Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Features:
- Four output options available
- High noise immunity
- Direct TTL/LSTTL interface
- TO-18 hermetically sealed package
- Sensors mechanically and spectrally matched to other Optek devices (see device descriptions detailed below)

Description:
All OPL800, OPL801, OPL820 and OPL821 sensors consist of a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip (monolithic chip for OPL820 and OPL821). OPL810, OPL811, OPL812 and OPL813 sensors also have a voltage regulator added to their photologic chips. Each device’s photologic chip is mounted onto a standard TO-18 header and hermetically sealed in a lensed metal can.

All devices in the series feature TTL/LSTTL compatible logic level output, which can drive up to 8 TTL loads (OPL800, OPL801) or up to 10 TTL loads (OPL810, OPL811, OPL812, OPL813, OPL820 and OPL821) without additional circuitry. On all these devices, the Schmitt trigger’s hysteresis characteristics provide high immunity to noise on input and Vcc.

OPL800 series devices feature medium-speed data rates to 250 kBaum, with typical rise and fall times of 25 nanoseconds.

OPL800 and OPL801 devices are mechanically and spectrally matched to OP130 and OP231 series LEDs. OPL810, OPL811, OPL812 and OPL813 devices are mechanically and spectrally matched to OP130 and OP230 series devices. OPL820 and OPL821 devices are mechanically and spectrally matched to OP130 and OP231 series LEDs.

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

<table>
<thead>
<tr>
<th>Pin #</th>
<th>OPL800 or OPL810</th>
<th>OPL821</th>
<th>Transistor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
<td>Ground</td>
<td>Collector</td>
</tr>
<tr>
<td>2</td>
<td>Vcc</td>
<td>Output</td>
<td>Base</td>
</tr>
<tr>
<td>3</td>
<td>Output</td>
<td>Vcc</td>
<td>Emitter</td>
</tr>
</tbody>
</table>

Mounted to TO-18 Base

DIMENSIONS ARE IN: [MILLIMETERS] INCHES

RoHS

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## Photologic Hermetic Sensors

### Part Numbers


### Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Photologic®</th>
<th>Input Power $E_p$ (µW/cm²) Min / Max</th>
<th>$V_{CC}$ (V) Min / Max</th>
<th>$I_{OL}$ / $I_{OL}$</th>
<th>Lead Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPL800</td>
<td>Totem-Pole</td>
<td>50 / 600</td>
<td>4.5 / 16.0</td>
<td>0.10 / 12.8</td>
<td>0.50&quot;</td>
</tr>
<tr>
<td>OPL800-OC</td>
<td>Open-Collector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL801</td>
<td>Inv-Totem-Pole</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL801-OC</td>
<td>Inv-Open-Collector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL810</td>
<td>Totem-Pole</td>
<td>5 / 100</td>
<td>4.5 / 16.0</td>
<td>0.10 / 16.0</td>
<td>0.50&quot;</td>
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<tr>
<td>OPL810-OC</td>
<td>Open-Collector</td>
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<td>OPL811</td>
<td>Inv-Totem-Pole</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL811-OC</td>
<td>Inv-Open-Collector</td>
<td></td>
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<tr>
<td>OPL812-OC</td>
<td>Open-Collector</td>
<td></td>
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<tr>
<td>OPL813-OC</td>
<td>Inv-Open-Collector</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL820</td>
<td>10K Pull-Up</td>
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<td></td>
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<tr>
<td>OPL820-OC</td>
<td>Open Collector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL821-OC</td>
<td>Inv. Open Collector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Schematics

- **OPL800/800B/810** Buffered Totem-Pole
- **OPL800-OC/810-OC/812-OC/820/OC** Open-Collector
- **OPL801/811** Inverted Totem-Pole
- **OPL801-OC/811-OC/813-OC/821-OC** Inverted Open-Collector
OPL820

OPL820 10K Pull-Up

VCC
OUT
GND
## Photologic Hermetic Sensors

**OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC**

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### Electrical Specifications

