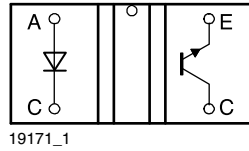


## Transmissive Optical Sensor with Phototransistor Output



21837



19171\_1

### DESCRIPTION

The TCST1030 is a transmissive sensor that include an infrared emitter and phototransistor, located face-to-face on the optical axes in a leaded package which blocks visible light.

### FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 8.3 x 4.7 x 8.15
- Gap (in mm): 3.1
- Aperture: none
- Typical output current under test:  $I_C = 2.4$  mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- Optical switch
- Shaft encoder
- Detection of opaque material such as paper
- Detection of magnetic tapes

### PRODUCT SUMMARY

PART NUMBER	GAP WIDTH (mm)	APERTURE WIDTH (mm)	TYPICAL OUTPUT CURRENT UNDER TEST <sup>(1)</sup> (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCST1030	3.1	-	2.4	Yes

#### Note

<sup>(1)</sup> Conditions like in table basic characteristics/coupler

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME <sup>(1)</sup>	REMARKS
TCST1030	Tube	MOQ: 5200 pcs, 65 pcs/tube	3.4 mm lead length

#### Note

<sup>(1)</sup> MOQ: minimum order quantity

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

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Total power dissipation	$T_{amb} \leq 25$ °C	$P_{tot}$	250	mW
Ambient temperature range		$T_{amb}$	- 25 to + 85	°C
Storage temperature range		$T_{stg}$	- 25 to + 100	°C
Soldering temperature	1.6 mm from case, $t \leq 10$ s	$T_{sd}$	260	°C
<b>INPUT (EMITTER)</b>				
Reverse voltage		$V_R$	6	V
Forward current		$I_F$	60	mA
Forward surge current	$t_p \leq 10$ $\mu$ s	$I_{FSM}$	3	A
Power dissipation	$T_{amb} \leq 25$ °C	$P_V$	100	mW
Junction temperature		$T_j$	100	°C

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>OUTPUT (DETECTOR)</b>				
Collector emitter voltage		$V_{CEO}$	70	V
Emitter collector voltage		$V_{ECO}$	7	V
Collector current		$I_C$	100	mA
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_V$	150	mW
Junction temperature		$T_j$	100	$^{\circ}\text{C}$

## ABSOLUTE MAXIMUM RATINGS

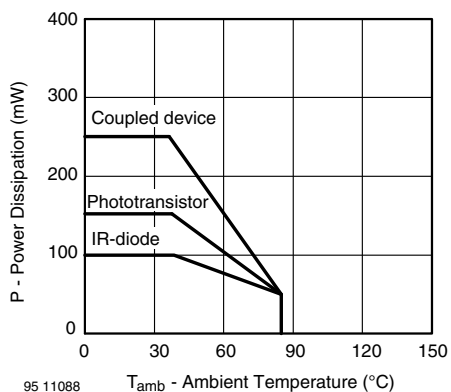


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>COUPLER</b>						
Collector current	$V_{CE} = 5\text{ V}$ , $I_F = 10\text{ mA}$	$I_C$	1.2	2.4		mA
Collector emitter saturation voltage	$I_F = 10\text{ mA}$ , $I_C = 1\text{ mA}$	$V_{CEsat}$			0.8	V
<b>INPUT (EMITTER)</b>						
Forward voltage	$I_F = 60\text{ mA}$	$V_F$		1.25	1.5	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$	$C_j$		50		pF
<b>OUTPUT (DETECTOR)</b>						
Collector emitter voltage	$I_C = 1\text{ mA}$	$V_{CEO}$	70			V
Emitter collector voltage	$I_E = 10\text{ }\mu\text{A}$	$V_{ECO}$	7			V
Collector dark current	$V_{CE} = 25\text{ V}$ , $I_F = 0\text{ A}$ , $E = 0\text{ lx}$	$I_{CEO}$		10	100	nA
<b>SWITCHING CHARACTERISTICS</b>						
Turn-on time	$I_C = 1\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ (see figure 2)	$t_{on}$		15		$\mu\text{s}$
Turn-off time	$I_C = 1\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_L = 100\text{ }\Omega$ (see figure 2)	$t_{off}$		10		$\mu\text{s}$

