# 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 Bulletin 210 for additional thermal design information.*

*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$^2$) Min / Max | $I_F$ (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 | | | |
| **OP165W** | | 0.50 / NA | | 90° | |
| **OP166A** | | 1.95 / NA | | 18° | |
| **OP166B** | | 1.40 / 2.20 | | | |

Pb
**RoHS**

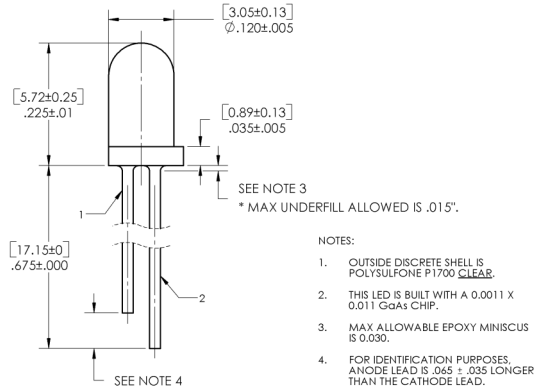


TT Electronics | OPTEK Technology
2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200
www.ttelectronics.com | sensors@ttelectronics.com

# Plastic Infrared Emitting Diode

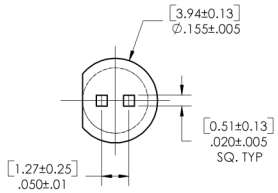
## OP165 Series, OP166A, OP166B

### 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.

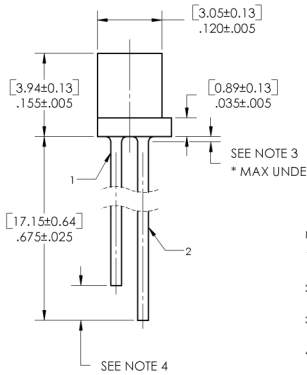



**DISCRETE PIN-OUT**

1 CATHODE

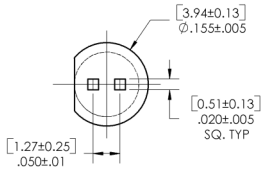
2 ANODE

### 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**

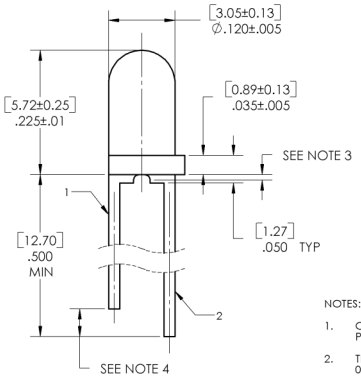
1 CATHODE

2 ANODE

**DIMENSIONS ARE IN:** **[MILLIMETERS]** **INCHES**

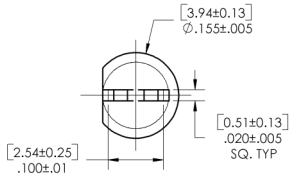
### OP166 (A, B)

* 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


| 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.



TT Electronics | OPTEK Technology
2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200
www.ttelectronics.com | sensors@ttelectronics.com

## Electrical Specifications

**Absolute Maximum Ratings** ($T_A$ = 25° C unless otherwise noted)

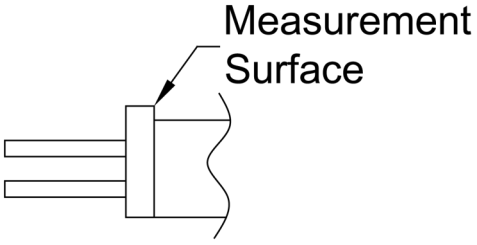
| | |
|---|---|
| Storage and Operating Temperature Range | -40° C to +100° C |
| Reverse Voltage | 2.0 V |
| Continuous Forward Current | 50 mA |
| Peak Forward Current (1 µs pulse width, 300 pps) | 3.0 A |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]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

