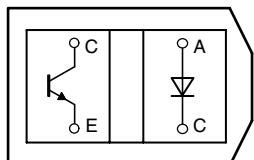


Reflective Optical Sensor with Transistor Output



19156_2



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: $I_C = 1 \text{ mA}$
- 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
TCRT5000L	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
TCRT5000L	Tube	MOQ: 2400 pcs, 48 pcs/tube	15 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	$t_p \leq 10 \mu\text{s}$	I _{FSM}	3	A
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	P _V	100	mW
Junction temperature		T _j	100	°C

TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with
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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	$T_{amb} \leq 55^\circ C$	P_V	100	mW
Junction temperature		T_j	100	°C
SENSOR				
Total power dissipation	$T_{amb} \leq 25^\circ C$	P_{tot}	200	mW
Ambient temperature range		T_{amb}	- 25 to + 85	°C
Storage temperature range		T_{stg}	- 25 to + 100	°C
Soldering temperature	2 mm from case, $t \leq 10$ s	T_{sd}	260	°C

Note

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

ABSOLUTE MAXIMUM RATINGS

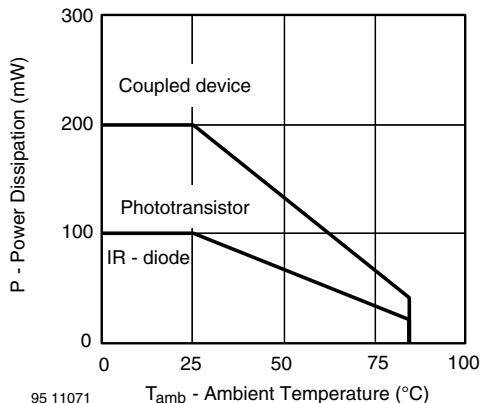


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS⁽¹⁾

PARAMETER	TEST CONDITION	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) $T_{amb} = 25^\circ C$, unless otherwise specified

(2) See figure 3

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

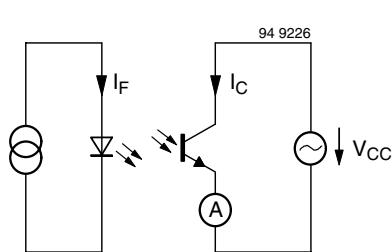


Fig. 2 - Test Circuit

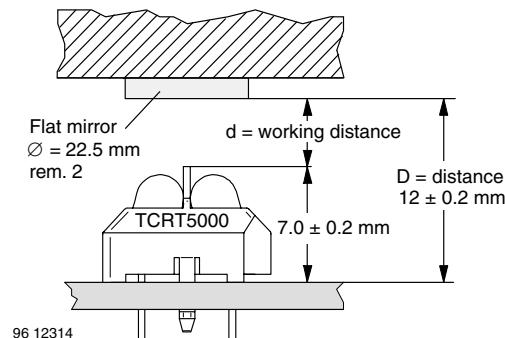
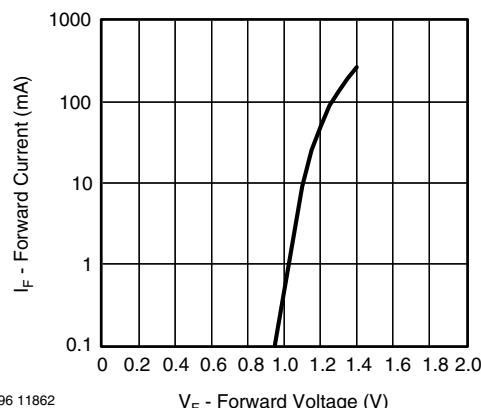


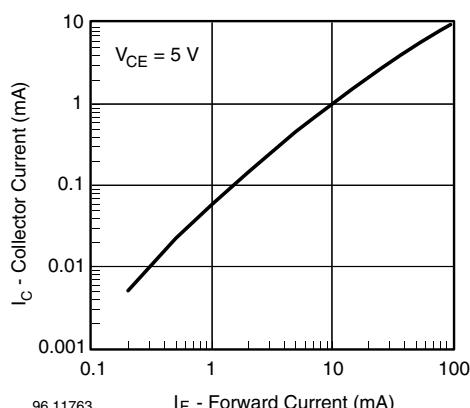
Fig. 3 - Test Circuit

BASIC CHARACTERISTICS

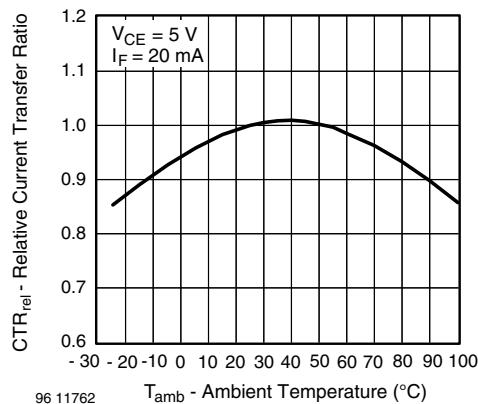
$T_{amb} = 25^\circ C$, unless otherwise specified



