REFLECTIVE OPTICAL SENSOR WITH TRANSISTOR OUTPUT

DESCRIPTION
The TCRT1000 and TCRT1010 are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light.

FEATURES
- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 7 x 4 x 2.5
- Peak operating distance: 1 mm
- Operating range within > 20 % relative collector current: 0.2 mm to 4 mm
- Typical output current under test: I_C = 0.5 mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS
- Optoelectronic scanning and switching devices i.e., index sensing, coded disk scanning etc. (optoelectronic encoder assemblies for transmissive sensing).

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DISTANCE FOR MAXIMUM CTR_{rel} [(mm)]</th>
<th>DISTANCE RANGE FOR RELATIVE I_{out} &gt; 20 % (mm)</th>
<th>TYPICAL OUTPUT CURRENT UNDER TEST [(mA)]</th>
<th>DAYLIGHT BLOCKING FILTER INTEGRATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCRT1000</td>
<td>1</td>
<td>0.2 to 4</td>
<td>0.5</td>
<td>Yes</td>
</tr>
<tr>
<td>TCRT1010</td>
<td>1</td>
<td>0.2 to 4</td>
<td>0.5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes
(1) CTR: current transfer ratio, I_{out}/I_{in}
(2) Conditions like in table basic characteristics/sensor

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>VOLUME [(1)]</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCRT1000</td>
<td>Bulk</td>
<td>MOQ: 1000 pcs, 1000 pcs/bulk</td>
<td>Straight leads</td>
</tr>
<tr>
<td>TCRT1010</td>
<td>Bulk</td>
<td>MOQ: 1000 pcs, 1000 pcs/bulk</td>
<td>Bent leads</td>
</tr>
</tbody>
</table>

Notes
(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °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>SENSOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>T_{amb} ≤ 25 °C</td>
<td>P_{tot}</td>
<td>200</td>
<td>mW</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>T_{amb}</td>
<td>- 40 to + 85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>T_{stg}</td>
<td>- 40 to + 100</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>2 mm distance to package, 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></td>
<td>V_R</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Forward current</td>
<td></td>
<td>I_F</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Forward surge current</td>
<td>I_{FSM}</td>
<td>3</td>
<td>A</td>
<td></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></td>
<td>T_J</td>
<td>100</td>
<td>°C</td>
</tr>
</tbody>
</table>
ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °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>32</td>
<td>V</td>
</tr>
<tr>
<td>Emitter collector voltage</td>
<td></td>
<td>V_{EEO}</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Collector current</td>
<td></td>
<td>I_{C}</td>
<td>50</td>
<td>mA</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></td>
<td>T_{J}</td>
<td>100</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes
(1) Measured with the “Kodak neutral test card”, white side with 90 % diffuse reflectance
(2) Measured without reflecting medium
**BASIC CHARACTERISTICS** \( (T_{\text{amb}} = 25 \, ^\circ\text{C}, \text{unless otherwise specified}) \)

Fig. 3 - Forward Current vs. Forward Voltage

Fig. 5 - Collector Current vs. Collector Emitter Voltage

Fig. 4 - Relative Current Transfer Ratio vs. Ambient Temperature

Fig. 6 - Current Transfer Ratio vs. Forward Current
Fig. 7 - Collector Current vs. Distance

Fig. 8 - Relative Collector Current vs. Displacement

PACKAGE DIMENSIONS in millimeters
Packaging and Ordering Information

Vishay Semiconductors

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

TUBE SPECIFICATION FIGURES

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

Drawing-No: 9.700-5097.01-4
Issue: 1, 25 02 00

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: ±0.05mm
Length: 575±1mm

Fig. 3

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

With stopper pins
Tolerance: ±0.05mm
Length: 575±1mm
Packaging and Ordering Information

Vishay Semiconductors

Fig. 4

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

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

Fig. 5

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

With stopper pins
Tolerance: ±0.5mm
Length: 575±1mm
Fig. 6

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

Drawing-No.: 9700-5205.01-4
Issue 1, 25.02.00

Fig. 7

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

Drawing-No.: 9700-5245.01-4
Issue 1, 25.02.00
Fig. 8

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