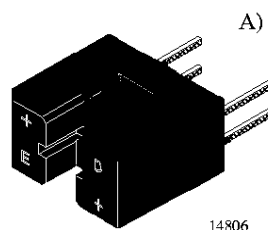
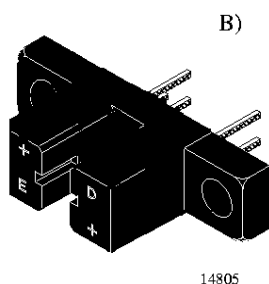


Transmissive Optical Sensor with Phototransistor Output

Description

This device has a compact construction where the emitting-light sources and the detectors are located face-to-face on the same optical axis.

The operating wavelength is 950 nm. The detector consists of a phototransistor.



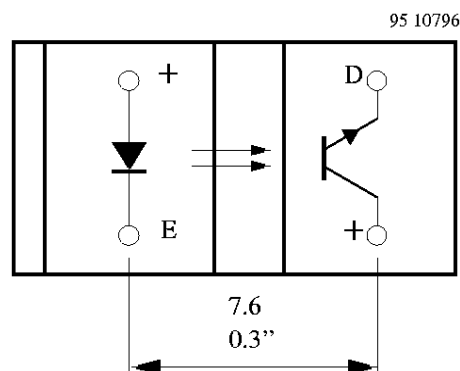
Applications

Contactless optoelectronic switch, control and counter

Features

- Compact construction
- No setting efforts
- Polycarbonate case protected against ambient light
- 2 case variations
- 3 different apertures
- CTR selected in groups (regarding fourth number of type designation)

Pin Connection



Order Instruction

Part Number	Resolution (mm)	Aperture (mm)
TCST1103 A)	0.6	1
TCST2103 B)		
TCST1202 A)	0.4	0.5
TCST2202 B)		
TCST1300 A)	0.2	0.25
TCST2300 B)		

Absolute Maximum Ratings

Input (Emitter)

Parameters	Test Conditions	Symbol	Value	Unit
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)

Parameters	Test Conditions	Symbol	Value	Unit
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	100	mA
Collector peak current	$t_p/T = 0.5, t_p \leq 10 \text{ ms}$	I_{CM}	200	mA
Power dissipation	$T_{amb} \leq 25^\circ C$	P_V	150	mW
Junction temperature		T_j	100	$^\circ C$

Coupler

Parameters	Test Conditions	Symbol	Value	Unit
Total power dissipation	$T_{amb} \leq 25^\circ C$	P_{tot}	250	mW
Operating temperature range		T_{amb}	-55 to +85	$^\circ C$
Storage temperature range		T_{sig}	-55 to +100	$^\circ C$
Soldering temperature	2 mm from case, $t \leq 5 \text{ s}$	T_{sd}	260	$^\circ W$

Electrical Characteristics

$T_{amb} = 25^{\circ}\text{C}$

Input (Emitter)

Parameters	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 60\text{ mA}$		V_F		1.25	1.6	V
Junction capacitance	$V_R = 0$, $f = 1\text{ MHz}$		C_j		50		pF

Output (Detector)

Parameters	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
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	$V_{CE} = 25\text{ V}$, $I_F = 0$, $E = 0$		I_{CEO}			100	nA

Coupler

Parameters	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
Current transfer ratio	$V_{CE} = 5\text{ V}$, $I_F = 20\text{ mA}$	TCST1103, TCST2103	CTR	10	20		%
		TCST1202, TCST2202	CTR	5	10		%
		TCST1300, TCST2300	CTR	1.25	2.5		%
Collector current	$V_{CE} = 5\text{ V}$, $I_F = 20\text{ mA}$	TCST1103, TCST2103	I_C	2	4		mA
		TCST1202, TCST2202	I_C	1	2		mA
		TCST1300, TCST2300	I_C	0.25	0.5		mA
Collector emitter saturation voltage	$I_F = 20\text{ mA}$, $I_C = 1\text{ mA}$	TCST1103, TCST2103	V_{CEsat}			0.4	V
Collector emitter saturation voltage	$I_F = 20\text{ mA}$, $I_C = 0.5\text{ mA}$	TCST1202, TCST2202	V_{CEsat}			0.4	V
Collector emitter saturation voltage	$I_F = 20\text{ mA}$, $I_C = 0.1\text{ mA}$	TCST1300, TCST2300	V_{CEsat}			0.4	V
Resolution, path of the shutter crossing the radiant sensitive zone	$I_{Crel} = 10/90\%$	TCST1103, TCST2103	s		0.6		mm
		TCST1202, TCST2202	s		0.4		mm
		TCST1300, TCST2300	s		0.2		mm

