IS471F

**Features**

1. Impervious to external disturbing lights due to light modulation system
2. Built-in pulse driver circuit and sync. detector circuit on the emitter side
3. A wide range of operating supply voltage (V<sub>CC</sub>: 4.5 to 16V)

**Applications**

1. Optoelectronic switches
2. Copiers, printers
3. Facsimiles

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>-0.5 to 16</td>
<td>V</td>
</tr>
<tr>
<td>Output</td>
<td>V&lt;sub&gt;O&lt;/sub&gt;</td>
<td>16</td>
<td>V</td>
</tr>
<tr>
<td>Output current</td>
<td>I&lt;sub&gt;o&lt;/sub&gt;</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>GL output</td>
<td>V&lt;sub&gt;GL&lt;/sub&gt;</td>
<td>16</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>P</td>
<td>250</td>
<td>mW</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>T&lt;sub&gt;op&lt;/sub&gt;</td>
<td>-25 to +60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>T&lt;sub&gt;st&lt;/sub&gt;</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>T&lt;sub&gt;sol&lt;/sub&gt;</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 Applies to GL<sub>out</sub> terminal
*2 For 5 seconds at the position shown in the right figure

An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

**Outline Dimensions**

(Unit: mm)

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### Electro-optical Characteristics

(V<sub>CC</sub>= 5V, Ta= 25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating supply voltage</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt;</td>
<td></td>
<td>4.5</td>
<td>-</td>
<td>16</td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>I&lt;sub&gt;CC&lt;/sub&gt;</td>
<td>V&lt;sub&gt;G&lt;/sub&gt;, GL&lt;sub&gt;out&lt;/sub&gt; terminals shall be opened.</td>
<td>-</td>
<td>3.5</td>
<td>7.0</td>
<td>mA</td>
</tr>
<tr>
<td>Output</td>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>I&lt;sub&gt;GL&lt;/sub&gt;=15mA, E&lt;sub&gt;VP&lt;/sub&gt;= 500lx, E&lt;sub&gt;VD&lt;/sub&gt;= 0&lt;sup&gt;+&lt;/sup&gt;</td>
<td>-</td>
<td>0.15</td>
<td>0.35</td>
<td>V</td>
</tr>
<tr>
<td>Low level output voltage</td>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>E&lt;sub&gt;VP&lt;/sub&gt;= E&lt;sub&gt;VD&lt;/sub&gt;= 0&lt;sup&gt;+&lt;/sup&gt;</td>
<td>4.97</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>High level output voltage</td>
<td>I&lt;sub&gt;OS&lt;/sub&gt;</td>
<td>E&lt;sub&gt;VP&lt;/sub&gt;= E&lt;sub&gt;VD&lt;/sub&gt;= 0&lt;sup&gt;+&lt;/sup&gt;</td>
<td>0.25</td>
<td>0.5</td>
<td>1.0</td>
<td>mA</td>
</tr>
<tr>
<td>Output short circuit current</td>
<td>V&lt;sub&gt;GL&lt;/sub&gt;</td>
<td>V&lt;sub&gt;GL&lt;/sub&gt;= 1.2V</td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>mA</td>
</tr>
<tr>
<td>GL output</td>
<td>I&lt;sub&gt;GL&lt;/sub&gt;</td>
<td></td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>mA</td>
</tr>
<tr>
<td>Low level output current</td>
<td>I&lt;sub&gt;GL&lt;/sub&gt;</td>
<td></td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>mA</td>
</tr>
<tr>
<td>&quot;Pulse cycle&quot;</td>
<td>t&lt;sub&gt;p&lt;/sub&gt;</td>
<td></td>
<td>4.4</td>
<td>8</td>
<td>13.7</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;Pulse width&quot;</td>
<td>t&lt;sub&gt;W&lt;/sub&gt;</td>
<td></td>
<td>4.4</td>
<td>8</td>
<td>13.7</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;Low→High&quot; threshold irradiance</td>
<td>E&lt;sub&gt;ePLH&lt;/sub&gt;</td>
<td>E&lt;sub&gt;VP&lt;/sub&gt;= 0&lt;sup&gt;+&lt;/sup&gt;</td>
<td>-</td>
<td>0.4</td>
<td>2.66</td>
<td>µ W/mm²</td>
</tr>
<tr>
<td>&quot;High→Low&quot; threshold irradiance</td>
<td>E&lt;sub&gt;ePHL&lt;/sub&gt;</td>
<td>Light emitting diode (λ&lt;sub&gt;p&lt;/sub&gt;= 940nm )&lt;sup&gt;6&lt;/sup&gt;</td>
<td>-</td>
<td>0.7</td>
<td>2.8</td>
<td>µ W/mm²</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>E&lt;sub&gt;ePLH&lt;/sub&gt;/E&lt;sub&gt;ePHL&lt;/sub&gt;</td>
<td></td>
<td>0.45</td>
<td>0.65</td>
<td>0.95</td>
<td>-</td>
</tr>
<tr>
<td>Response time</td>
<td>t&lt;sub&gt;FHL&lt;/sub&gt;</td>
<td>*6</td>
<td>-</td>
<td>400</td>
<td>670</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;High→Low&quot; propagation delay time</td>
<td>t&lt;sub&gt;PLH&lt;/sub&gt;</td>
<td>*6</td>
<td>-</td>
<td>400</td>
<td>670</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;Low→High&quot; propagation delay time</td>
<td>t&lt;sub&gt;PHL&lt;/sub&gt;</td>
<td>*6</td>
<td>-</td>
<td>400</td>
<td>670</td>
<td>µs</td>
</tr>
<tr>
<td>External disturbing light illuminance</td>
<td>E&lt;sub&gt;VDX&lt;/sub&gt;</td>
<td>E&lt;sub&gt;eP&lt;/sub&gt;= 7.5 µ W/mm², λ&lt;sub&gt;p&lt;/sub&gt;= 940nm</td>
<td>2000</td>
<td>7500</td>
<td>-</td>
<td>lx</td>
</tr>
</tbody>
</table>

