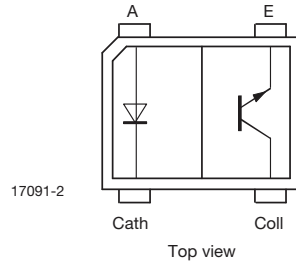


Reflective Optical Sensor with Transistor Output



FEATURES

- Package type: SMD
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 3.4 x 2.7 x 1.5
- Operating range within > 20 % relative collector current: 0.2 mm to 5 mm
- Emitter wavelength: 940 nm
- Moisture sensitivity level (MSL): 3
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

The TCNT2000 is a reflective sensor in a miniature SMD package. It has a compact construction where the emitting light source and the detector are arranged in the same plane. The operating infrared wavelength is 940 nm. The detector consists of a silicon phototransistor. The sensor analog output signal (photo current) is triggered by detection of reflected infrared light from a close by object.

The sensor has a built in daylight blocking filter, which greatly suppresses disturbing ambient light and therefore increases signal to noise ratio.

APPLICATIONS

- Position sensor
- Optical switch
- Optical encoder (e.g. disc and tape drives for DVD and/or camera applications)
- Object detection (e.g. paper presence in printer and copy machines)

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
TCNT2000	1	0.2 to 5	0.8	Yes

Notes

- (1) CTR: current transference ratio, I_{out}/I_{in}
 (2) Conditions like in table basic characteristics/sensors

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
TCNT2000	Tape and reel	MOQ: 1000 pcs	Drypack, MSL 3

Note

- (1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V _R	5	V
Forward current		I _F	100	mA
Forward surge current	t _p ≤ 100 μs	I _{FSM}	500	mA
OUTPUT (DETECTOR)				
Collector emitter voltage		V _{CEO}	20	V
Emitter collector voltage		V _{ECO}	7	V
Collector current		I _C	20	mA
SENSOR				
Total power dissipation	T _{amb} ≤ 25 °C	P _{tot}	170	mW
Ambient temperature range		T _{amb}	- 40 to + 85	°C
Storage temperature range		T _{stg}	- 40 to + 100	°C
Soldering temperature	In accordance with fig. 11	T _{sd}	260	°C

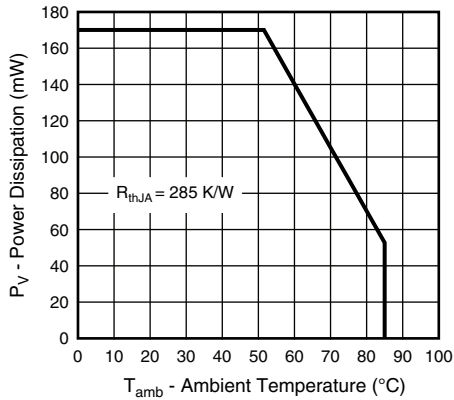
ABSOLUTE MAXIMUM RATINGS


Fig. 1 - Power Dissipation vs. Ambient Temperature

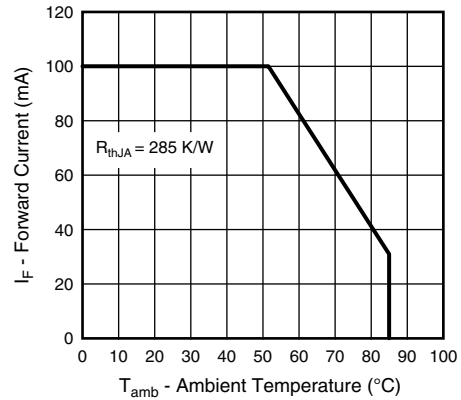


Fig. 2 - Forward Current vs. Ambient Temperature

BASIC CHARACTERISTICS ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	$I_F = 20 \text{ mA}$	V_F		1.25	1.45	V
	$I_F = 100 \text{ mA}$			1.4	1.7	
Temperature coefficient of V_F	$I_F = 20 \text{ mA}$	TKV_F		1.0		mV/K
Peak wavelength	$I_F = 100 \text{ mA}$	λ_P		940		nm
Reverse current	$V_R = 5 \text{ V}$	I_R			10	μA
OUTPUT (DETECTOR)						
Collector emitter voltage	$I_C = 0.1 \text{ mA}$	V_{CEO}	20			V
Emitter collector voltage	$I_e = 100 \mu\text{A}$	V_{ECO}	7			V
Collector dark current	$V_{CE} = 20 \text{ V}, E = 0 \text{ lx}$	I_{CEO}		1	30	nA
SENSOR						
Collector current	$V_{CE} = 5 \text{ V}, I_F = 20 \text{ mA}, D = 1 \text{ mm}$	I_C	0.4	0.8	1.6	mA
Current transfer ratio	$I_C/I_F, D = 1 \text{ mm}, V_{CE} = 5 \text{ V}$	CTR		4		%
Rise time	$I_C = 0.8 \text{ mA}, V_{CE} = 5 \text{ V}, R_L = 100 \Omega$	t_r		10	70	μs
Fall time	$I_C = 0.8 \text{ mA}, V_{CE} = 5 \text{ V}, R_L = 100 \Omega$	t_f		15	70	μs