Switching Characteristics

$V_S = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $R_L = 100 \Omega$

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Turn-on time		t_{on}		10		μs
Turn-off time		t_{off}		8		μs

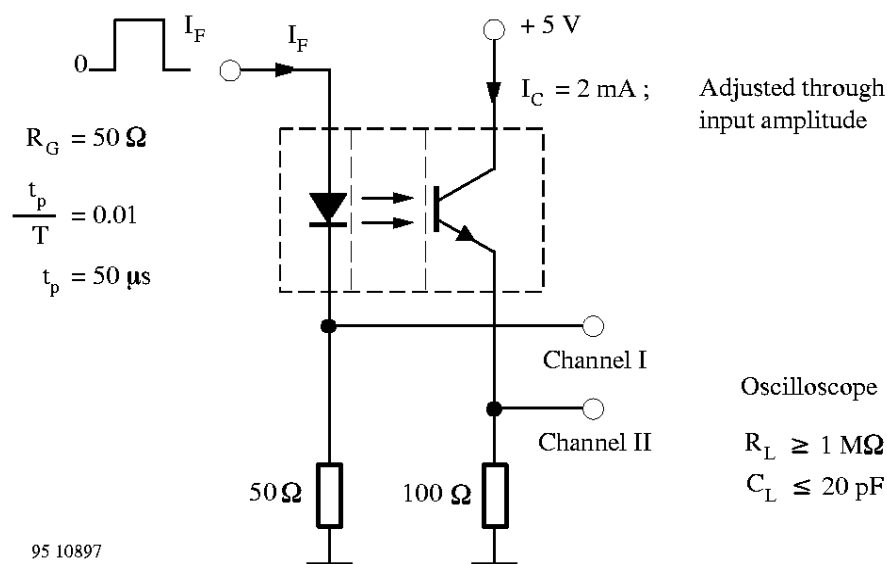


Figure 1. Test circuit

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

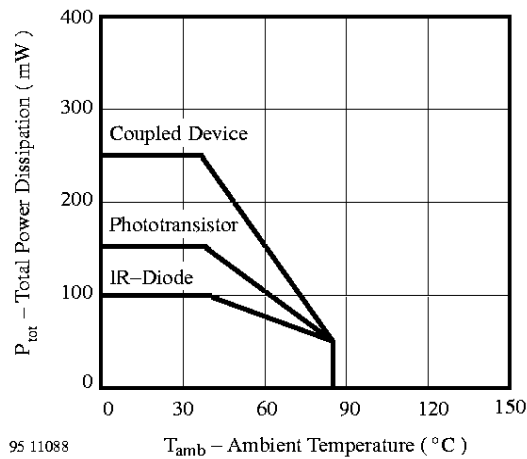


Figure 2. Total Power Dissipation vs. Ambient Temperature

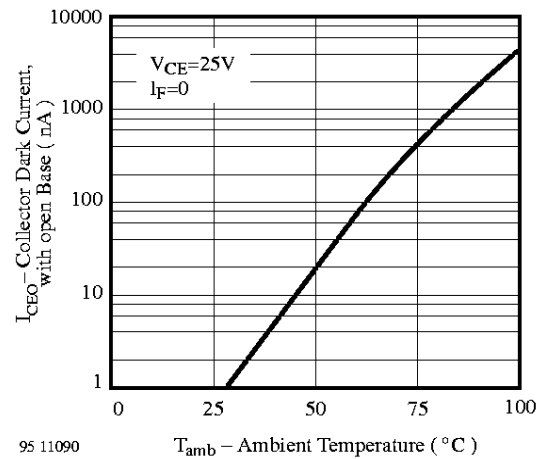


Figure 5. Collector Dark Current vs. Ambient Temperature

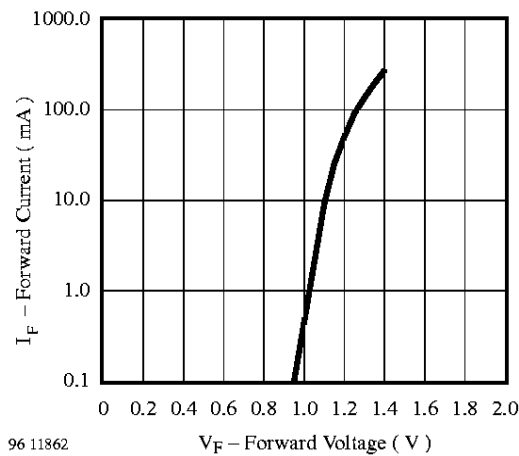


Figure 3. Forward Current vs. Forward Voltage

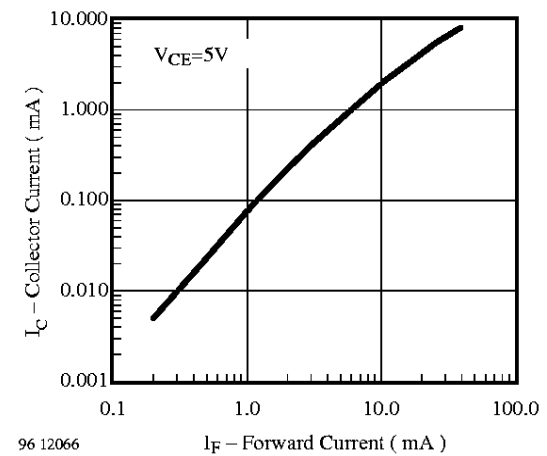


