

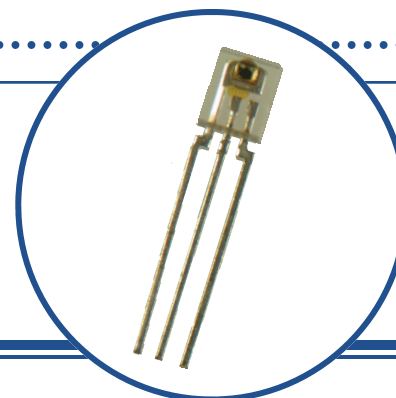
## Photologic Sensor

OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,  
OPL560, OPL561, OPL562, OPL563



### Features:

- Choice of four output options in low-cost side-looking package
- Choice of two sensitivity options (OPL560/561/562/563)
- High noise immunity
- Direct TTL/LSTTL CMOS interface
- Data rates to 250 kBaud for all except OPL560 series (200 kBaud)
- Low power consumption



### Description:

All components in this series include a photodiode, amplifier, voltage regulator, Schmitt trigger and NPN output transistor on a single silicon chip. **OPL560** chips also include a voltage regulator on the chip. All devices in the series have a Photologic® chip that is encapsulated in a molded plastic side-looking package with an integral lens (recessed integral lens for OPL535 and OPL536). This packaging provides enhanced optical coupling, combined with mechanical protection. The hysteresis characteristics of the Schmitt trigger on each device offers high immunity to noise on input and  $V_{CC}$ .

**OPL530, OPL531, OPL535 and OPL536** include a 10 K  $\Omega$  pull-up resistor ( $R_L$ ) from output to  $V_{CC}$ . These components exhibit very stable performance over supply voltages ranging from 4.5 V to 16 V and a wide range of irradiance levels. **OPL550 and OPL551** devices feature TTL/LSTTL compatible logic level output which can drive up to 8 TTL loads without additional circuitry and medium-speed data rates to 250 kBaud, with typical rise and fall times of 25 nanoseconds. **OPL560, OPL561, OPL562 and OPL563** devices feature TTL/LSTTL compatible logic level output which can drive up to 10 TTL loads over supply voltages ranging from 4.5 V to 16 V.

**OPL530, OPL531, OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563** are mechanically and spectrally matched to OP140 and OP240 LEDs. **OPL535 and OPL536** are mechanically and spectrally matched to OP145 and OP245 series LEDs.

### Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor

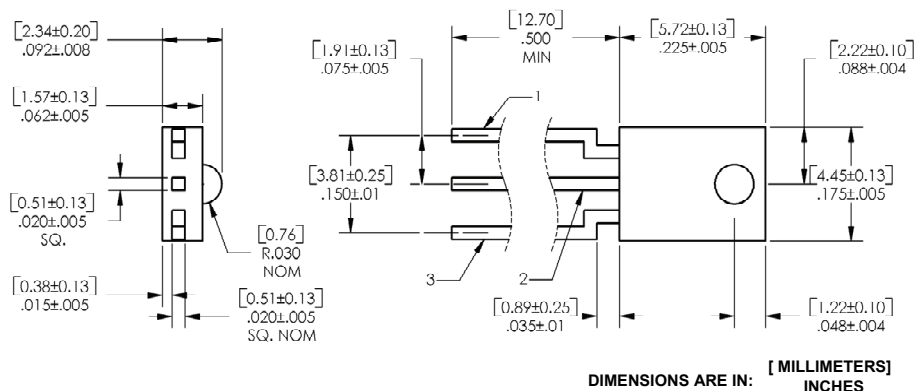
| Base Part Number           | Package       | Output Type - with Light | Input Power Range<br>(mW/cm <sup>2</sup> ) [Min/Max] |            |           |
|----------------------------|---------------|--------------------------|------------------------------------------------------|------------|-----------|
|                            |               |                          | -                                                    | A          | B         |
| OPL530                     | External Lens | Internal 10K - High      | 0.08/0.40                                            | 0.08/0.25  | 0.20/0.40 |
| OPL531                     |               | Internal 10K - Low       |                                                      |            |           |
| OPL535                     | Recessed Lens | Internal 10K - High      |                                                      |            |           |
| OPL536                     |               | Internal 10K - Low       |                                                      |            |           |
| OPL550                     | External Lens | Totem Pole - High        | 0.25/2.4                                             | 0.25/1.4   | N/A       |
| OPL551                     |               | Totem Pole - Low         | 0.25/2.5                                             | 0.25/1.5   |           |
| OPL560                     |               | Totem Pole - High        | 0.09/0.55                                            | 0.09/0.36  | 0.18/0.55 |
| OPL561                     |               | Totem Pole - Low         |                                                      |            |           |
| OPL562                     |               | Totem Pole - High        | 0.025/0.23                                           | 0.025/0.14 |           |
| OPL563                     |               | Totem Pole - Low         |                                                      |            |           |
| OC = Open Collector Output |               |                          |                                                      |            |           |



