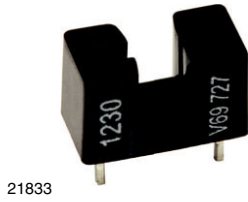
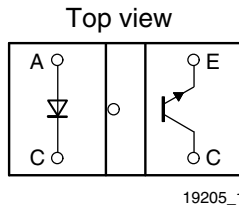


# Transmissive Optical Sensor with Phototransistor Output



21833



## DESCRIPTION

The TCST1230 is a transmissive sensor that includes 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): 9.2 x 4.8 x 5.4
- Gap (in mm): 2.8
- Aperture (in mm): 0.5
- Typical output current under test:  $I_C = 2$  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

## 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
TCST1230	2.8	0.5	2	Yes

### Note

- Conditions like in table basic characteristics/coupler

## ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME <sup>(1)</sup>	REMARKS
TCST1230	Tube	MOQ: 4800 pcs, 60 pcs/tube	-

### Note

- 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		$T_{stg}$	- 40 to + 100	°C
Soldering temperature	Distance to package 1.6 mm, $t \leq 5$ 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



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>	70	V
Emitter collector voltage		V <sub>ECO</sub>	7	V
Collector current		I <sub>C</sub>	100	mA
Power dissipation	T <sub>amb</sub> ≤ 25 °C	P <sub>V</sub>	150	mW
Junction temperature		T <sub>j</sub>	100	°C

**ABSOLUTE MAXIMUM RATINGS**

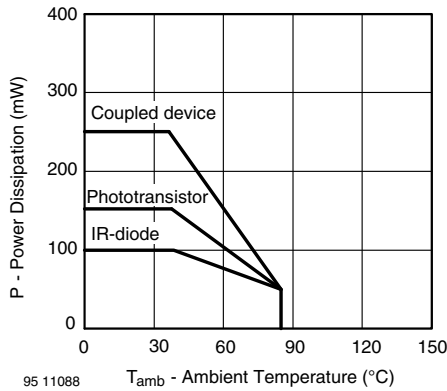


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>COUPLER</b>						
Collector current	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 20 mA	I <sub>C</sub>	0.5		14	mA
Collector emitter saturation voltage	I <sub>F</sub> = 20 mA, I <sub>C</sub> = 0.2 mA	V <sub>CEsat</sub>			0.4	V
<b>INPUT (EMITTER)</b>						
Forward voltage	I <sub>F</sub> = 60 mA	V <sub>F</sub>		1.25	1.5	V
Junction capacitance	V <sub>R</sub> = 0 V, f = 1 MHz	C <sub>j</sub>		50		pF
<b>OUTPUT (DETECTOR)</b>						
Collector emitter voltage	I <sub>C</sub> = 1 mA	V <sub>CEO</sub>	70			V
Emitter collector voltage	I <sub>E</sub> = 10 μA	V <sub>ECO</sub>	7			V
Collector dark current	V <sub>CE</sub> = 25 V, I <sub>F</sub> = 0 A, E = 0 lx	I <sub>CEO</sub>		10	100	nA
<b>SWITCHING CHARACTERISTICS</b>						
Turn-on time	I <sub>C</sub> = 1 mA, V <sub>CE</sub> = 5 V, R <sub>L</sub> = 100 Ω (see figure 2)	t <sub>on</sub>		15		μs
Turn-off time	I <sub>C</sub> = 1 mA, V <sub>CE</sub> = 5 V, R <sub>L</sub> = 100 Ω (see figure 2)	t <sub>off</sub>		10		μs

