Ambient Light Sensor

Description
TEM6000 is a silicon NPN epitaxial planar phototransistor in a miniature transparent mold for surface mounting onto a printed circuit board. The device is sensitive to the visible spectrum.

Features
- Adapted to human eye responsivity
- Wide angle of half sensitivity $\varphi = \pm 60^\circ$
- SMD style package on PCB technology
- Suitable for IR reflow soldering
- Lead free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Applications
Ambient light sensor for display backlight dimming in:
- Mobile phones
- Notebook computers
- PDA’s
- Cameras
- Dashboards

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test condition</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector Emitter Voltage</td>
<td></td>
<td>$V_{\text{CEO}}$</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Emitter Collector Voltage</td>
<td></td>
<td>$V_{\text{ECO}}$</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td></td>
<td>$I_C$</td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Total Power Dissipation</td>
<td>$T_{\text{amb}} \leq 55 , ^\circ\text{C}$</td>
<td>$P_{\text{tot}}$</td>
<td>100</td>
<td>mW</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td></td>
<td>$T_J$</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>$T_{\text{amb}}$</td>
<td>- 40 to + 85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>$T_{\text{stg}}$</td>
<td>- 40 to + 85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Soldering Temperature</td>
<td>$t \leq 3 , \text{s}$</td>
<td>$T_{\text{sd}}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal Resistance Junction/ Ambient</td>
<td></td>
<td>$R_{\text{thJA}}$</td>
<td>450</td>
<td>K/W</td>
</tr>
</tbody>
</table>
Basic 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>Collector Emitter Breakdown Voltage</td>
<td>( I_C = 0.1 , \text{mA} )</td>
<td>( V_{\text{CEO}} )</td>
<td>6</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Collector dark current</td>
<td>( V_{\text{CE}} = 5 , \text{V}, E = 0 )</td>
<td>( I_{\text{CEO}} )</td>
<td>3</td>
<td>50</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>Collector-emitter capacitance</td>
<td>( V_{\text{CE}} = 0 , \text{V}, f = 1 , \text{MHz}, E = 0 )</td>
<td>( C_{\text{CEO}} )</td>
<td>16</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Collector Light Current</td>
<td>( E_v = 20 , \text{lx}, ) standard light A</td>
<td>( I_{\text{ca}} )</td>
<td>3.5</td>
<td>10</td>
<td>16</td>
<td>( \mu\text{A} )</td>
</tr>
<tr>
<td></td>
<td>( E_v = 100 , \text{lx}, ) standard light A</td>
<td>( I_{\text{ca}} )</td>
<td>50</td>
<td></td>
<td></td>
<td>( \mu\text{A} )</td>
</tr>
<tr>
<td>Angle of Half Sensitivity</td>
<td></td>
<td>( \phi )</td>
<td>±60</td>
<td></td>
<td></td>
<td>deg</td>
</tr>
<tr>
<td>Wavelength of Peak Sensitivity</td>
<td></td>
<td>( \lambda_p )</td>
<td>570</td>
<td></td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Range of Spectral Bandwidth</td>
<td></td>
<td>( \lambda_{\text{0.1}} )</td>
<td>360 to 970</td>
<td></td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Collector Emitter Saturation Voltage</td>
<td>( E_v = 20 , \text{lx}, 0.45 , \mu\text{A} )</td>
<td>( V_{\text{CEsat}} )</td>
<td>0.1</td>
<td></td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

Typical Characteristics  \((T_{\text{amb}} = 25 \, ^\circ\text{C} \) unless otherwise specified)

Figure 1. Collector Light Current vs. Illuminance

Figure 2. Relative Spectral Responsivity vs. Wavelength

Figure 3. Relative Radiant Sensitivity vs. Angular Displacement
Drypack
Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

Floor Life
Floor life (time between soldering and removing from MBB) must not exceed the time indicated in J-STD-020. TEMT6000 is released for:
Moisture Sensitivity Level 4, according to JEDEC, J-STD-020
Floor Life: 72 h
Conditions: $T_{\text{amb}} < 30 \, ^\circ\text{C}$, RH < 60 %
TEMT6000
Vishay Semiconductors

Package Dimensions in mm

Drawing-No. 6541-5053.01-4
Issue 2; 21.06.04

All dimensions in mm
Net indicated tolerances ±0.1
Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

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.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are
known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs
and forbid their use within the next ten years. Various national and international initiatives are pressing for an
earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the
use of ODSs listed in the following documents.

   respectively
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

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting
substances and do not contain such substances.

We reserve the right to make changes to improve technical design
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each
customer application by the customer. Should the buyer use Vishay Semiconductors products for any
unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all
claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal
damage, injury or death associated with such unintended or unauthorized use.

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