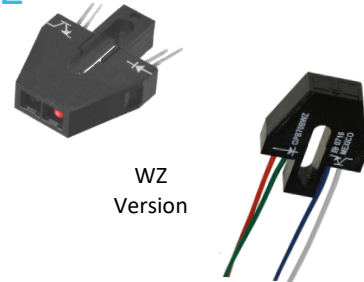


# Reflective Object Sensor

OPB703 through OPB705,  
 OPB703WZ through OPB705WZ,  
 OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ

Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Features:

- Phototransistor output
- High sensitivity
- Low-cost plastic housing
- Available with lenses for dust protection and ambient light filtration
- Focused for maximum sensitivity

## Description:

The **OPB703**, **OPB704** and **OPB705** consist of an Infrared (890 nm) Light Emitting Diode (LED) and a NPN silicon Phototransistor, mounted side-by-side on converging optical axes in a black plastic housing and are designed for PCBoard mounting. The **OPB703WZ**, **OPB704WZ** and **OPB705WZ** are designed for remote mounting utilizing interconnect wires of UL approved 26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

The **OPB70AWZ** consists of an Infrared (890 nm) Light Emitting Diode (LED) and a NPN silicon Photodarlington, mounted side-by-side on converging optical axes in a black plastic housing and is designed for remote mounting utilizing interconnect wires of UL approved 26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

The **OPB70DWZ through OPB70FWZ** consist of a Visible (Red 660 nm) Light Emitting Diode (LED) and a NPN silicon Phototransistor or Rbe Phototransistor, mounted side-by-side on converging optical axes in a black plastic housing and are designed for remote mounting utilizing interconnect wires of UL approved 26 AWG, 24" (61.0 cm) minimum length, stripped and tinned.

Various lens options are available: No lens for the (**OPB703**, **OPB703WZ**), blue window for dust protection for the (**OPB704**, **OPB704WZ**) and aperture lens for improved resolution for the (**OPB705**, **OPB705WZ**, **OPB70AWZ**, **OPB70DWZ**). The **OPB704GWZ** offers excellent protection for dirty environments.

The phototransistor responds to illumination from the emitter when a reflective object passes within the field of view centered typically at 0.15" (3.8 mm).

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

## Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor
- Mark Detection
- Office Equipment
- Gaming Equipment

| Ordering Information |                |                |                   |                   |                |                   |
|----------------------|----------------|----------------|-------------------|-------------------|----------------|-------------------|
| Part                 | LED Peak       | Detector       | Optical Cover     | Lead or Wire      |                |                   |
| OPB703               | 890 nm         | Transistor     | None              | 0.160" Leads      |                |                   |
| OPB703WZ             |                |                |                   | 24" / 26 AWG Wire |                |                   |
| OPB704               |                |                |                   | 0.160" Leads      |                |                   |
| OPB704WZ             |                |                | 24" / 26 AWG Wire |                   |                |                   |
| OPB70HWZ (Obsolete)  |                |                | Blue Window       | 24" / 26 AWG Wire |                |                   |
| OPB704G (Obsolete)   |                |                |                   | 0.160" Leads      |                |                   |
| OPB704GWZ            |                |                |                   | 24" / 26 AWG Wire |                |                   |
| OPB705               |                |                | Darlington        | Aperture          | 0.160" Leads   |                   |
| OPB705WZ             |                |                |                   |                   | Blue Window    | 24" / 26 AWG Wire |
| OPB70AWZ             |                |                |                   |                   |                |                   |
| OPB70BWZ (Obsolete)  |                |                |                   | Aperture          |                |                   |
| OPB70CWZ (Obsolete)  |                |                |                   |                   | Clear Window   |                   |
| OPB70DWZ             |                |                |                   |                   |                |                   |
| OPB70EWZ             | Rbe Transistor |                |                   |                   |                |                   |
| OPB70FWZ             | Transistor     |                |                   |                   |                |                   |
|                      | 660 nm         | Rbe Transistor | Aperture          | 24" / 26 AWG Wire |                |                   |
| OPB70DWZ             |                |                |                   |                   | Transistor     |                   |
| OPB70EWZ             |                |                |                   |                   | Rbe Transistor |                   |
| OPB70FWZ             |                |                |                   |                   | Transistor     |                   |