RoHS

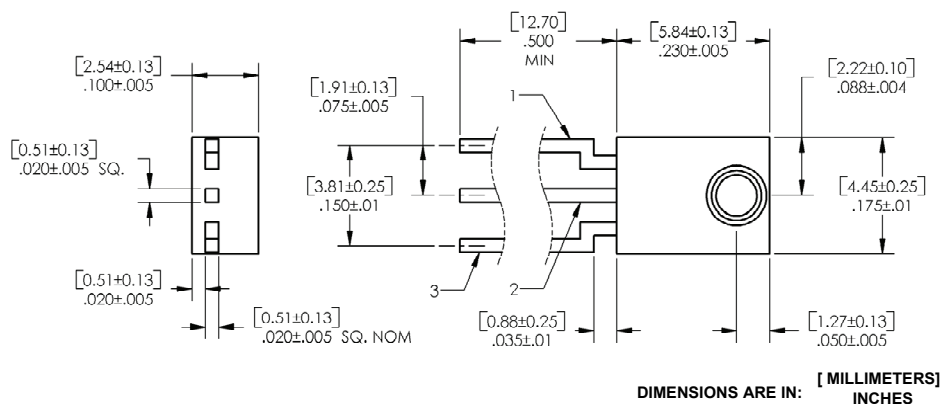
OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

**OPL530, OPL550, OPL560 Series**



| Pin # | Sensor          |
|-------|-----------------|
| 1     | Ground          |
| 2     | Output          |
| 3     | V <sub>CC</sub> |

**OPL535, OPL536 Series**



| Pin # | Sensor          |
|-------|-----------------|
| 1     | Ground          |
| 2     | Output          |
| 3     | V <sub>CC</sub> |

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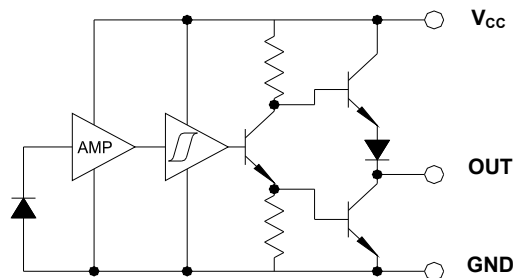
# Photologic Sensor

OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,  
OPL560, OPL561, OPL562, OPL563

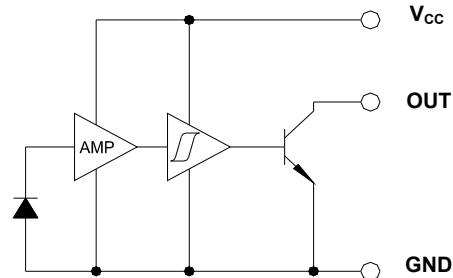


OPL530, OPL531, OPL535, OPL536, OPL550, OPL551, OPL560, OPL561, OPL562, OPL563 (-OC, -OCA, -OCB)  
OPL550, OPL550A, OPL551, OPL551A,  
OPL560, OPL560A, OPL561, OPL561A, OPL562, OPL562A, OPL563, OPL563A