**Electrical Characteristics** ($T_A$ = 25° C unless otherwise noted)

| SYMBOL | PARAMETER | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| **Input Diode** | | | | | | |
| $E_{E\ (APT)}$ (2) | Apertured Radiant Incidence<br>OP165A, OP166A | 1.95 | - | - | mW/cm$^2$ | $I_F$ = 20 mA |
| $P_O$ | Radiant Power Output<br>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 | µA | $V_R$ = 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<br>OP165 (A, B, C, D), OP166 (A, B)<br>OP165W | -<br>- | ±0.30<br>±0.30 | -<br>- | nm/° C | $I_F$ = Constant |
| $\theta_{HP}$ | Emission Angle at Half Power Points<br>OP165 (A, B, C, D), OP166 (A, B)<br>OP165W | -<br>- | 18<br>90 | -<br>- | Degree | $I_F$ = 20 mA |
| $t_r$ | Output Rise Time | - | 1000 | - | ns | $I_{F(PK)}$ = 100 mA, PW = 10 µs, D.C. = 10.0 % |
| $t_f$ | Output Fall Time | - | 500 | - | ns | |

Notes:

1. Derate linearly 1.07 mW/° C above 25° C.
2. $E_{E(APT)}$ 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.





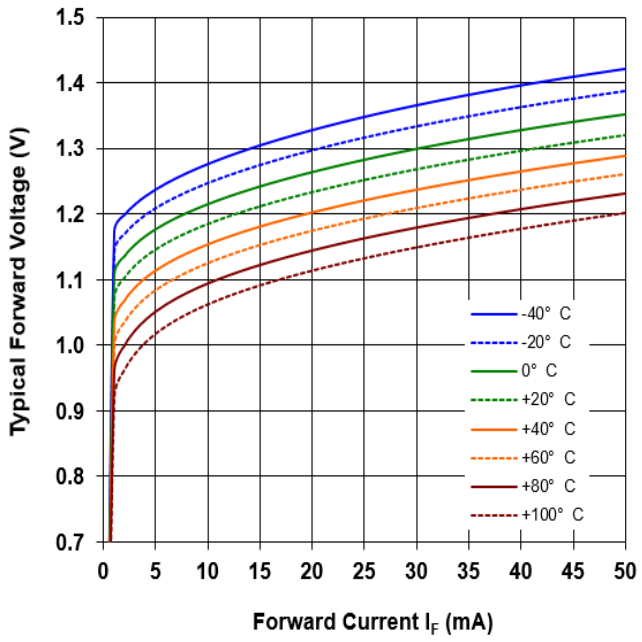


TT Electronics | OPTEK Technology
2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200
www.ttelectronics.com | sensors@ttelectronics.com