RoHS

General Note  
 TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

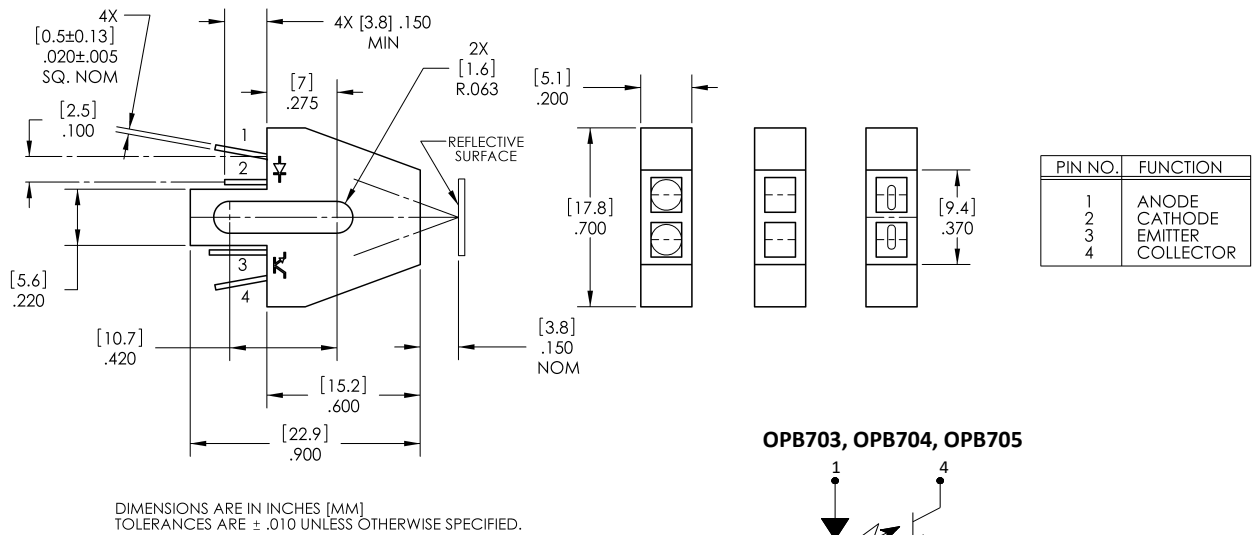
TT Electronics | OPTEK Technology  
 2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200  
 www.ttelectronics.com | sensors@ttelectronics.com

# Reflective Object Sensor

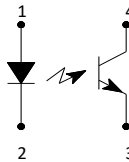
OPB703 through OPB705,  
 OPB703WZ through OPB705WZ,  
 OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
 Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



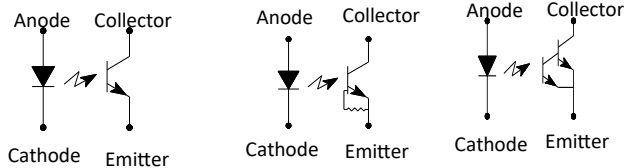
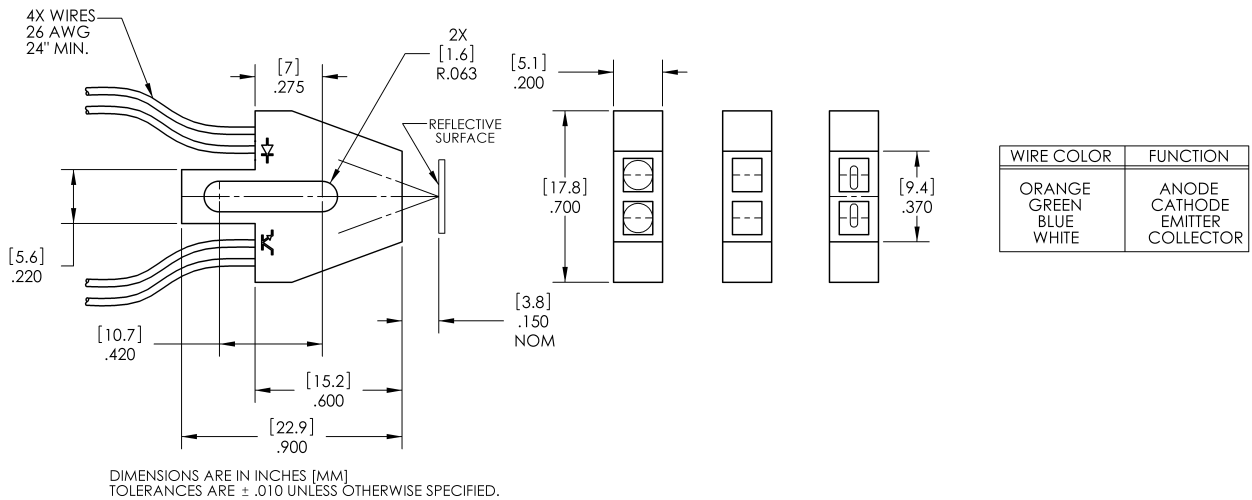
## OPB703, OPB704, OPB705