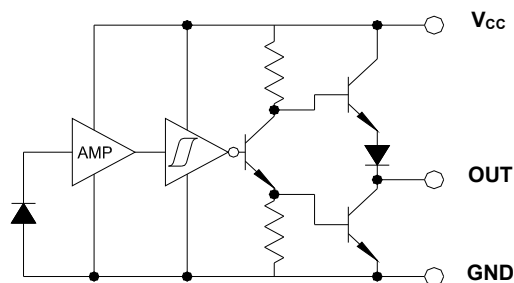
OPL550/550A/560/560A/562/562A Totem-Pole



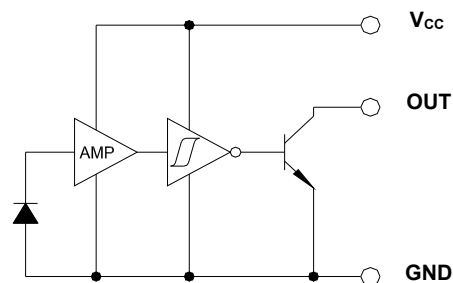
OPL530/535/550/560/562 (-OC, -OCA, -OCB) Open-Collector



OPL 551/551A/561/561A/563/563A/ Inverted Totem-Pole

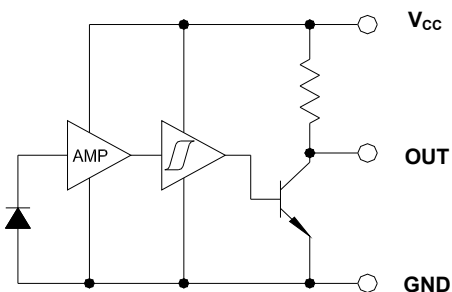


OPL 531/536/551/561/563 (-OC, -OCA, -OCB) Inverted Open-Collector

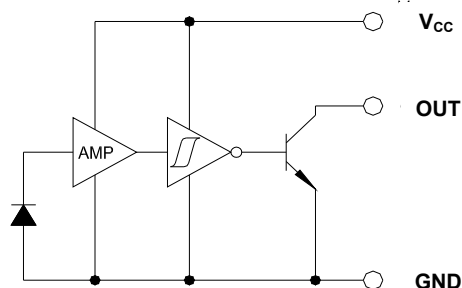
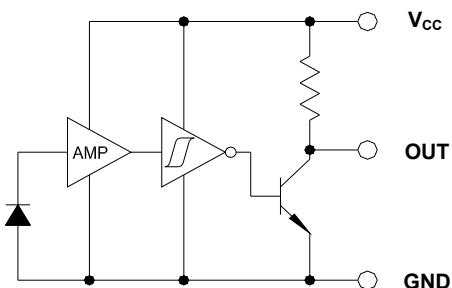
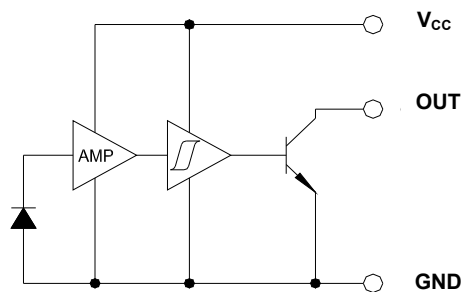


OPL530, OPL530A, OPL530B, OPL531, OPL531A, OPL531B  
OPL535, OPL535A, OPL535B, OPL536, OPL536A, OPL536B

OPL530/530A/530B, OPL535/535A/535B 10K Pull-Up



OPL531/531A/531B, OPL536/536A/536B Inverted 10K Pull-Up



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**Photologic Sensor**  
**OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,**  
**OPL560, OPL561, OPL562, OPL563**



