

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


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 transfere 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
SENSOR				
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	$^\circ\text{C}$
INPUT (EMITTER)				
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 _{amb} = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
OUTPUT (DETECTOR)				
Collector emitter voltage		V _{CEO}	32	V
Emitter collector voltage		V _{ECO}	5	V
Collector current		I _C	50	mA
Power dissipation	T _{amb} ≤ 25 °C	P _V	100	mW
Junction temperature		T _j	100	°C

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

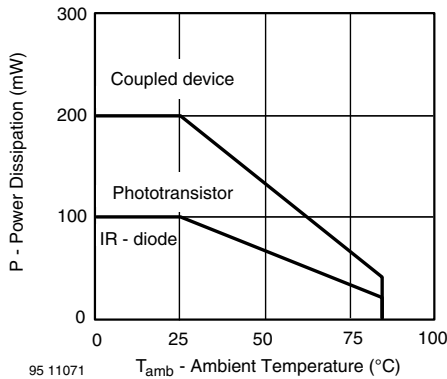


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
SENSOR						
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
INPUT (EMITTER)						
Forward voltage	I _F = 50 mA	V _F		1.25	1.6	V
Radiant intensity	I _F = 50 mA, t _p = 20 ms	I _e			7.5	mW/sr
Peak wavelength	I _F = 100 mA	λ _P	940			nm
Virtual source diameter	Method: 63 % encircled energy	d		1.2		mm
OUTPUT (DETECTOR)						
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 V, I _F = 0 A, E = 0 lx	I _{CEO}			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

