

Transmissive Optical Sensor with Phototransistor Output

Description

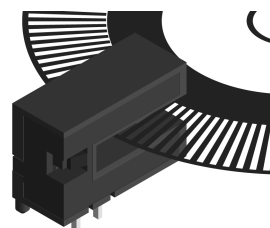
This device has a compact construction where the emitting-light sources and the detectors are located face-to-face on the same optical axis. The operating wavelength is 950 nm. The detector consists of a phototransistor.

Applications

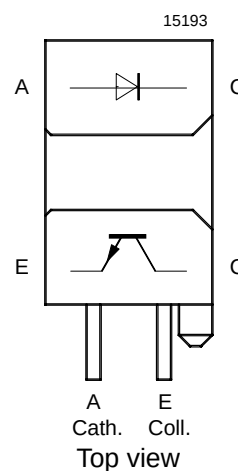
- Position sensor for shaft encoder
- Detection of opaque material such as paper, cards, magnetic tapes etc.
- Limit switch for mechanical motions in VCR
- Read/ write head position in data storage equipment
- General purpose – wherever the space is limited

Features

- Gap 2.7 mm
- Package height: 9 mm
- Aperture 0.5 mm
- Plastic polycarbonate housing
- **Current Transfer Ratio (CTR)** of typical 7.5%
- Designed for horizontal moving objects



15209



Order Instruction

Ordering Code	Resolution (mm) / Aperture (mm)	Remarks
TCST5250	0.4 / 0.5	

Absolute Maximum Ratings

Input (Emitter)

Parameter	Test Conditions	Symbol	Value	Unit
Reverse voltage		V_R	6	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10 \mu\text{A}$	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_V	100	mW
Junction temperature		T_j	100	$^\circ\text{C}$

Output (Detector)

Parameter	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
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_V	150	mW
Junction temperature		T_j	100	$^\circ\text{C}$

Coupler

Parameter	Test Conditions	Symbol	Value	Unit
Total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_{tot}	250	mW
Operation temperature range		T_{amb}	-25 to +85	$^\circ\text{C}$
Storage temperature range		T_{stg}	-40 to +100	$^\circ\text{C}$
Soldering temperature	1.6 mm from case, $t \leq 5 \text{ s}$	T_{sd}	260	$^\circ\text{C}$

Electrical Characteristics ($T_{amb} = 25^\circ\text{C}$)

Input (Emitter)

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

Output (Detector)

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

Coupler

Parameter	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector current	$V_{CE} = 10 \text{ V}, I_F = 20 \text{ mA}$	I_C	0.5	1.5	15	mA
Collector emitter saturation voltage	$I_F = 20 \text{ mA}, I_C = 0.2 \text{ mA}$	V_{CEsat}			0.4	V

Switching Characteristics

Parameter	Test Conditions	Symbol	Typ.	Unit
Turn-on time	$I_C = 1 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $R_L = 100 \Omega$ (see figure 1)	t_{on}	15.0	μs
Turn-off time		t_{off}	10.0	μs

