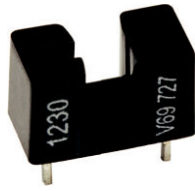
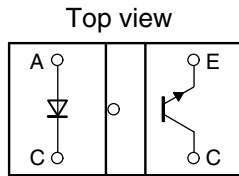


# Transmissive Optical Sensor with Phototransistor Output



21833



19205\_1

## 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

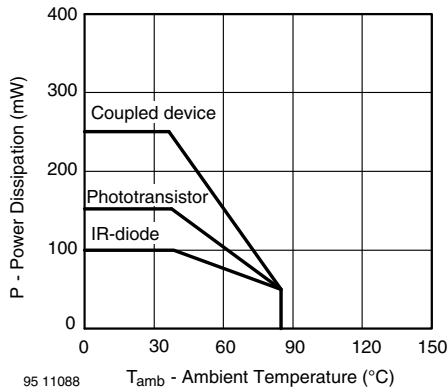


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| 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   |

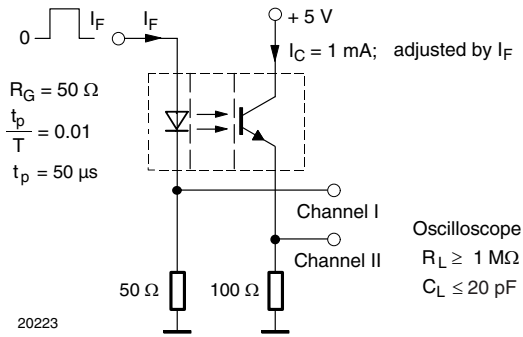


Fig. 2 - Test Circuit for  $t_{on}$  and  $t_{off}$

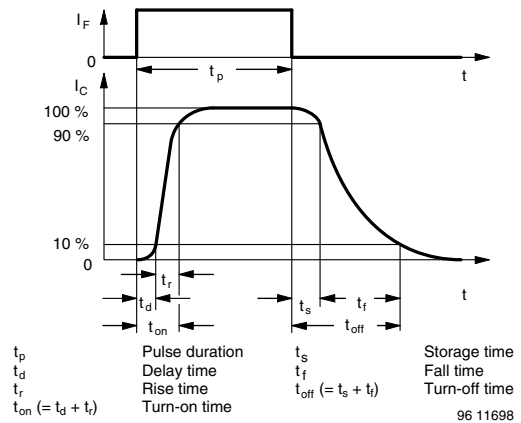


Fig. 3 - Switching Times

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

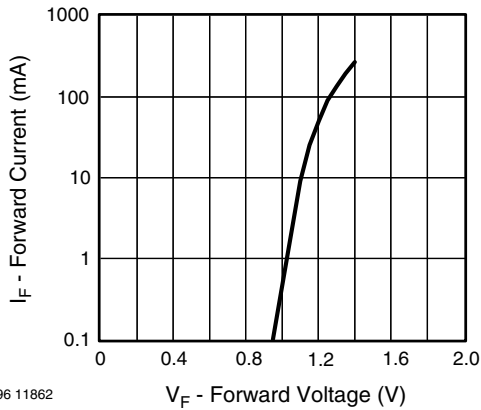


Fig. 4 - Forward Current vs. Forward Voltage

