Transmissive Optical Sensor with Schmitt-Trigger Logic Output

**Description**
The TCYS5201 is a transmissive sensor that includes an infrared emitter and a Photo Schmitt-Trigger with digital output interface, located face-to-face on the optical axes. The package blocks visible light and includes mounting clips and a three pin connector.

**Features**
- **Package type:** connector, 3 pin Molex 5267-NA series order number: 22-03-5035
- **Detector type:** Photo Schmitt-Trigger
- **Dimensions:**
  - L 19.8 mm x W 9.9 mm x H 18 mm
  - Gap: 5 mm
  - Aperture: 0.5 mm
- **Typical output current under test:** $I_C = 16 \text{ mA}$
- **Output voltage level is LOW, if IR beam is not interrupted**
- **Output device TTL compliant, open collector**
- **Daylight blocking filter**
- **Emitter wavelength:** 950 nm
- **Lead (Pb)-free soldering released**
- **Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC**
- **Minimum order quantity:** 400 pcs, 400 pcs/bulk

**Applications**
- Detection of opaque materials, documents etc.
- Paper position sensor in copy machines
- Position sensor for shaft encoders

**Handling Precaution**
Connect a capacitor with more than 100 nF between $V_S$ and ground in order to stabilize power supply voltage!

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test condition</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td></td>
<td>$V_S$</td>
<td>16</td>
<td>V</td>
</tr>
<tr>
<td>Output voltage</td>
<td></td>
<td>$V_O$</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Low level output current</td>
<td></td>
<td>$I_{OL}$</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Operation temperature range</td>
<td></td>
<td>$T_{amb}$</td>
<td>- 25 to + 85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td></td>
<td>$T_{stg}$</td>
<td>- 40 to + 100</td>
<td>°C</td>
</tr>
</tbody>
</table>
### Electrical Characteristics

$T_{\text{amb}} = 25 \, ^\circ\text{C}$, unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test condition</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage range</td>
<td>$V_S$</td>
<td>4.5</td>
<td>5.5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>High level supply current</td>
<td>$V_S = 5 , V$</td>
<td>$I_S$</td>
<td>15</td>
<td>30</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Low level supply current</td>
<td>$V_S = 5 , V$</td>
<td>$I_S$</td>
<td>15</td>
<td>30</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>High level output voltage</td>
<td>$V_S = 5 , V, R_L = 1 , k\Omega$</td>
<td>$V_{OH}$</td>
<td>4.5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Low level output voltage</td>
<td>$V_S = 5 , V, I_{OL} = 16 , mA$</td>
<td>$V_{OL}$</td>
<td>0.18</td>
<td>0.35</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>$V_S = 5 , V, R_L = 47 , k\Omega$</td>
<td>$f$</td>
<td></td>
<td></td>
<td></td>
<td>KHz</td>
</tr>
</tbody>
</table>

1) Infrared beam interrupted
2) Infrared beam not interrupted

**Note:** Operating conditions are stabilized after 100 µs of supply voltage turn on.

### Switching Characteristics

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test condition</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rise time</td>
<td>$V_S = 5 , V, R_L = 1 , k\Omega$ (see figure 1)</td>
<td>$t_r$</td>
<td>50.0</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Fall time</td>
<td>$V_S = 5 , V, R_L = 1 , k\Omega$ (see figure 1)</td>
<td>$t_f$</td>
<td>20.0</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
</tbody>
</table>

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![Figure 1. Test circuit and pin connection](image1.png)

![Figure 2. Pulse diagram](image2.png)
Typical Characteristics

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- **Figure 3**: Trip point characteristic
- **Figure 4**: Frequency response
- **Figure 5**: Rel. Supply Current vs. Ambient Temperature
- **Figure 6**: Output Current vs. Output Voltage
- **Figure 7**: Output Voltage vs. Ambient Temperature
Package Dimensions in mm

1 = GND
2 = VO
3 = VS

weight: ca. 1.01g
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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

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2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

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