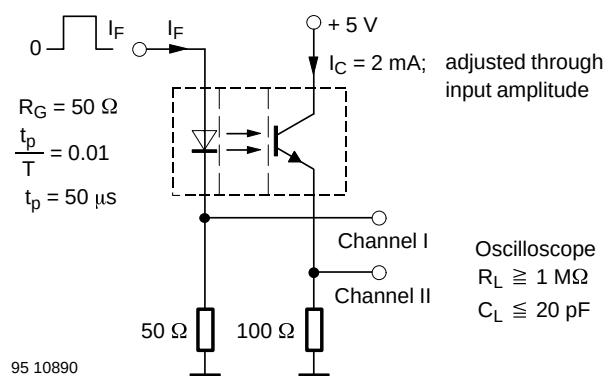


Figure 1. Test circuit

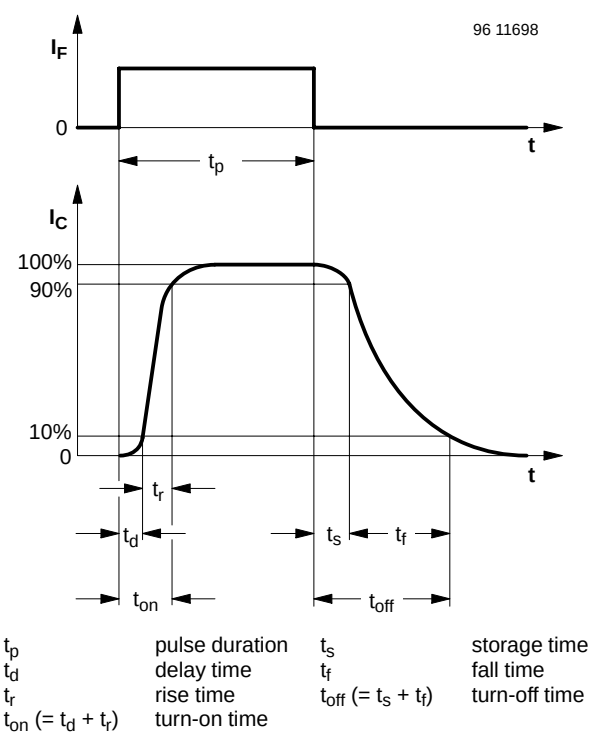


Figure 2. Switching times

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

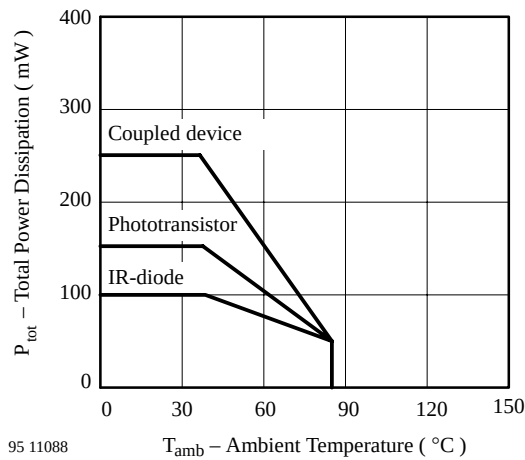


Figure 3. Total Power Dissipation vs. Ambient Temperature

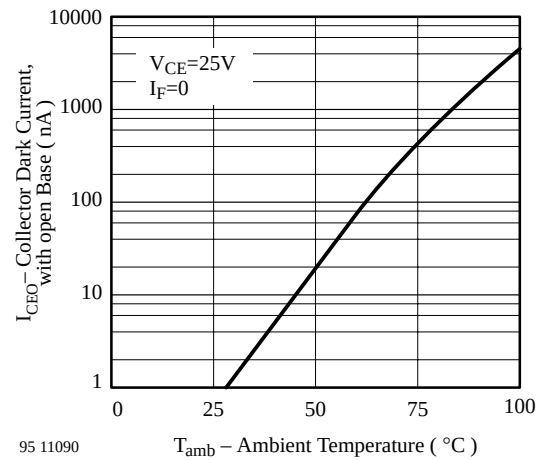


Figure 6. Collector Dark Current vs. Ambient Temperature

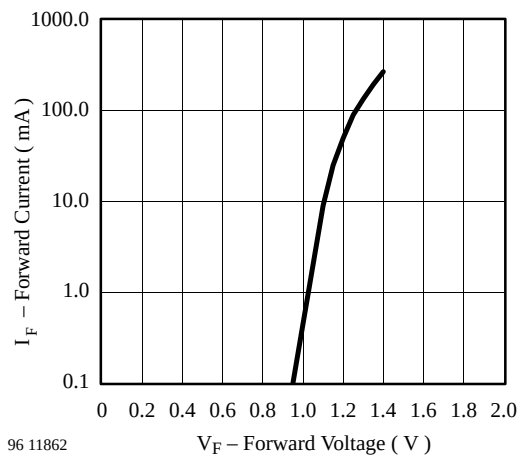


Figure 4. Forward Current vs. Forward Voltage

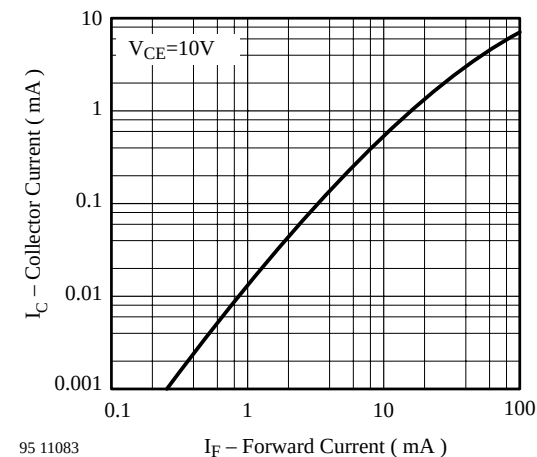


Figure 7. Collector Current vs. Forward Current