# Transmissive Optical Sensor with Vishay Semiconductors Phototransistor Output

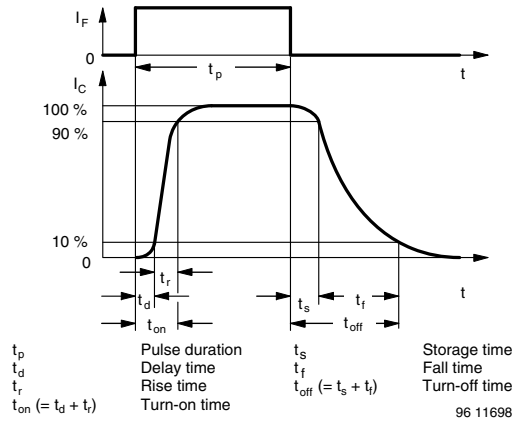

 Fig. 2 - Test Circuit for  $t_{on}$  and  $t_{off}$ 


Fig. 3 - Switching Times

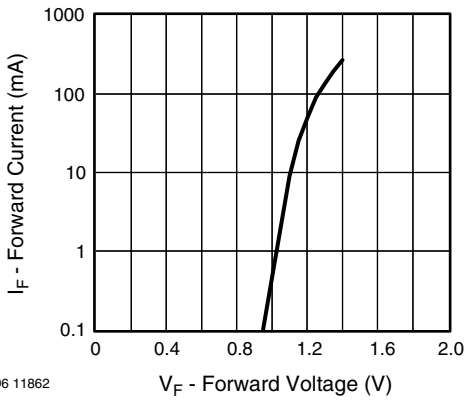
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified)