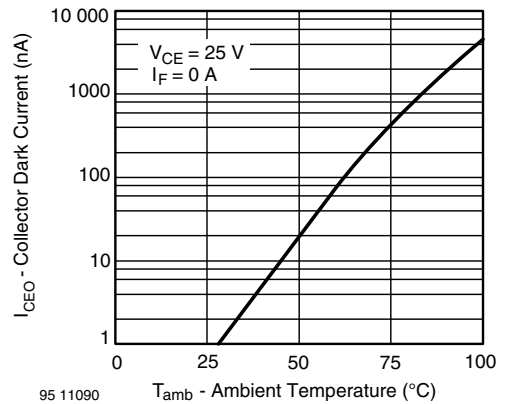


Fig. 6 - Collector Dark Current vs. Ambient Temperature

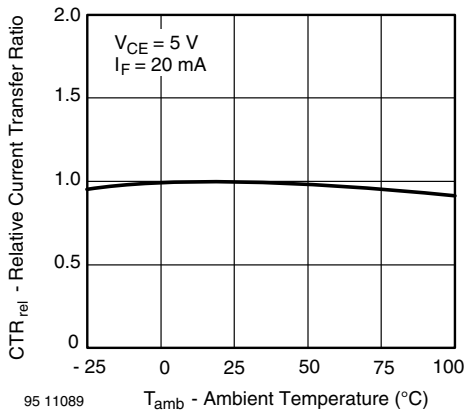


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

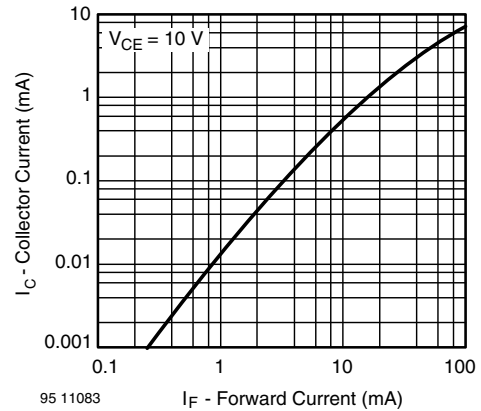


Fig. 7 - Collector Current vs. Forward Current

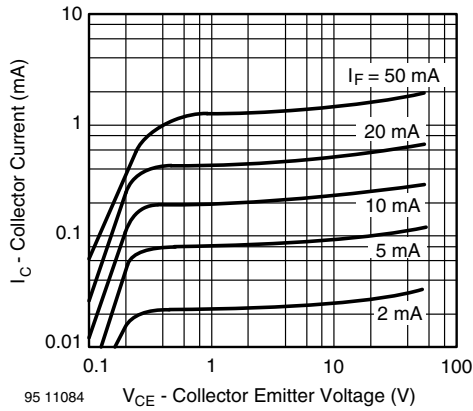


Fig. 8 - Collector Current vs. Collector Emitter Voltage

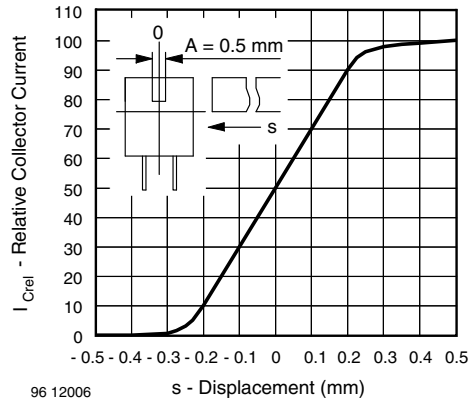


Fig. 11 - Relative Collector Current vs. Displacement

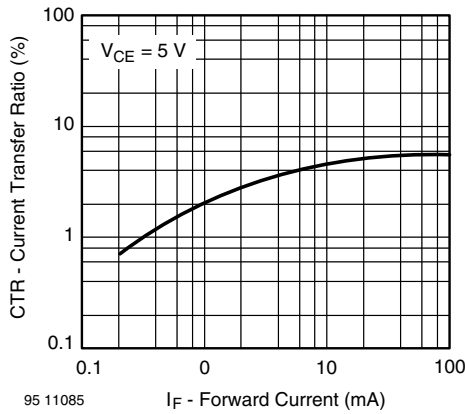


Fig. 9 - Current Transfer Ratio vs. Forward Current

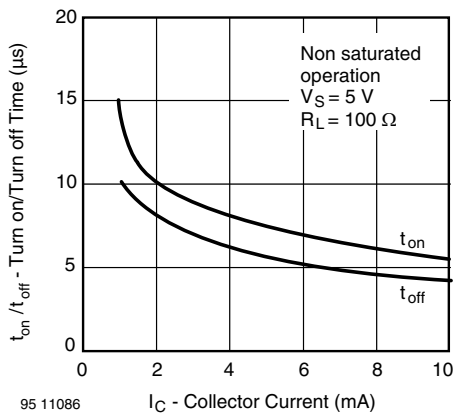
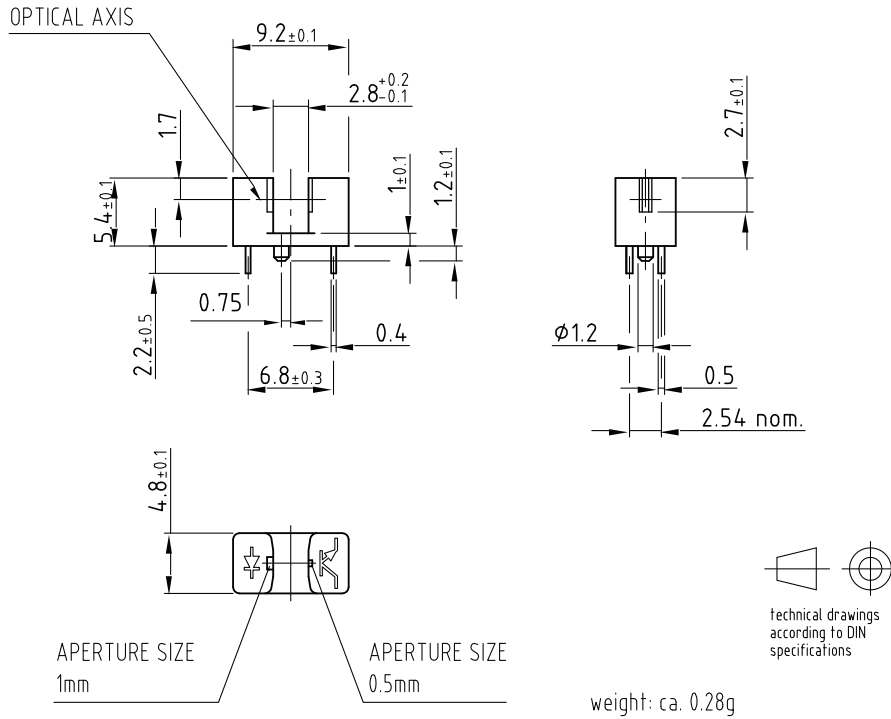


