

Reflective Optical Sensor with Transistor Output

Description

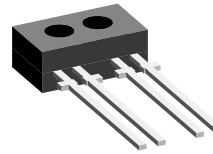
The TCRT1000 and TCRT1010 are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light.

Features

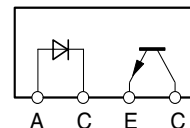
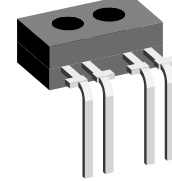
- Package type: Leaded
- Detector type: Phototransistor
- Dimensions:
L 7 mm x W 4 mm x H 2.5 mm
- Peak operating distance: 1 mm
- Operating range: 0.2 mm to 4 mm
- Typical output current under test: $I_C = 0.5 \text{ mA}$
- Daylight blocking filter
- Emitter wavelength 950 nm
- Lead (Pb)-free soldering released
- Lead (Pb)-free component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



TCRT1000



TCRT1010



19155

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

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

Coupler

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

Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	5	V
Forward current		I_F	50	mA
Forward surge current	$t_p \leq 10 \mu s$	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25^\circ C$	P_V	100	mW
Junction temperature		T_j	100	$^\circ C$

Output (Detector)

Parameter	Test condition	Symbol	Value	Unit
Collector emitter voltage		V_{CEO}	32	V
Emitter collector voltage		V_{ECO}	5	V
Collector current		I_C	50	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	P_V	100	mW
Junction temperature		T_j	100	$^\circ C$

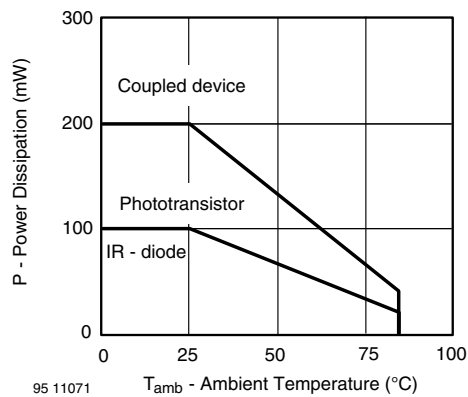


Figure 1. Power Dissipation Limit vs. Ambient Temperature

Electrical Characteristics

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

Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector current	$V_{CE} = 5 V$, $I_F = 20 mA$, $d = 1 mm$ (figure 2)	$I_C^{(1)}$	0.3	0.5		mA
Cross talk current	$V_{CE} = 5 V$, $I_F = 20 mA$ (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

Input (Emitter)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	$I_F = 50 \text{ mA}$	V_F		1.25	1.6	V
Radiant intensity	$I_F = 50 \text{ mA}$, $t_p = 20 \text{ ms}$	I_e			7.5	mW/sr
Peak wavelength	$I_F = 100 \text{ mA}$	λ_p	940			nm
Virtual source diameter	Method: 63 % encircled energy	\emptyset		1.2		mm

Output (Detector)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector emitter voltage	$I_C = 1 \text{ mA}$	V_{CEO}	32			V
Emitter collector voltage	$I_E = 100 \text{ }\mu\text{A}$	V_{ECO}	5			V
Collector dark current	$V_{CE} = 20 \text{ V}$, $I_F = 0$, $E = 0$	I_{CEO}			200	nA

