

Vishay Semiconductors

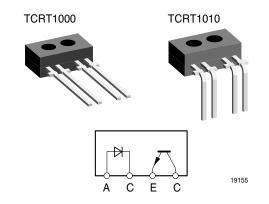
Reflective Optical Sensor with Transistor Output

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 7 mm x W 4 mm x H 2.5 mm
- Peak operating distance: 1 mm
- Operating range: 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
- Lead (Pb)-free component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



Applications

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

Order Instructions

Part Number	Remarks	Minimum Order Quantity
TCRT1000	Straight leads	1000 pcs, 1000 pcs/bulk
TCRT1010	Bent leads	1000 pcs, 1000 pcs/bulk

Absolute Maximum Ratings

 $T_{amb} = 25$ °C, unless otherwise specified

Coupler

Parameter	Test condition	Symbol	Value	Unit
Total power dissipation	$T_{amb} \le 25 \ ^{\circ}C$	P _{tot}	200	mW
Ambient temperature range		T _{amb}	- 40 to + 85	°C
Storage temperature range		T _{stg}	- 40 to + 100	°C
Soldering temperature	2 mm distance to package, $t \leq$ 5 s	T _{sd}	260	°C

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Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V _R	5	V
Forward current		١ _F	50	mA
Forward surge current	$t_p \le 10 \ \mu s$	I _{FSM}	3	A
Power dissipation	$T_{amb} \le 25 \ ^{\circ}C$	P _V	100	mW
Junction temperature		Tj	100	°C

Output (Detector)

Parameter	Test condition	Symbol	Value	Unit
Collector emitter voltage		V _{CEO}	32	V
Emitter collector voltage		V _{ECO}	5	V
Collector current		Ι _C	50	mA
Power dissipation	$T_{amb} \le 25 \ ^{\circ}C$	P _V	100	mW
Junction temperature		Tj	100	°C

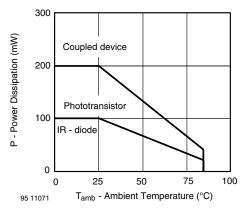


Figure 1. Power Dissipation Limit vs. Ambient Temperature

Electrical Characteristics

 T_{amb} = 25 °C, unless otherwise specified

Coupler

Parameter	Test condition	Symbol	Min	Тур.	Max	Unit
Collector current	$V_{CE} = 5 V$, $I_F = 20 mA$, d = 1 mm (figure 2)	Ι _C ¹⁾	0.3	0.5		mA
Cross talk current	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA} \text{ (figure 1)}$	I _{CX} ²⁾			1	μA
Collector emitter saturation voltage	I _F = 20 mA, I _C = 0.1 mA, d = 1 mm (figure 2)	V _{CEsat} ¹⁾			0.3	V

¹⁾ Measured with the 'Kodak neutral test card", white side with 90% diffuse reflectance

²⁾ Measured without reflecting medium



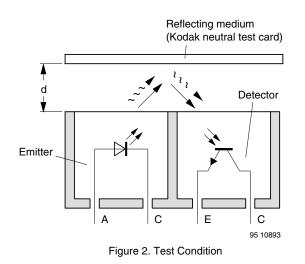
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Input (Emitter)

Parameter	Test condition	Symbol	Min	Тур.	Max	Unit
Forward voltage	I _F = 50 mA	V _F		1.25	1.6	V
Radiant intensity	I _F = 50 mA, t _P = 20 ms	l _e			7.5	mW/sr
Peak wavelength	I _F = 100 mA	λ _P	940			nm
Virtual source diameter	Method: 63 % encircled energy	Ø		1.2		mm

Output (Detector)

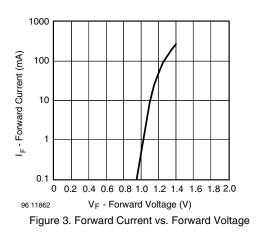
Parameter	Test condition	Symbol	Min	Тур.	Max	Unit
Collector emitter voltage	I _C = 1 mA	V _{CEO}	32			V
Emitter collector voltage	I _E = 100 μA	V _{ECO}	5			V
Collector dark current	$V_{CE} = 20 \text{ V}, \text{ I}_{F} = 0, \text{ E} = 0$	I _{CEO}			200	nA



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Typical Characteristics

T_{amb} = 25 °C, unless otherwise specified



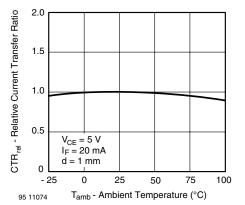
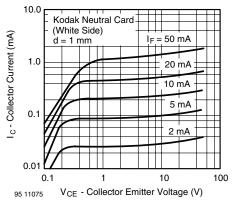
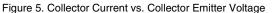


Figure 4. Relative Current Transfer Ratio vs. **Ambient Temperature**





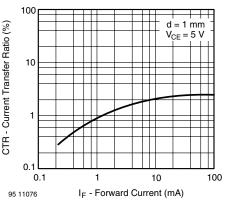


Figure 6. Current Transfer Ratio vs. Forward Current

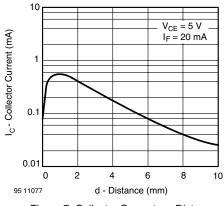


Figure 7. Collector Current vs. Distance

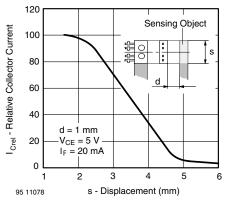
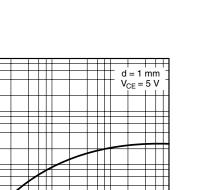


Figure 8. Relative Collector Current vs. Displacement

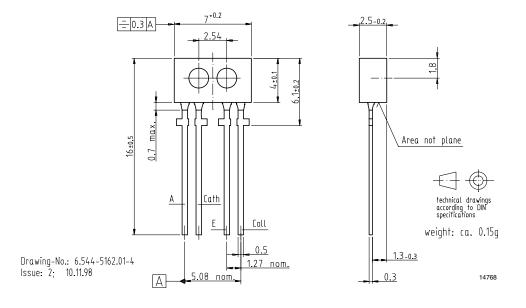


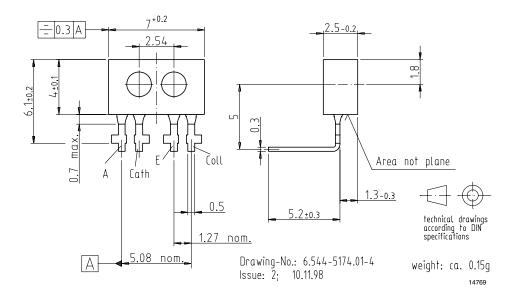




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Package Dimensions in mm





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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.

- 1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments 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
- 3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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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