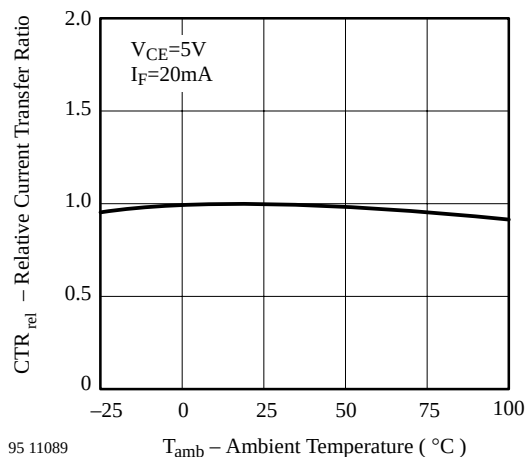


Figure 5. Relative Current Transfer Ratio vs. Ambient Temperature

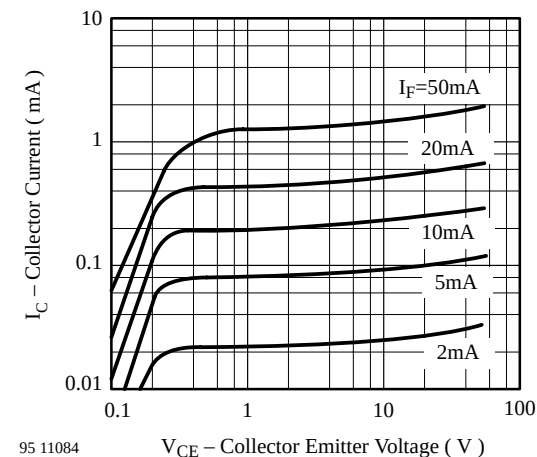


Figure 8. Collector Current vs. Collector Emitter Voltage

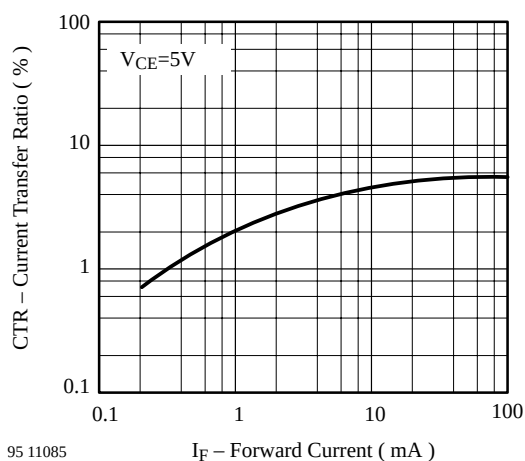


Figure 9. Current Transfer Ratio vs. Forward Current

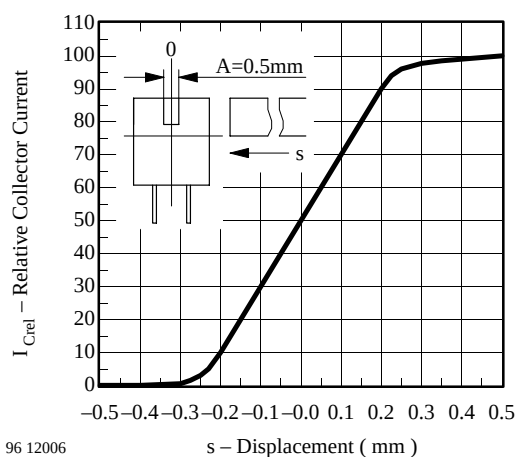


Figure 11. Relative Collector Current vs. Displacement

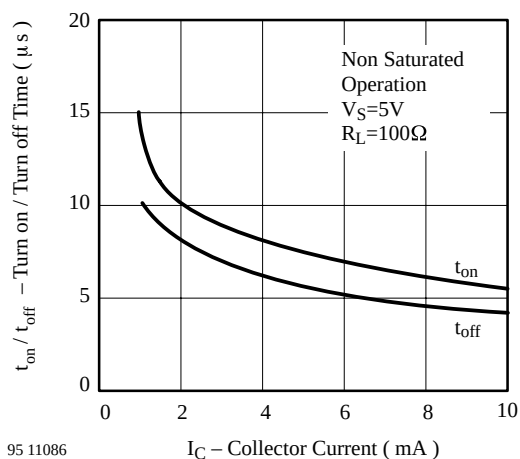


Figure 10. Turn on / off Time vs. Collector Current

Dimensions of TCST5250 in mm

