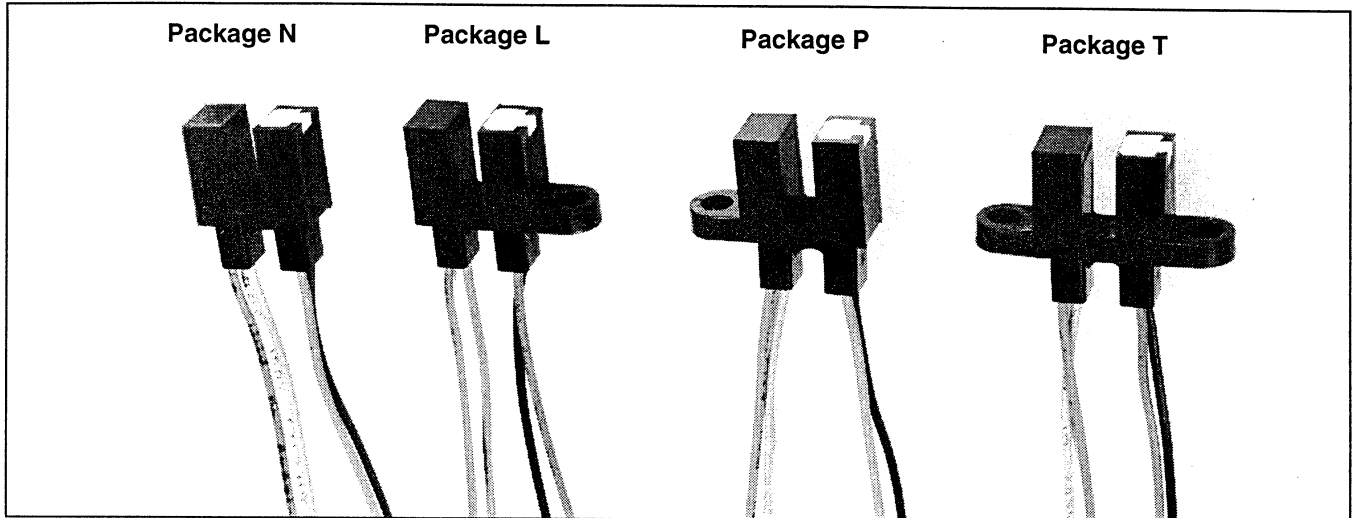


# Photologic® Slotted Optical Switches

## Types OPB480, OPB490 Series



### Features

- Choice of mounting configuration
- Choice of aperture
- Choice of output configuration
- Choice of opaque or IR transmissive shell material
- Data rates to 250 kBaud
- 24" min 26AWG wire leads
- Low power consumption

### Description

The OPB480 and OPB490 series of Photologic® Photo Integrated Circuit Switches provide optimum flexibility for the design engineer. Building from a standard housing with a 0.125" (3.18 mm) wide slot, the user can specify (1) type and polarity of TTL output, (2) discrete shell material, (3) aperture width, and (4) choice of mounting configuration. These devices exhibit stable performance over supply voltages ranging from 4.5 V to 16.0 V and may be specified as buffered or inverted with 10 kW pull-up or open collector output. All are TTI/LSTTL compatible and can drive up to 10 TTL loads.

### Replaces/Upgrades

OPB980, OPB990 series

### Absolute Maximum Ratings (T<sub>A</sub> = 25° C unless otherwise noted)

|  |                       |
|--|-----------------------|
| Supply Voltage, V <sub>CC</sub> (Not to exceed 3 sec.) | 18 V                  |
| Storage Temperature Range                              | -40° C to +80° C      |
| Operating Temperature Range                            | -40° C to +80° C      |
| Input Diode Power Dissipation                          | 100 mW <sup>(1)</sup> |
| Output Photologic® Power Dissipation                   | 90 mW <sup>(2)</sup>  |
| Total Device Power Dissipation                         | 190 mW <sup>(3)</sup> |
| Voltage at Output Lead (Open Collector Output)         | 35 V                  |
| Diode Forward D.C. Current                             | 40 mA                 |
| Diode Reverse D.C. Voltage                             | 2 V                   |

### Notes:

- (1) Derate linearly 1.82 mW/° C above 25° C.
- (2) Derate linearly 1.64 mW/° C above 25° C.
- (3) Derate linearly 3.45 mW/° C above 25° C.
- (4) The OPB980/OPB990 series of switches are terminated with 24 inches of 7 strand 26 AWG, UL 1429 insulated wire on each terminal. Insulation colors and functions are:

|                      |                         |
|----------------------|-------------------------|
| RED - IRED Anode     | WHITE - V <sub>CC</sub> |
| BLACK - IRED Cathode | BLUE - Output           |
|                      | GREEN - Ground          |

Other wire lengths and/or colors in addition to customer selected connectors are available. Contact your local representative or call the factory.

