Ambient Light Sensor, RoHS Compliant, Released for Lead (Pb)-free Solder Process, AEC-Q101 Released

Description
TEMT6000X01 ambient light sensor plays a key role in power savings strategies by controlling LCD display intensity and keypad backlighting of mobile devices and in industrial on/off-lighting operation. It is sensitive to visible light much like the human eye and has peak sensitivity at 570 nm. TEMT6000X01 has analog output and is packaged in a small surface mount package.

Features
- Product designed and qualified acc. AEC-Q101 for the automotive market
- High sensitivity: $I_{PCE} = 50 \mu A$ ($E_V = 100 \text{ lx}$)
- Adapted to human eye responsivity
- Wide angle of half sensitivity: $\varphi = \pm 60^\circ$
- Surface mount package
- Dimensions: L 4 mm x W 2 mm x H 1.05 mm
- Tape and reel: 3000 pcs/reel
- Minimum order quantity: MOQ = 3000 pcs
- Lead (Pb)-free soldering released
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC

Applications
Ambient light sensor for control of display backlight dimming in LCD displays and keypad backlighting of mobile devices and in industrial on/off-lighting operation.
- Automotive sensors
- Mobile phones
- Notebook computers
- PDA’s
- Cameras
- Dashboards

Absolute Maximum Ratings
$T_{amb} = 25 \, ^\circ C$, 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>$V_{CEO}$</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Emitter collector voltage</td>
<td></td>
<td>$V_{ECO}$</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>$T_{amb} \leq 55 , ^\circ C$</td>
<td>$P_V$</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></td>
<td>$T_{amb}$</td>
<td>- 40 to + 100</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>
<tr>
<td>Soldering temperature</td>
<td>Reflow profile figure 7</td>
<td>$T_{sd}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction/ambient</td>
<td></td>
<td>$R_{thJA}$</td>
<td>450</td>
<td>K/W</td>
</tr>
</tbody>
</table>
**Basic Characteristics**

\(T_{amb} = 25 \, ^{\circ}C\), 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 , mA)</td>
<td>(V_{CEO})</td>
<td>6</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Collector dark current</td>
<td>(V_{CE} = 5 , V, E = 0)</td>
<td>(I_{CEO})</td>
<td>3</td>
<td>50</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>Collector-emitter capacitance</td>
<td>(V_{CE} = 0 , V, f = 1 , MHz, E = 0)</td>
<td>(C_{CEO})</td>
<td>16</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Collector light current</td>
<td>(E_v = 20 , lx, CIE illuminant A, V_{CE} = 5 , V)</td>
<td>(I_{PCE})</td>
<td>3.5</td>
<td>10</td>
<td>16</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td>(E_v = 100 , lx, CIE illuminant A, V_{CE} = 5 , V)</td>
<td>(I_{PCE})</td>
<td></td>
<td>50</td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>Temperature coefficient of (I_{PCE})</td>
<td>CIE illuminant A</td>
<td>(T_{KIPCE})</td>
<td>1.18</td>
<td></td>
<td></td>
<td>%/K</td>
</tr>
<tr>
<td></td>
<td>LED, white</td>
<td>(T_{KIPCE})</td>
<td>0.9</td>
<td></td>
<td></td>
<td>%/K</td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td>(\phi)</td>
<td></td>
<td>± 60</td>
<td></td>
<td></td>
<td>deg</td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td>(\lambda_p)</td>
<td></td>
<td>570</td>
<td></td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td>(\lambda_{0.1})</td>
<td></td>
<td>360 to 970</td>
<td></td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Collector emitter saturation voltage</td>
<td>(E_v = 20 , lx, CIE illuminant A, I_{PCE} = 1.2 , µA)</td>
<td>(V_{CEsat})</td>
<td>0.1</td>
<td></td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

Figure 1. Power Dissipation vs. Ambient Temperature
Typical Characteristics

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

Figure 2. Collector Dark Current vs. Ambient Temperature

![Collector Dark Current vs. Ambient Temperature](image)

Figure 3. Relative Photo Current vs. Ambient Temperature

![Relative Photo Current vs. Ambient Temperature](image)

Figure 4. Photo Current vs. Illuminance

![Photo Current vs. Illuminance](image)

Figure 5. Collector Emitter Capacitance vs. Collector Emitter Voltage

![Collector Emitter Capacitance vs. Collector Emitter Voltage](image)

Figure 6. Relative Spectral Sensitivity vs. Wavelength

![Relative Spectral Sensitivity vs. Wavelength](image)

Figure 7. Relative Radiant Sensitivity vs. Angular Displacement

![Relative Radiant Sensitivity vs. Angular Displacement](image)
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. TEMT6000X01 is released for:
Moisture sensitivity level 4, according to JEDEC, J-STD-020
Floor life: 72 h
Conditions: \( T_{\text{amb}} < 30 \, ^\circ C, \, \text{RH} < 60 \, % \)

Drying
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at 40 \( ^\circ C \) (+ 5 \( ^\circ C \)), RH < 5 %.

Figure 8. Tin (Sn) Reflow Solder Profile (Pb-free)

Figure 9. Lead Tin (SnPb) Reflow Solder Profile
Package Dimensions in millimeters

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**Emitter**

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**Collector**

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**Recommended solder pad footprint**

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**Tape and reel packing:** 3000 pcs/reel

**Minimum order quantity:** 3000 pcs

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Drawing-No.: 6.541-5053.01-4

Issue: 3; 27.04.07
Ozone Depleting Substances Policy Statement

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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).

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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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