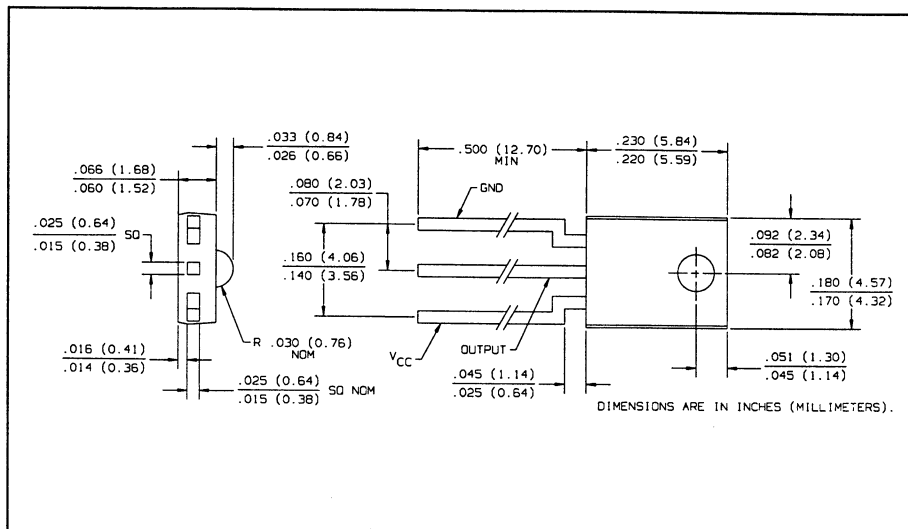
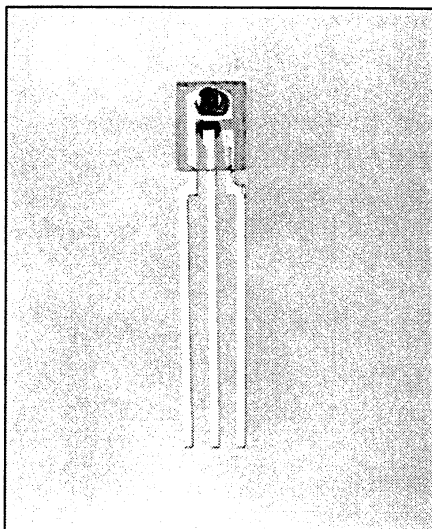


# Photologic® Plastic Sensors Types OPL550, OPL551 Series



## Features

- Four output options
- High noise immunity
- Direct TTL/LSTTL interface
- Low cost plastic side-looking package
- Mechanically and spectrally matched to OP140 and OP240 series LEDs
- Data rates to 250 kBaud

## Description

The OPL550, OPL550-OC, OPL551, and OPL551-OC contain a monolithic integrated circuit which incorporates a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip. The devices feature TTL/LSTTL compatible logic level output which can drive up to 8 TTL loads without additional circuitry. Also featured are medium speed data rates to 250 kBaud with typical rise and fall times of 25 nsec. The Schmitt trigger's hysteresis characteristics provide high immunity to noise on input and  $V_{CC}$ . The Photologic® chip is encapsulated in a molded plastic package which has an integral lens for enhanced optical coupling. These devices are mechanically and spectrally matched to OP140 and OP240 infrared emitting diodes.