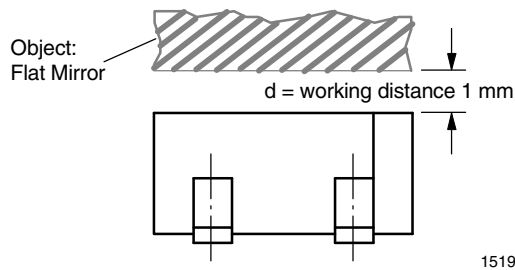


Fig. 3 - Test Circuit

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

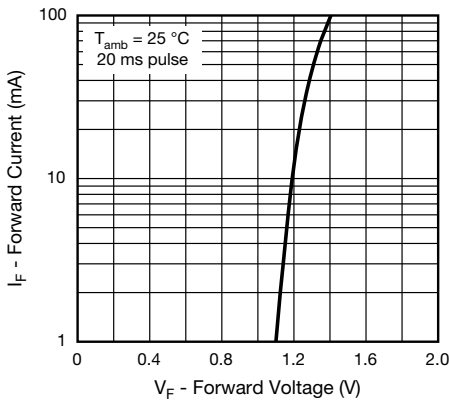


Fig. 4 - Forward Current vs. Forward Voltage

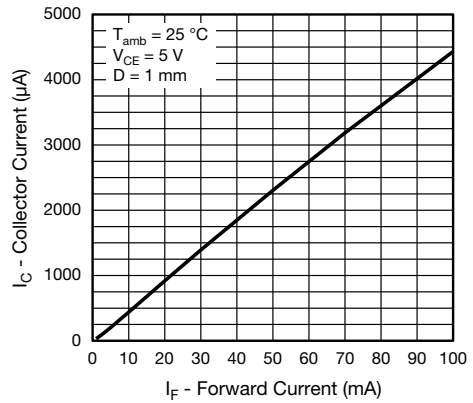


Fig. 7 - Collector Current vs. Forward Current

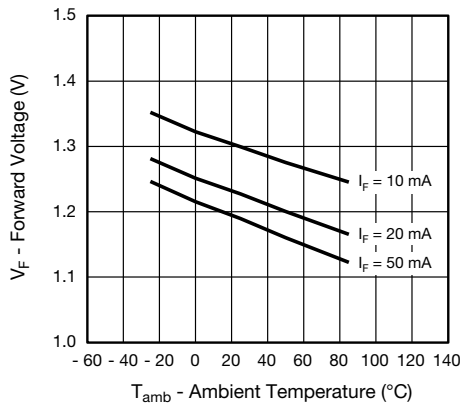


Fig. 5 - Forward Voltage vs. Ambient Temperature

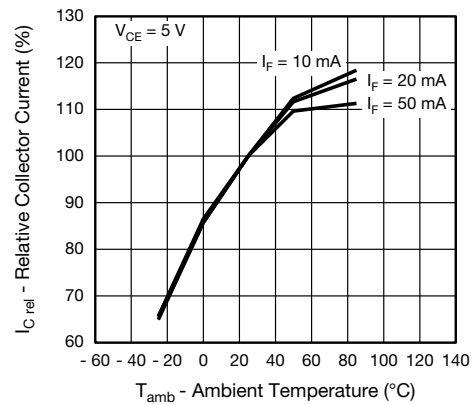


Fig. 8 - Relative Collector Current vs. Ambient Temperature

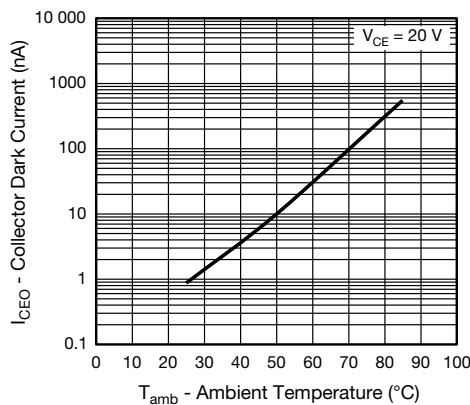


Fig. 6 - Collector Dark Current vs. Ambient Temperature

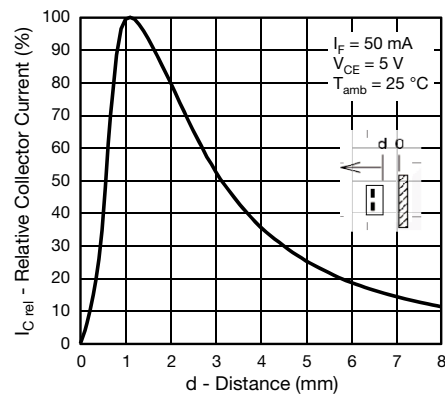


Fig. 9 - Relative Collector Current vs. Distance

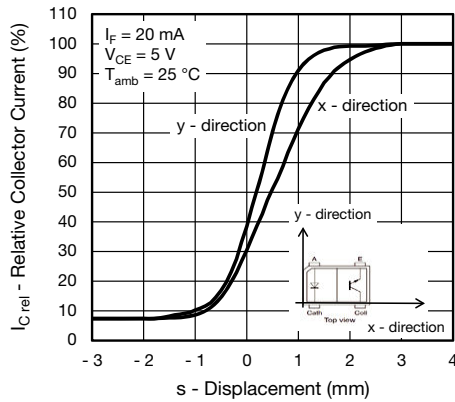