Fig. 4 - Forward Current vs. Forward Voltage

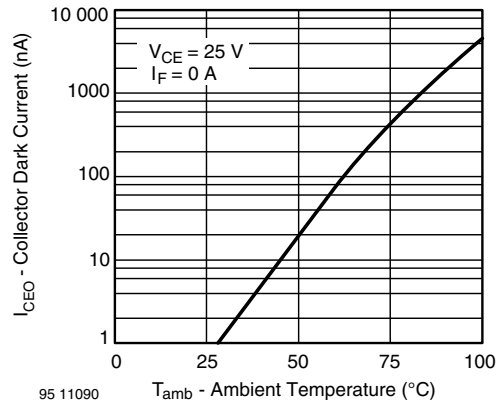


Fig. 6 - Collector Dark Current vs. Ambient Temperature

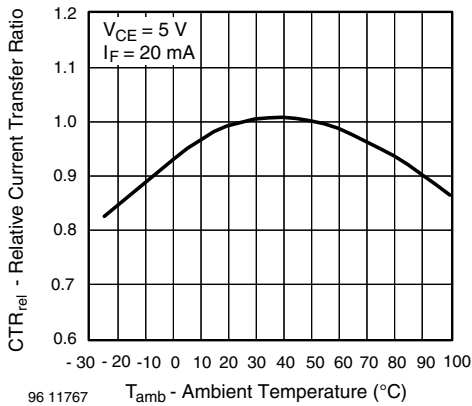


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

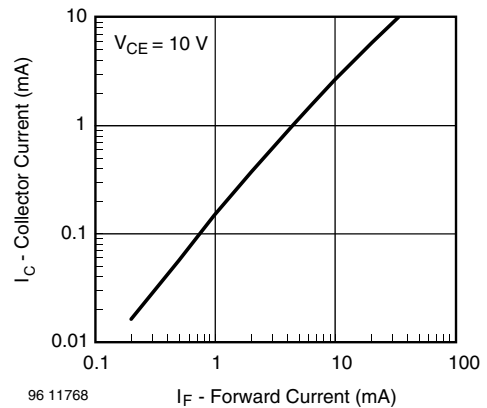


Fig. 7 - Collector Current vs. Forward Current

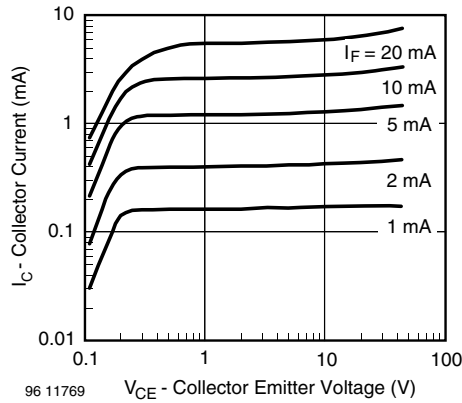


Fig. 8 - Collector Current vs. Collector Emitter Voltage

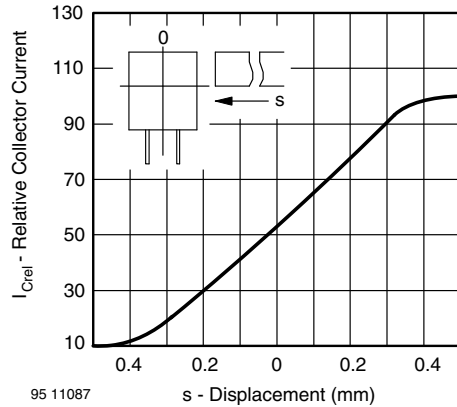


Fig. 11 - Relative Collector Current vs. Displacement

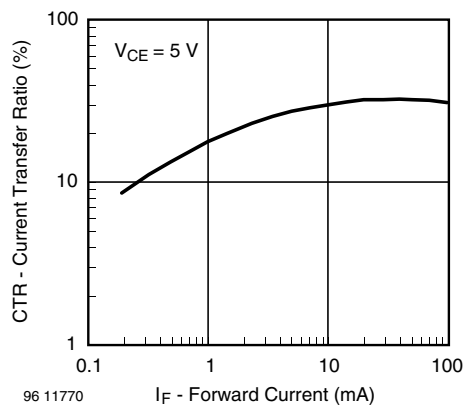


Fig. 9 - Current Transfer Ratio vs. Forward Current

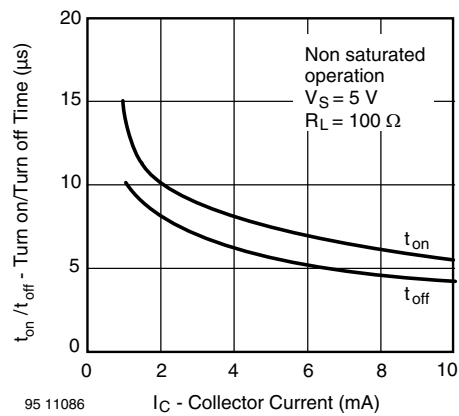
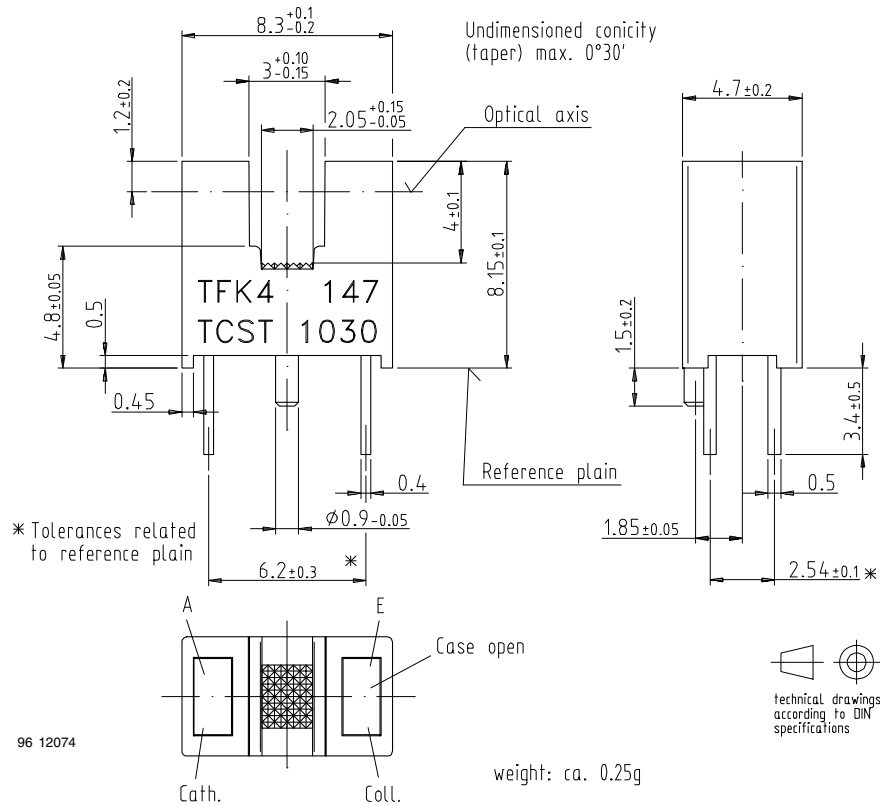