Figure 6. Collector Current vs. Forward Current

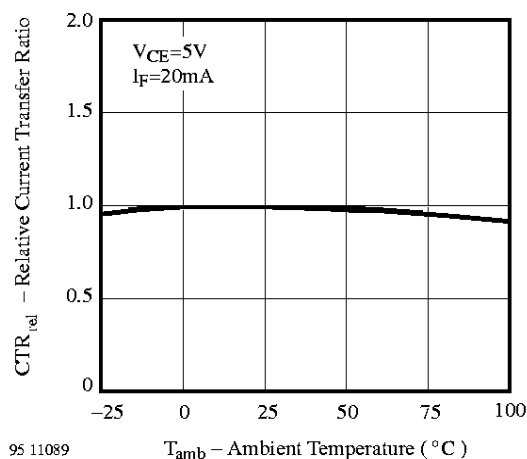


Figure 4. Rel. Current Transfer Ratio vs. Ambient Temperature

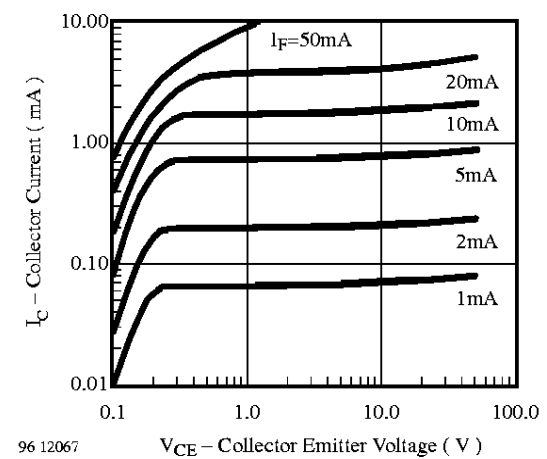


Figure 7. Collector Current vs. Collector Emitter Voltage

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

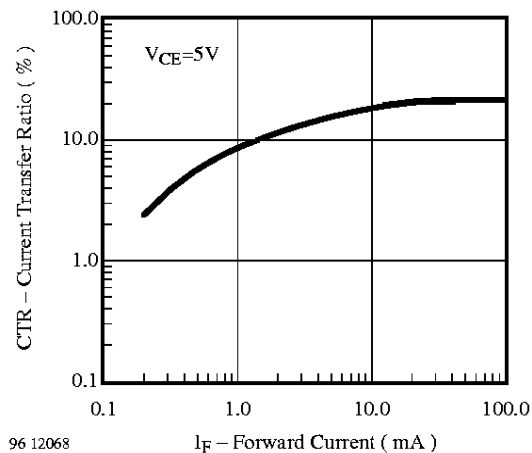


Figure 8. Current Transfer Ratio vs. Forward Current

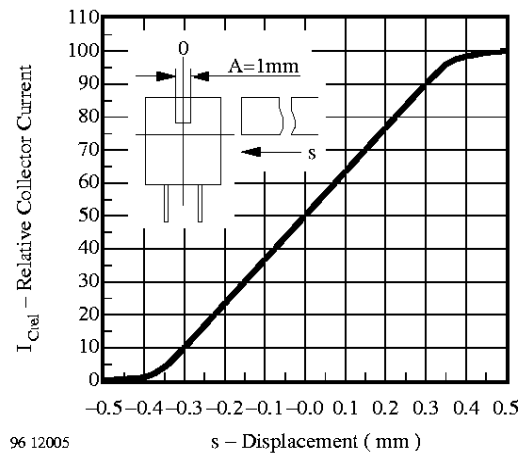


Figure 10. Rel. Collector Current vs. Displacement

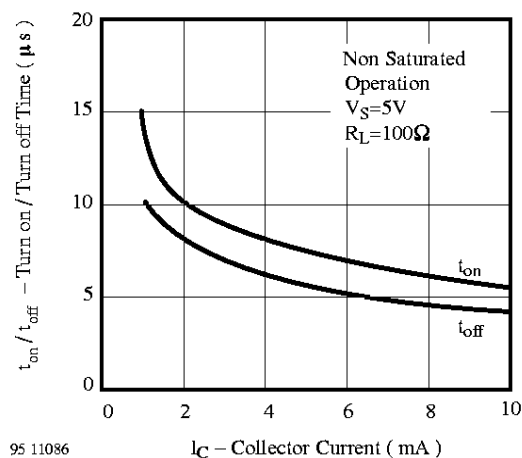


Figure 9. Turn on / off Time vs. Collector Current

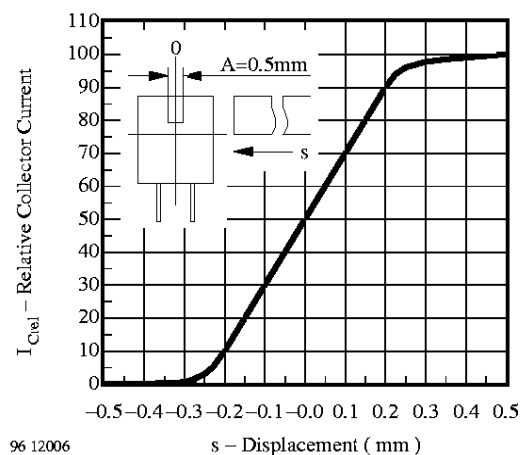


Figure 11. Rel. Collector Current vs. Displacement