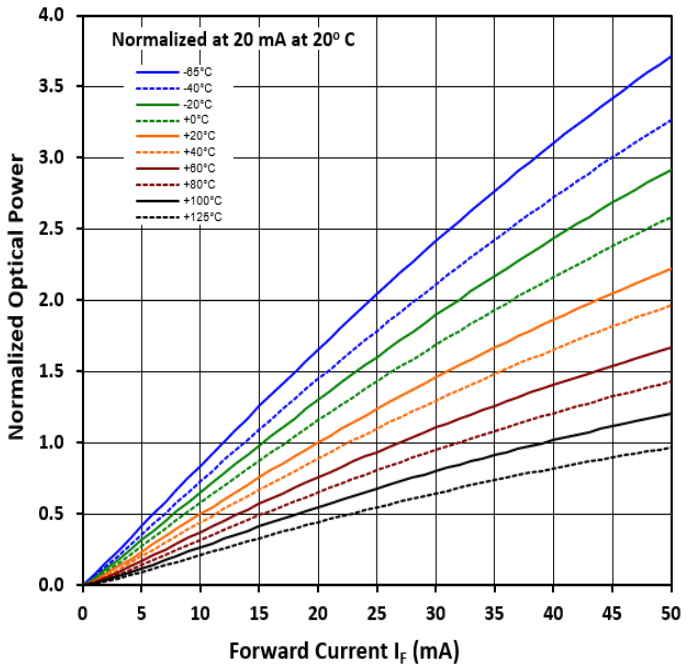
## Typical Performance

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

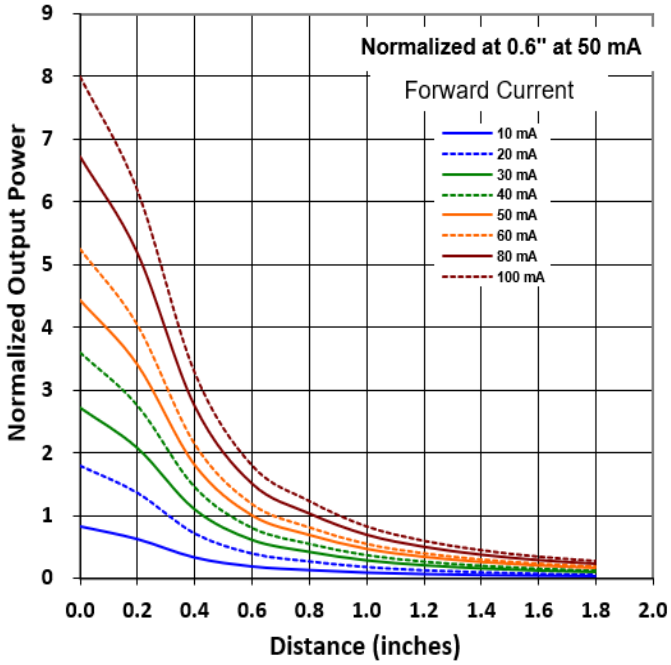
### LED Forward Current vs Forward Voltage vs Temp



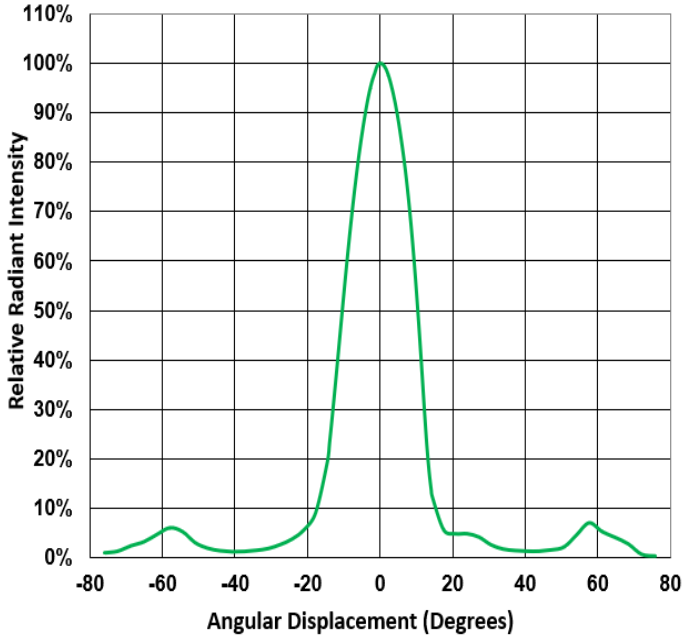

### Optical Power vs $I_F$ vs Temperature




### Distance vs Output Power vs $I_F$




### Radiant Intensity vs Angular Displacement







TT Electronics | OPTEK Technology

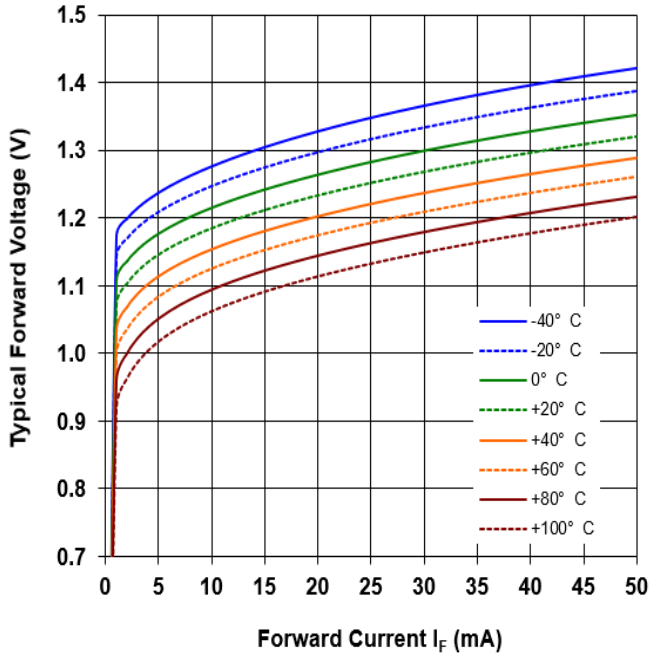
2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200

