

## Reflective Optical Sensor with Transistor Output



### 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](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### DESCRIPTION

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

### APPLICATIONS

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

### PRODUCT SUMMARY

PART NUMBER	DISTANCE FOR MAXIMUM $CTR_{rel}$ (1) (mm)	DISTANCE RANGE FOR RELATIVE $I_{out} > 20\%$ (mm)	TYPICAL OUTPUT CURRENT UNDER TEST (2) (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCRT1000	1	0.2 to 4	0.5	Yes
TCRT1010	1	0.2 to 4	0.5	Yes

#### Notes

(1) CTR: current transference ratio,  $I_{out}/I_{in}$

(2) Conditions like in table basic characteristics/sensor

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
TCRT1000	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	Straight leads
TCRT1010	Bulk	MOQ: 1000 pcs, 1000 pcs/bulk	Bent leads

#### Note

(1) MOQ: minimum order quantity

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>SENSOR</b>				
Total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_{tot}$	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, $t \leq 5$ s	$T_{sd}$	260	$^\circ\text{C}$
<b>INPUT (EMITTER)</b>				
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	50	mA
Forward surge current	$t_p \leq 10 \mu\text{s}$	$I_{FSM}$	3	A
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_V$	100	mW
Junction temperature		$T_J$	100	$^\circ\text{C}$



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>OUTPUT (DETECTOR)</b>				
Collector emitter voltage		V <sub>CEO</sub>	32	V
Emitter collector voltage		V <sub>ECO</sub>	5	V
Collector current		I <sub>C</sub>	50	mA
Power dissipation	T <sub>amb</sub> ≤ 25 °C	P <sub>V</sub>	100	mW
Junction temperature		T <sub>j</sub>	100	°C

**ABSOLUTE MAXIMUM RATINGS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)



Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>SENSOR</b>						
Collector current	V <sub>CE</sub> = 5 V, I <sub>F</sub> = 20 mA, d = 1 mm (figure 2)	I <sub>C</sub> <sup>(1)</sup>	0.3	0.5		mA
Cross talk current	V <sub>CE</sub> = 5 V, I <sub>F</sub> = 20 mA, (figure 1)	I <sub>CX</sub> <sup>(2)</sup>			1	μA
Collector emitter saturation voltage	I <sub>F</sub> = 20 mA, I <sub>C</sub> = 0.1 mA, d = 1 mm (figure 2)	V <sub>CEsat</sub> <sup>(1)</sup>			0.3	V
<b>INPUT (EMITTER)</b>						
Forward voltage	I <sub>F</sub> = 50 mA	V <sub>F</sub>		1.25	1.6	V
Radiant intensity	I <sub>F</sub> = 50 mA, t <sub>p</sub> = 20 ms	I <sub>e</sub>			7.5	mW/sr
Peak wavelength	I <sub>F</sub> = 100 mA	λ <sub>P</sub>	940			nm
Virtual source diameter	Method: 63 % encircled energy	d		1.2		mm
<b>OUTPUT (DETECTOR)</b>						
Collector emitter voltage	I <sub>C</sub> = 1 mA	V <sub>CEO</sub>	32			V
Emitter collector voltage	I <sub>E</sub> = 100 μA	V <sub>ECO</sub>	5			V
Collector dark current	V <sub>CE</sub> = 20 V, I <sub>F</sub> = 0 A, E = 0 lx	I <sub>CEO</sub>			200	nA

**Notes**

- (1) Measured with the “Kodak neutral test card”, white side with 90 % diffuse reflectance
- (2) Measured without reflecting medium