Fig. 10 - Relative Collector Current vs. Displacement

REFLOW SOLDER PROFILE

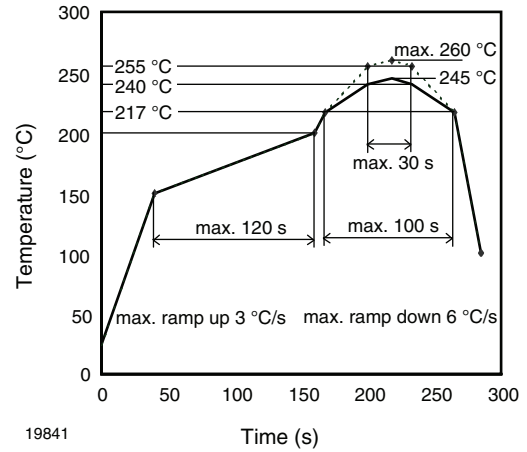


Fig. 11 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

PRECAUTIONS FOR USE

1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (Burn out will happen).

2. Storage

- 2.1. Storage temperature and rel. humidity conditions are: 5 °C to 30 °C, RH 60
- 2.2. Floor life must not exceed 168 h, acc. to JEDEC level 3, J-STD-020.

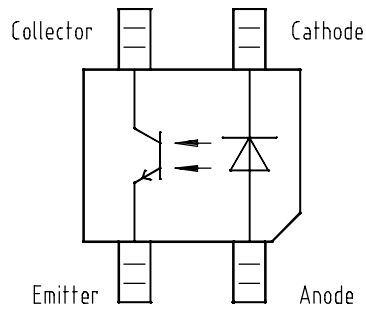
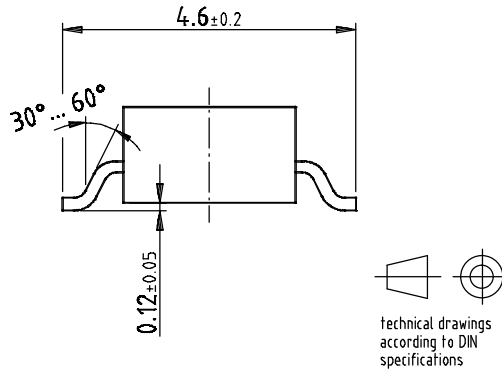
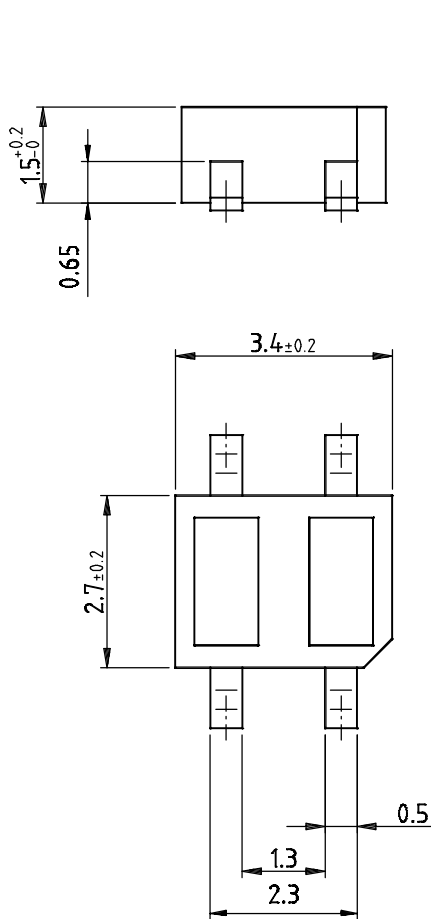
Once the package is opened, the products should be used within 168 h. Otherwise, they should be kept in a damp proof box with desiccant.