## OPB703, OPB704, OPB705



## OPB703WZ, OPB704WZ, OPB705WZ, OPB70AWZ, OPB70DWZ



### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

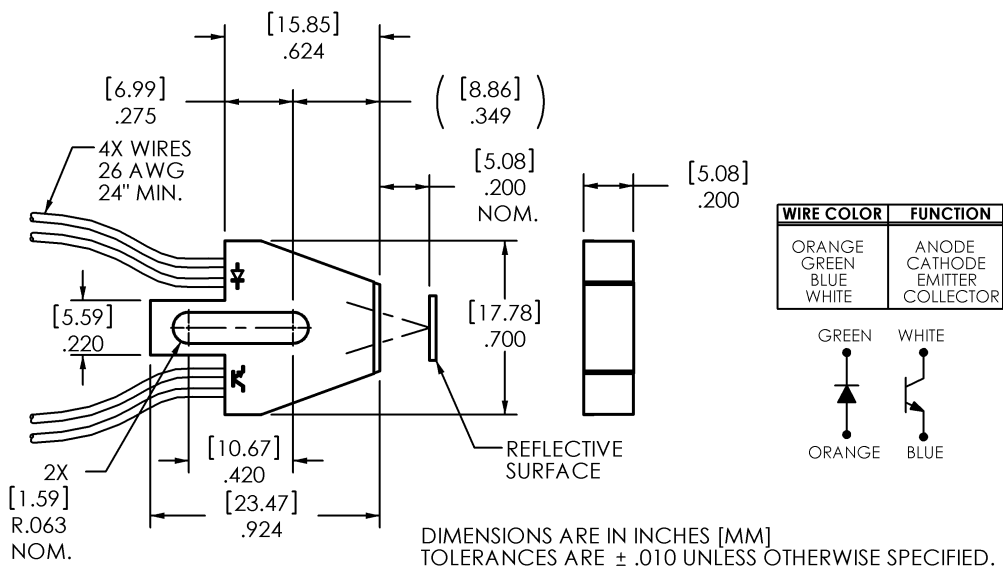
TT Electronics | OPTEK Technology  
 2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200  
 www.ttelectronics.com | sensors@ttelectronics.com

# Reflective Object Sensor

OPB703 through OPB705,  
 OPB703WZ through OPB705WZ,  
 OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
 Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## OPB704GWZ



General Note  
 TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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

# Reflective Object Sensor

OPB703 through OPB705,  
OPB703WZ through OPB705WZ,  
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Electrical Specifications

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

|  |                       |
|--|-----------------------|
| Storage Temperature Range  | -40° C to +80° C      |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from the case for 5 sec. with soldering iron] | 240° C <sup>(1)</sup> |

### Input Diode

|                    |                       |
|--------------------|-----------------------|
| Forward DC Current | 40 mA                 |
| Reverse DC Voltage | 2 V                   |
| Power Dissipation  | 100 mW <sup>(2)</sup> |

### Output Photodetector

|  |                       |
|--|-----------------------|
| Collector-Emitter Voltage<br>Phototransistor | 30 V                  |
| Photodarlington                              | 15 V                  |
| Emitter-Collector Voltage                    | 5 V                   |
| Collector DC Current                         | 25 mA                 |
| Power Dissipation                            | 100 mW <sup>(2)</sup> |