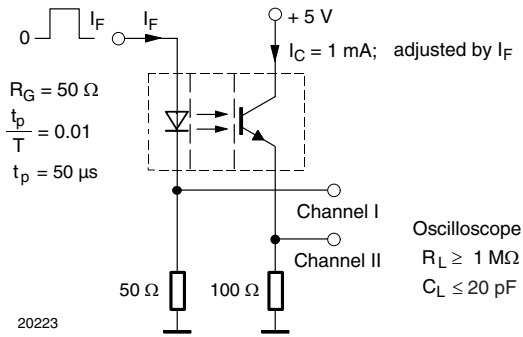


Fig. 2 - Test Circuit for  $t_{on}$  and  $t_{off}$

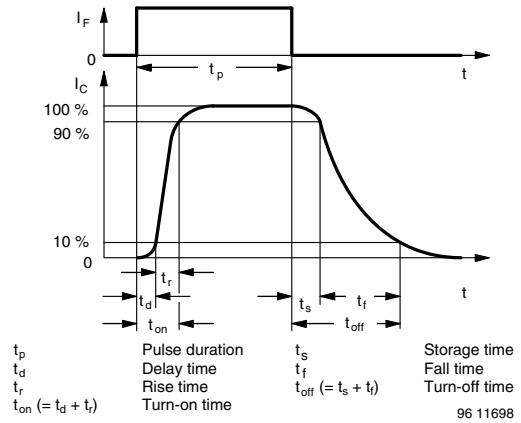


Fig. 3 - Switching Times

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

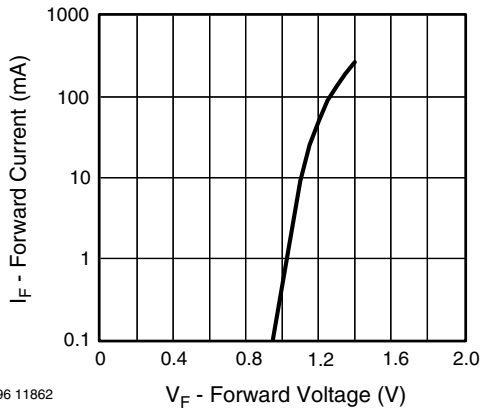


Fig. 4 - Forward Current vs. Forward Voltage

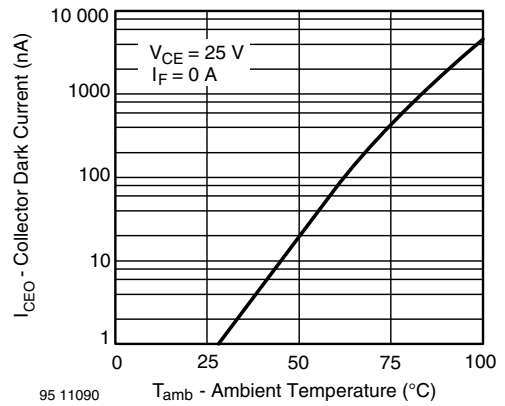


Fig. 6 - Collector Dark Current vs. Ambient Temperature

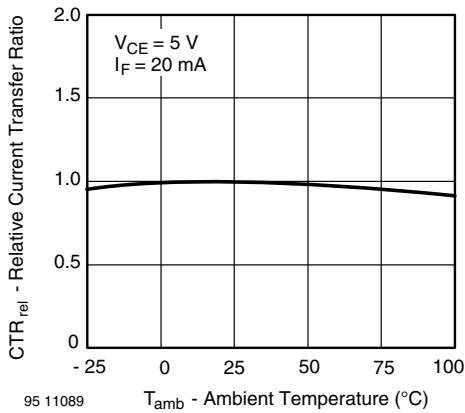


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