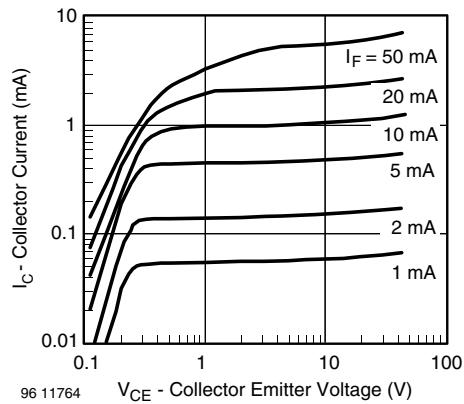
96 11862 Fig. 4 - Forward Current vs. Forward Voltage



96 11763 Fig. 6 - Collector Current vs. Forward Current



96 11762 Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

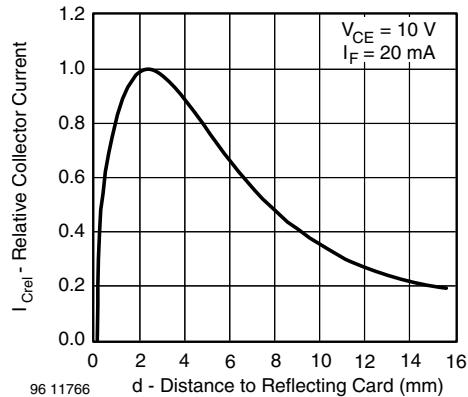
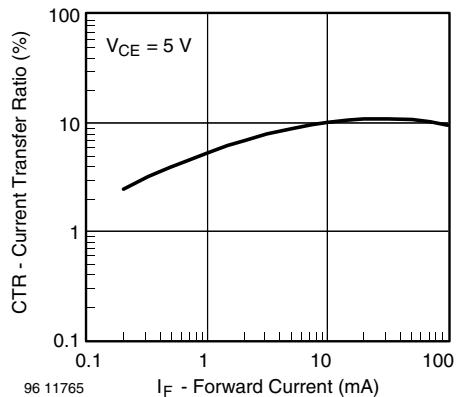


96 11764 Fig. 7 - Collector Emitter Saturation Voltage vs. Collector Current

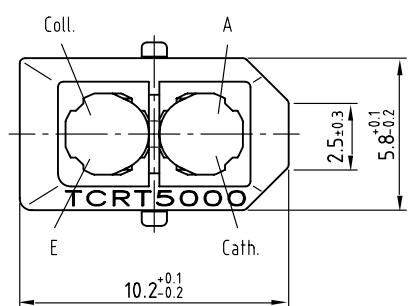
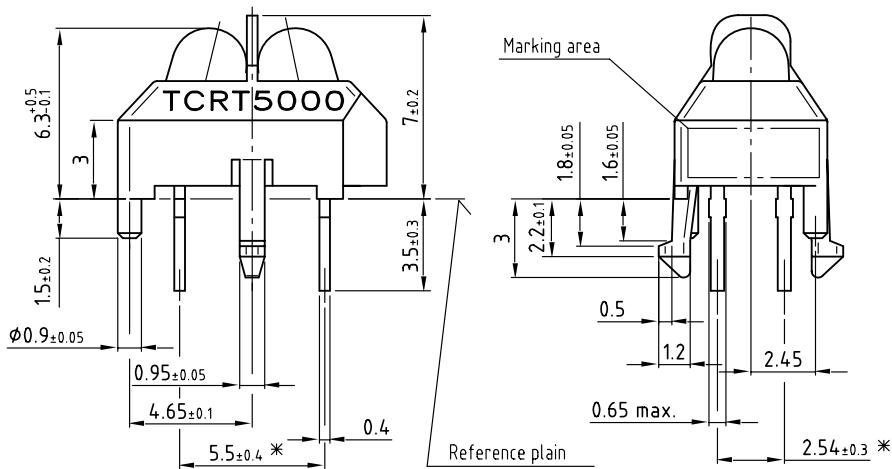
TCRT5000, TCRT5000L

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Reflective Optical Sensor with
Transistor Output



