DESCRIPTION
The TCST5250 is a transmissive sensor that includes an infrared emitter and a phototransistor, located face-to-face on the optical axes in a leaded package which blocks visible light.

FEATURES
- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 14.3 x 6 x 9.5
- Gap (in mm): 2.7
- Aperture (in mm): 0.5
- Typical output current under test: I_C = 1.5 mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

APPLICATIONS
- Optical switch
- Shaft encoder

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>GAP WIDTH (mm)</th>
<th>APERTURE WIDTH (mm)</th>
<th>TYPICAL OUTPUT CURRENT UNDER TEST (1) (mA)</th>
<th>DAYLIGHT BLOCKING FILTER INTEGRATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCST5250</td>
<td>2.7</td>
<td>0.5</td>
<td>1.5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note (1) Conditions like in table basic characteristics/coupler

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>VOLUME (1)</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCST5250</td>
<td>Tube</td>
<td>MOQ: 4860 pcs, 30 pcs/tube</td>
<td>-</td>
</tr>
</tbody>
</table>

Note (1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (1)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>COUPLER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>P_spec</td>
<td>250</td>
<td>mW</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>T_amb</td>
<td></td>
<td>- 25 to + 85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>T_stg</td>
<td></td>
<td>- 40 to + 100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>Distance to package 1.6 mm, t ≤ 5 s</td>
<td>T_sd</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>INPUT (EMITTER)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>V_R</td>
<td></td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Forward current</td>
<td>I_F</td>
<td></td>
<td>60</td>
<td>mA</td>
</tr>
<tr>
<td>Forward surge current</td>
<td>I_FSM</td>
<td></td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>P_V</td>
<td>100</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>T_J</td>
<td></td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>OUTPUT (DETECTOR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector emitter voltage</td>
<td>V_CEO</td>
<td></td>
<td>70</td>
<td>V</td>
</tr>
<tr>
<td>Emitter collector voltage</td>
<td>V_ECO</td>
<td></td>
<td>7</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td>I_C</td>
<td></td>
<td>100</td>
<td>mA</td>
</tr>
</tbody>
</table>
TCST5250
Vishay Semiconductors Transmissive Optical Sensor with Phototransistor Output

**ABSOLUTE MAXIMUM RATINGS (1)**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power dissipation</td>
<td>$T_{amb} \leq 25 , ^\circ C$</td>
<td>$P_V$</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td></td>
<td>$T_J$</td>
<td>100</td>
<td>°C</td>
</tr>
</tbody>
</table>

**Note**

(1) $T_{amb} = 25 \, ^\circ C$, unless otherwise specified

**ABSOLUTE MAXIMUM RATINGS**

![Fig. 1 - Power Dissipation Limit vs. Ambient Temperature](image)

**BASIC CHARACTERISTICS (1)**

<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><strong>COUPLER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector current</td>
<td>$V_{CE} = 10 , V$, $I_F = 20 , mA$</td>
<td>$I_C$</td>
<td>0.5</td>
<td>1.5</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Collector emitter saturation voltage</td>
<td>$I_F = 20 , mA$, $I_C = 0.2 , mA$</td>
<td>$V_{CESat}$</td>
<td></td>
<td>0.4</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td><strong>INPUT (EMITTER)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>$I_F = 60 , mA$</td>
<td>$V_F$</td>
<td>1.25</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Junction capacitance</td>
<td>$V_R = 0 , V$, $f = 1 , MHz$</td>
<td>$C_J$</td>
<td>50</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td><strong>OUTPUT (DETECTOR)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector emitter voltage</td>
<td>$I_C = 1 , mA$</td>
<td>$V_{CEO}$</td>
<td>70</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Emitter collector voltage</td>
<td>$I_E = 10 , \mu A$</td>
<td>$V_{EEO}$</td>
<td>7</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Collector dark current</td>
<td>$V_{CE} = 25 , V$, $I_F = 0 , A$, $E = 0 , lx$</td>
<td>$I_{CEO}$</td>
<td>10</td>
<td>100</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td><strong>SWITCHING CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-on time</td>
<td>$I_C = 1 , mA$, $V_{CE} = 5 , V$, $R_L = 100 , \Omega$ (see figure 2)</td>
<td>$t_{on}$</td>
<td>15</td>
<td></td>
<td>µs</td>
<td></td>
</tr>
<tr>
<td>Turn-off time</td>
<td>$I_C = 1 , mA$, $V_{CE} = 5 , V$, $R_L = 100 , \Omega$ (see figure 2)</td>
<td>$t_{off}$</td>
<td>10</td>
<td></td>
<td>µs</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