www.ttelectronics.com | sensors@ttelectronics.com

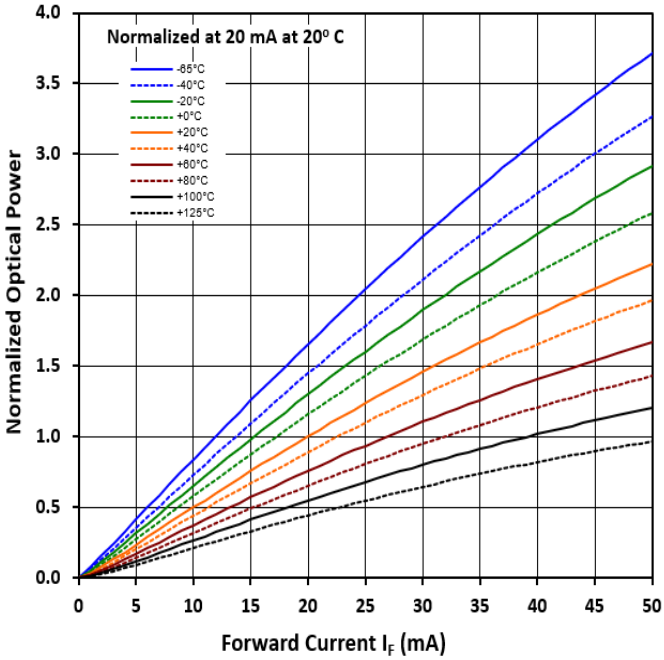
## Typical Performance

**OP165(W)**

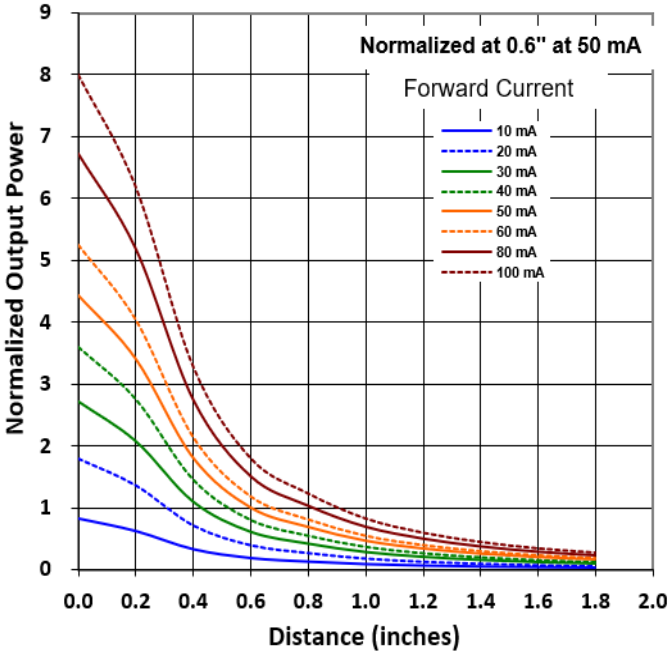
### LED Forward Current vs Forward Voltage vs Temp