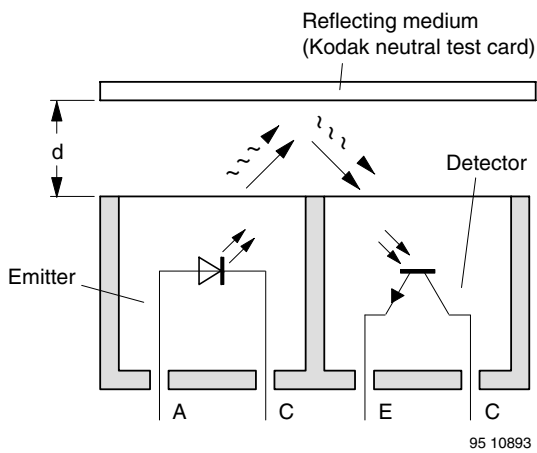


Figure 2. Test Condition

Typical Characteristics

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

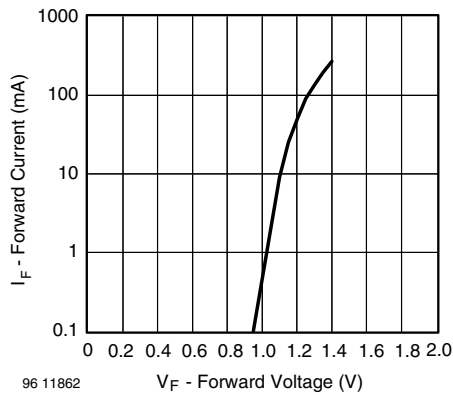


Figure 3. Forward Current vs. Forward Voltage

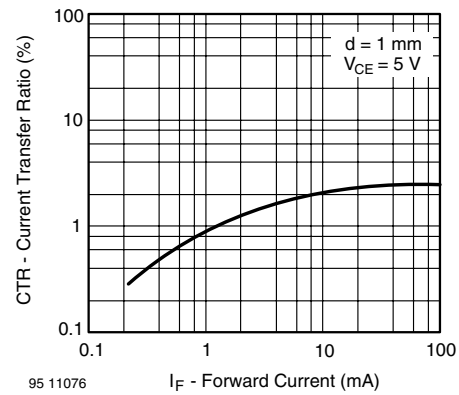


Figure 6. Current Transfer Ratio vs. Forward Current

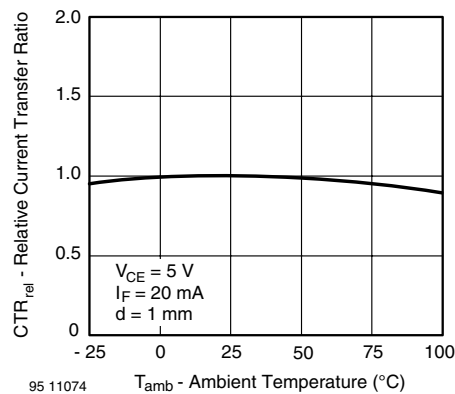


Figure 4. Relative Current Transfer Ratio vs. Ambient Temperature

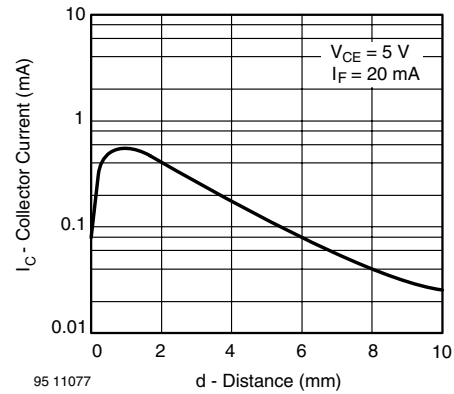


Figure 7. Collector Current vs. Distance

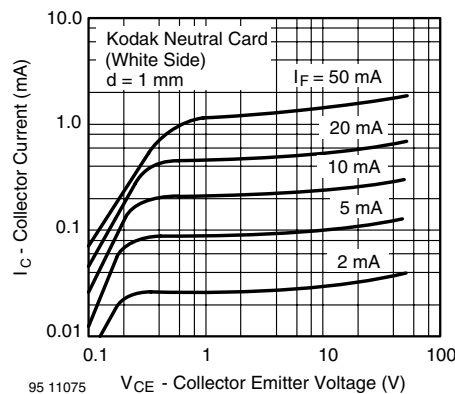


