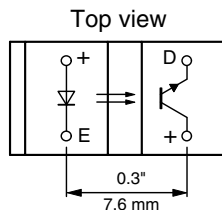


Transmissive Optical Sensor with Phototransistor Output



19180_4



19180_3

DESCRIPTION

The TCST2103, TCST2202, and TCST2300 are transmissive sensors that include an infrared emitter and phototransistor, located face-to-face on the optical axes in a leaded package which blocks visible light. These part numbers include options for aperture width.

FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 24.5 x 6.3 x 10.8
- Gap (in mm): 3.1
- Typical output current under test: $I_C = 4$ mA (TCST2103)
- Typical output current under test: $I_C = 2$ mA (TCST2202)
- Typical output current under test: $I_C = 0.5$ mA (TCST2300)
- 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
- Photo interrupter
- Counter
- Encoder

PRODUCT SUMMARY

PART NUMBER	GAP WIDTH (mm)	APERTURE WIDTH (mm)	TYPICAL OUTPUT CURRENT UNDER TEST ⁽¹⁾ (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCST2103	3.1	1	4	Yes
TCST2202	3.1	0.5	2	Yes
TCST2300	3.1	0.25	0.5	Yes

Note

⁽¹⁾ Conditions like in table basic characteristics/coupler

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
TCST2103	Tube	MOQ: 1020 pcs, 85 pcs/tube	With mounting flange
TCST2202	Tube	MOQ: 1020 pcs, 85 pcs/tube	With mounting flange
TCST2300	Tube	MOQ: 1020 pcs, 85 pcs/tube	With mounting flange

Note

⁽¹⁾ MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
COUPLER				
Total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_{tot}	250	mW
Ambient temperature range		T_{amb}	- 55 to + 85	$^\circ\text{C}$
Storage temperature range		T_{stg}	- 55 to + 100	$^\circ\text{C}$
Soldering temperature	Distance to package: 2 mm; $t \leq 5$ s	T_{sd}	260	$^\circ\text{C}$

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
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	$T_{amb} \leq 25^\circ C$	P_V	100	mW
Junction temperature		T_j	100	$^\circ C$
OUTPUT (DETECTOR)				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector peak current	$t_p/T = 0.5, t_p \leq 10 ms$	I_{CM}	200	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	P_V	150	mW
Junction temperature		T_j	100	$^\circ C$

Note

⁽¹⁾ $T_{amb} = 25^\circ C$, unless otherwise specified

ABSOLUTE MAXIMUM RATINGS

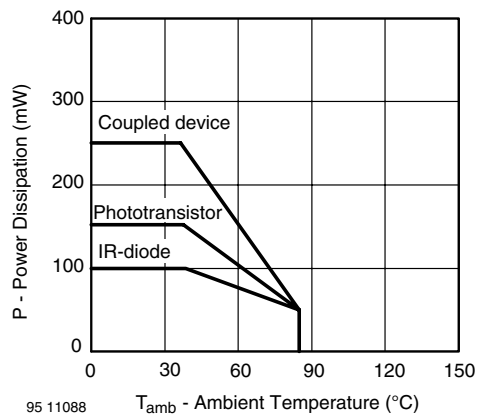


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS ⁽¹⁾							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
COUPLER							
Current transfer ratio	$V_{CE} = 5 V, I_F = 20 mA$	TCST2103	CTR	10	20		%
		TCST2202	CTR	5	10		%
		TCST2300	CTR	1.25	2.5		%
Collector current	$V_{CE} = 5 V, I_F = 20 mA$	TCST2103	I_C	2	4		mA
		TCST2202	I_C	1	2		mA
		TCST2300	I_C	0.25	0.5		mA
Collector emitter saturation voltage	$I_F = 20 mA, I_C = 1 mA$	TCST2103	V_{CEsat}			0.4	V
	$I_F = 20 mA, I_C = 0.5 mA$	TCST2202	V_{CEsat}			0.4	V
	$I_F = 20 mA, I_C = 0.1 mA$	TCST2300	V_{CEsat}			0.4	V
Resolution, path of the shutter crossing the radiant sensitive zone	$I_{Crel} = 10 \% \text{ to } 90 \%$	TCST2103	s		0.6		mm
		TCST2202	s		0.4		mm
		TCST2300	s		0.2		mm