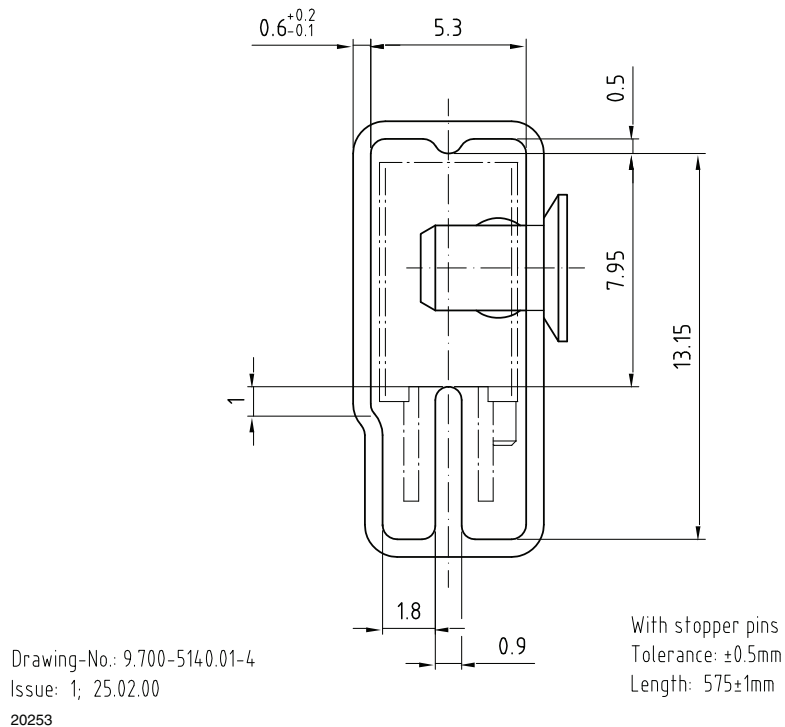
Fig. 10 - Turn-on/Turn-off Time vs. Collector Current

## Transmissive Optical Sensor with Phototransistor Output Vishay Semiconductors

### PACKAGE DIMENSIONS in millimeters



### TUBE 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:  $\pm 0.5\text{mm}$

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:  $\pm 0.5\text{mm}$   
Length:  $575 \pm 1\text{mm}$

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

15201

Fig. 3

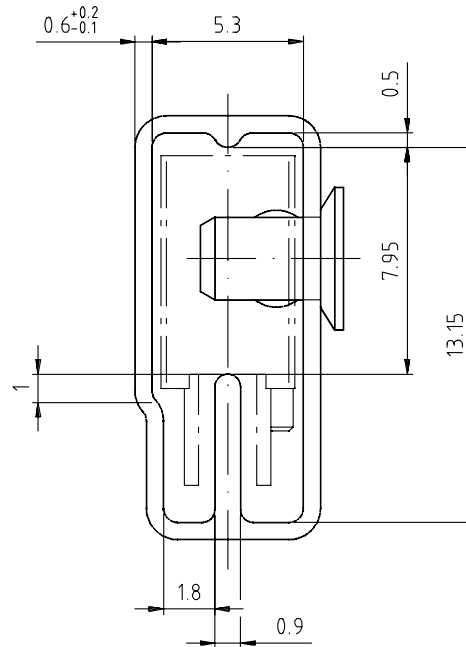


With rubber stopper  
Tolerance: ±0.5mm  
Length: 575±1mm

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:  $\pm 0.5$ mm  
 Length:  $450 \pm 1$ mm  
 All dimensions in mm

Fig. 8



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