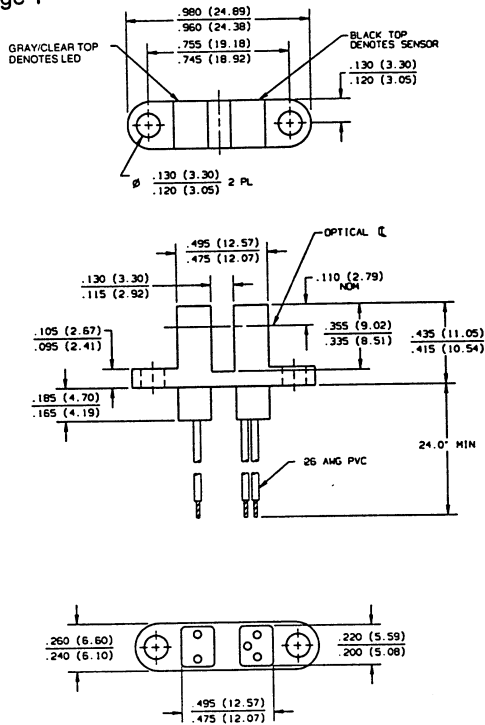
- (5) Normal application would be with light source blocked, simulated by I<sub>f</sub> = 0mA.
- (6) All parameters tested using pulse techniques.

### Housing

All housings are an opaque grade of injection-molded plastic to minimize the assembly's sensitivity to ambient radiation, both visible and near-infrared. Discrete shells (exposed on the parallel faces inside the device throat) are either IR transmissive plastic for applications where aperture contamination may occur or opaque plastic for maximum protection against ambient light.

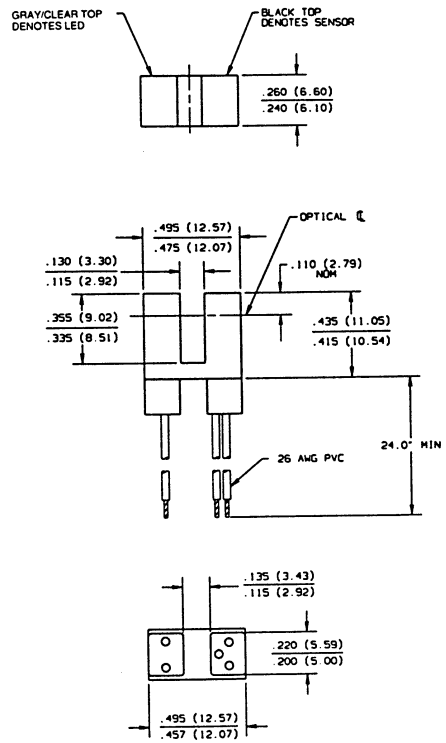
# Types OPB480, OPB490 Series

Package T



DIMENSIONS ARE IN INCHES (MILLIMETERS)

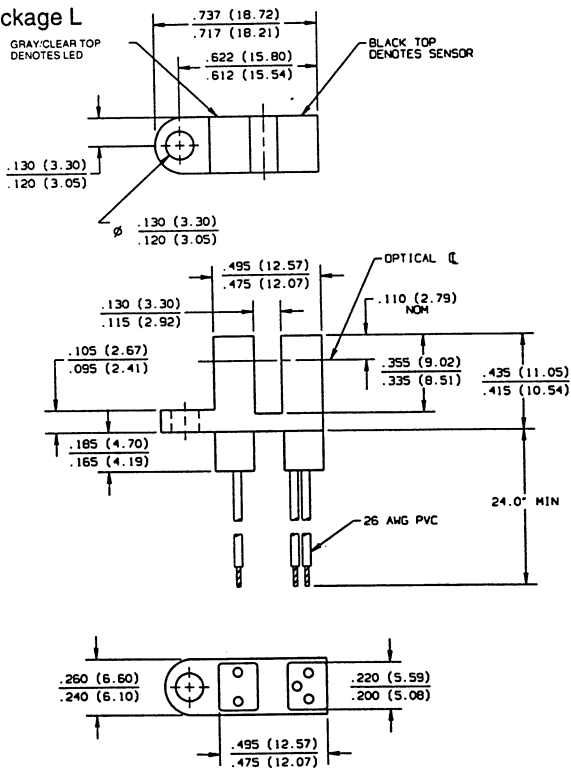
Package N



DIMENSIONS ARE IN INCHES (MILLIMETERS)