BASIC CHARACTERISTICS ⁽¹⁾							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)							
Forward voltage	$I_F = 60 \text{ mA}$		V_F		1.25	1.6	V
Junction capacitance	$V_R = 0 \text{ V}, f = 1 \text{ MHz}$		C_j		50		pF
OUTPUT (DETECTOR)							
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}			100	nA
SWITCHING CHARACTERISTICS							
Turn-on time	$I_C = 2 \text{ mA}, V_S = 5 \text{ V}, R_L = 100 \text{ } \Omega$ (see figure 2)		t_{on}		10		μs
Turn-off time	$I_C = 2 \text{ mA}, V_S = 5 \text{ V}, R_L = 100 \text{ } \Omega$ (see figure 2)		t_{off}		8		μs

Note

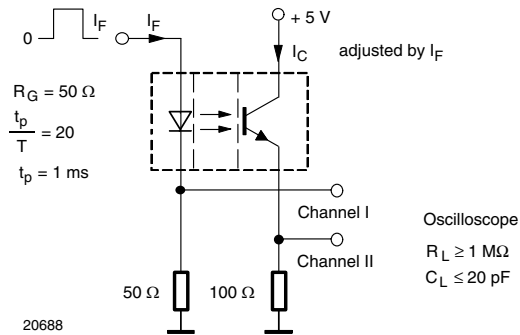
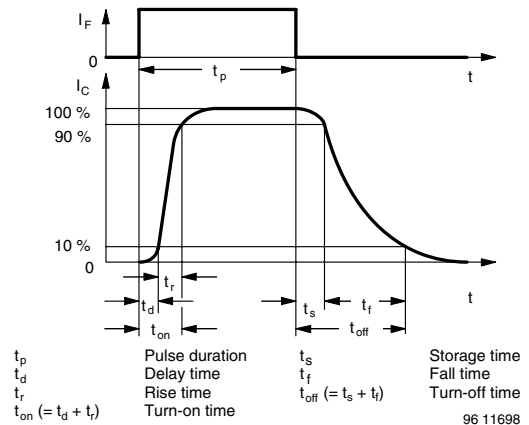
 (1) $T_{amb} = 25 \text{ } ^\circ\text{C}$, unless otherwise specified

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


Fig. 3 - Switching Times

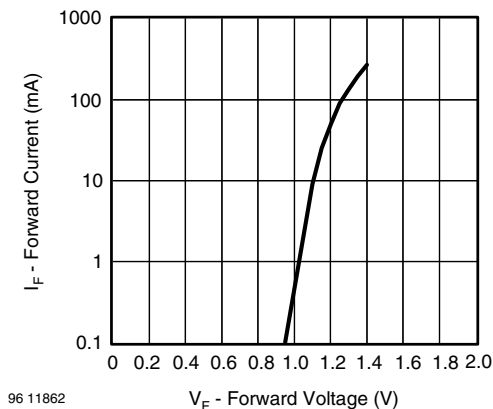
BASIC CHARACTERISTICS
 $T_{amb} = 25 \text{ } ^\circ\text{C}$, unless otherwise specified


