IR Sensor Module for Remote Control Systems

FEATURES
- Photo detector and preamplifier in one package
- AC coupled response from 30 kHz to 60 kHz, all data formats
- If the IR signal strength is more than 1000 mW/m² (distance less than 0.35 m with a typical IR remote control), the frequency range is limited to 55 kHz
- Improved shielding against electrical field disturbance
- AGC to suppress ambient noise
- High sensitivity, long receiving range
- Supply voltage: 2.5 V to 5.5 V
- Carrier out signal for IR repeater applications
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

DESCRIPTION
The TSMP58138 is a miniaturized sensor for receiving the modulated signal of infrared remote control systems. A PIN diode and preamplifier are assembled on a lead frame, the epoxy package is designed as an IR filter. The modulated output signal, carrier out, can be used for repeater applications and code learning applications.

This component has not been qualified according to automotive specifications.

PARTS TABLE

<table>
<thead>
<tr>
<th>Carrier frequency</th>
<th>38 kHz</th>
<th>TSMP58138</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>Minicast</td>
<td></td>
</tr>
<tr>
<td>Pinning</td>
<td>1 = carrier OUT, 2 = GND, 3 = V_S</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>5.0 W x 6.95 H x 4.8 D</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Leaded</td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>Repeater</td>
<td></td>
</tr>
</tbody>
</table>

BLOCK DIAGRAM

APPLICATION CIRCUIT

Recommended circuit for best sensitivity in repeater applications.
It limits the output voltage swing V_S to about 0.7 V in order to avoid internal coupling.
### ELECTRICAL AND OPTICAL CHARACTERISTICS  
**(T<sub>amb</sub> = 25 °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 current (pin 3)</td>
<td>E&lt;sub&gt;v&lt;/sub&gt; = 0, V&lt;sub&gt;s&lt;/sub&gt; = 5 V</td>
<td>I&lt;sub&gt;SD&lt;/sub&gt;</td>
<td>0.55</td>
<td>0.7</td>
<td>0.9</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>E&lt;sub&gt;v&lt;/sub&gt; = 40 klx, sunlight</td>
<td>I&lt;sub&gt;SH&lt;/sub&gt;</td>
<td>-</td>
<td>0.8</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Supply voltage</td>
<td></td>
<td>V&lt;sub&gt;s&lt;/sub&gt;</td>
<td>2.5</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>Transmission distance</td>
<td>E&lt;sub&gt;v&lt;/sub&gt; = 0, test signal see Fig. 1, IR diode TSAL6200, I&lt;sub&gt;f&lt;/sub&gt; = 50 mA</td>
<td>d</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>m</td>
</tr>
<tr>
<td>Output voltage low (pin 1)</td>
<td>I&lt;sub&gt;OSL&lt;/sub&gt; = 0.5 mA, E&lt;sub&gt;e&lt;/sub&gt; = 0.7 mW/m², test signal see Fig. 1</td>
<td>V&lt;sub&gt;OSL&lt;/sub&gt;</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>mV</td>
</tr>
<tr>
<td>Minimum irradiance</td>
<td>Less than 5 missing or 5 additional sub carrier pulses related to one burst</td>
<td>E&lt;sub&gt;e_min&lt;/sub&gt;</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>mW/m²</td>
</tr>
<tr>
<td>Maximum irradiance</td>
<td>Less than 5 missing or 5 additional sub carrier pulses related to one burst</td>
<td>E&lt;sub&gt;e_max&lt;/sub&gt;</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>W/m²</td>
</tr>
<tr>
<td>Directivity</td>
<td>Angle of half transmission distance</td>
<td>θ&lt;sub&gt;1/2&lt;/sub&gt;</td>
<td>-</td>
<td>± 45</td>
<td>-</td>
<td>deg</td>
</tr>
</tbody>
</table>

### TYPICAL CHARACTERISTICS  
**(T<sub>amb</sub> = 25 °C, unless otherwise specified)**

- **Optical Test Signal:**
  - IR diode TSAL6200, I<sub>f</sub> = 0.25 A
  - N = 15 carrier pulses per burst, f = 38 kHz, burst repetition time: 3 ms

- **E<sub>e</sub>** - Carrier Frequency (kHz)
- **E<sub>e_min</sub>** - Detection Threshold (mW/m²)

**Fig. 1 - Output Function**

**Fig. 2 - Frequency Dependence of Sensitivity**
Fig. 3 - Relative Spectral Sensitivity vs. Wavelength

Fig. 4 - Horizontal Directivity

Fig. 5 - Vertical Directivity
PACKAGE DIMENSIONS in millimeters

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Marking area

technical drawings according to DIN specifications

Not indicated tolerances ± 0.2
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