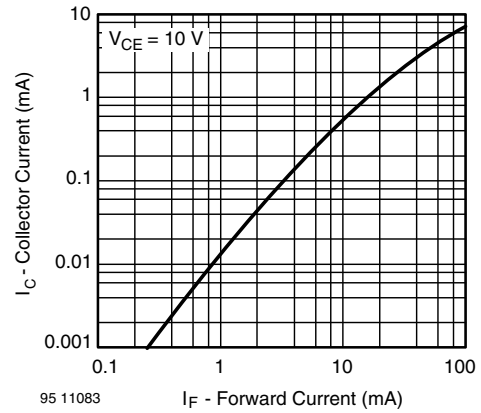


Fig. 7 - Collector Current vs. Forward Current

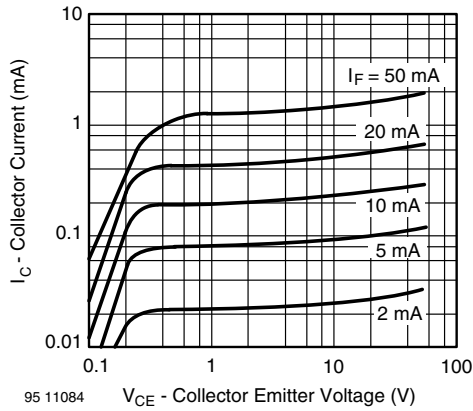


Fig. 8 - Collector Current vs. Collector Emitter Voltage

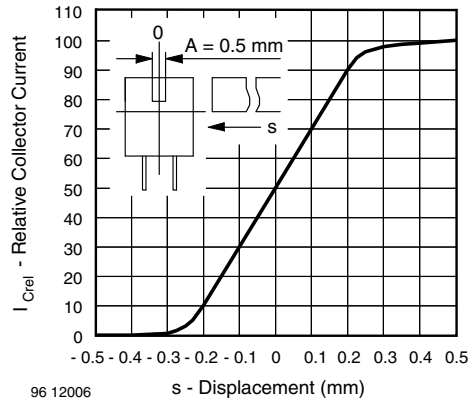


Fig. 11 - Relative Collector Current vs. Displacement

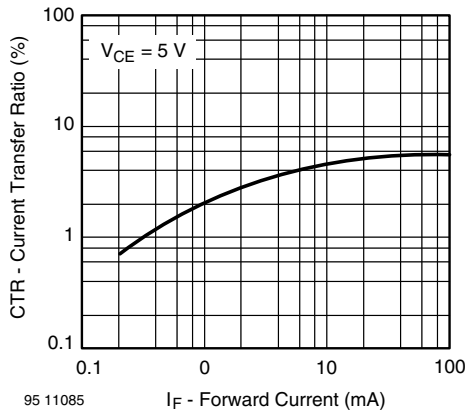


Fig. 9 - Current Transfer Ratio vs. Forward Current

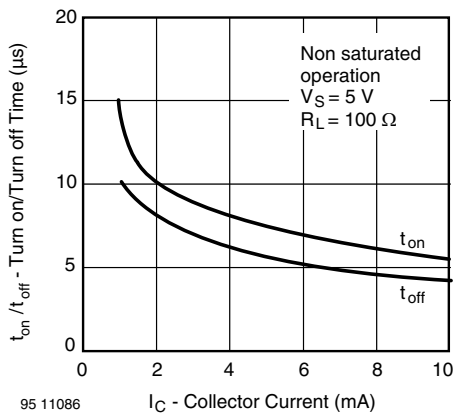
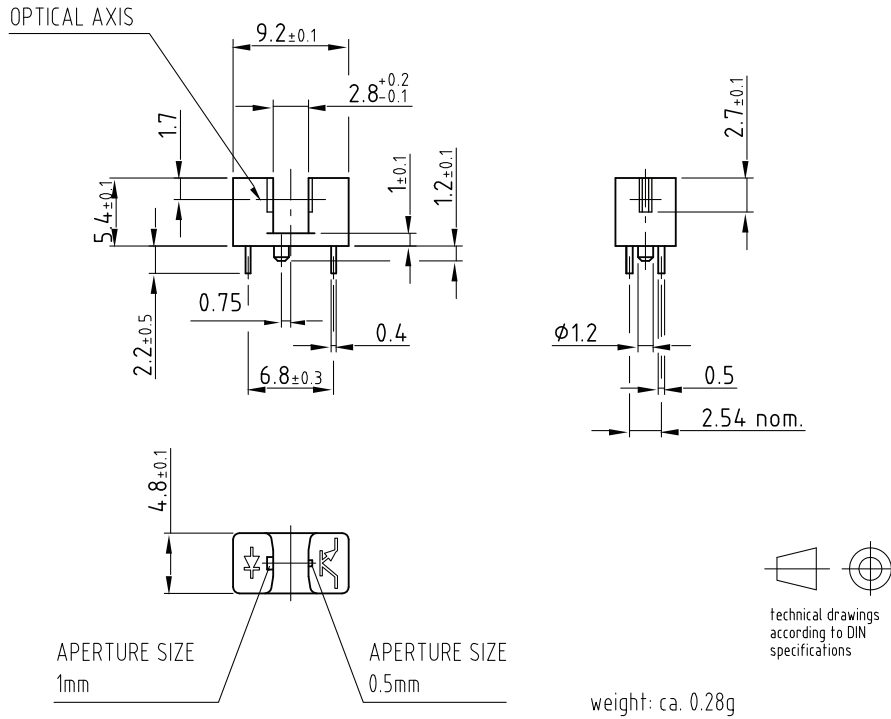


