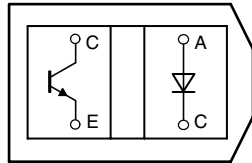


TCRT5000 - IR Proximity Sensor



Top view 19156_1

FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 10.2 x 5.8 x 7
- Peak operating distance: 2.5 mm
- Operating range within > 20 % relative collector current: 0.2 mm to 15 mm
- Typical output current under test: $I_C = 1$ mA
- 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

DESCRIPTION

The TCRT5000 and TCRT5000L are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light. The package includes two mounting clips. TCRT5000L is the long lead version.

APPLICATIONS

- Position sensor for shaft encoder
- Detection of reflective material such as paper, IBM cards, magnetic tapes etc.
- Limit switch for mechanical motions in VCR
- General purpose - wherever the space is limited

PRODUCT SUMMARY

PART NUMBER	DISTANCE FOR MAXIMUM CTR _{rel} ⁽¹⁾ (mm)	DISTANCE RANGE FOR RELATIVE I _{out} > 20 % (mm)	TYPICAL OUTPUT CURRENT UNDER TEST ⁽²⁾ (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
TCRT5000	2.5	0.2 to 15	1	Yes

Notes

(1) CTR: current transfere ratio, I_{out}/I_{in}

(2) Conditions like in table basic characteristics/sensors

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
TCRT5000	Tube	MOQ: 4500 pcs, 50 pcs/tube	3.5 mm lead length

Note

(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V_R	5	V
Forward current		I_F	60	mA
Forward surge current	$t_p \leq 10 \mu s$	I_{FSM}	3	A
Power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	P_V	100	mW
Junction temperature		T_j	100	$^\circ\text{C}$



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ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
OUTPUT (DETECTOR)				
Collector emitter voltage		V_{CEO}	70	V
Emitter collector voltage		V_{ECO}	5	V
Collector current		I_C	100	mA
Power dissipation	$T_{amb} \leq 55^\circ\text{C}$	P_V	100	mW
Junction temperature		T_j	100	$^\circ\text{C}$
SENSOR				
Total power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P_{tot}	200	mW
Ambient temperature range		T_{amb}	- 25 to + 85	$^\circ\text{C}$
Storage temperature range		T_{stg}	- 25 to + 100	$^\circ\text{C}$
Soldering temperature	2 mm from case, $t \leq 10$ s	T_{sd}	260	$^\circ\text{C}$

Note

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

ABSOLUTE MAXIMUM RATINGS

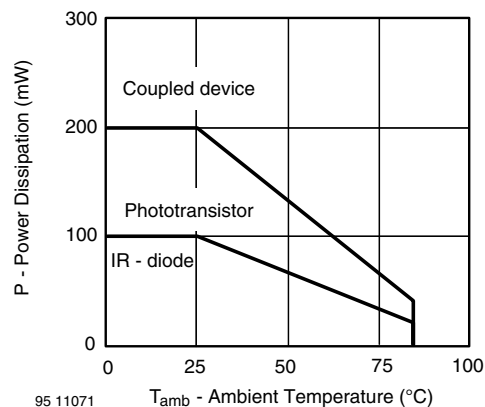


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	$I_F = 60$ mA	V_F		1.25	1.5	V
Junction capacitance	$V_R = 0$ V, $f = 1$ MHz	C_j		17		pF
Radiant intensity	$I_F = 60$ mA, $t_p = 20$ ms	I_e			21	mW/sr
Peak wavelength	$I_F = 100$ mA	λ_P	940			nm
Virtual source diameter	Method: 63 % encircled energy	d		2.1		mm
OUTPUT (DETECTOR)						
Collector emitter voltage	$I_C = 1$ mA	V_{CEO}	70			V
Emitter collector voltage	$I_e = 100$ μA	V_{ECO}	7			V
Collector dark current	$V_{CE} = 20$ V, $I_F = 0$ A, $E = 0$ lx	I_{CEO}		10	200	nA
SENSOR						
Collector current	$V_{CE} = 5$ V, $I_F = 10$ mA, $D = 12$ mm	$I_C^{(2)(3)}$	0.5	1	2.1	mA
Collector emitter saturation voltage	$I_F = 10$ mA, $I_C = 0.1$ mA, $D = 12$ mm	$V_{CEsat}^{(2)(3)}$			0.4	V

Note

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

(2) See figure 3

(3) Test surface: mirror (Mfr. Spindler a. Hoyer, Part No. 340005)