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

**Input Diode**

|                                                                                                                                                                                           |                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Supply Voltage ( $V_{CC}$ )<br>OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536, OPL536-OC,<br>OPL550, OPL551<br>OPL560, OPL561, OPL562, OPL563                            | 18 V<br>10 V<br>18 V                                                  |
| Operating Temperature Range                                                                                                                                                               | $-40^\circ\text{C}$ to $+85^\circ\text{C}$                            |
| Storage Temperature Range                                                                                                                                                                 | $-40^\circ\text{C}$ to $+100^\circ\text{C}$                           |
| Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron]                                                                                               | $260^\circ\text{C}$                                                   |
| Sourcing Current<br>OPL560, OPL561, OPL562, OPL563                                                                                                                                        | 10 mA                                                                 |
| Power Dissipation<br>OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536, OPL536-OC<br>OPL550, OPL551, OPL560, OPL561, OPL562, OPL563                                         | 90 mW<br>200 mW <sup>(2)</sup>                                        |
| Sinking Current<br>OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536, OPL536-OC<br>OPL550, OPL551<br>OPL560, OPL561, OPL562, OPL563                                         | 50 mA<br>-<br>50 mA                                                   |
| Voltage at Output Lead <sup>(4)</sup><br>OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536, OPL536-OC<br>OPL550-OC, OPL551-OC<br>OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC | 35 V<br>35 V<br>35 V                                                  |
| Duration of Output Short to $V_{CC}$ or Ground<br>OPL550, OPL551                                                                                                                          | 1 second                                                              |
| Duration of Output Short to $V_{CC}$<br>OPL550-OC, OPL551-OC<br>OPL560, OPL561, OPL562, OPL563, OPL560-OC, OPL561-OC, OPL562-OC, OPL563-OC                                                | 1 second<br>1 second                                                  |
| Low Level Output Current<br>OPL550, OPL551 Series                                                                                                                                         | 16 mA                                                                 |
| High Level Output Current<br>OPL550, OPL551 Series                                                                                                                                        | 1 mA                                                                  |
| Irradiance<br>OPL550, OPL551 Series<br>OPL560, OPL560-OC, OPL561, OPL561-OC<br>OPL562, OPL562-OC, OPL563, OPL563-OC                                                                       | 10 mW/cm <sup>2</sup><br>9 mW/cm <sup>2</sup><br>3 mW/cm <sup>2</sup> |
|                                                                                                                                                                                           |                                                                       |

**Notes:**

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly 2.67 mW/ $^\circ\text{C}$  above  $70^\circ\text{C}$  for OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC. Derate linearly 2.5 mW/ $^\circ\text{C}$  above  $25^\circ\text{C}$  for all devices in the OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563 series.
- (3) Irradiance measurements are made with  $\lambda_i = 935\text{ nm}$ .
- (4) This applies to OC versions only. For  $I_{CC}$  on pull-up versions, add  $V_{CC}/10\text{ K}\Omega$ .

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# Photologic Sensor

OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,  
OPL560, OPL561, OPL562, OPL563