Considering tape life, we suggest to use products within one year from production date.

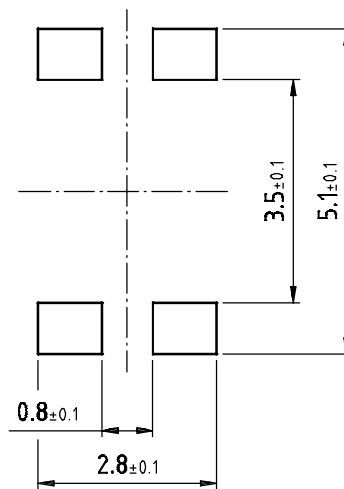
- 2.3 If opened more than 168 h in an atmosphere 5 °C to 30 °C, RH 60 %, devices should be treated at 60 °C ± 5 °C for 15 h.
- 2.4 If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3.



PACKAGE DIMENSIONS in millimeters



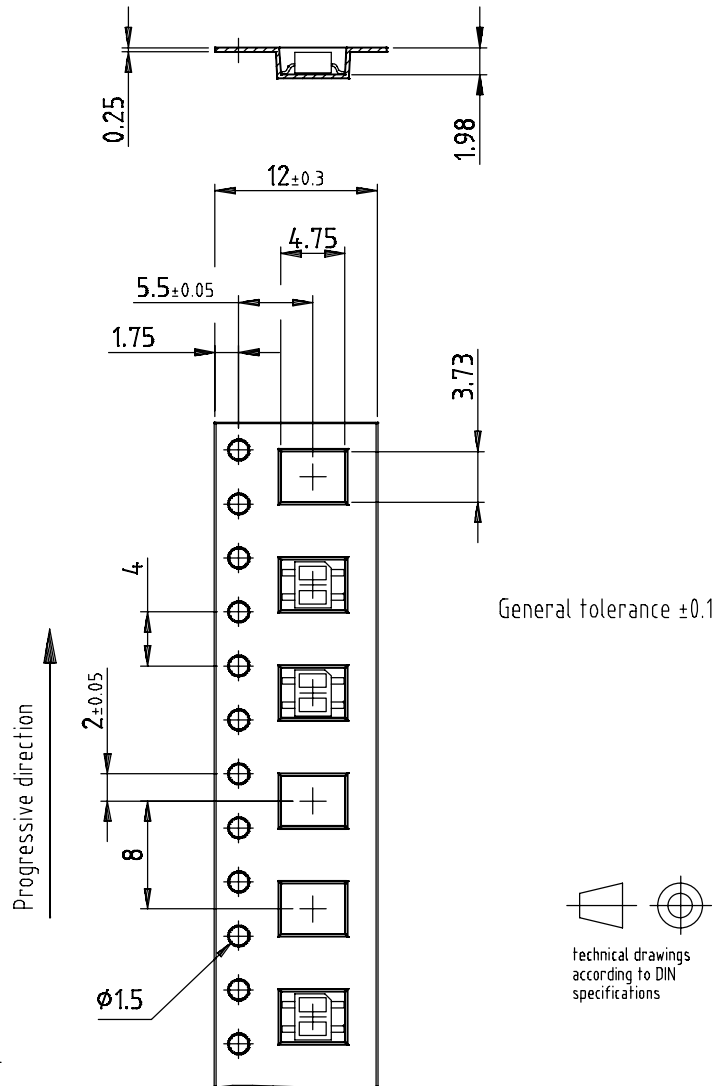
Proposal: Solder pad design



Drawing-No.: 6.541-5045.01-4
 Issue: 3; 07.02.01
 15191



DIMENSIONS IN SHAPE in millimeters



Drawing-No.: 9.700-5249.01-4

Issue: 1; 11.05.00

15211