Fig. 2 - Test Condition

**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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

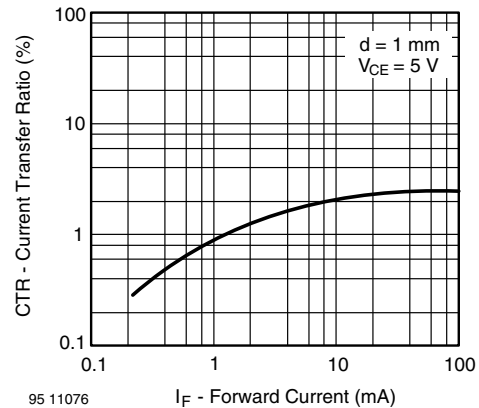


Fig. 6 - Current Transfer Ratio vs. Forward Current



Fig. 7 - Collector Current vs. Distance



Fig. 8 - Relative Collector Current vs. Displacement

### PACKAGE DIMENSIONS in millimeters



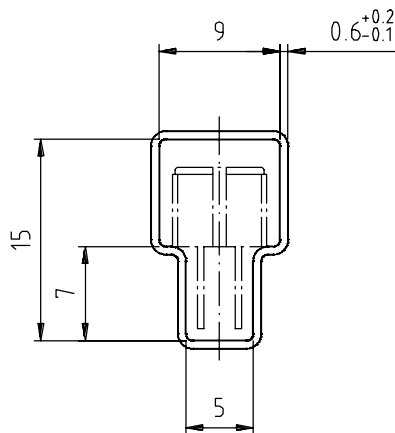
## Packaging and Ordering Information

PART NUMBER	MOQ <sup>(1)</sup>	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
TCZT8020-PAER	2500	Bulk	-	22

### Notes

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

### TUBE SPECIFICATION FIGURES



With rubber stopper

Tolerance: ±0.5mm

Length: 575±1mm

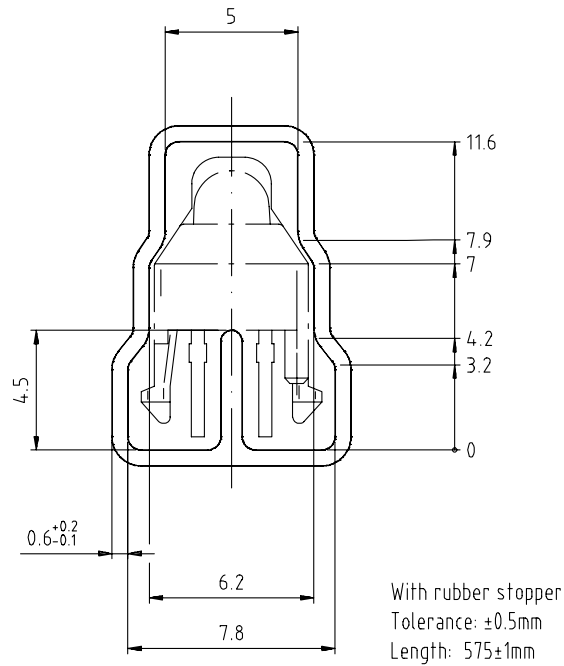
Drawing-No.: 9.700-5097.01-4  
Issue: 1; 25.02.00

15198

Fig. 1

# Packaging and Ordering Information

Vishay Semiconductors Packaging and Ordering Information



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

Drawing refers to following types: TCRT 5000

15210

Fig. 2



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

15201

Fig. 3

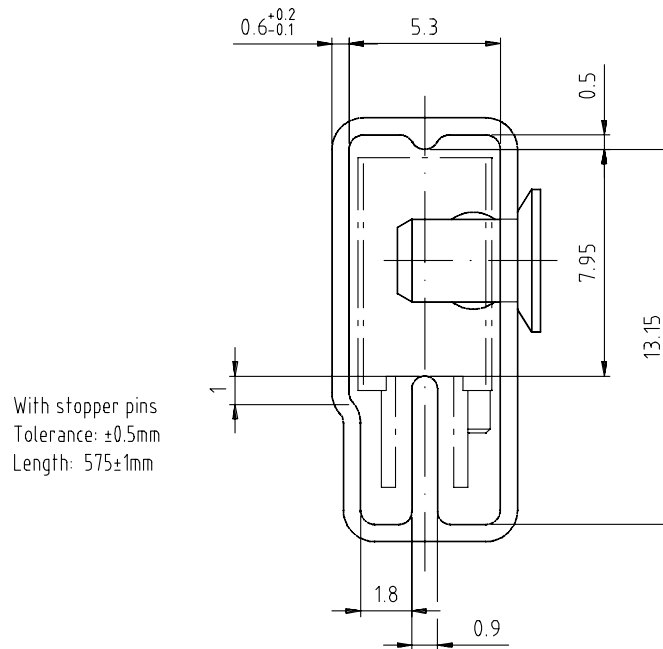


With rubber stopper  
Tolerance: ±0.5mm  
Length: 575±1mm

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

15199

Fig. 4



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

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

15202

Fig. 5



Drawing-No.: 9.700-5205.01-4  
Issue: 1; 25.02.00

15196

Fig. 6



Drawing-No.: 9.700-5245.01-4  
Issue: 1; 25.02.00

15195

Fig. 7





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

With stopper pins  
 Tolerance:  $\pm 0.5\text{mm}$   
 Length:  $450 \pm 1\text{mm}$   
 All dimensions in mm

Fig. 8



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