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

| SYMBOL                        | PARAMETER                                                                                                                                                                           | MIN        | TYP    | MAX        | UNITS                                | TEST CONDITIONS                                                                                    |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|------------|--------------------------------------|----------------------------------------------------------------------------------------------------|
| $V_{CC}$                      | Operating Supply Voltage<br>OPL530, OPL530-OC, OPL531, OPL531-OC<br>OPL535, OPL535-OC, OPL536, OPL536-OC,<br>OPL560, OPL561 Series                                                  | 4.5        | -      | 16         | V                                    | -                                                                                                  |
|                               | OPL550, OPL551 Series                                                                                                                                                               | 4.5        | -      | 5.5        | V                                    | -                                                                                                  |
|                               | Peak-to-Peak $V_{CC}$ Ripple Necessary to Cause False Triggering of Output<br>OPL530, OPL530-OC, OPL531, OPL531-OC<br>OPL535, OPL535-OC, OPL536, OPL536-OC<br>OPL560, OPL561 Series | -          | -      | 2          | V                                    | $f = \text{DC to } 50 \text{ MHz}$                                                                 |
|                               | OPL550, OPL551 Series                                                                                                                                                               | -          | 2      | -          | V                                    | $V_{CC} = 5 \text{ V DC}, f = \text{DC to } 50 \text{ MHz}$                                        |
| $I_{CC}$                      | Supply Current <sup>(4)</sup><br>OPL530, OPL530-OC, OPL531, OPL531-OC<br>OPL535, OPL535-OC, OPL536, OPL536-OC                                                                       | -          | 2.7    | 5          | mA                                   | $E_E = 0 \text{ or } 1 \text{ mW/cm}^2$                                                            |
|                               | OPL550, OPL551 Series                                                                                                                                                               | -          | 8      | 15         | mA                                   | $E_E = 0 \text{ or } 3 \text{ mW/cm}^2, V_{CC} = 5.5 \text{ V}$                                    |
|                               | OPL560, OPL561 Series                                                                                                                                                               | -          | 8      | 12         | mA                                   | $E_E = 0 \text{ or } 1 \text{ mW/cm}^2$                                                            |
| $E_{eT(+)}$                   | Positive-Going Threshold Irradiance <sup>(3)</sup><br>OPL530, OPL530-OC, OPL531, OPL531-OC<br>OPL535, OPL535-OC, OPL536, OPL536-OC                                                  | 0.08       | -      | 0.40       | $\text{mW/cm}^2$                     | $T_A = 25^\circ \text{C}$                                                                          |
|                               | OPL530A, OPL530-OCA, OPL531A, OPL531-OCA<br>OPL535A, OPL535-OCA, OPL536A, OPL536-OCA                                                                                                | 0.08       | -      | 0.25       | $\text{mW/cm}^2$                     | $T_A = 25^\circ \text{C}$                                                                          |
|                               | OPL530B, OPL530-OCB, OPL531B, OPL531-OCB<br>OPL535B, OPL535-OCB, OPL536B, OPL536-OCB                                                                                                | 0.12       | -      | 0.40       | $\text{mW/cm}^2$                     | $T_A = 25^\circ \text{C}$                                                                          |
|                               | OPL550, OPL550-OC, OPL551, OPL551-OC<br>OPL550A, OPL550-OCA, OPL551, OPL551-OCA                                                                                                     | .25<br>.25 | -<br>- | 2.4<br>1.4 | $\text{mW/cm}^2$<br>$\text{mW/cm}^2$ | $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$<br>$V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$ |
| $E_{eT(+)} / E_{eT(-)}$       | Hysteresis Ratio<br>OP530, OP531 Series                                                                                                                                             | 1.05       | 1.3    | 1.6        | -                                    | -                                                                                                  |
|                               | OP535, OP536 Series                                                                                                                                                                 | 1.05       | 1.2    | 1.5        | -                                    | -                                                                                                  |
|                               | OPL550, OPL551 Series                                                                                                                                                               | 1.50       | 2      | 2.5        | -                                    | -                                                                                                  |
|                               | OPL560, OPL561 Series                                                                                                                                                               | 1.20       | 1.55   | 2          | -                                    | -                                                                                                  |
| $\Delta E_{et(+)} (\Delta T)$ | Temperature Co-efficient<br>OPL530, OPL530-OC, OPL531, OPL531-OC                                                                                                                    | -          | -0.6   | -          | %/ $^\circ\text{C}$                  | $>0^\circ\text{C}$                                                                                 |
|                               | OPL535, OPL535-OC, OPL536, OPL536-OC                                                                                                                                                | -          | -1.6   | -          | %/ $^\circ\text{C}$                  | $<0^\circ\text{C}$                                                                                 |

### Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly 2.67 mW/ $^\circ\text{C}$  above  $70^\circ \text{C}$  for OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC. Derate linearly 2.5 mW/ $^\circ\text{C}$  above  $25^\circ \text{C}$  for all devices in the OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563 series.
- (3) Irradiance measurements are made with  $\lambda_i = 935 \text{ nm}$ .
- (4) This applies to OC versions only. For  $I_{CC}$  on pull-up versions, add  $V_{CC}/10 \text{ K}\Omega$ .