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

**OP8800/801/810/811 and OPB800-OC Series**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>OPL800, OPL801</th>
<th>OPL810, OPL811</th>
<th>OPL820</th>
<th>OPL810, OPL811</th>
<th>OPL820</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Diode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Operating Temperature Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL800, OPL801</td>
<td>-55° C to +110° C</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL810, OPL811</td>
<td>-55° C to +105° C</td>
<td></td>
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<tr>
<td>OPL820</td>
<td>-40° C to +100° C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL800, OPL801</td>
<td>-65° C to +150° C</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>OPL810, OPL811</td>
<td>-65° C to +125° C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL820</td>
<td>-55° C to +125° C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead Soldering Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[1/16 inch (1.6mm) from the case for 5 sec. with soldering iron]</td>
<td>260°C&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td></td>
<td></td>
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<tr>
<td><strong>Input Infrared LED</strong></td>
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<tr>
<td>Supply Voltage, V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL800, OPL801</td>
<td>10 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL810, OPL811, OPL820</td>
<td>18 V</td>
<td></td>
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<tr>
<td>Sourcing Current</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>OPL810, OPL811</td>
<td>10 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Voltage (high state)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>OPL800, OPL801, OPL810, OPL811</td>
<td>35 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL820</td>
<td>30 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Current Sink (low state)</td>
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<tr>
<td>OPL810, OPL811</td>
<td>50 mA</td>
<td></td>
<td></td>
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<tr>
<td>OPL820</td>
<td>16 mA</td>
<td></td>
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<tr>
<td>Irradiance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL800, OPL801</td>
<td>3 mW/cm&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL810, OPL810-OC, OPL811-OC</td>
<td>2 mW/cm&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL812, OPL812-OC, OPL813-OC</td>
<td>1 mW/cm&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<sup>(1)</sup> 260°C is the maximum recommended temperature for lead soldering.
Electrical Specifications

Absolute Maximum Ratings ($T_a = 25^\circ C$ unless otherwise noted)
OPB800/801/810/811/812/813 and OPB800-OC Series

<table>
<thead>
<tr>
<th>Output Photologic®</th>
<th>OPL800, OPL801, OPL810, OPL811, OPL820</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage at Output Lead</td>
<td>35 V, 30 V</td>
</tr>
<tr>
<td>Duration of Output Short to $V_{CC}$</td>
<td>1 second</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>120 mW$^{(2)}$, 250 mW$^{(2)}$, 200 mW$^{(2)}$</td>
</tr>
</tbody>
</table>

Notes:

1. RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
2. Derate linearly 2.5 mW/°C above 25° C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/°C above 90° C for OPL820.
3. For OPL800, OPL801, OPL810, OPL811, light measurements are made with $\lambda_i = 935$ nm. For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.
## Electrical Specifications

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{CC})</td>
<td>Operating Supply Voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPL800/801</td>
<td>4.5</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>OPL810/811</td>
<td>4.5</td>
<td>-</td>
<td>16</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>OP820</td>
<td>4.5</td>
<td>-</td>
<td>16</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Peak-to-Peak (V_{CC}) Ripple Necessary to</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Cause False Triggering of Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPL800/801</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>V</td>
<td>(f = \text{DC to } 50 \text{ MHz})</td>
</tr>
<tr>
<td></td>
<td>OPL810/811</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>V</td>
<td>(f = \text{DC to } 50 \text{ MHz})</td>
</tr>
<tr>
<td>(I_{CC})</td>
<td>Supply Current</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>mA</td>
<td>(E_e = 0 \text{ or } 1 \text{ mW/cm}^2)</td>
</tr>
<tr>
<td>(E_{eT}^{(+)})</td>
<td>Positive-Going Threshold Irradiance (^{(3)})</td>
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</tr>
<tr>
<td></td>
<td>OPL800/801</td>
<td>0.050</td>
<td>0.180</td>
<td>0.600</td>
<td>mW/cm(^2)</td>
<td>(T_a = 25^\circ C)</td>
</tr>
<tr>
<td></td>
<td>OPL810/811</td>
<td>0.015</td>
<td>0.060</td>
<td>0.200</td>
<td>mW/cm(^2)</td>
<td>(T_a = 25^\circ C)</td>
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<tr>
<td></td>
<td>OP820</td>
<td>0.002</td>
<td>0.015</td>
<td>0.035</td>
<td>mW/cm(^2)</td>
<td>T(_a) = 25°C (\text{See below}^{(3)})</td>
</tr>
<tr>
<td>(E_{eT}^{(+)} / E_{eT}^{(-)})</td>
<td>Hysteresis Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPL800/801</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>OPL810/811</td>
<td>1.2</td>
<td>1.5</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(E_e^{(+)} / E_e^{(-)})</td>
<td>Hysteresis Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OPL820</td>
<td>1.05</td>
<td>1.20</td>
<td>1.90</td>
<td>-</td>
<td>(\text{See below}^{(4)})</td>
</tr>
<tr>
<td>(I_{CCH})</td>
<td>High State Supply Current</td>
<td>-</td>
<td>5</td>
<td>12</td>
<td>mA</td>
<td>(\text{See below}^{(4)})</td>
</tr>
<tr>
<td>(I_{CCL})</td>
<td>Low State Supply Current</td>
<td>-</td>
<td>4</td>
<td>12</td>
<td>mA</td>
<td>(\text{See below}^{(4)})</td>
</tr>
</tbody>
</table>
Electrical Specifications