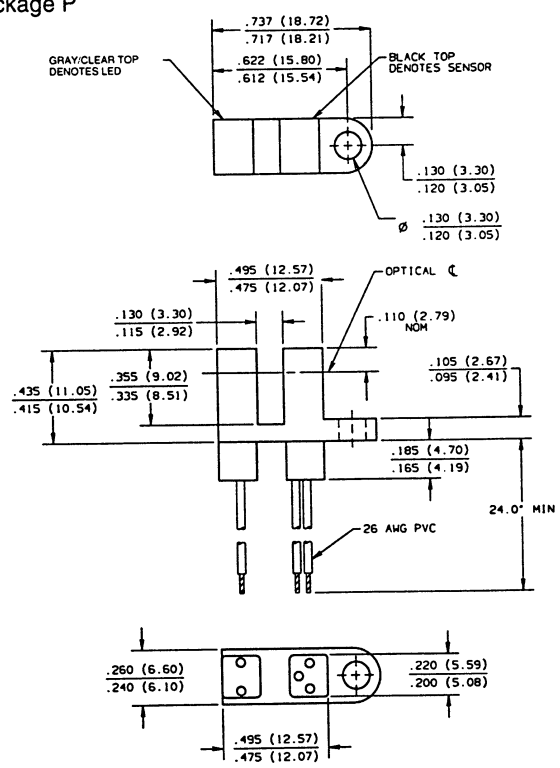
SLOTTED OPTICAL SWITCHES

Package L



DIMENSIONS ARE IN INCHES (MILLIMETERS)

Package P



DIMENSIONS ARE IN INCHES (MILLIMETERS)

# Types OPB480, OPB490 "55" Series



Electrical Characteristics ( $T_A = -40^\circ\text{C}$  to  $+80^\circ\text{C}$  unless otherwise noted)

| SYMBOL                                      | PARAMETER  | MIN          | TYP | MAX  | UNITS         | TEST CONDITIONS  |
|---|--|--------------|-----|------|---------------|--|
| <b>Input Diode</b>                          |  |              |     |      |               |  |
| $V_F$                                       | Forward Voltage  |              |     | 1.7  | V             | $I_F = 20\text{ mA}$ , $T_A = 25^\circ\text{C}$  |
| $I_R$                                       | Reverse Current  |              |     | 100  | $\mu\text{A}$ | $V_R = 2\text{ V}$ , $T_A = 25^\circ\text{C}$  |
| <b>Output Photologic<sup>®</sup> Sensor</b> |  |              |     |      |               |  |
| $V_{CC}$                                    | Operating D.C. Supply Voltage  | 4.5          |     | 16.0 | V             |  |
| $I_{CCL}$                                   | Low Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 4\text{ mA}$   |
| $I_{CCH}$                                   | High Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 4\text{ mA}$   |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
| $V_{OL}$                                    | Low Level Output Voltage:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 0\text{ mA}^{(5)}$                             |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 4\text{ mA}$                                   |
| $V_{OH}$                                    | High Level Output Voltage:<br>Buffered with 10 k pull-up                                   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 4\text{ mA}$       |
|   | Inverted with 10 k pull-up   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 0\text{ mA}^{(5)}$ |
| $I_{OH}$                                    | High Level Output Current:<br>Buffered Open-Collector Output                               |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 4\text{ mA}$ , $T_A = 25^\circ\text{C}$        |
|   | Inverted Open-Collector Output   |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 0\text{ mA}$ , $T_A = 25^\circ\text{C}$        |
| $I_F(+)$                                    | LED Positive-Going Threshold Current   |              |     | 4    | mA            | $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$   |
| $I_F(+)/I_F(-)$                             | Hysteresis   |              | 1.2 |      |               | $V_{CC} = 5\text{ V}$  |
| $t_r, t_f$                                  | Output Rise Time, Output Fall Time   |              | 50  |      | ns            | $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$<br>$I_F = 0$ or $4\text{ mA}$                             |
| $t_{PLH}, t_{PHL}$                          | Propagation Delay Low-High & High-Low  |              | 3.0 |      | $\mu\text{s}$ | $R_L = 300\text{ }\Omega$ to $5\text{ V}$<br>$C_L = 50\text{ pF}$  |

