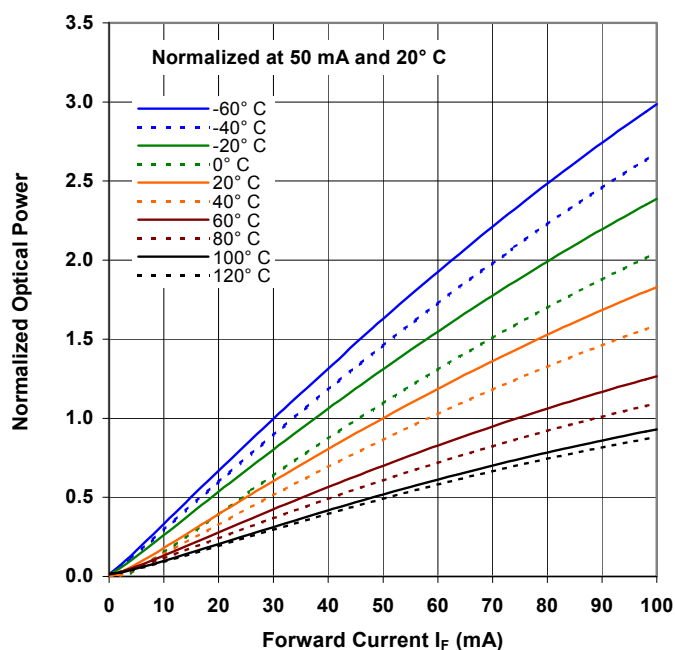
## Performance

OP268 (FA, FB, FC, FPS), OP269 (A, B, C)

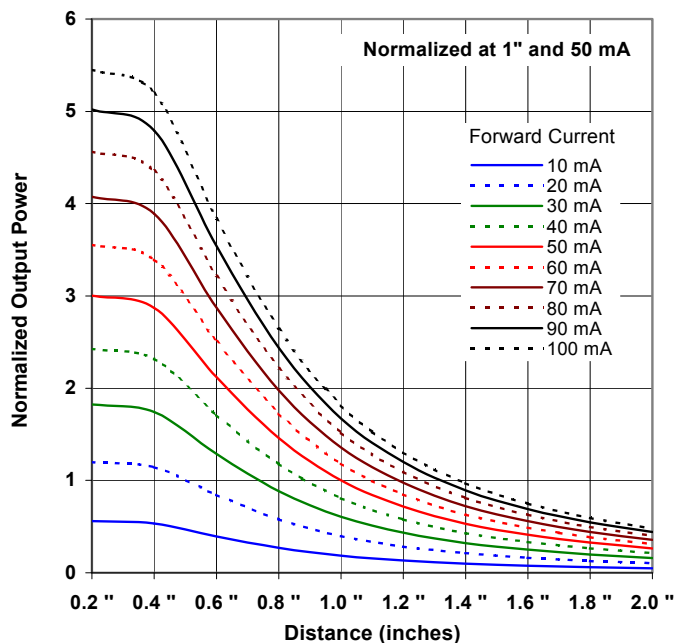
Forward Voltage vs Forward Current vs Temperature



Optical Power vs  $I_F$  vs Temperature



Distance vs Output Power vs Forward Current



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