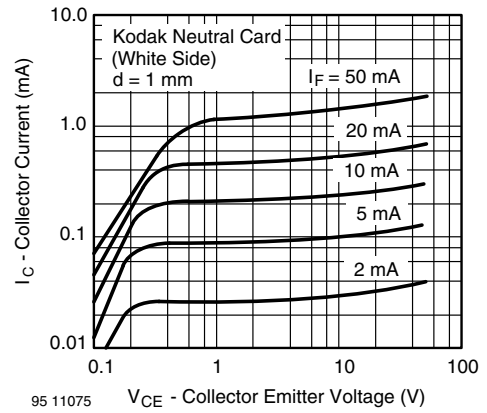


Fig. 5 - Collector Current vs. Collector Emitter Voltage



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

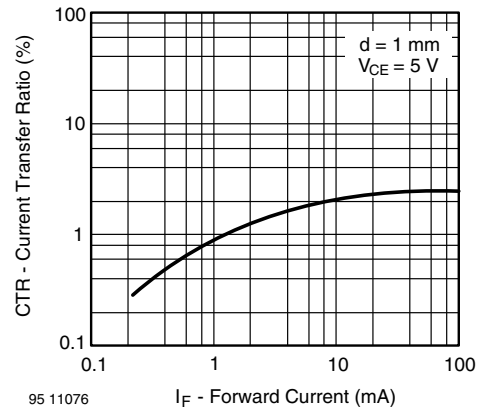


Fig. 6 - Current Transfer Ratio vs. Forward Current

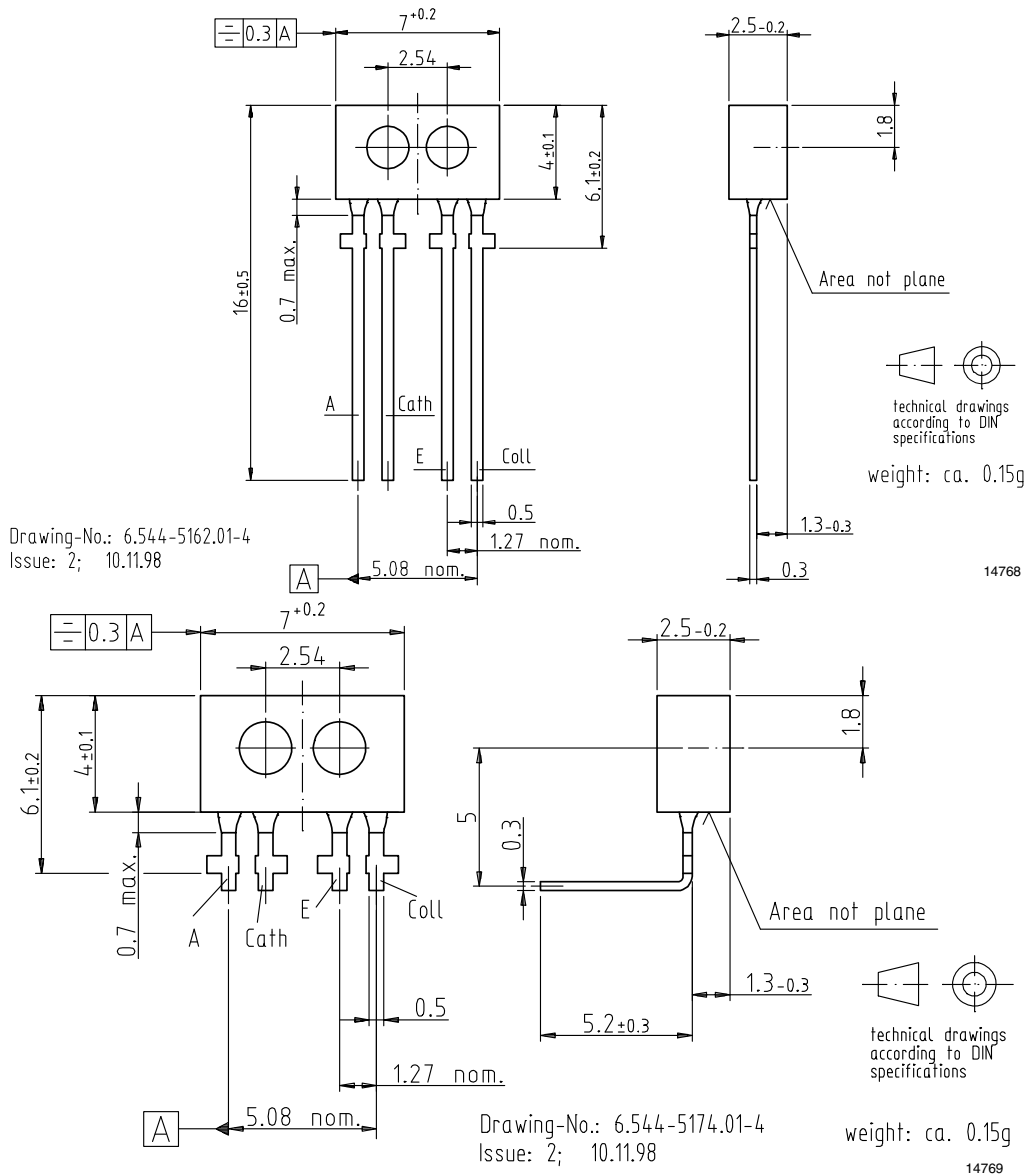


Fig. 7 - Collector Current vs. Distance



Fig. 8 - Relative Collector Current vs. Displacement

PACKAGE DIMENSIONS in millimeters



Packaging and Ordering Information

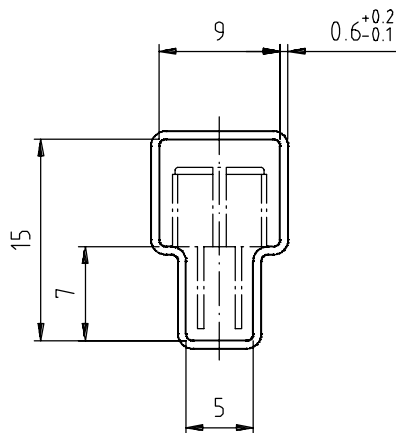
PART NUMBER	MOQ ⁽¹⁾	PCS PER TUBE	TUBE SPEC. (FIGURE)	CONSTITUENTS (FORMS)
CNY70	4000	80	1	28
TCPT1300X01	2000	Reel	(2)	29
TCRT1000	1000	Bulk	-	26
TCRT1010	1000	Bulk	-	26
TCRT5000	4500	50	2	27
TCRT5000L	2400	48	3	27
TCST1030	5200	65	5	24
TCST1030L	2600	65	6	24
TCST1103	1020	85	4	24
TCST1202	1020	85	4	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
TCZT8020-PAER	2500	Bulk	-	22