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
- (2) For OPB703WZ, OPB704WZ, OPB705WZ and OPB704GWZ derate linearly 1.82 mW/° C above 25° C.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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

# Reflective Object Sensor

OPB703 through OPB705,  
 OPB703WZ through OPB705WZ,  
 OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
 Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Electrical Specifications

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
 (OPB703, OPB703WZ, OPB704, OPB704WZ, OPB705, OPB705WZ, OPB704GWZ)

| SYMBOL                        | PARAMETER  | MIN                  | TYP              | MAX                   | UNITS         | TEST CONDITIONS   |
|-------------------------------|--|----------------------|------------------|-----------------------|---------------|---|
| <b>Input Diode</b>            |  |                      |                  |                       |               |   |
| $V_F$                         | Forward Voltage  | -                    | -                | 1.7                   | V             | $I_F = 40\text{ mA}$  |
| $I_R$                         | Reverse Current  | -                    | -                | 100                   | $\mu\text{A}$ | $V_R = 2\text{ V}$  |
| <b>Output Phototransistor</b> |  |                      |                  |                       |               |   |
| $V_{(BR)CEO}$                 | Collector-Emitter Breakdown Voltage  | 30                   | -                | -                     | V             | $I_{CE} = 100\ \mu\text{A}$   |
| $V_{(BR)ECO}$                 | Emitter-Collector Breakdown Voltage  | 5                    | -                | -                     | V             | $I_{EC} = 100\ \mu\text{A}$   |
| $I_{CEO}$                     | Collector Dark Current   | -                    | -                | 250                   | nA            | $V_{CE} = 10\text{ V}, I_F = 0, E_E = 0$                                |
| <b>Coupled</b>                |  |                      |                  |                       |               |   |
| $I_{C(ON)}$                   | On-State Collector Current<br>OPB703, OPB703WZ<br>OPB704, OPB704WZ<br>OPB705, OPB705WZ | 0.30<br>0.20<br>0.15 | -<br>-<br>-      | 2.5<br>2.5<br>1.0     | mA            | $V_{CE} = 5\text{ V}, I_F = 40\text{ mA}, d = 0.15''$ <sup>(4)(6)</sup> |
|                               | OPB704GWZ  | 0.50                 | -                | 6.0                   |               | $V_{CE} = 5\text{ V}, I_F = 40\text{ mA}, d = 0.20''$ <sup>(4)(6)</sup> |
| $I_{CX}$                      | Crosstalk<br>OPB703, OPB703WZ<br>OPB704, OPB704WZ<br>OPB705, OPB705WZ<br>OPB704GWZ     | -<br>-<br>-<br>-     | -<br>-<br>-<br>- | 20<br>20<br>10<br>100 | $\mu\text{A}$ | $V_{CE} = 5\text{ V}, I_F = 40\text{ mA}$ <sup>(5)</sup>                |

**Notes:**

- (1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
- (2) For OPB703, OPB704 and OPB705, derate linearly 1.67 mW/° C above 25° C.
- (3) For OPB703WZ, OPB704WZ, OPB705WZ, OPB704GWZ, OPB70AWZ, OPB70DWZ, OPB70EWZ, and OPB70FWZ derate linearly 1.82 mW/° C above 25° C.
- (4) The distance from the assembly face to the reflective surface is d.
- (5) Crosstalk ( $I_{CX}$ ) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (6) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.
- (7) All parameters tested using pulse techniques.

**General Note**

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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

# Reflective Object Sensor

OPB703 through OPB705,  
OPB703WZ through OPB705WZ,  
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Electrical Specifications

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
(OPB70AWZ)