Fig. 4 - Forward Current vs. Forward Voltage

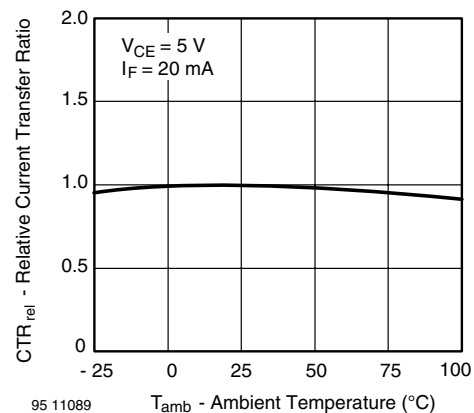


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

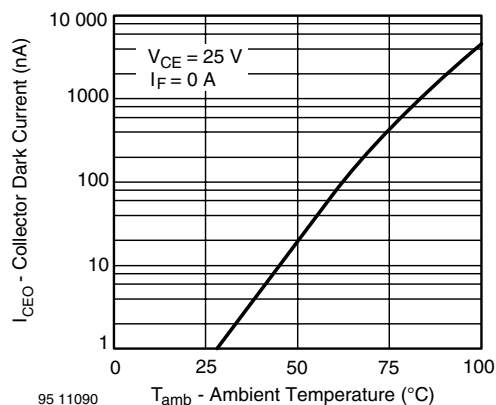


Fig. 6 - Collector Dark Current vs. Ambient Temperature

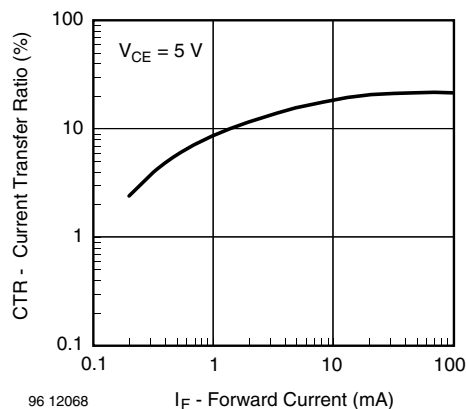


Fig. 9 - Current Transfer Ratio vs. Forward Current

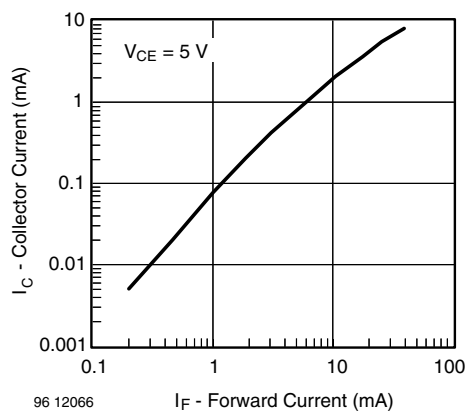


Fig. 7 - Collector Current vs. Forward Current

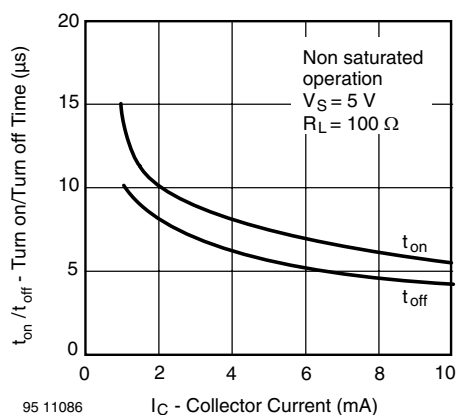


Fig. 10 - Turn-off/Turn-on Time vs. Collector Current

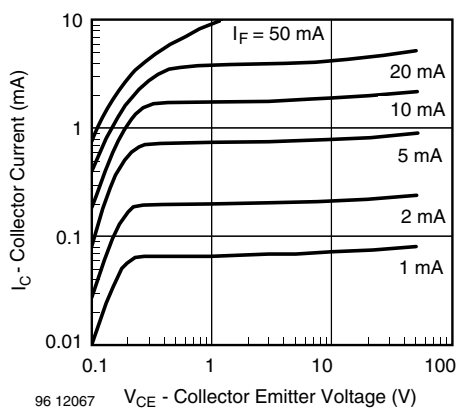


Fig. 8 - Collector Current vs. Collector Emitter Voltage

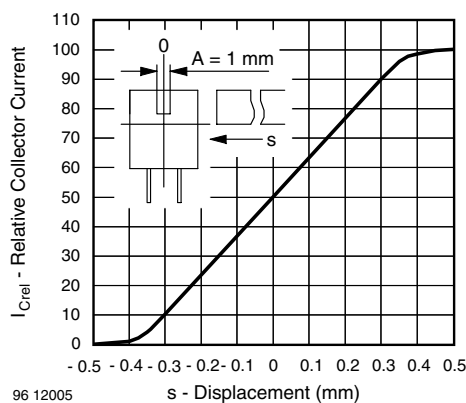


Fig. 11 - Relative Collector Current vs. Displacement

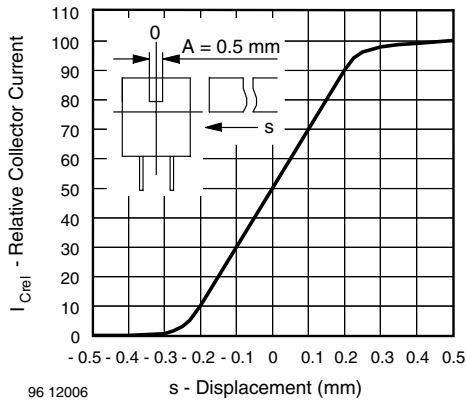