Notes

(1) MOQ: minimum order quantity

(2) Please refer to datasheets

TUBE SPECIFICATION FIGURES



With rubber stopper

Tolerance: $\pm 0.5\text{mm}$

Length: $575 \pm 1\text{mm}$

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



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

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

15201

Fig. 3

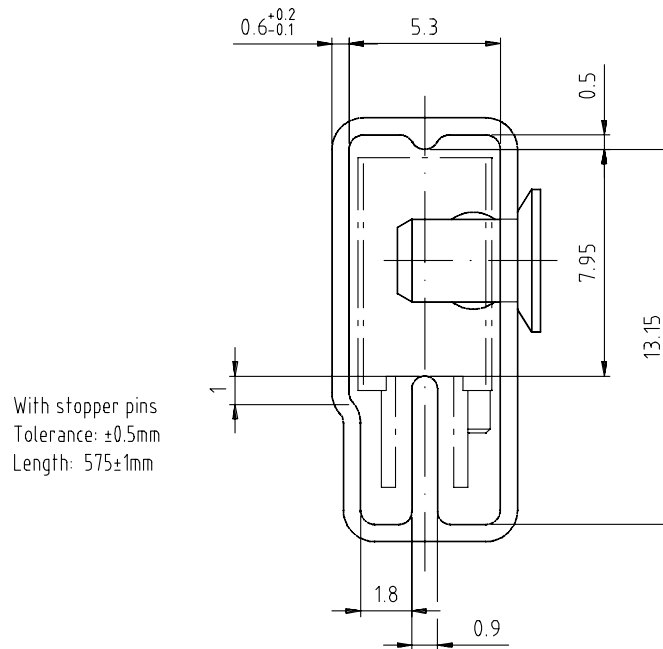


With rubber stopper
Tolerance: ±0.5mm
Length: 575±1mm

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

15199

Fig. 4



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

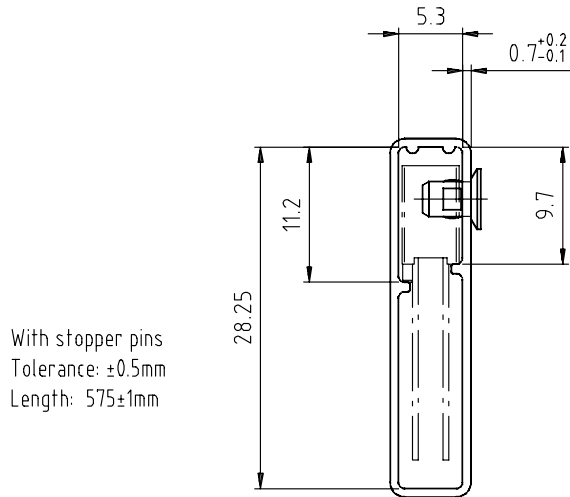
Drawing-No.: 9.700-5140.01-4
Issue: 1; 25.02.00

15202

Fig. 5

Packaging and Ordering Information

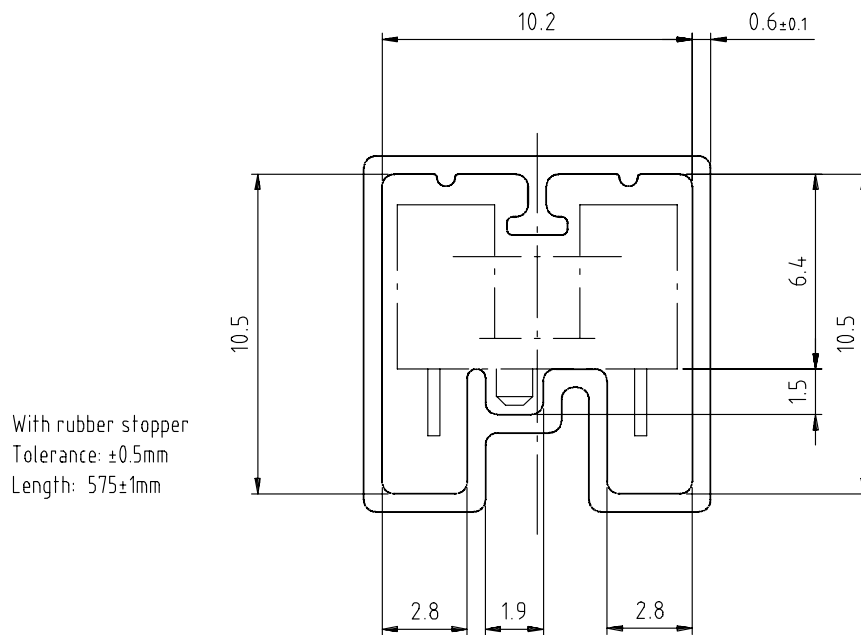
Vishay Semiconductors Packaging and Ordering Information



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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