| SYMBOL                        | PARAMETER                           | MIN | TYP | MAX  | UNITS         | TEST CONDITIONS   |
|-------------------------------|-------------------------------------|-----|-----|------|---------------|---|
| <b>Input Diode</b>            |                                     |     |     |      |               |   |
| $V_F$                         | Forward Voltage                     | -   | -   | 1.7  | V             | $I_F = 40\text{ mA}$  |
| $I_R$                         | Reverse Current                     | -   | -   | 100  | $\mu\text{A}$ | $V_R = 2\text{ V}$  |
| <b>Output PhotoDarlington</b> |                                     |     |     |      |               |   |
| $V_{(BR)CEO}$                 | Collector-Emitter Breakdown Voltage | 15  | -   | -    | V             | $I_{CE} = 1.0\text{ mA}$ , $E_E = 0$  |
| $V_{(BR)ECO}$                 | Emitter-Collector Breakdown Voltage | 5   | -   | -    | V             | $I_{EC} = 100\ \mu\text{A}$ , $E_E = 0$   |
| $I_{CEO}$                     | Collector Dark Current              | -   | -   | 250  | nA            | $V_{CE} = 10\text{ V}$ , $I_F = 0$ , $E_E = 0$                                      |
| <b>Coupled</b>                |                                     |     |     |      |               |   |
| $I_{C(ON)}$                   | On-State Collector Current          | 5.0 | -   | 26.0 | mA            | $V_{CE} = 5\text{ V}$ , $I_F = 40\text{ mA}$ , $d = 0.15''$ <sup>(1)(3)</sup>       |
| $V_{(SAT)}$                   | Saturation Voltage                  | -   | -   | 1.15 | V             | $I_{CV} = 400\ \mu\text{A}$ , $I_F = 40\text{ mA}$ , $d = 0.15''$ <sup>(1)(3)</sup> |
| $I_{CX}$                      | Crosstalk                           | -   | -   | 25   | $\mu\text{A}$ | $V_{CE} = 5\text{ V}$ , $I_F = 40\text{ mA}$ <sup>(2)</sup>                         |

Notes:

- (1) The distance from the assembly face to the reflective surface is  $d$ .
- (2) Crosstalk ( $I_{CX}$ ) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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

# Reflective Object Sensor

OPB703 through OPB705,  
OPB703WZ through OPB705WZ,  
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Electrical Specifications

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
(OPB70EWZ)

| SYMBOL                        | PARAMETER                           | MIN | TYP | MAX | UNITS         | TEST CONDITIONS                               |
|-------------------------------|-------------------------------------|-----|-----|-----|---------------|---|
| <b>Input Diode</b>            |                                     |     |     |     |               |   |
| $V_F$                         | Forward Voltage                     | -   | -   | 2.6 | V             | $I_F = 40\text{ mA}$                          |
| $I_R$                         | Reverse Current                     | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$                            |
| <b>Output Phototransistor</b> |                                     |     |     |     |               |   |
| $V_{(BR)CEO}$                 | Collector-Emitter Breakdown Voltage | 30  | -   | -   | V             | $I_{CE} = 100\ \mu\text{A}, I_F = 0, E_E = 0$ |
| $V_{(BR)ECO}$                 | Emitter-Collector Breakdown Voltage | 0.4 | -   | -   | V             | $I_{EC} = 100\ \mu\text{A}, I_F = 0, E_E = 0$ |
| $I_{CEO}$                     | Collector Dark Current              | -   | -   | 100 | nA            | $V_{CE} = 10\text{ V}, I_F = 0, E_E = 0$      |

### Coupled

| SYMBOL      | PARAMETER                  | TEST CONDITION | MIN | TYP | MAX | UNITS         | TEST CONDITIONS   |
|-------------|----------------------------|----------------|-----|-----|-----|---------------|---|
| $I_{C(ON)}$ | On-State Collector Current | OPB70EWZ       | .25 | -   | 2.5 | mA            | $V_{CE} = 5\text{ V}, I_F = 40\text{ mA}, d = 0.15''^{(1)(3)}$    |
| $V_{(SAT)}$ | Saturation Voltage         |                | -   | -   | 0.4 | V             | $I_C = 100\ \mu\text{A}, I_F = 40\text{ mA}, d = 0.15''^{(1)(3)}$ |
| $I_{CX}$    | Crosstalk                  |                | -   | -   | 2   | $\mu\text{A}$ | $V_{CE} = 5\text{ V}, I_F = 40\text{ mA}^{(2)}$                   |

#### Notes:

- (1) The distance from the assembly face to the reflective surface is  $d$ .
- (2) Crosstalk ( $I_{CX}$ ) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

#### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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

# Reflective Object Sensor

OPB703 through OPB705,  
OPB703WZ through OPB705WZ,  
OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)