PACKAGE DIMENSIONS in millimeters, **TCRT5000**



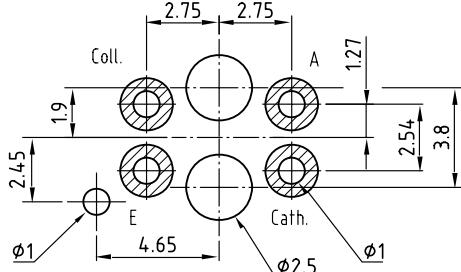
* Tolerances related to reference plain

weight: ca. 0.23g



technical drawings
according to DIN
specifications

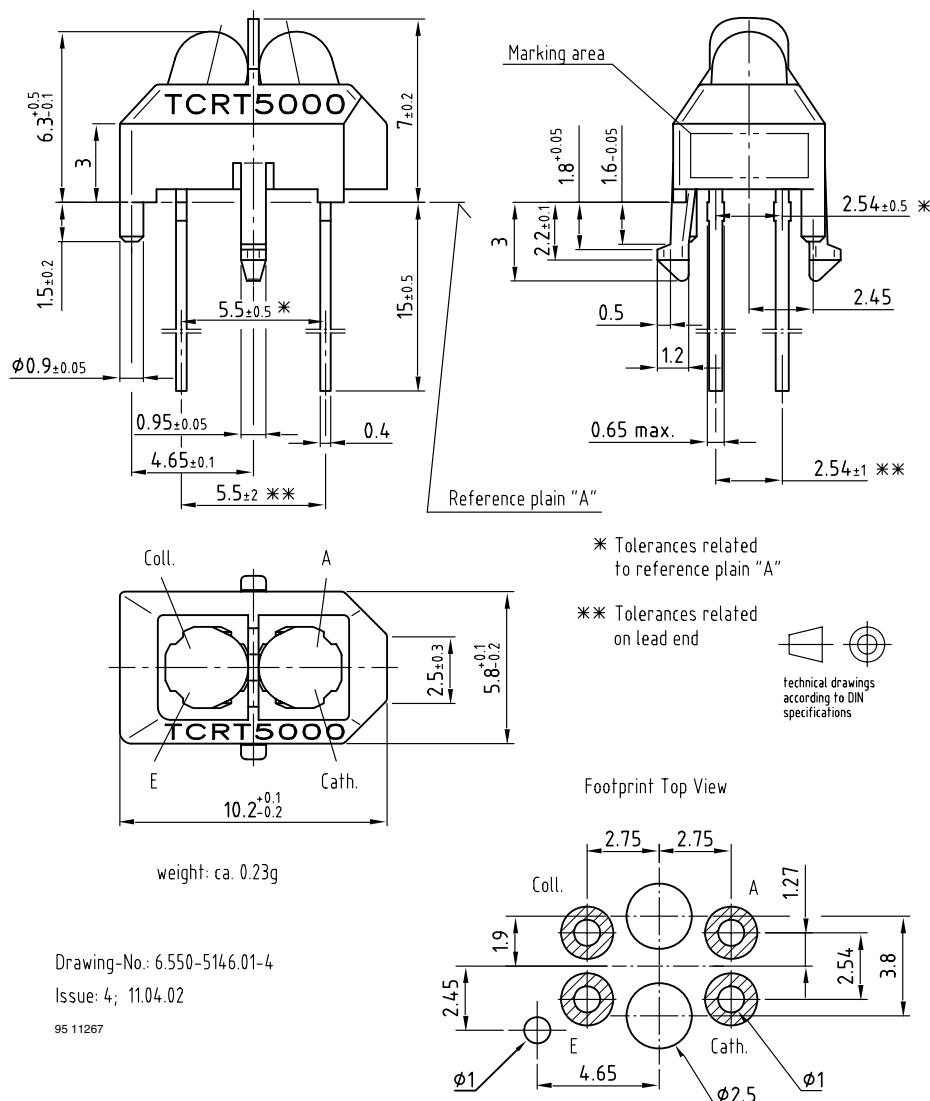
Footprint Top View



Drawing-No.: 6.550-5096.01-4

Issue: 4; 11.04.02

96 12073

PACKAGE DIMENSIONS in millimeters, **TCRT5000L**


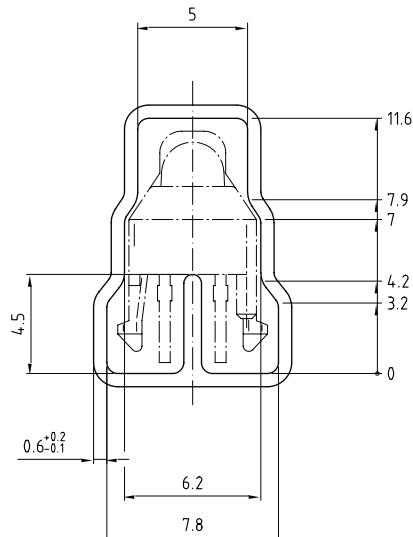
TCRT5000, TCRT5000L

Vishay Semiconductors

Reflective Optical Sensor with
Transistor Output



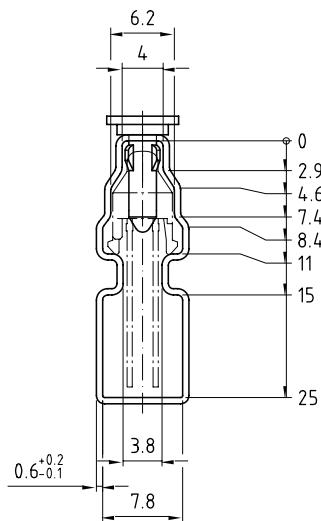
TUBE DIMENSIONS in millimeters, **TCRT5000**



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

Drawing-No.: 9.700-5139.01-4
Issue: 1; 10.05.00
20298

TUBE DIMENSIONS in millimeters, **TCRT5000L**



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

Drawing-No.: 9.700-5178.01-4
Issue: 1; 25.02.00
20299



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