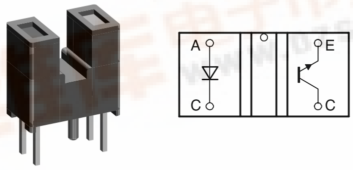
Transmissive Optical Sensor with Phototransistor Output

Description

The TCST1030 and TCST1030L 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. TCST1030L is the long lead version.



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Features

- Package type: Leaded
- Detector type: Phototransistor
- Dimensions:
  L 8.3 mm x W 4.7 mm x H 8.15 mm
- Gap: 3 mm
- Aperture: none
- Typical output current under test: I_C = 2.4 mA
- Daylight blocking filter
- Emitter wavelength 950 nm
- Lead (Pb)-free soldering released
- Lead (Pb)-free component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb
Pb-free

e4

Applications

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

Order Instructions

Part Number	Remarks	Minimum Order Quantity
TCST1030	3.4 mm lead length	5200 pcs, 65 pcs/tube
TCST1030L	16 mm lead length	2600 pcs, 65 pcs/tube

Absolute Maximum Ratings

T_{amb} = 25 °C, unless otherwise specified

Coupler

Parameter	Test condition	Symbol	Value	Unit
Total power dissipation	$T_{amb} \le 25$ °C	P_{tot}	250	mW
Operation 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 ≤ 10 s	T_{sd}	260	°C

Input (Emitter)

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \le 10$ µs	I_{FSM}	3	A
Power dissipation	$T_{amb} \le 25$ °C	P_V	100	mW
Junction temperature		T_j	100	°C

Output (Detector)

Parameter	Test condition	Symbol	Value	Unit
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	100	mA
Power dissipation	$T_{amb} \le 25$ °C	P_V	150	mW
Junction temperature		T_j	100	°C

Electrical Characteristics

T_{amb} = 25 °C, unless otherwise specified

Coupler

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector current	V_{CE} = 5 V, I_F = 10 mA	I_C	1.2	2.4		mA
Collector emitter saturation voltage	I_F = 10 mA, I_C = 1 mA	V_{CEsat}			0.8	V

Input (Emitter)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 60 mA	V_F		1.25	1.5	V
Junction capacitance	V_R = 0, f = 1 MHz	C_j		50		pF

Output (Detector)

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector emitter voltage	I_C = 1 mA	V_{CEO}	70			V
Emitter collector voltage	I_E = 10 µA	V_{ECO}	7			V
Collector dark current	V_{CE} = 25 V, I_F = 0, E = 0	I_{CEO}		10	100	nA

Switching Characteristics

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Turn-on time	I_C = 1 mA, V_{CE} = 5 V, R_L = 100 Ω (see figure 1)	t_{on}		15.0		µs
Turn-off time	I_C = 1 mA, V_{CE} = 5 V, R_L = 100 Ω (see figure 1)	f_{off}		10.0		µs

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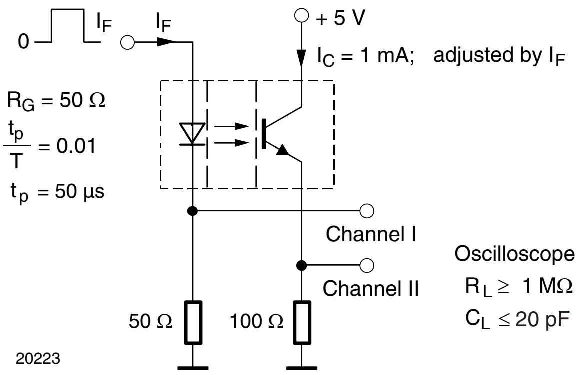