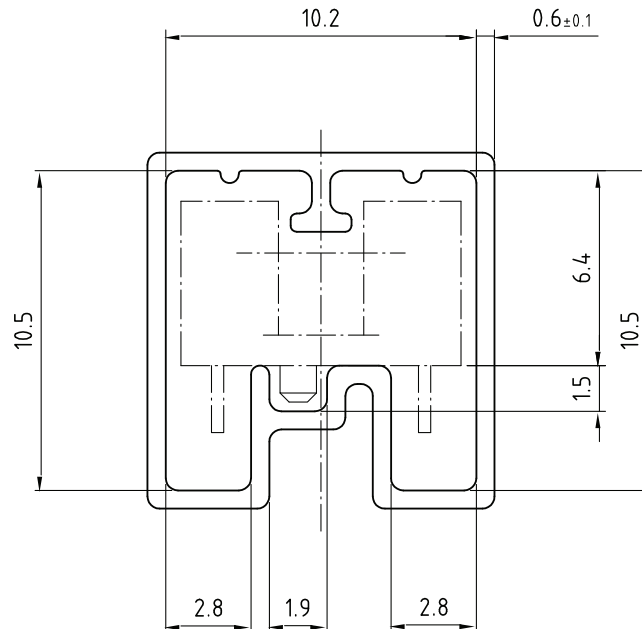
Fig. 10 - Turn-on/Turn-off Time vs. Collector Current

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

## 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



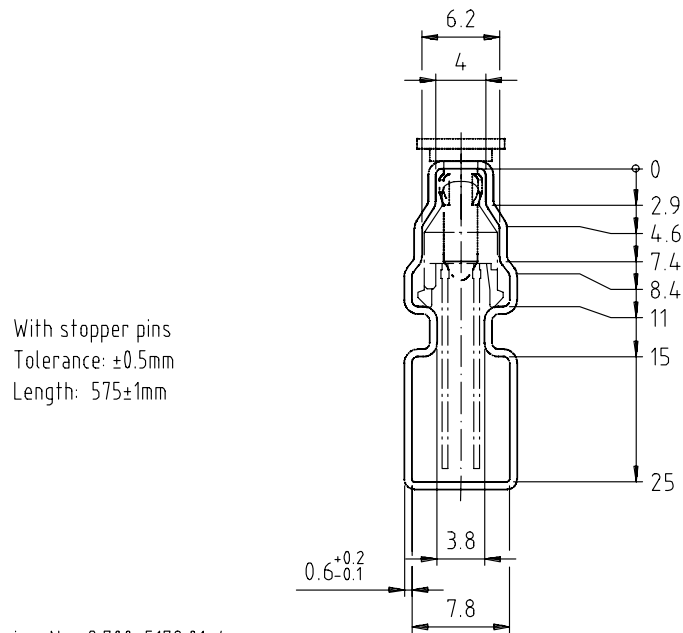
Drawing-No.: 9.700-5139.01-4  
Issue: 1; 10.05.00

Drawing refers to following types: TCRT 5000

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

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

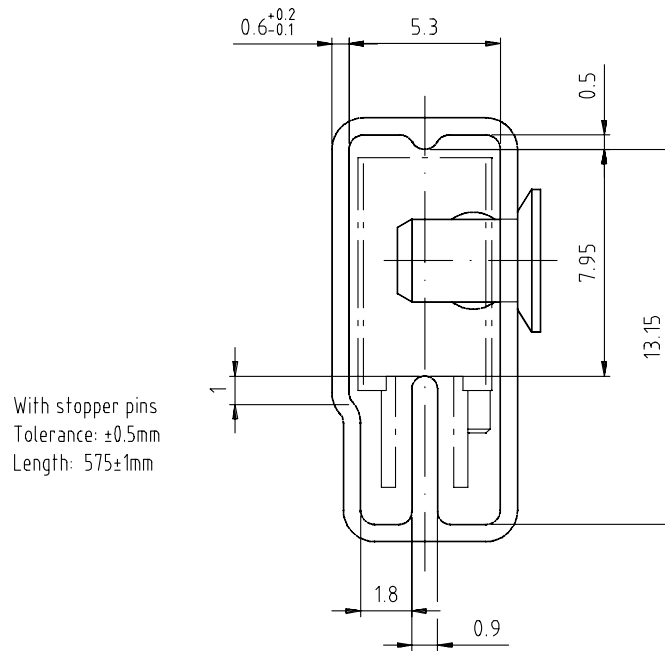


With rubber stopper  
Tolerance: ±0.5mm  
Length: 575±1mm

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





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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