*3 E<sub>eP</sub> represents illuminance of signal light in sync with the low level timing of output at GL<sub>out</sub> terminal.

*4 Pulse cycle (t<sub>p</sub>), pulse width (t<sub>W</sub>) are defined as shown in Fig. 2.

*5 Defined as E<sub>eP</sub> that causes the output to go "Low to High" (or "High to Low").

*6 Light source: Infrared light emitting diode (λ<sub>p</sub>= 940nm )

*7 External disturbing light illuminance E<sub>VDX</sub> represents illuminance of signal light in sync with the low level timing of output at GL<sub>out</sub> terminal.

E<sub>VP</sub> represents illuminance of DC light. For detail, see Fig. 1.

E<sub>VD</sub> represents illuminance of DC light. Note that the light source is CIE standard light source A.

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*Fig. 1*

(Note) Fig. 1 shows the output waveform at GL<sub>out</sub> terminal with IS471F connected as shown in Fig. 3.

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*Fig. 2*

*5 Defined as E<sub>eP</sub> that causes the output to go "Low to High" (or "High to Low").

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*Fig. 3*
*6 Test circuit for response time, threshold irradiance is shown in Fig. 4.

**Fig. 4**

Light emitting diode: peak emission wavelength $\lambda_P = 940\text{nm}$

*7 $E_{\text{VDX}}$: Defined as the $E_{\text{VD}}$ at the limit of normal operation range.

**Fig. 5 Power Dissipation vs. Ambient Temperature**

**Fig. 6 Low Level Output Voltage vs. Low Level Output Current**

**Fig. 7 Low Level Output Voltage vs. Ambient Temperature**

**Fig. 8 Supply Current vs. Supply Voltage**
Fig. 9 Low Level Output Current vs. Supply Voltage

![Graph showing low level output current vs. supply voltage](image)

Fig. 10 Sensitivity Diagram (Tₐ = 25°C)

![Sensitivity diagram](image)

Fig. 11 Spectral Sensitivity

![Graph showing spectral sensitivity](image)

**Basic Circuit**

![Basic circuit diagram](image)

In order to stabilize power supply line, connect a by-pass capacitor of 0.33µF or more between Vcc and GNP near the device.

● Please refer to the chapter “Precautions for Use.”
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      - Alarm equipment
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