Figure 5. Collector Current vs. Collector Emitter Voltage

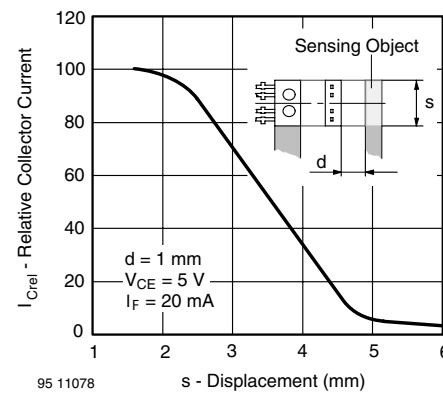
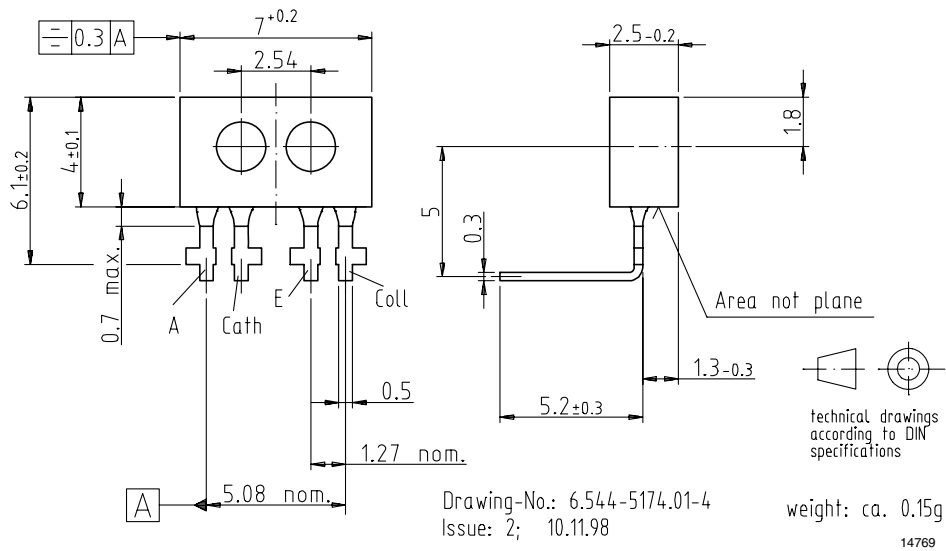
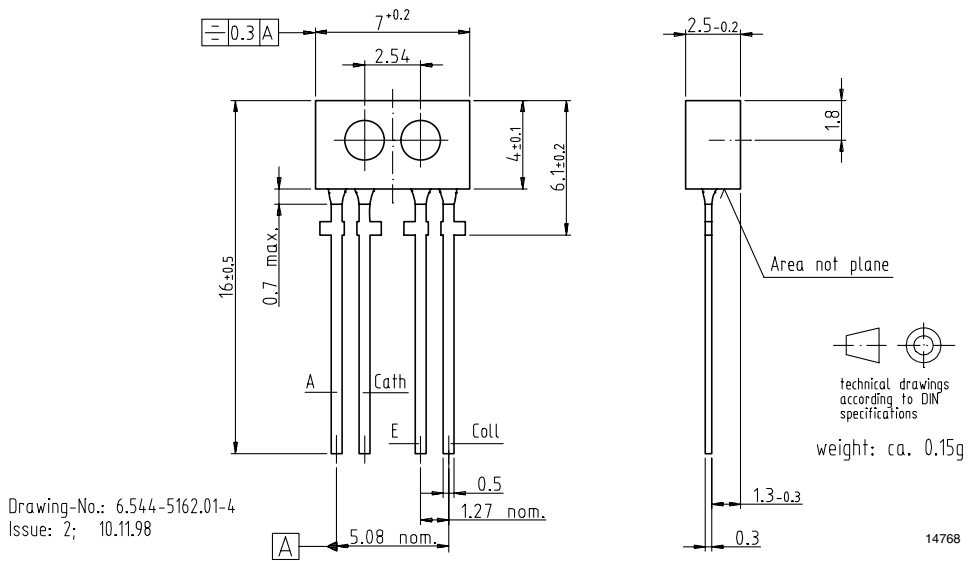


Figure 8. Relative Collector Current vs. Displacement

Package Dimensions in mm



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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.

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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.

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