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Level Output Voltage</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OPL800</td>
<td></td>
<td>2.4</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>( I_{OH} = -800 \mu A, E_e = 1 \text{ mW/cm}^2 )</td>
</tr>
<tr>
<td>OPL801</td>
<td></td>
<td>2.4</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>( I_{OH} = -800 \mu A, E_e = 0 )</td>
</tr>
<tr>
<td>OPL810</td>
<td></td>
<td>V_{CC}-2.1</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>( I_{OH} = -1mA, E_e = 0.4 \text{ mW/cm}^2 )</td>
</tr>
<tr>
<td>OPL811</td>
<td></td>
<td>V_{CC}-2.1</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>( I_{OH} = -1mA, E_e = 0 )</td>
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<tr>
<td>OPL820-OC/821-OC</td>
<td></td>
<td>V_{CC} 1.5</td>
<td>-</td>
<td>V_{CC}</td>
<td>V</td>
<td>( I_{OH} = -100 \mu A^{(4)} )</td>
</tr>
</tbody>
</table>

Notes:
(1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
(2) Derate linearly 2.5 mW/\(^\circ\)C above 25\(^\circ\) C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/\(^\circ\)C above 90\(^\circ\) C for OPL820.
(3) For OPL800, OPL801, OPL810, OPL811, light measurements are made with \( \lambda_i = 935 \text{ nm} \). For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.
(4) High output state limits are valid for \( 4.5 < V_{CC} < 16 \text{ V} \) and \( E_e > 0.035 \text{ mW/cm}^2 \) (OPL820, OPL820-OC). \( E_e < 0.001 \text{ mW/cm}^2 \) (OPL821-OC).
(5) Low output state limits are valid for \( 4.5 < V_{CC} < 16 \text{ V} \) and \( E_e > 0.035 \text{ mW/cm}^2 \) (OPL821-OC). \( E_e < 0.001 \text{ mW/cm}^2 \) (OPL820, OPL820-OC).
## Photologic Hermetic Sensors

**OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC**

### Electrical Specifications

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{OH}</td>
<td>High Level Output Voltage</td>
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<td></td>
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</tr>
<tr>
<td>OPL800</td>
<td>-</td>
<td>2.4</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>I_{OH} = -800 μA, E_e = 1 mW/cm²</td>
</tr>
<tr>
<td>OPL801</td>
<td>-</td>
<td>2.4</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>I_{OH} = -800 μA, E_e = 0</td>
</tr>
<tr>
<td>OPL810</td>
<td>V_{CC}-2.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>V</td>
<td>I_{OH} = -1mА, E_e = 0.4 mW/cm²</td>
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<tr>
<td>OPL811</td>
<td>V_{CC}-2.1</td>
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<td>-</td>
<td>-</td>
<td>V</td>
<td>I_{OH} = -1mА, E_e = 0</td>
</tr>
<tr>
<td>OPL820-OC/821-OC</td>
<td>V_{CC}-1.5</td>
<td>-</td>
<td>V_{CC}</td>
<td>V</td>
<td>I_{OH} = -100 μА(4)</td>
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<tr>
<td>V_{OL}</td>
<td>Low Level Output Voltage</td>
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<tr>
<td>OPL800/800-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 12.8 mA, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>OPL801/801-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 12.8 mA, E_e = 1 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL810/810-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 16 mA, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>OPL811/811-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 16 mA, E_e = 0.4 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL812-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 16 mA, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>OPL813-OC</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 16 mA, E_e = 0.2 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL820</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
<td>I_{OL} = 16 mA(5)</td>
<td></td>
</tr>
<tr>
<td>I_{OH}</td>
<td>High Level Output Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL800-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 2 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL801-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>OPL810-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 0.4 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL811-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>OPL812-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 0.2 mW/cm²</td>
<td></td>
</tr>
<tr>
<td>OPL813-OC</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
<td>V_{OH} = 30 V, E_e = 0</td>
<td></td>
</tr>
<tr>
<td>I_{OS}</td>
<td>Short Circuit Output Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPL800</td>
<td>-20</td>
<td>-</td>
<td>100</td>
<td>mA</td>
<td>E_e = 1 mW/cm², Output = GND</td>
<td></td>
</tr>
<tr>
<td>OPL801</td>
<td>-</td>
<td>-100</td>
<td>mA</td>
<td>E_e = 0, Output = GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Note

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## Electrical Specifications