(1) $T_{amb} = 25 \, ^\circ C$, unless otherwise specified
Transmissive Optical Sensor with Phototransistor Output

**BASIC CHARACTERISTICS**

T<sub>amb</sub> = 25 °C, unless otherwise specified

---

**Fig. 2 - Test Circuit for ton and toff**

**Fig. 3 - Switching Times**

**Fig. 4 - Forward Current vs. Forward Voltage**

**Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature**

**Fig. 6 - Collector Dark Current vs. Ambient Temperature**

**Fig. 7 - Collector Current vs. Forward Current**
Fig. 8 - Collector Current vs. Collector Emitter Voltage

Fig. 9 - Current Transfer Ratio vs. Forward Current

Fig. 10 - Turn-on/Turn-off Time vs. Collector Current

Fig. 11 - Relative Collector Current vs. Displacement
TCST5250

Transmissive Optical Sensor with Phototransistor Output

Vishay Semiconductors

PACKAGE DIMENSIONS in millimeters

Not indicated tolerances ±0.2

Recommended installation holes for reference only (component side)

Drawing-No.: 6550-5198.01-4
Issue 3: 06.06.00

15192
### Packaging and Ordering Information

#### Notes
- **(1)** MOQ: minimum order quantity
- **(2)** Please refer to datasheets

#### PART NUMBER | MOQ (1) | PCS PER TUBE | TUBE SPEC. (FIGURE) | CONSTITUENTS (FORMS)
--- | --- | --- | --- | ---
CNY70 | 4000 | 80 | 1 | 28
TCPT1300X01 | 2000 | Reel | (2) | 29
TCRT1000 | 1000 | Bulk | - | 26
TCRT1010 | 1000 | Bulk | - | 26
TCRT5000 | 4500 | 50 | 2 | 27
TCRT5000L | 2400 | 48 | 3 | 27
TCST1030 | 5200 | 65 | 5 | 24
TCST1030L | 2600 | 65 | 6 | 24
TCST1103 | 1020 | 85 | 4 | 24
TCST1202 | 1020 | 85 | 4 | 24
TCST1230 | 4800 | 60 | 7 | 24
TCST1300 | 1020 | 85 | 4 | 24
TCST2103 | 1020 | 85 | 4 | 24
TCST2202 | 1020 | 85 | 4 | 24
TCST2300 | 1020 | 85 | 4 | 24
TCST5250 | 4860 | 30 | 8 | 24
TCUT1300X01 | 2000 | Reel | (2) | 29
TCST8020-PAER | 2500 | Bulk | - | 22

---

#### TUBE SPECIFICATION FIGURES

![Tube Specification Diagram]

Drawing-No: 9,700-5097.01-4
Issue: 1, 25 02 00

With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm

Fig. 1
Fig. 2

Drawing-No.: 9.700-5139.01-4
Issue: 1; 10.05.00

Drawing refers to following types: TCRT 5000

With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm

Fig. 3

Drawing-No.: 9.700-5178.01-4
Issue: 1; 25.02.00

With stopper pins
Tolerance: ±0.5mm
Length: 575±1mm
Packaging and Ordering Information

Drawing-No.: 9.700-5100.01-4
Issue: 1, 25.02.00

Fig. 4

With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm

Drawing-No.: 9.700-5140.01-4
Issue: 1, 25.02.00

Fig. 5

With stopper pins
Tolerance: ±0.5mm
Length: 575±1mm
Fig. 8

Drawing-No.: 9.700-5222.01-4
Issue: 2; 19.11.04
20257

With stopper pins
Tolerance ±0.5mm
Length: 450±1mm
All dimensions in mm
Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.