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

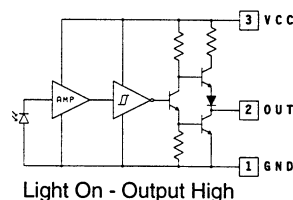
|                                                                                          |                                             |
|------------------------------------------------------------------------------------------|---------------------------------------------|
| Supply Voltage, $V_{CC}$ (not to exceed 3 seconds)                                       | +10 V                                       |
| Storage Temperature Range                                                                | $-40^\circ\text{C}$ to $+100^\circ\text{C}$ |
| Operating Temperature Range                                                              | $-40^\circ\text{C}$ to $+85^\circ\text{C}$  |
| Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron] | $260^\circ\text{C}^{(1)}$                   |
| Power Dissipation                                                                        | 200 mW <sup>(2)</sup>                       |
| Duration of Output Short to $V_{CC}$ or Ground (OPL550, OPL551)                          | 1.00 sec.                                   |
| Duration of Output Short to $V_{CC}$ (OPL550-OC, OPL551-OC)                              | 1.00 sec.                                   |
| Voltage at Output Lead (OPL550-OC, OPL551-OC)                                            | 35 V                                        |
| Low Level Output Current                                                                 | 16 mA                                       |
| High Level Output Current (OPL550, OPL551)                                               | 1 mA                                        |
| Irradiance                                                                               | 10 mW/cm <sup>2</sup>                       |

### Notes:

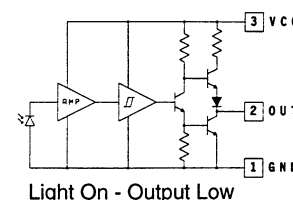
- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. Max. 20 grams force may be applied to leads when soldering.
- (2) Derate linearly 2.5 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$ .
- (3) Irradiance measurements are made with  $\lambda_i = 935\text{ nm}$ .

## Schematics

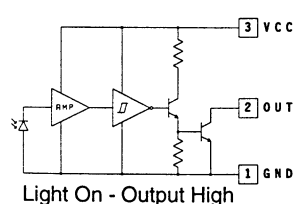
### OPL550 (Totem-Pole Output) Buffer



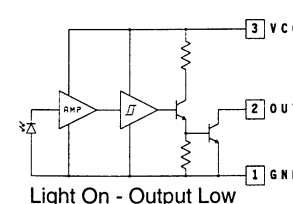
### OPL551 (Totem-Pole Output) Inverter



### OPL550-OC (Open-Collector Output) Buffer



### OPL551-OC (Open-Collector Output) Inverter



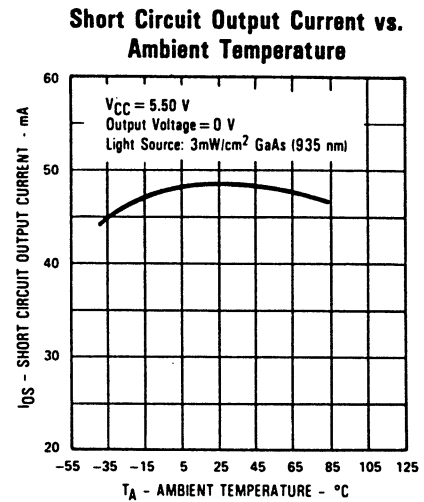
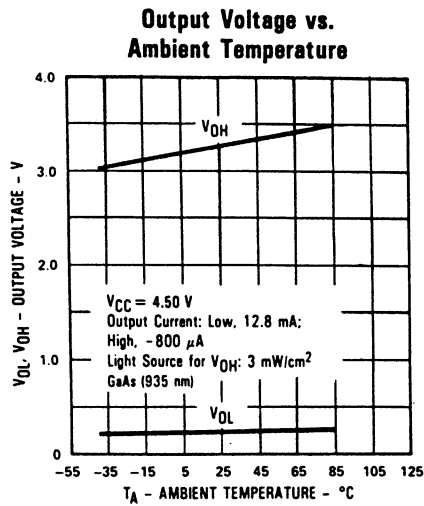
# Types OPL550, OPL551 Series

Electrical Characteristics (-40° C to +85° C unless otherwise noted)