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**Photologic Sensor**  
**OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,**  
**OPL560, OPL561, OPL562, OPL563**



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

| SYMBOL   | PARAMETER                                                                        | MIN            | TYP  | MAX  | UNITS         | TEST CONDITIONS                                                                            |
|----------|----------------------------------------------------------------------------------|----------------|------|------|---------------|--------------------------------------------------------------------------------------------|
| $V_{OH}$ | Operating Supply Voltage<br>OPL550                                               | 2.4            | 3.3  | -    | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$ ,<br>$E_E = 3\text{ mW/cm}^2$ |
|          | OPL551                                                                           | 2.4            | 3.3  | -    | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OH} = -800\text{ }\mu\text{A}$ ,<br>$E_E = 0$                |
|          | OPL560                                                                           | $V_{CC} - 2.1$ | -    | -    | V             | $I_{OH} = -1\text{ }\mu\text{A}$ , $E_E = 1\text{ mW/cm}^2$                                |
|          | OPL561                                                                           | $V_{CC} - 2.1$ | -    | -    | V             | $I_{OH} = -1\text{ }\mu\text{A}$ , $E_E = 0$                                               |
| $V_{OL}$ | Low Level Output Voltage<br>OPL530, OPL530-OC, OPL535, OPL535-OC                 | -              | 0.2  | 0.4  | V             | $I_{OL} = 16\text{ mA}$ , $E_E = 0$                                                        |
|          | OPL531, OPL531-OC, OPL536, OPL536-OC                                             | -              | 0.2  | 0.4  | V             | $I_{OL} = 16\text{ mA}$ , $E_E = 1\text{ mW/cm}^2$                                         |
|          | OPL550                                                                           | -              | 0.25 | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 12.8\text{ mA}$ ,<br>$E_E = 0$                         |
|          | OPL551                                                                           | -              | 0.25 | 0.4  | V             | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 12.8\text{ mA}$ ,<br>$E_E = 3\text{ mW/cm}^2$          |
|          | OPL560, OPL560-OC                                                                | -              | -    | .4   | V             | $I_{OL} = 16\text{ mA}$ , $E_E = 0$                                                        |
|          | OPL561, OPL561-OC                                                                | -              | -    | .4   | V             | $I_{OL} = 16\text{ mA}$ , $E_E = 1\text{ mW/cm}^2$                                         |
| $I_{OS}$ | Short Circuit Output Current<br>OPL550                                           | -20            | -55  | -100 | mA            | $V_{CC} = 5.5\text{ V}$ , Output = GND,<br>$E_E = 3\text{ mW/cm}^2$                        |
|          | OPL551                                                                           | -20            | -55  | -100 | mA            | $V_{CC} = 5.5\text{ V}$ , Output = GND,<br>$E_E = 0$                                       |
| $I_{OH}$ | High Level Output Current <sup>(4)</sup><br>OPL531, OPL531-OC, OPL536, OPL536-OC | -              | 0.1  | 10   | $\mu\text{A}$ | $V_{OH} = 30\text{ V}$ , $E_E = 0$                                                         |
|          | OPL535, OPL535-OC, OPL530, OPL530-OC                                             | -              | 0.1  | 10   | $\mu\text{A}$ | $V_{OH} = 30\text{ V}$ , $E_E = 1\text{ mW/cm}^2$                                          |
|          | OPL550-OC                                                                        | -              | 1    | 100  | $\mu\text{A}$ | $V_{CC} = 4.5\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$E_E = 3\text{ mW/cm}^2$             |
|          | OPL551-OC                                                                        | -              | 1    | 100  | $\mu\text{A}$ | $V_{CC} = 4.5\text{ V}$ , $V_{OH} = 30\text{ V}$ ,<br>$E_E = 0$                            |
|          | OPL560-OC                                                                        | -              | -    | 100  | $\mu\text{A}$ | $V_{OH} = 30\text{ V}$ , $E_E = 1\text{ mW/cm}^2$                                          |
|          | OPL561-OC                                                                        | -              | -    | 100  | $\mu\text{A}$ | $V_{OH} = 30\text{ V}$ , $E_E = 0$                                                         |

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly  $2.67\text{ mW}/^\circ\text{C}$  above  $70^\circ\text{C}$  for OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC. Derate linearly  $2.5\text{ mW}/^\circ\text{C}$  above  $25^\circ\text{C}$  for all devices in the OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563 series.
- (3) Irradiance measurements are made with  $\lambda_i = 935\text{ nm}$ .
- (4) This applies to OC versions only. For  $I_{CC}$  on pull-up versions, add  $V_{CC}/10\text{ K}\Omega$ .

