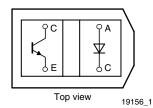


Vishay Semiconductors

Reflective Optical Sensor with Transistor Output





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.

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



- · 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 charactristics/sensors

ORDERING INFORMATION				
ORDERING CODE	PACKAGING	VOLUME (1) REMAR		
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 ≤ 10 μs	I _{FSM}	3	Α		
Power dissipation	T _{amb} ≤ 25 °C	P _V	100	mW		
Junction temperature		Tj	100	°C		

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TCRT5000, TCRT5000L

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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		Ic	100	mA	
Power dissipation	T _{amb} ≤ 55 °C	P _V	100	mW	
Junction temperature		Tj	100	°C	
SENSOR					
Total power dissipation	T _{amb} ≤ 25 °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 ≤ 10 s	T _{sd}	260	°C	

Note

ABSOLUTE MAXIMUM RATINGS

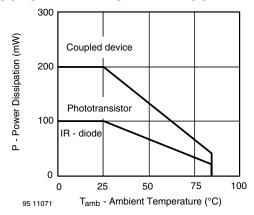


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (1)							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
INPUT (EMITTER)	INPUT (EMITTER)						
Forward voltage	I _F = 60 mA	V _F		1.25	1.5	٧	
Junction capacitance	V _R = 0 V, f = 1 MHz	C _j		17		pF	
Radiant intensity	$I_F = 60 \text{ mA}, t_p = 20 \text{ ms}$	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	$V_{CE} = 20 \text{ V}, I_F = 0 \text{ A}, E = 0 \text{ lx}$	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) $T_{amb} = 25$ °C, unless otherwise specified
- (2) See figure 3
- (3) Test surface: mirror (Mfr. Spindler a. Hoyer, Part No. 340005)

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



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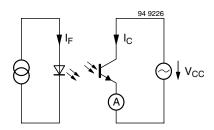


Fig. 2 - Test Circuit

Flat mirror d = working distance Ø = 22.5 mm rem. 2 D = distance 12 ± 0.2 mm 7.0 ± 0.2 mm

Fig. 3 - Test Circuit

BASIC CHARACTERISTICS

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

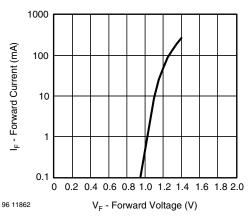


Fig. 4 - Forward Current vs. Forward Voltage

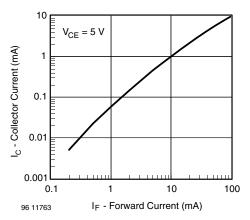


Fig. 6 - Collector Current vs. Forward Current

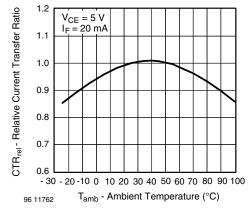


Fig. 5 - Relative Current Transfer Ratio vs. Ambient Temperature

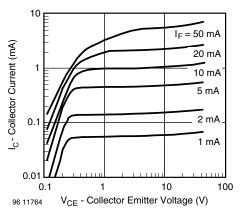


Fig. 7 - Collector Emitter Saturation Voltage vs. Collector Current

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Reflective Optical Sensor with Transistor Output



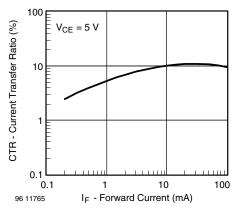


Fig. 8 - Current Transfer Ratio vs. Forward Current

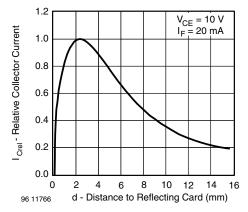
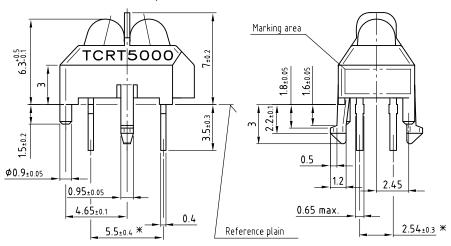
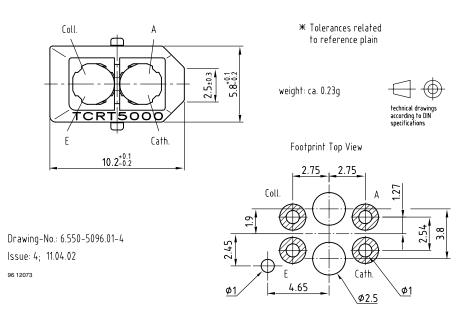


Fig. 9 - Relative Collector Current vs. Distance

PACKAGE DIMENSIONS in millimeters, **TCRT5000**



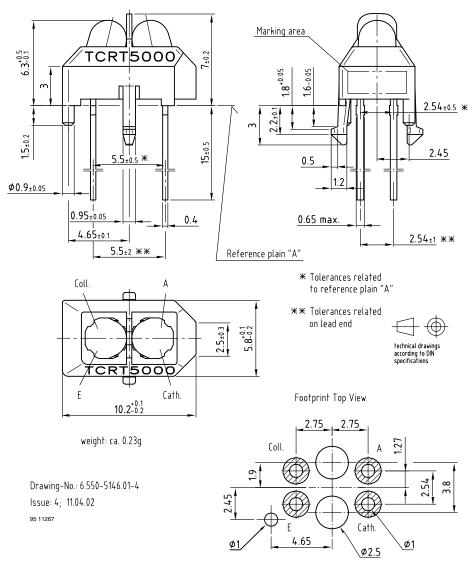




Reflective Optical Sensor with Transistor Output

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PACKAGE DIMENSIONS in millimeters, **TCRT5000L**

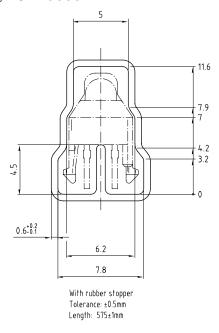


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Reflective Optical Sensor with Transistor Output

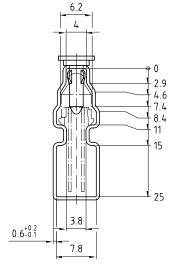


TUBE DIMENSIONS in millimeters, **TCRT5000**



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

TUBE DIMENSIONS in millimeters, **TCRT5000L**



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

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



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