TCRT5000

Reflective Optical Sensor with Transistor Output

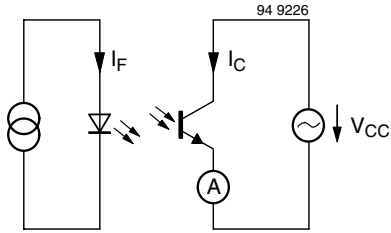


Fig. 2 - Test Circuit

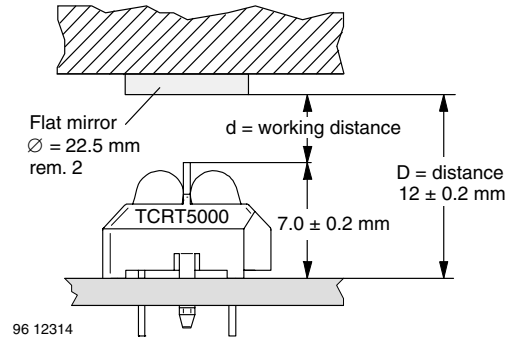
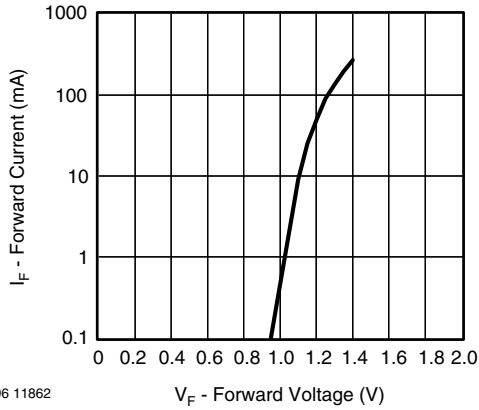


Fig. 3 - Test Circuit

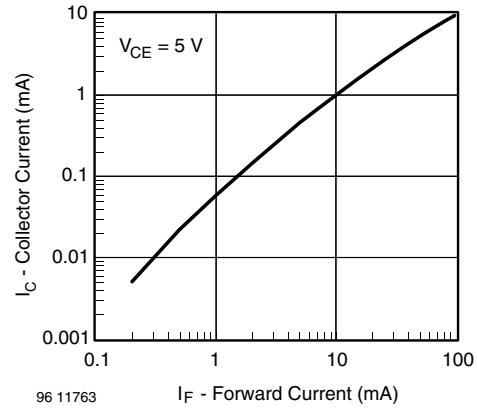
BASIC CHARACTERISTICS

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



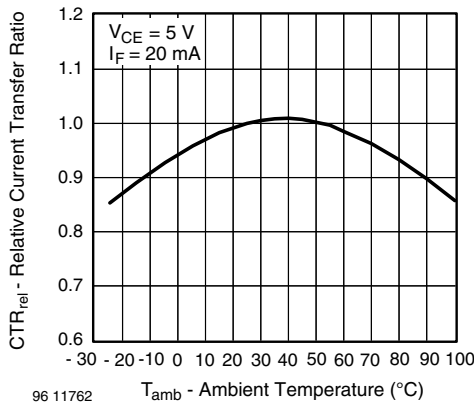
96 11862

Fig. 4 - Forward Current vs. Forward Voltage



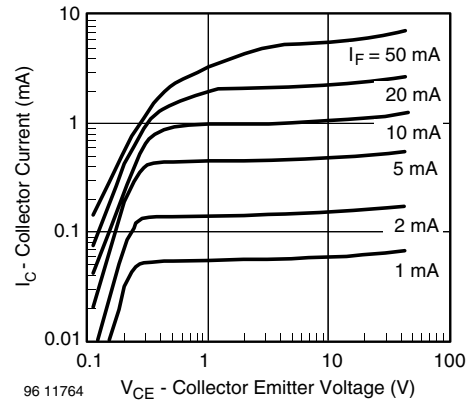
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Fig. 6 - Collector Current vs. Forward Current