Figure 1. Test Circuit for t_{on} and t_{off}

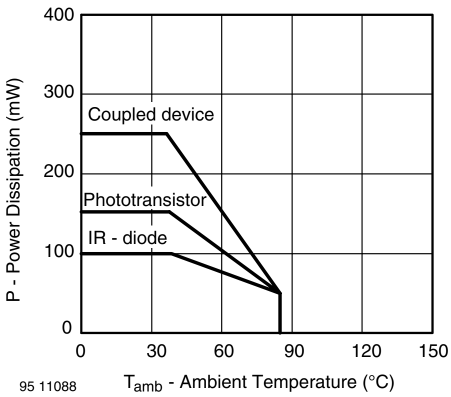


Figure 3. Power Dissipation Limit vs. Ambient Temperature

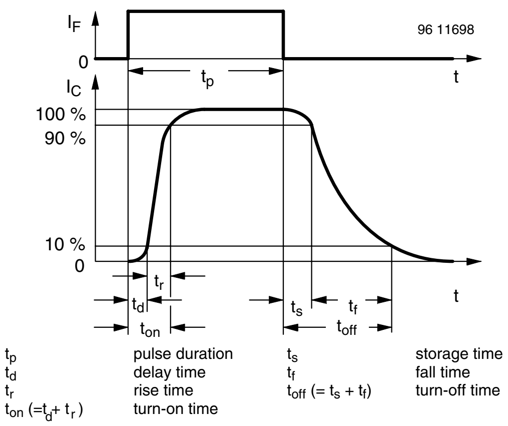


Figure 2. Switching Times

Typical Characteristics

T_{amb} = 25 °C, unless otherwise specified

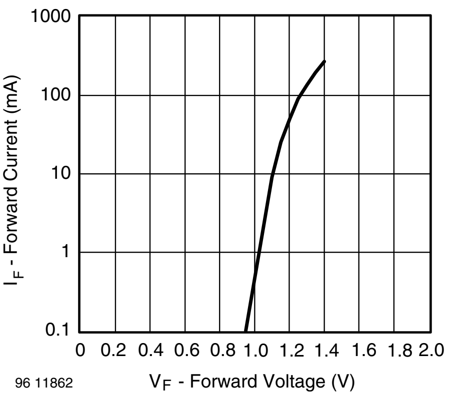


Figure 4. Forward Current vs. Forward Voltage