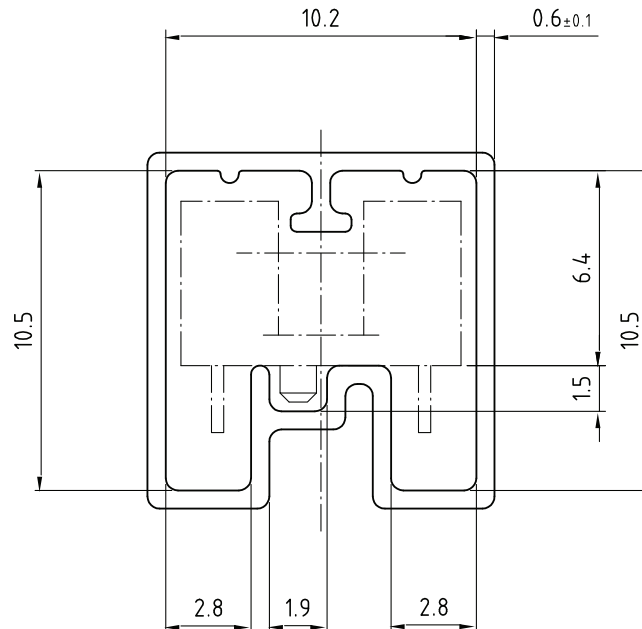
Fig. 10 - Turn-on/Turn-off Time vs. Collector Current

**PACKAGE DIMENSIONS** in millimeters



Drawing-No.: 6.550-5123.01-4  
 Issue: 5; 30.01.06  
 96 12083

**TUBE DIMENSIONS** in millimeters



Drawing-No.: 9.700-5245.01-4  
 Issue: 1; 25.02.00  
 20256

With rubber stopper  
 Tolerance:  $\pm 0.5$ mm  
 Length:  $575 \pm 1$ mm

## 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

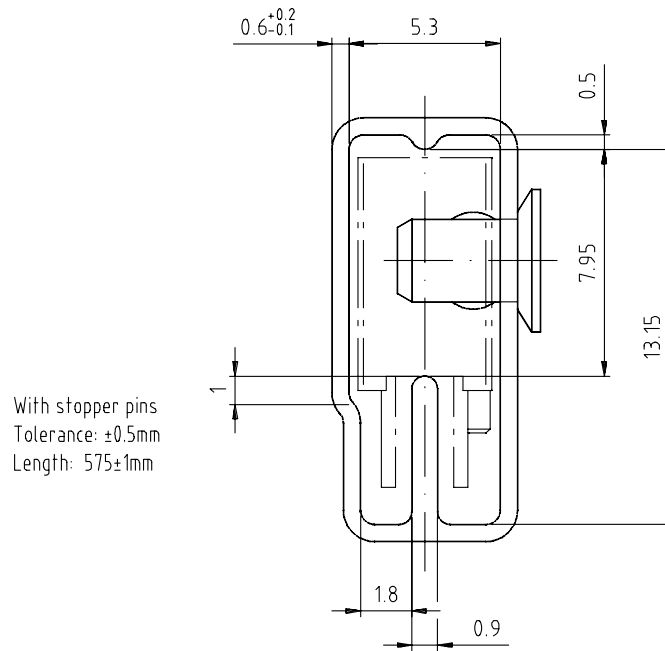


With rubber stopper  
Tolerance: ±0.5mm  
Length: 575±1mm

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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