96 11762

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



96 11764

Fig. 7 - Collector Emitter Saturation Voltage vs. Collector Current



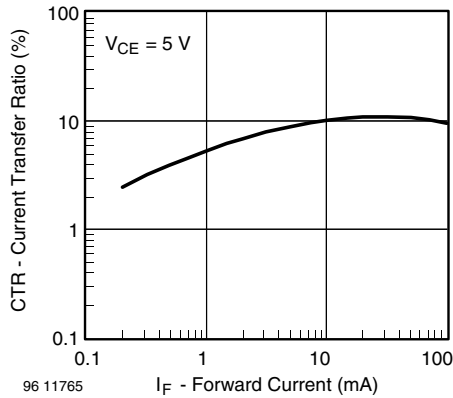


Fig. 8 - Current Transfer Ratio vs. Forward Current

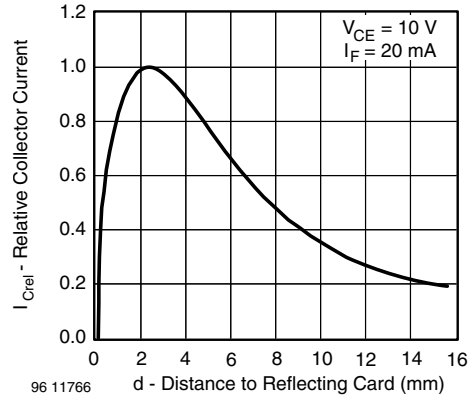
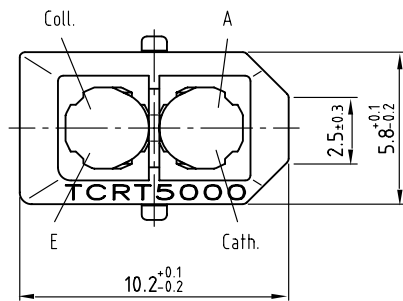
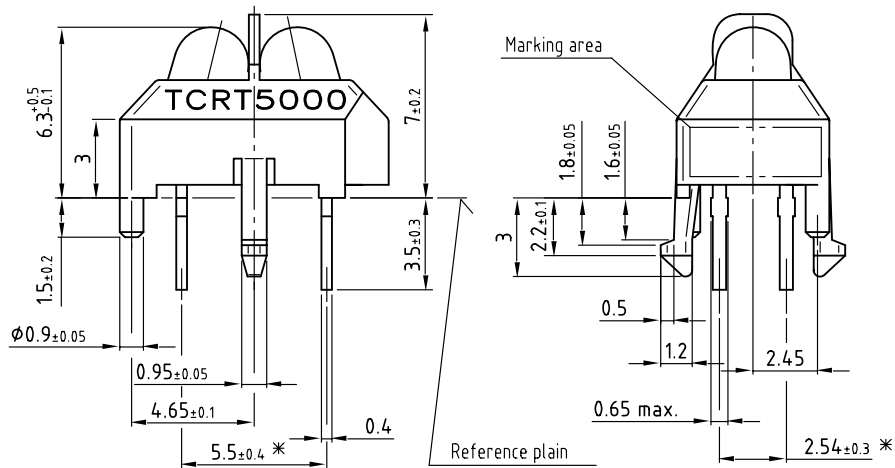


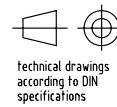
Fig. 9 - Relative Collector Current vs. Distance

PACKAGE DIMENSIONS in millimeters, TCRT5000

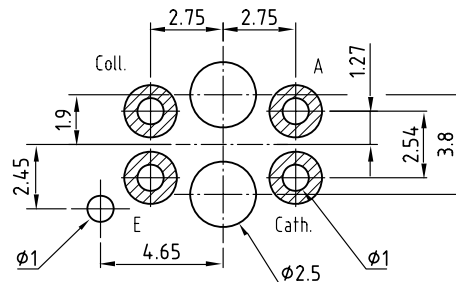


* Tolerances related to reference plain

weight: ca. 0.23g



Footprint Top View



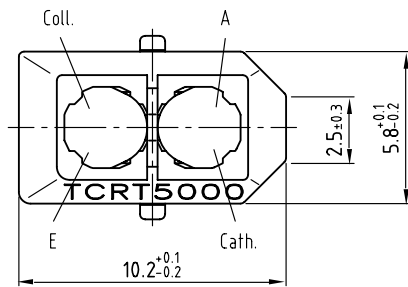
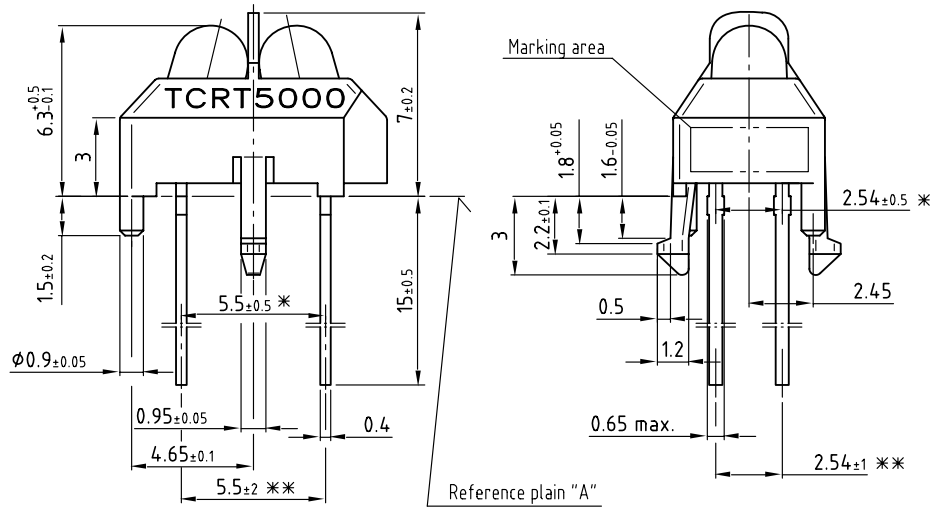
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Issue: 4; 11.04.02

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TCRT5000

Reflective Optical Sensor with



weight: ca. 0.23g

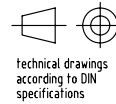
Drawing-No.: 6.550-5146.01-4

Issue: 4; 11.04.02

95 11267

* Tolerances related to reference plain "A"

** Tolerances related on lead end



technical drawings according to DIN specifications

Footprint Top View