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# Photologic Sensor

OPL530, OPL531, OPL535, OPL536, OPL550, OPL551,  
OPL560, OPL561, OPL562, OPL563



## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| SYMBOL         | PARAMETER                                          | MIN | TYP | MAX | UNITS | TEST CONDITIONS                                                                                                                                   |
|----------------|----------------------------------------------------|-----|-----|-----|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| t <sub>r</sub> | Output Rise Time<br>OPL530, OPL531, OPL535, OPL536 | -   | 1.5 | -   | μs    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , C <sub>L</sub> = 50 pF                                                                               |
|                | OPL530-OC, OPL531-OC, OPL535-OC,<br>OPL536-OC      | -   | 50  | -   | ns    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , R <sub>L</sub> = 300 Ω to 5 V, C <sub>L</sub> = 50 pF                                                |
|                | OPL550, OPL551                                     | -   | 25  | 70  | ns    | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 3 mW/cm <sup>2</sup> , f = 10 kHz, DC = 50%<br>R <sub>L</sub> = 8 TTL loads  |
|                | OPL550-OC, OPL551-OC                               | -   | 25  | 70  | ns    | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 3 mW/cm <sup>2</sup> , f = 10 kHz, DC = 50%,<br>R <sub>L</sub> = 360 Ω       |
|                | OPL560, OPL561                                     | -   | -   | 70  | ns    | T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> ,<br>f = 10 kHz, DC = 50%,<br>R <sub>L</sub> = 360 Ω                           |
|                | OPL560-OC, OPL561-OC                               | -   | -   | 100 | μs    |                                                                                                                                                   |
| t <sub>r</sub> | Output Rise Time<br>OPL530, OPL531, OPL535, OPL536 | -   | -   | -   | μs    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , C <sub>L</sub> = 50 pF                                                                               |
|                | OPL530-OC, OPL531-OC, OPL535-OC,<br>OPL536-OC      | -   | -   | -   | ns    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , R <sub>L</sub> = 300 Ω to 5 V, C <sub>L</sub> = 50 pF                                                |
|                | OPL550-OC, OPL551-OC                               | -   | 25  | 70  | ns    | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 3 mW/cm <sup>2</sup> , R <sub>L</sub> = 8 TTL loads,<br>f = 10 kHz, DC = 50% |
|                | OPL560-OC, OPL561-OC                               | -   | -   | 70  | ns    | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 3 mW/cm <sup>2</sup> , R <sub>L</sub> = 8 TTL loads,<br>f = 10 kHz, DC = 50% |
|                | OPL560, OPL561                                     | -   | -   | 70  | ns    | T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> ,<br>f = 10 kHz                                                                |
|                | OPL560-OC, OPL561-OC                               | -   | -   | 100 | ns    | T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> ,<br>f = 10 kHz                                                                |
| t <sub>f</sub> | Output Fall Time<br>OPL530, OPL531, OPL535, OPL536 | -   | 20  | -   | ns    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , C <sub>L</sub> = 50 pF                                                                               |
|                | OPL530-OC, OPL531-OC, OPL535-OC,<br>OPL536-OC      | -   | 20  | -   | ns    | E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> , R <sub>L</sub> = 300 Ω to 5 V, C <sub>L</sub> = 50 pF                                                |
|                | OPL550-OC, OPL551-OC                               | -   | 25  | 70  | ns    | V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 3 mW/cm <sup>2</sup> , R <sub>L</sub> = 360 Ω, f = 10 kHz,<br>DC = 50%       |
|                | OPL560, OPL561                                     | -   | -   | 70  | ns    | T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> ,<br>f = 10 kHz                                                                |
|                | OPL560-OC, OPL561-OC                               | -   | -   | 100 | ns    | T <sub>A</sub> = 25° C, E <sub>E</sub> = 0 or 1 mW/cm <sup>2</sup> ,<br>f = 10 kHz                                                                |
|                |                                                    |     |     |     |       |                                                                                                                                                   |

### Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly 2.67 mW/°C above 70° C for OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC. Derate linearly 2.5 mW/°C above 25° C for all devices in the OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563 series.
- (3) Irradiance measurements are made with λ<sub>i</sub> = 935 nm.
- (4) This applies to OC versions only. For I<sub>CC</sub> on pull-up versions, add V<sub>CC</sub>/10 KΩ.

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

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

| SYMBOL             | PARAMETER                                                                                       | MIN | TYP | MAX | UNITS         | TEST CONDITIONS                                                                                                                                                |
|--------------------|-------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $t_{pE_T(+)}$      | Propagation Delay<br>OPL530, OPL531, OPL535, OPL536                                             | -   | 1.0 | -   | $\mu\text{s}$ | $E_E = 0$ or $1 \text{ mW/cm}^2$ , $R_L = 300 \Omega$ to $5 \text{ V}$ , $C_L = 50 \text{ pF}$                                                                 |
|                    | OPL530-OC, OPL531-OC, OPL535-OC, OPL536-OC                                                      | -   | 1.0 | -   | $\mu\text{s}$ | $E_E = 0$ or $1 \text{ mW/cm}^2$ , $R_L = 300 \Omega$ to $5 \text{ V}$ , $C_L = 50 \text{ pF}$                                                                 |
|                    | OPL550-OC, OPL551-OC                                                                            | -   | 2.5 | 5   | $\mu\text{s}$ | $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$ , $E_E = 0$ or $3 \text{ mW/cm}^2$ , $R_L = 8 \text{ TTL loads}$ , $f = 10 \text{ kHz}$ , $\text{DC} = 50\%$ |
| $t_{pE_T(-)}$      | Propagation Delay<br>OPL530, OPL531, OPL535, OPL536, OPL530-OC, OPL531-OC, OPL535-OC, OPL536-OC | -   | 3.0 | -   | $\mu\text{s}$ | $E_E = 0$ or $1 \text{ mW/cm}^2$ , $R_L = 300 \Omega$ to $5 \text{ V}$ , $C_L = 50 \text{ pF}$                                                                 |
|                    | OPL550-OC, OPL551-OC                                                                            | -   | 2.5 | 5   | $\mu\text{s}$ | $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$ , $E_E = 0$ or $3 \text{ mW/cm}^2$ , $R_L = 360 \Omega$ , $f = 10 \text{ kHz}$ , $\text{DC} = 50\%$          |
| $t_{PLH}, T_{PHL}$ | Propagation Delay (Low-High/High-Low)<br>OPL560, OPL561                                         | -   | 5   | -   | $\mu\text{s}$ | $\text{DC} = 50\%$ , $R_L = 10 \text{ TTL Loads}$                                                                                                              |
|                    | OP560-OC, OPL561-OC                                                                             | -   | 5   | -   | $\mu\text{s}$ | $\text{DC} = 50\%$ , $R_L = 300 \Omega$                                                                                                                        |

**Notes:**

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
- (2) Derate linearly  $2.67 \text{ mW}/^\circ\text{C}$  above  $70^\circ\text{C}$  for OPL530, OPL530-OC, OPL531, OPL531-OC, OPL535, OPL535-OC, OPL536 and OPL536-OC. Derate linearly  $2.5 \text{ mW}/^\circ\text{C}$  above  $25^\circ\text{C}$  for all devices in the OPL550, OPL551, OPL560, OPL561, OPL562 and OPL563 series.
- (3) Irradiance measurements are made with  $\lambda_i = 935 \text{ nm}$ .
- (4) This applies to OC versions only. For  $I_{CC}$  on pull-up versions, add  $V_{CC}/10 \text{ K}\Omega$ .

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