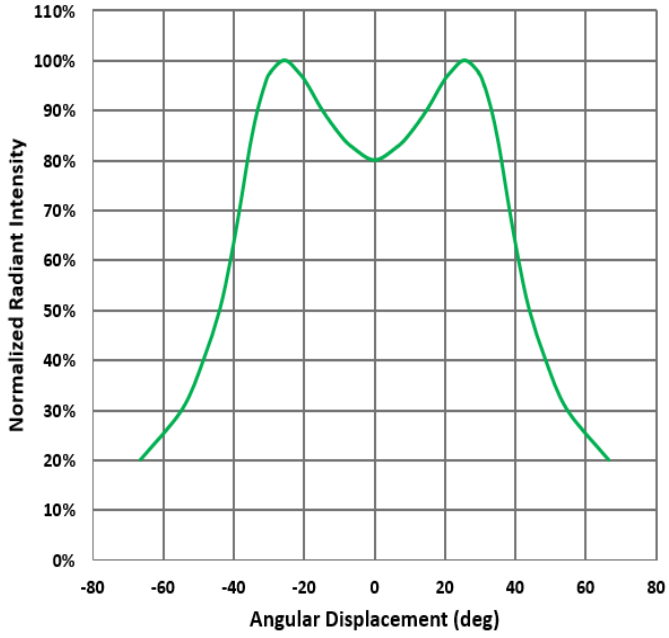

### Optical Power vs $I_F$ vs Temperature




### Distance vs Output Power vs $I_F$




### Radiant Intensity vs Angular Displacement







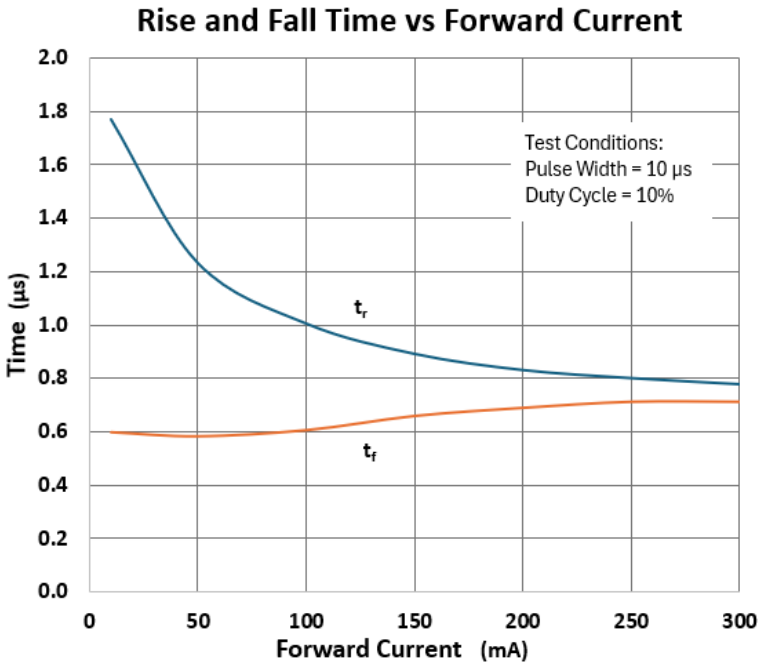
TT Electronics | OPTEK Technology

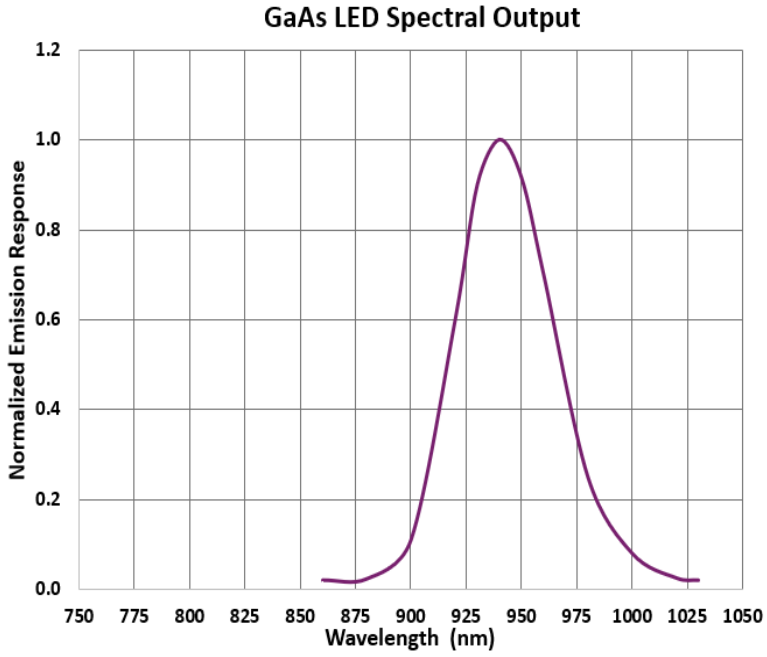
2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200

www.ttelectronics.com | sensors@ttelectronics.com

## Typical Performance

**OP165, OP166, OP165W**







TT Electronics | OPTEK Technology

2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200

www.ttelectronics.com | sensors@ttelectronics.com