## Electrical Specifications

Electrical Characteristics ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
(OPB70DWZ and OPB70FWZ)

| SYMBOL                        | PARAMETER                           | MIN | TYP | MAX | UNITS         | TEST CONDITIONS                                     |
|-------------------------------|-------------------------------------|-----|-----|-----|---------------|---|
| <b>Input Diode</b>            |                                     |     |     |     |               |   |
| $V_F$                         | Forward Voltage                     | -   | -   | 2.6 | V             | $I_F = 40\text{ mA}$                                |
| $I_R$                         | Reverse Current                     | -   | -   | 100 | $\mu\text{A}$ | $V_R = 2\text{ V}$                                  |
| <b>Output Phototransistor</b> |                                     |     |     |     |               |   |
| $V_{(BR)CEO}$                 | Collector-Emitter Breakdown Voltage | 30  | -   | -   | V             | $I_{CE} = 100\ \mu\text{A}$ , $I_F = 0$ , $E_E = 0$ |
| $V_{(BR)ECO}$                 | Emitter-Collector Breakdown Voltage | 5.0 | -   | -   | V             | $I_{EC} = 100\ \mu\text{A}$ , $I_F = 0$ , $E_E = 0$ |
| $I_{CEO}$                     | Collector Dark Current              | -   | -   | 250 | nA            | $V_{CE} = 10\text{ V}$ , $I_F = 0$ , $E_E = 0$      |

### Coupled

|             |                            |          |     |     |               |  |   |
|-------------|----------------------------|----------|-----|-----|---------------|--|---|
| $I_{C(ON)}$ | On-State Collector Current | OPB70DWZ | .10 | -   | 1.5           | mA   | $V_{CE} = 5\text{ V}$ , $I_F = 40\text{ mA}$ , $d = 0.15''$ <sup>(1)(3)</sup> |
|             |                            | OPB70FWZ | .25 | -   | 3.5           |  |   |
| $V_{(SAT)}$ | Saturation Voltage         | -        | -   | 0.4 | V             | $I_{C(ON)} = 100\ \mu\text{A}$ , $I_F = 40\text{ mA}$ , $d = 0.15''$ <sup>(1)(3)</sup> |   |
| $I_{CX}$    | Crosstalk                  | -        | -   | 5.0 | $\mu\text{A}$ | $V_{CE} = 5\text{ V}$ , $I_F = 40\text{ mA}$ <sup>(2)</sup>                            |   |

#### Notes:

- (1) The distance from the assembly face to the reflective surface is  $d$ .
- (2) Crosstalk ( $I_{CX}$ ) is the collector current measured with the indicated current in the input diode and with no reflecting surface.
- (3) Measured using Eastman Kodak neutral white test card with 90 % diffuse reflectance as a reflecting surface. Reference: Eastman Kodak, Catalog # E 152 7795.

#### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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



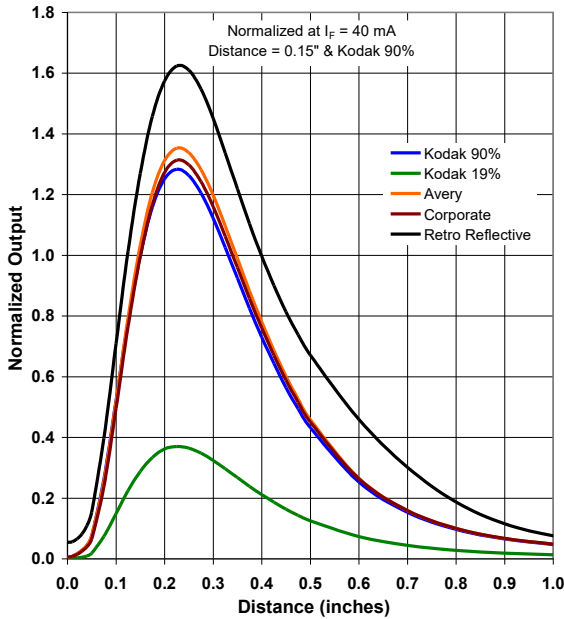
# Reflective Object Sensor

OPB703 through OPB705,  
 OPB703WZ through OPB705WZ,  
 OPB70AWZ, OPB70DWZ, OPB70EWZ, OPB70FWZ  
 Obsolete (OPB70BWZ, OPB70CWZ, OPB70HWZ, OPB704G)