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

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output Rise Time, Fall Time</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>ns</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 8 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL800/801-OC</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>ns</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 360 \Omega, f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL810/811-OC</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>ns</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 0.4 \text{ mW/cm}^2, R_L = 10 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL810-OC/811-OC/812-OC/813-OC</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>ns</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 300 \Omega, f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL820</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>ns</td>
<td>(R_L = 390 \Omega)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Propagation Delay</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 8 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>Low/High - High/Low</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 1 \text{ mW/cm}^2, R_L = 8 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL800/801-OC</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(T_A = 25^\circ \text{C}, E_e = 0 \text{ or } 0.4 \text{ mW/cm}^2, R_L = 10 \text{ TTL loads, } f = 10 \text{ kHz, D.C.} = 50%)</td>
</tr>
<tr>
<td></td>
<td>OPL810/811</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(E_e = 0.1 \text{ mW/cm}^2, R_L = 390 \Omega)</td>
</tr>
<tr>
<td></td>
<td>OPL810-OC/811-OC/812-OC/813-OC</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(E_e = 0.1 \text{ mW/cm}^2, R_L = 390 \Omega)</td>
</tr>
<tr>
<td></td>
<td>OPL820 (to high state)</td>
<td>-</td>
<td>2.1</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(E_e = 0.1 \text{ mW/cm}^2, R_L = 390 \Omega)</td>
</tr>
<tr>
<td></td>
<td>OPL820 (to low state)</td>
<td>-</td>
<td>2.1</td>
<td>-</td>
<td>(\mu\text{s})</td>
<td>(E_e = 0.1 \text{ mW/cm}^2, R_L = 390 \Omega)</td>
</tr>
</tbody>
</table>

### Data Rate

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data Rate Using NRZ Format</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>kHz</td>
<td>(E_e = 0.1 \text{ mW/cm}^2, R_L = 390 \Omega)</td>
</tr>
</tbody>
</table>

**Notes:**

1. RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering. For OPB820, a maximum of 20 grams force may be applied to leads while at soldering temperatures.
2. Derate linearly 2.5 mW/\(^\circ\text{C}\) above 25°C for OPL800, OPL801, OPL810, OPL811. Derate linearly 5.7 mW/\(^\circ\text{C}\) above 90°C for OPL820.
3. For OPL800, OPL801, OPL810, OPL811, light measurements are made with \(\lambda_i = 935 \text{ nm}\). For OPB820, light measurements are made with an LED source having a wavelength of 935 nm.
4. High output state limits are valid for \(4.5 \text{ V} < V_{CC} < 16 \text{ V}\) and \(E_e > 0.035 \text{ mW/cm}^2\) (OPL820, OPL820-OC), \(E_e < 0.001 \text{ mW/cm}^2\) (OPL821-OC).
5. Low output state limits are valid for \(4.5 \text{ V} < V_{CC} < 16 \text{ V}\) and \(E_e > 0.035 \text{ mW/cm}^2\) (OPL821-OC), \(E_e < 0.001 \text{ mW/cm}^2\) (OPL820, OPL820-OC).
Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Performance
OPL800, OPL801

Output Voltage vs. Ambient Temperature

Short Circuit Output Current vs. Ambient Temperature

OPL800-OC, OPL801-OC

Output Current (High) vs. Ambient Temperature

Rise Time and Fall Time vs. Ambient Temperature

OPL800, OPL800-OC

Normalized Supply Current vs. Ambient Temperature

OPL801, OPL801-OC

Normalized Supply Current vs. Ambient Temperature

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Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Performance
OPL800, OPL801 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

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Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Performance

OPL810, OPL811 Series
- Output Voltage vs. Ambient Temp.
- High Output Current vs. Ambient Temp.
- Normalized Threshold Irradiance vs. TA

OPL812, OPL813 Series
- Normalized Threshold Irradiance vs. Amb. Temp.
- Normalized Spectral Response
- Angular Displacement from Package Mechanical Axis

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Performance

OPL812, OPL813 Series

Normalized Supply Current vs. Ambient Temperature

Propagation Time vs. Ambient Temperature

Rise Time & Fall Time vs. Ambient Temperature

Rise Time & Fall Time vs. Ambient Temperature and Output Load

Switching Test Curves

Switching Test Curve for Inverters

Switching Test Curve for Buffers

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Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Performance

Normalized Threshold Irradiance vs. Ambient Temperature

Angular Displacement From Package Mechanical Axis

Normalized Spectral Response

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Photologic Hermetic Sensors
OPL800, OPL800-OC, OPL801, OPL801-OC, OPL810, OPL810-OC, OPL811, OPL811-OC, OPL812-OC, OPL813-OC, OPL820, OPL820-OC, OPL821-OC

Performance
OPL820, OPL821 Series

Normalized Supply Current vs. Ambient Temperature

Normalized High Level Output Voltage vs. Ambient Temperature

Low Level Output Voltage vs. Ambient Temperature

Propagation Time vs. Ambient Temperature

Propagation Time vs. Irradiance