Fig. 12 - Relative Collector Current vs. Displacement

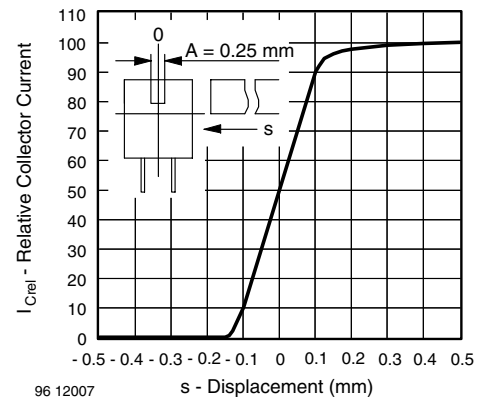
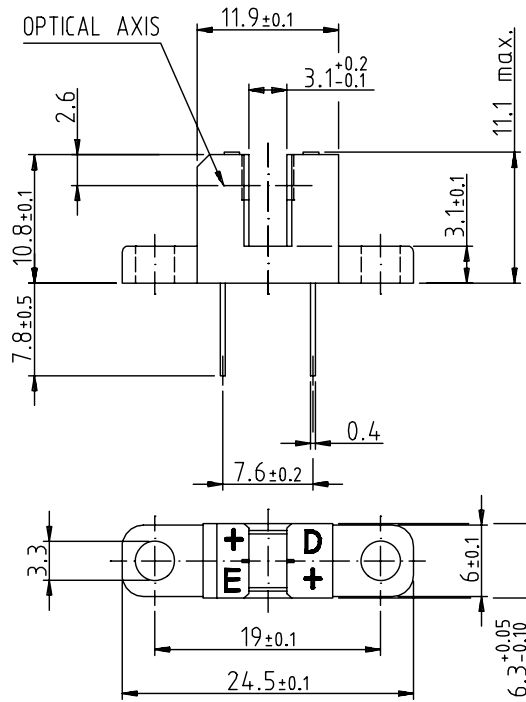
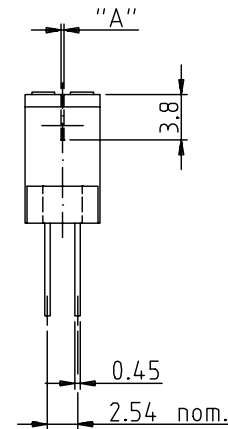


Fig. 13 - Relative Collector Current vs. Displacement

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5040.01-4
Issue: 2; 10.11.98
96 12095



technical drawings
according to DIN
specifications

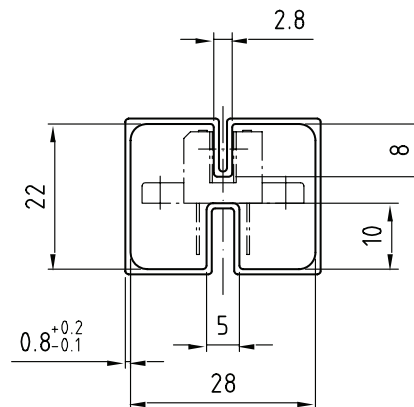
weight: ca. 0.90g

TCST2103, TCST2202, TCST2300

Vishay Semiconductors Transmissive Optical Sensor with
Phototransistor Output



TUBE DIMENSIONS in millimeters



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

Drawing-No.: 9.700-5100.01-4

Issue: 1; 25.02.00

20252



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.