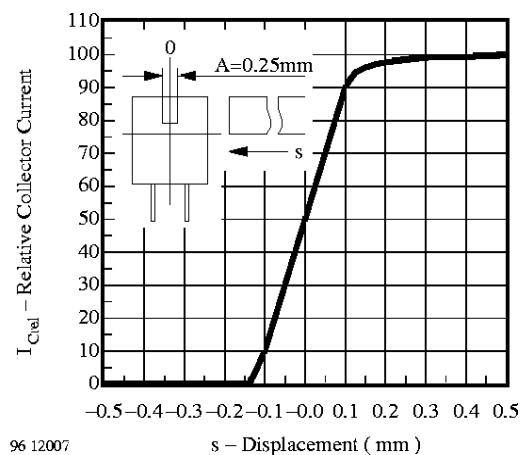
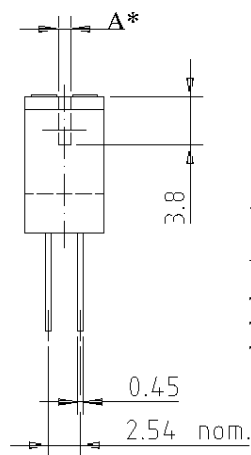
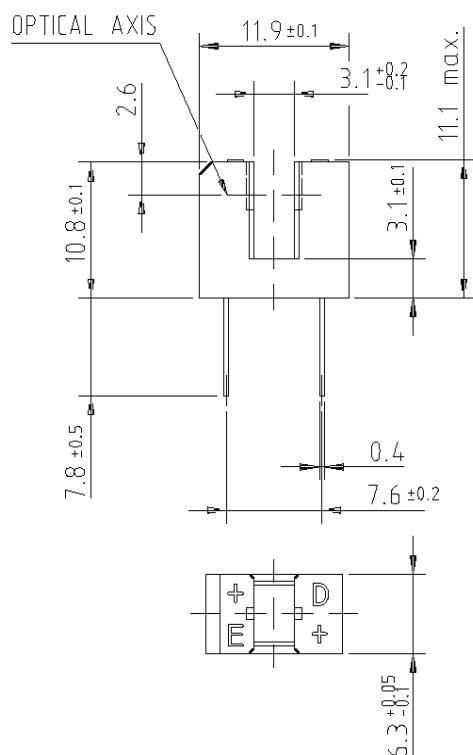


Figure 12. Rel. Collector Current vs. Displacement

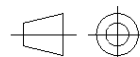
Dimensions of TCST1.0. in mm



weight: ca. 0.80 g

A*: various apertures

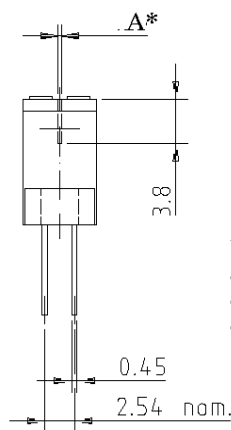
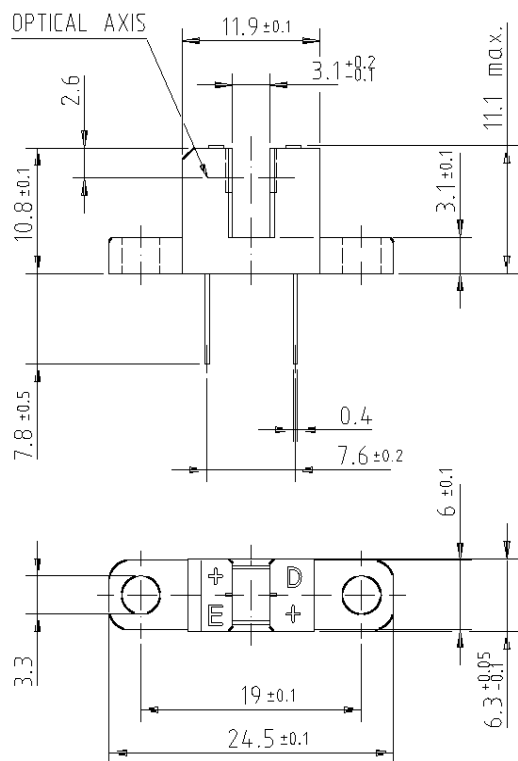
TCST110. with aperture 1.00 mm (0.04")
TCST120. with aperture 0.50 mm (0.02")
TCST130. with aperture 0.25 mm (0.01")



technical drawings
according to DIN
specifications

96 12094

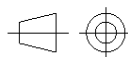
Dimensions of TCST2.0. in mm



weight: ca. 0.90 g

A*: various apertures

TCST210. with aperture 1.00 mm (0.04")
TCST220. with aperture 0.50 mm (0.02")
TCST230. with aperture 0.25 mm (0.01")



technical drawings
according to DIN
specifications

96 12095

Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic 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.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division 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.

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

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC products for any unintended or unauthorized application, the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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