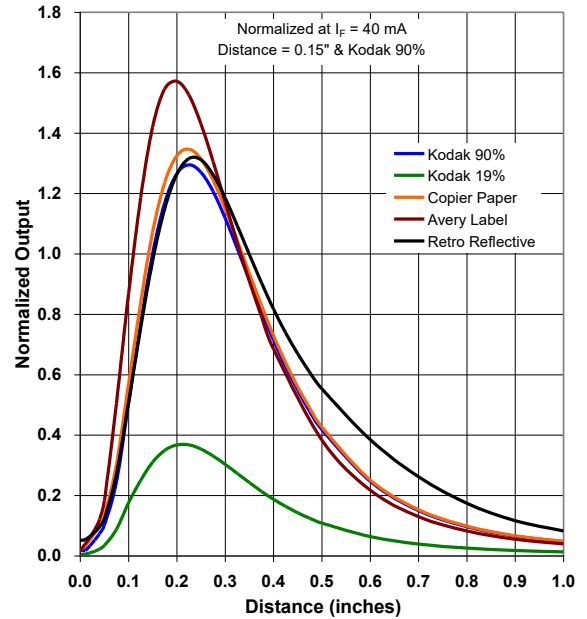


## Performance

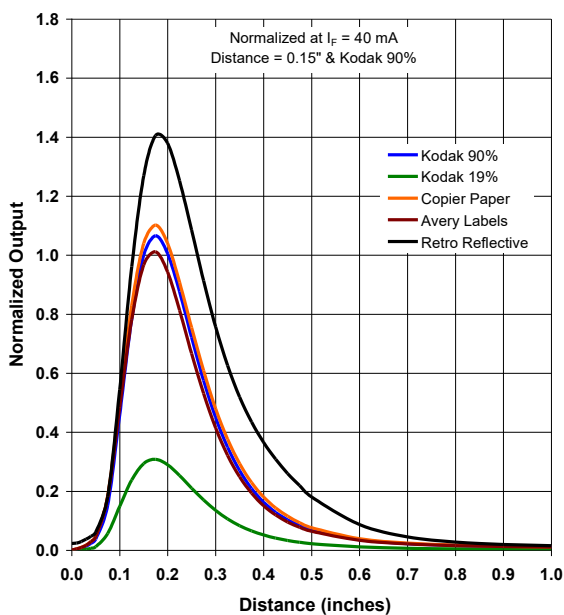
OPB703 - Output vs Distance



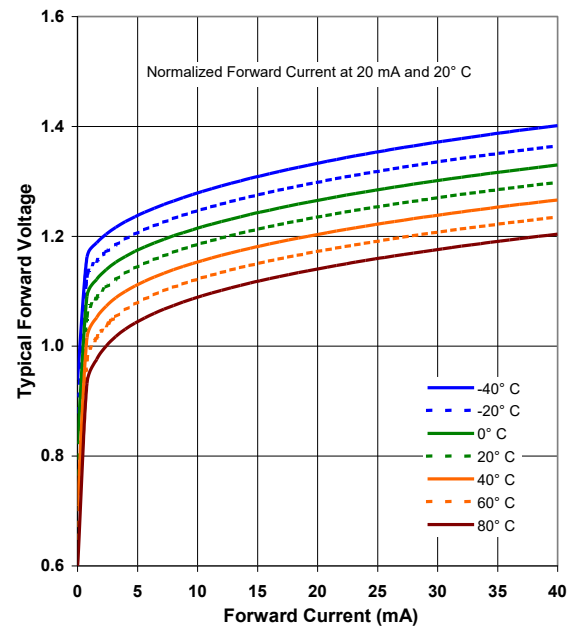
OPB704 - Output vs Distance



OPB705 - Output vs Distance



Forward Voltage vs Forward Current vs Temp



**General Note**

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

TT Electronics | OPTeK Technology  
 2900 E. Plano Pkwy, Plano, TX 75074 | Ph: +1 972 323 2200  
[www.ttelectronics.com](http://www.ttelectronics.com) | [sensors@ttelectronics.com](mailto:sensors@ttelectronics.com)