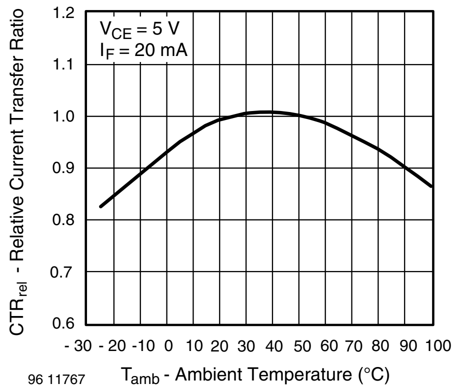


Figure 5. Relative Current Transfer Ratio vs. Ambient Temperature

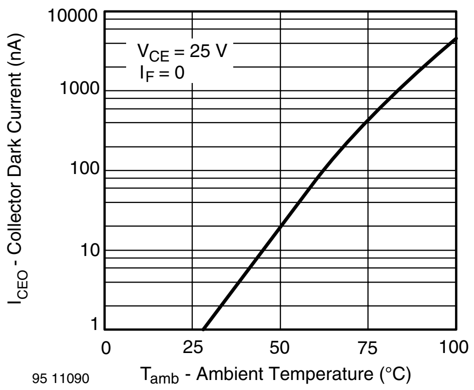


Figure 6. Collector Dark Current vs. Ambient Temperature

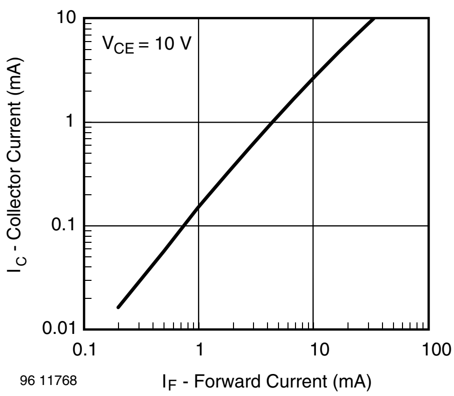


Figure 7. Collector Current vs. Forward Current

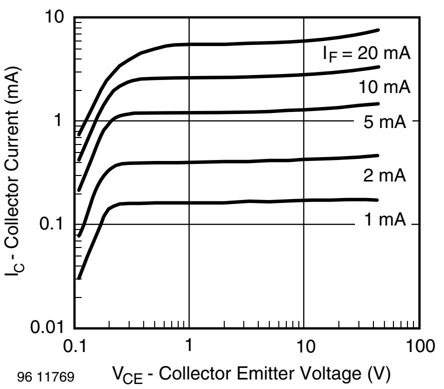