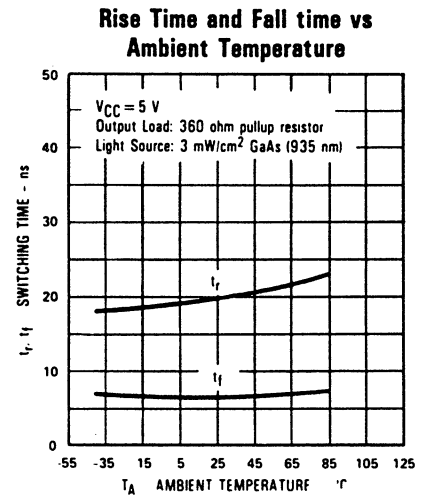
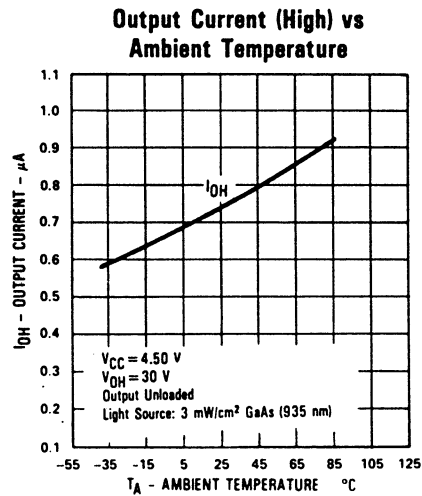
| SYMBOL                                      | PARAMETER                                                                                                               | MIN          | TYP  | MAX        | UNITS                                    | TEST CONDITIONS                                                                                |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------|------|------------|------------------------------------------|------------------------------------------------------------------------------------------------|
| V <sub>CC</sub>                             | Operating Supply Voltage                                                                                                | 4.5          |      | 5.5        | V                                        |                                                                                                |
|                                             | Peak-to-Peak V <sub>CC</sub> Ripple Necessary to Cause False Triggering of Output                                       |              | 2.0  |            | V                                        | V <sub>CC</sub> = 5 VDC<br>f = DC to 50 MHz                                                    |
| E <sub>eT</sub> (+)                         | Positive-Going Threshold Irradiance<br>OPL550, OPL550-OC, OPL551, OPL551-OC<br>OPL550A, OPL550-OCA, OPL551A, OPL551-OCA | 0.25<br>0.25 |      | 2.4<br>1.4 | mW/cm <sup>2</sup><br>mW/cm <sup>2</sup> | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C<br>V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C |
| E <sub>eT</sub> (+)/E <sub>eT</sub> (-)     | Hysteresis Ratio                                                                                                        | 1.50         | 2.0  | 2.5        |                                          |                                                                                                |
| I <sub>CC</sub>                             | Supply Current                                                                                                          |              | 8.0  | 15.0       | mA                                       | V <sub>CC</sub> = 5.5 V,<br>E <sub>e</sub> = 0 or 3 mW/cm <sup>2</sup>                         |
| <b>OPL550 (Buffer, Totem-Pole)</b>          |                                                                                                                         |              |      |            |                                          |                                                                                                |
| V <sub>OH</sub>                             | High Level Output Voltage                                                                                               | 2.4          | 3.3  |            | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -800 μA,<br>E <sub>e</sub> = 3 mW/cm <sup>2</sup>   |
| V <sub>OL</sub>                             | Low Level Output Voltage                                                                                                |              | 0.25 | 0.40       | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 12.8 mA,<br>E <sub>e</sub> = 0                      |
| I <sub>OS</sub>                             | Short Circuit Output Current                                                                                            | -20          | -55  | -100       | mA                                       | V <sub>CC</sub> = 5.5 V, E <sub>e</sub> = 3 mW/cm <sup>2</sup> ,<br>Output = GND               |
| <b>OPL550-OC (Buffer, Open-Collector)</b>   |                                                                                                                         |              |      |            |                                          |                                                                                                |
| I <sub>OH</sub>                             | High Level Output Current                                                                                               |              | 1.0  | 100        | μA                                       | V <sub>CC</sub> = 4.5 V, V <sub>OH</sub> = 30 V,<br>E <sub>e</sub> = 3 mW/cm <sup>2</sup>      |
| V <sub>OL</sub>                             | Low Level Output Voltage                                                                                                |              | 0.25 | 0.40       | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 12.8 mA,<br>E <sub>e</sub> = 0                      |