# Types OPB480, OPB490 "51" Series

Electrical Characteristics ( $T_A = -40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  unless otherwise noted)

| SYMBOL                                      | PARAMETER  | MIN          | TYP | MAX  | UNITS         | TEST CONDITIONS  |
|---|--|--------------|-----|------|---------------|--|
| <b>Input Diode</b>                          |  |              |     |      |               |  |
| $V_F$                                       | Forward Voltage  |              |     | 1.7  | V             | $I_F = 20\text{ mA}$ , $T_A = 25^{\circ}\text{C}$  |
| $I_R$                                       | Reverse Current  |              |     | 100  | $\mu\text{A}$ | $V_R = 2\text{ V}$ , $T_A = 25^{\circ}\text{C}$  |
| <b>Output Photologic<sup>®</sup> Sensor</b> |  |              |     |      |               |  |
| $V_{CC}$                                    | Operating D.C. Supply Voltage  | 4.5          |     | 16.0 | V             |  |
| $I_{CCL}$                                   | Low Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 8\text{ mA}$   |
| $I_{CCH}$                                   | High Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 8\text{ mA}$   |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
| $V_{OL}$                                    | Low Level Output Voltage:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 0\text{ mA}^{(5)}$                             |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 8\text{ mA}$                                   |
| $V_{OH}$                                    | High Level Output Voltage:<br>Buffered with 10 k pull-up                                   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 8\text{ mA}$       |
|   | Inverted with 10 k pull-up   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 0\text{ mA}^{(5)}$ |
| $I_{OH}$                                    | High Level Output Current:<br>Buffered Open-Collector Output                               |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 8\text{ mA}$ , $T_A = 25^{\circ}\text{C}$      |
|   | Inverted Open-Collector Output   |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 0\text{ mA}$ , $T_A = 25^{\circ}\text{C}$      |
| $I_{F(+)}$                                  | LED Positive-Going Threshold Current   |              |     | 8    | mA            | $V_{CC} = 5\text{ V}$ , $T_A = 25^{\circ}\text{C}$   |
| $I_{F(+)} / I_{F(-)}$                       | Hysteresis   |              | 1.2 |      |               | $V_{CC} = 5\text{ V}$  |
| $t_r, t_f$                                  | Output Rise Time, Output Fall Time   |              | 50  |      | ns            | $V_{CC} = 5\text{ V}$ , $T_A = 25^{\circ}\text{C}$<br>$I_F = 0$ or $8\text{ mA}$                           |
| $t_{PLH}, t_{PHL}$                          | Propagation Delay Low-High & High-Low  |              | 3.0 |      | $\mu\text{s}$ | $R_L = 300\text{ }\Omega$ to $5\text{ V}$<br>$C_L = 50\text{ pF}$  |

SLOTTED  
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Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Optek Technology, Inc.      1215 W. Crosby Road      Carrollton, Texas 75006      (972)323-2200      Fax (972)323-2396

# Types OPB480, OPB490 "11" Series



Electrical Characteristics ( $T_A = -40^\circ\text{C}$  to  $+80^\circ\text{C}$  unless otherwise noted)

| SYMBOL                                      | PARAMETER  | MIN          | TYP | MAX  | UNITS         | TEST CONDITIONS  |
|---|--|--------------|-----|------|---------------|--|
| <b>Input Diode</b>                          |  |              |     |      |               |  |
| $V_F$                                       | Forward Voltage  |              |     | 1.7  | V             | $I_F = 20\text{ mA}$ , $T_A = 25^\circ\text{C}$  |
| $I_R$                                       | Reverse Current  |              |     | 100  | $\mu\text{A}$ | $V_R = 2\text{ V}$ , $T_A = 25^\circ\text{C}$  |
| <b>Output Photologic<sup>®</sup> Sensor</b> |  |              |     |      |               |  |
| $V_{CC}$                                    | Operating D.C. Supply Voltage  | 4.5          |     | 16.0 | V             |  |
| $I_{CCL}$                                   | Low Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 12\text{ mA}$  |
| $I_{CCH}$                                   | High Level Supply Current:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 12\text{ mA}$  |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 7.5  | mA            | $V_{CC} = 16\text{ V}$ , $I_F = 0\text{ mA}^{(5)}$   |
| $V_{OL}$                                    | Low Level Output Voltage:<br>Buffered with 10 k pull-up<br>Buffered Open-Collector Output  |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 0\text{ mA}^{(5)}$                             |
|   | Inverted with 10 k pull-up<br>Inverted Open-Collector Output                               |              |     | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 16\text{ mA}$<br>$I_F = 12\text{ mA}$                                  |
| $V_{OH}$                                    | High Level Output Voltage:<br>Buffered with 10 k pull-up                                   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 12\text{ mA}$      |
|   | Inverted with 10 k pull-up   | $V_{CC}-1.5$ |     |      | V             | $V_{CC} = 4.5\text{ V}$ to $16\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$<br>$I_F = 0\text{ mA}^{(5)}$ |
| $I_{OH}$                                    | High Level Output Current:<br>Buffered Open-Collector Output                               |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 12\text{ mA}$ , $T_A = 25^\circ\text{C}$       |
|   | Inverted Open-Collector Output   |              |     | 10   | $\mu\text{A}$ | $V_{CC} = 16\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$I_F = 0\text{ mA}$ , $T_A = 25^\circ\text{C}$        |
| $I_F(+)$                                    | LED Positive-Going Threshold Current   |              |     | 12   | mA            | $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$   |
| $I_F(+)/I_F(-)$                             | Hysteresis   |              | 1.2 |      |               | $V_{CC} = 5\text{ V}$  |
| $t_r, t_f$                                  | Output Rise Time, Output Fall Time   |              | 50  |      | ns            | $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$<br>$I_F = 0$ or $12\text{ mA}$                            |
| $t_{PLH}, t_{PHL}$                          | Propagation Delay Low-High & High-Low  |              | 3.0 |      | $\mu\text{s}$ | $R_L = 300\text{ }\Omega$ to $5\text{ V}$<br>$C_L = 50\text{ pF}$  |