Figure 8. Collector Current vs. Collector Emitter Voltage

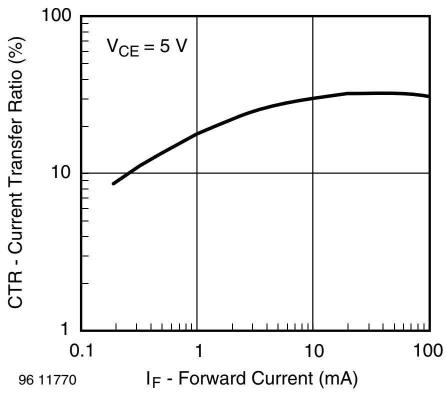


Figure 9. Current Transfer Ratio vs. Forward Current

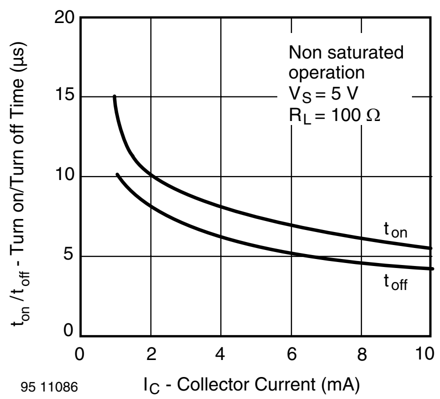


Figure 10. Turn on/off Time vs. Collector Current

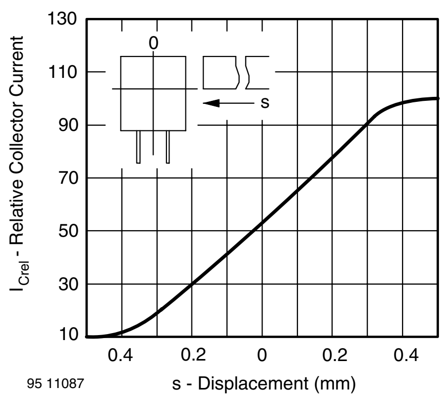
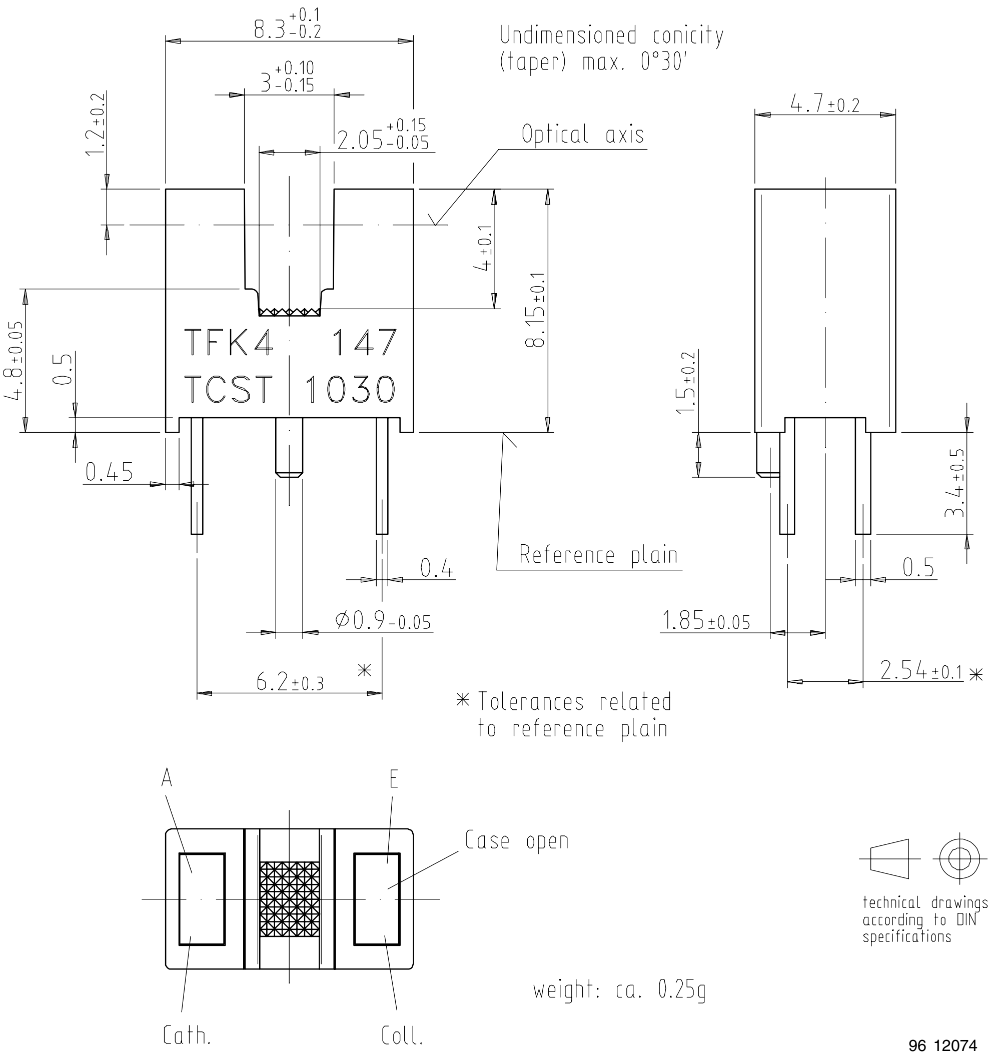
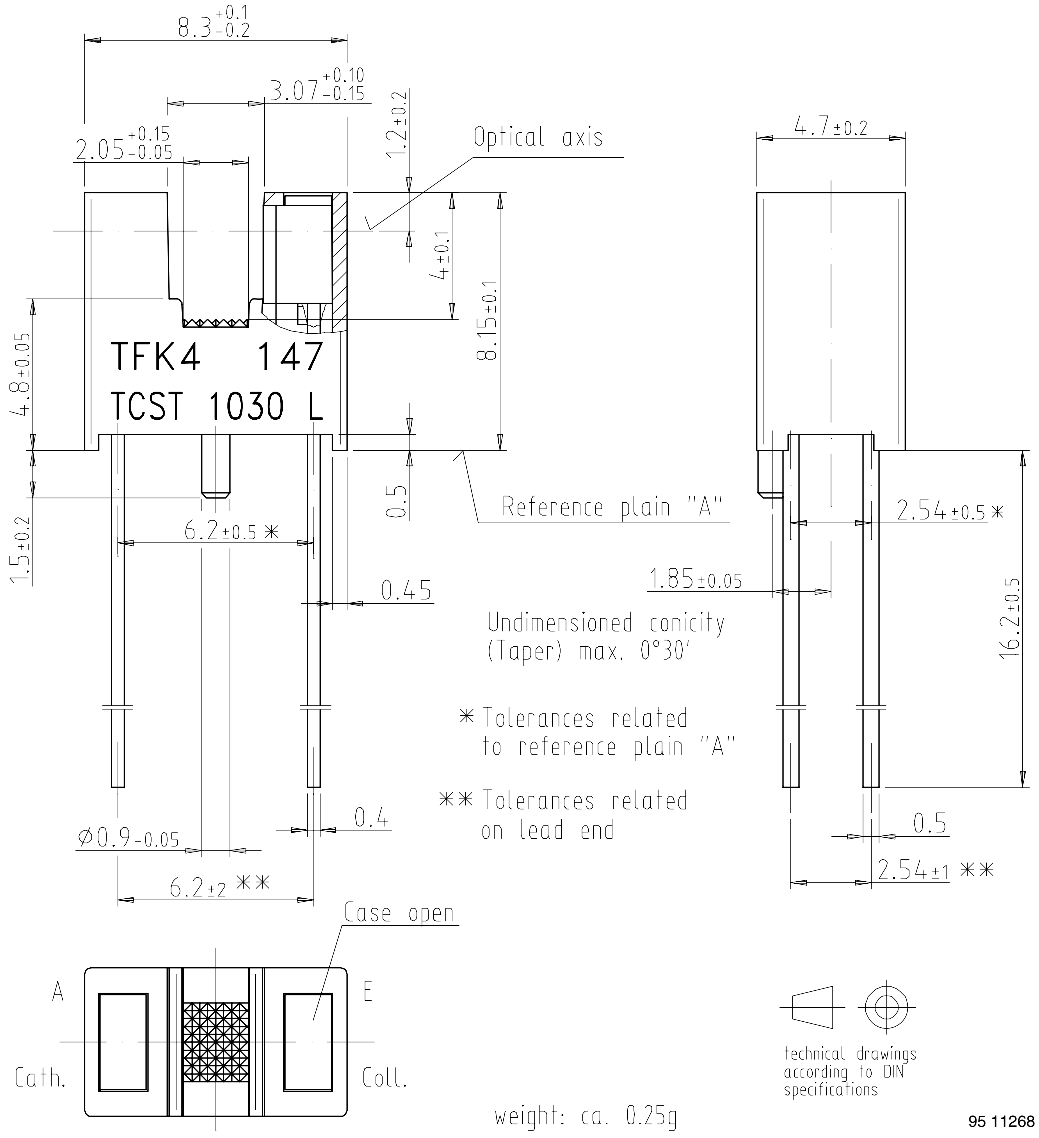