| <b>OPL551 (Inverter, Totem-Pole)</b>        |                                                                                                                         |              |      |            |                                          |                                                                                                |
| V <sub>OH</sub>                             | High Level Output Voltage                                                                                               | 2.4          | 3.3  |            | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -800 μA,<br>E <sub>e</sub> = 0                      |
| V <sub>OL</sub>                             | Low Level Output Voltage                                                                                                |              | 0.25 | 0.40       | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 12.8 mA,<br>E <sub>e</sub> = 3 mW/cm <sup>2</sup>   |
| I <sub>OS</sub>                             | Short Circuit Output Current                                                                                            | -20          | -55  | -100       | mA                                       | V <sub>CC</sub> = 5.5V, E <sub>e</sub> = 0,<br>Output = GND                                    |
| <b>OPL551-OC (Inverter, Open-Collector)</b> |                                                                                                                         |              |      |            |                                          |                                                                                                |
| I <sub>OH</sub>                             | High Level Output Current                                                                                               |              | 1.0  | 100        | μA                                       | V <sub>CC</sub> = 4.5 V, V <sub>OH</sub> = 30 V,<br>E <sub>e</sub> = 0                         |
| V <sub>OL</sub>                             | Low Level Output Current                                                                                                |              | 0.25 | 0.40       | V                                        | V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 12.8 mA,<br>E <sub>e</sub> = 3 mW/cm <sup>2</sup>   |
| <b>OPL550, OPL551</b>                       |                                                                                                                         |              |      |            |                                          |                                                                                                |
| t <sub>r</sub> , t <sub>f</sub>             | Output Rise Time, Output Fall Time                                                                                      |              | 25   | 70         | ns                                       | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C,<br>E <sub>e</sub> = 0 or 3 mW/cm <sup>2</sup>   |
| t <sub>PLH</sub> , t <sub>PHL</sub>         | Propagation Delay, Low-High, High-Low                                                                                   |              | 2.5  | 5.0        | μs                                       | f = 10 kHz, D.C. = 50%,<br>R <sub>L</sub> = 8 TTL Loads                                        |
| <b>OPL550-OC, OPL551-OC</b>                 |                                                                                                                         |              |      |            |                                          |                                                                                                |
| t <sub>r</sub> , t <sub>f</sub>             | Output Rise Time, Output Fall Time                                                                                      |              | 25   | 70         | ns                                       | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C,<br>E <sub>e</sub> = 0 or 3 mW/cm <sup>2</sup>   |
| t <sub>PLH</sub> , t <sub>PHL</sub>         | Propagation Delay, Low-High, High-Low                                                                                   |              | 2.5  | 5.0        | μs                                       | f = 10 kHz, D.C. = 50%,<br>R <sub>L</sub> = 360 Ω                                              |