# Types OPB480, OPB490 Series

## PART NUMBER GUIDE

OPB 4 X X X X X

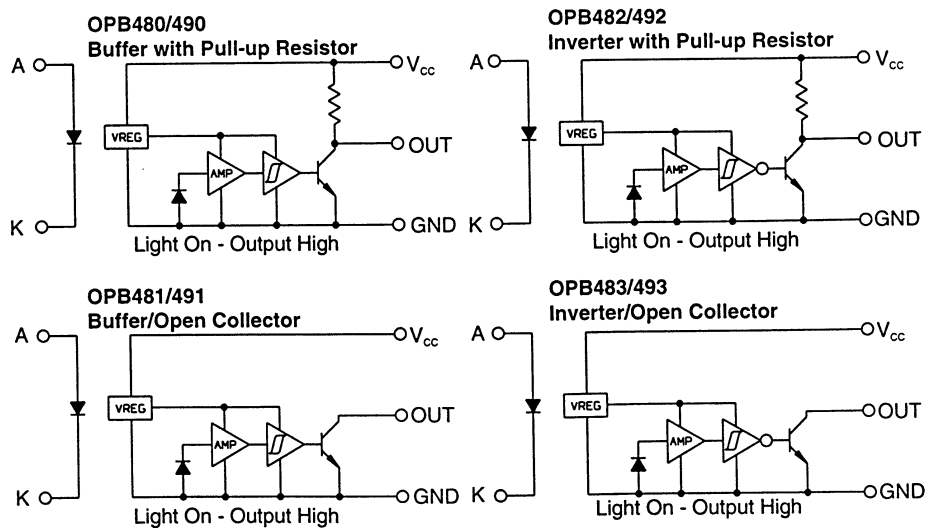
|  |  |   |
|--|--|---|
| <p>Optek Assembly</p>  |  | <p>Aperture Width In Front of Sensor<br/>5 = 0.050" 1 = 0.010"</p>                                  |
| <p>Photologic®<br/>Photo Integrated Circuit<br/>Sensor Family</p>                          |  | <p>Aperture Width In Front of Emitter<br/>5 = 0.050" 1 = 0.010"</p>                                 |
| <p>Discrete Shell Material<br/>Designation</p>   |  | <p>Mounting Configurations</p>  |
| <p>8 - Base Mount IR Transmissive<br/>Plastic Discrete Shell<br/>With Wire Termination</p> |  | <p>T - Both Mounting Tabs<br/>N - No Mounting Tabs<br/>L - Single Mounting Tab<br/>Emitter Side</p> |
| <p>9 - Base Mount Opaque<br/>Plastic Discrete Shell<br/>With Wire Termination</p>          |  | <p>P - Single Mounting Tab<br/>Photologic® Side</p>   |

SLOTTED OPTICAL SWITCHES

### Electrical Specification Variations

- 0 - Buffered with 10 k pull-up
- 1 - Buffered Open-Collector Output
- 2 - Inverted with 10 k pull-up
- 3 - Inverted Open-Collector Output

### Schematic



Optek reserves the right to make changes at any time in order to improve design and to supply the best product possible.  
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