Figure 11. Relative Collector Current vs. Displacement

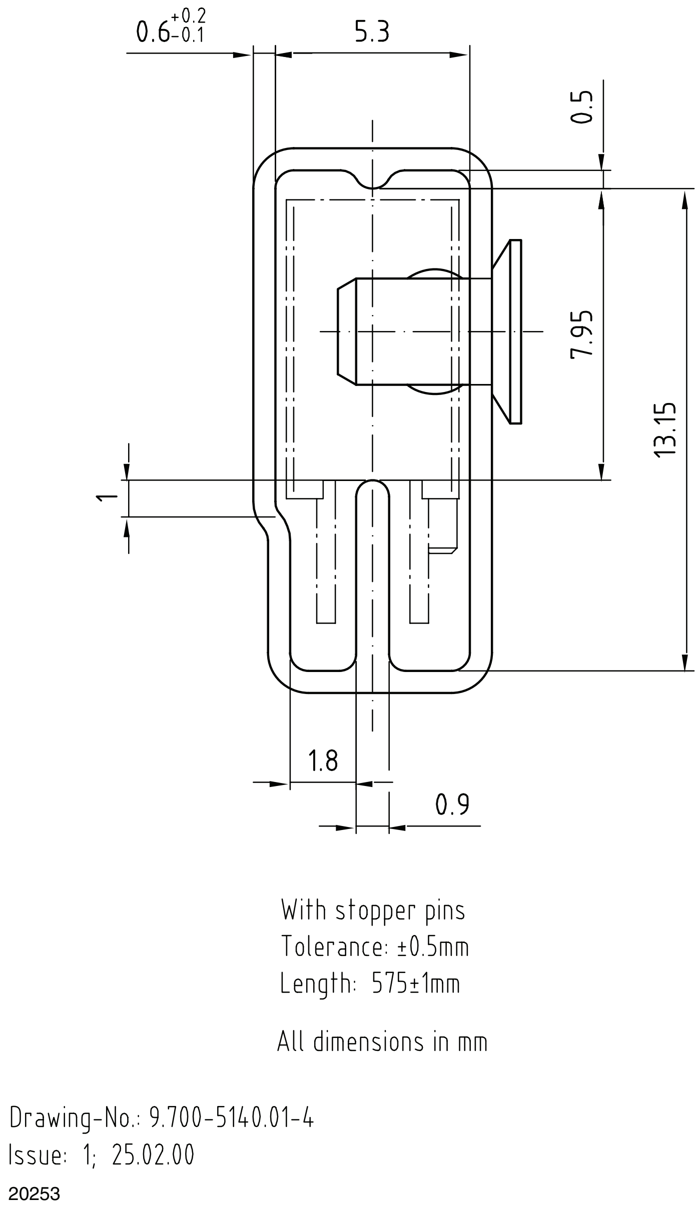
Package Dimensions in mm

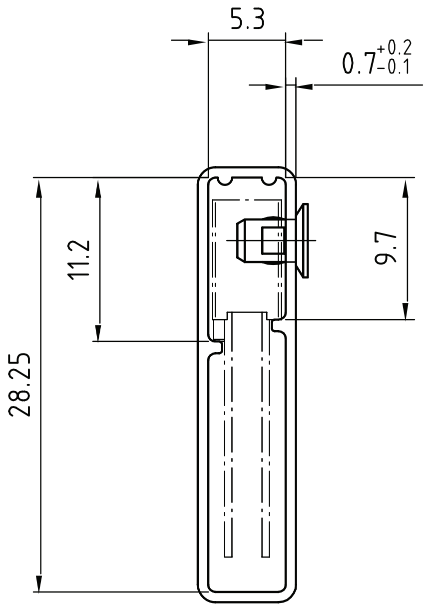




8.3 +0.1 -0.2
3.07 +0.10 -0.15
2.05 +0.15 -0.05
1.2±0.2
Optical axis
4±0.1
8.15±0.1
4.8±0.05
TFK4 147
TCST 1030 L
0.5
Reference plain "A"
1.5±0.2
6.2±0.5 ✳
0.45
Undimensioned conicity
(Taper) max. 0°30'
✳ Tolerances related
to reference plain "A"
✳✳ Tolerances related
on lead end
0.4
⌀0.9-0.05
6.2±2 ✳✳
Case open
4.7±0.2
2.54±0.5 ✳
1.85±0.05
16.2±0.5
0.5
2.54±1 ✳✳
A
E
Cath.
Coll.
technical drawings
according to DIN
specifications
weight: ca. 0.25g
95 11268

Tube Dimensions in mm





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

All dimensions in mm

Drawing-No.: 9.700-5205.01-4
Issue: 1; 25.02.00

20254

Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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