## Typical Performance Curves

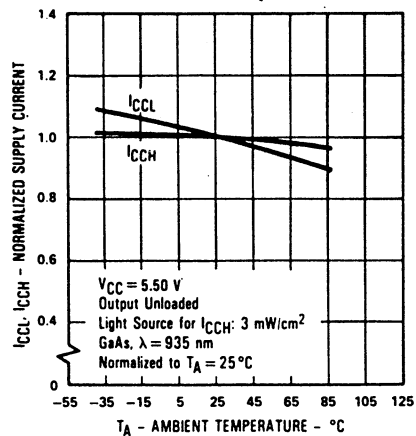
### OPL550, OPL551



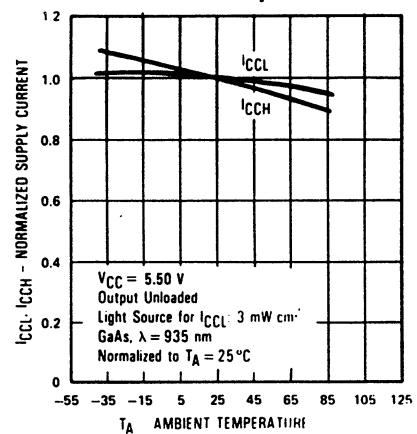
### OPL550-OC, OPL551-OC



### OPL550, OPL550-OC Normalized Supply Current vs. Ambient Temperature

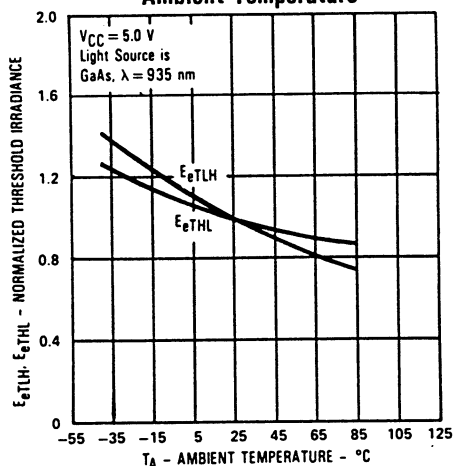


### OPL551, OPL551-OC Normalized Supply Current vs. Ambient Temperature

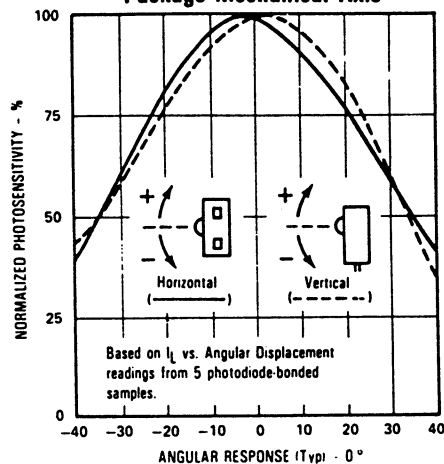


# Types OPL550, OPL551 Series

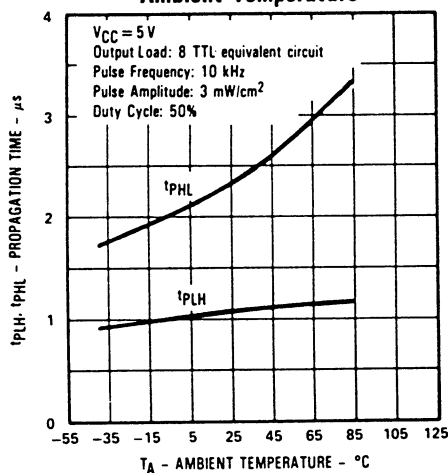
**Normalized Threshold Irradiance vs Ambient Temperature**



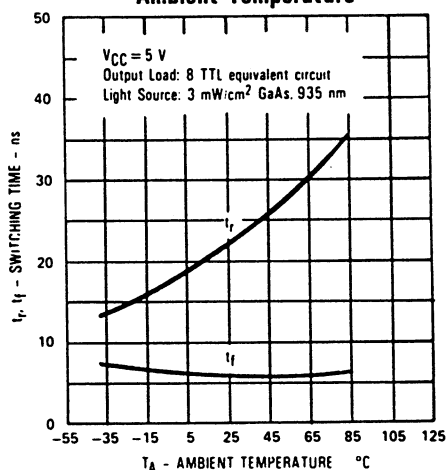
**Angular Displacement from Package Mechanical Axis**



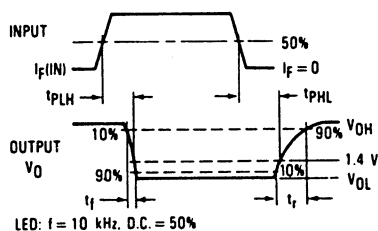
**Propagation Time vs Ambient Temperature**



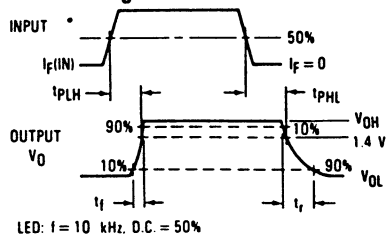
**Rise Time and Fall time vs Ambient Temperature**



**Switching Test Curve for Inverters**



**Switching Test Curve for Buffers**



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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