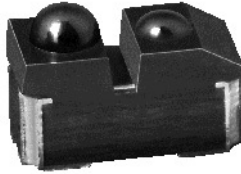


Reflective Sensor for Touchless Switch



84606 3D

DESCRIPTION

TCND3000 is a reflective optical sensor for applications using the HALIOS® (High Ambient Light Independent Optical System) principle. It consists of an infrared emitter and a photodetector forming the optical sensing path. According to the HALIOS principle a second infrared emitter is used for compensation of disturbing ambient light. Optoelectronic parameters of the sensor are matched to the corresponding integrated circuit E909.01, manufactured by ELMOS Semiconductor AG (www.elmos.de).

FEATURES

- Package type: surface mount
- Detector type: pin photodiode
- Dimensions (L x W x H in mm): 4.83 x 2.54 x 2.21
- Peak operating distance: 20 mm
- Peak operating range: 10 mm to 20 mm
- Typical output current under test: $I_C > 5.6 \mu A$
- Lead (Pb)-free soldering released
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Emitter wavelength: 885 nm
- Daylight blocking filter
- Touch distance: 10 mm ⁽¹⁾
- Proximity distance: 20 mm ⁽¹⁾
- High ambient light suppression for sunlight: $\leq 200 \text{ klx}$
- High ambient light suppression for CIE standard illuminant A: $\leq 100 \text{ klx}$


RoHS
COMPLIANT

Note

⁽¹⁾ Using E909.01 interface ASIC and Kodak grey card with 20 % diffuse reflection

APPLICATIONS

- Optical switches for general purpose

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
TCND3000	0	Not applicable	IC interface	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
TCND3000	Tape and reel	MOQ: 800 pcs, 800 pcs/reel	Drypack

Note

⁽¹⁾ MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
SENSOR				
Power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	P_V	180	mW
Storage temperature range		T_{stg}	- 40 to + 100	$^{\circ}\text{C}$
Ambient temperature range		T_{amb}	- 40 to + 85	$^{\circ}\text{C}$
Thermal resistance junction/ambient		R_{thJA}	450	K/W
Soldering temperature	Acc. fig. 7	T_{sd}	260	$^{\circ}\text{C}$
IR EMITTER LEDS (TRANSMITTER)				
Reverse voltage		V_{RS}	5	V
Forward current		I_{FS}	50	mA
Peak forward current	$t_{ps} = 4\text{ }\mu\text{s}, t_S = 8\text{ }\mu\text{s}$	I_{FS}	100	mA
Junction temperature		T_{JS}	105	$^{\circ}\text{C}$
IR EMITTER LEDC (COMPENSATION)				
Reverse voltage		V_{RC}	5	V
Forward current		I_{FC}	50	mA
Peak forward current	$t_{pc} = 4\text{ }\mu\text{s}, t_S = 8\text{ }\mu\text{s}$	I_{FC}	100	mA
Junction temperature		T_{JC}	105	$^{\circ}\text{C}$
DETECTOR				
Reverse voltage		V_{RD}	5	V
Junction temperature		T_{JD}	105	$^{\circ}\text{C}$

Note

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

ABSOLUTE MAXIMUM RATINGS

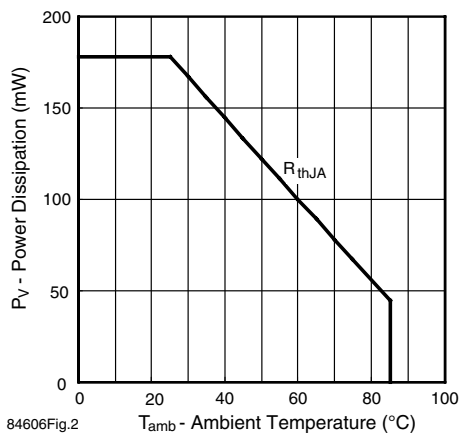


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
SENSOR						
Light Current	Kodak grey card, 20 % diffuse reflection, distance: 1 cm, $I_{FS} = 10\text{ mA}$	I_{CA}		1.2		μA
Optical crosstalk sensing path	no reflective medium, $I_{FS} = 10\text{ mA}$	I_{CA}		0.9		μA
Compensation current	$I_{FC} = 2\text{ mA}$	I_{CR}		5		μA

BASIC CHARACTERISTICS (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
IR EMITTER LEDS (TRANSMITTER)						
Forward voltage	$I_{FS} = 10 \text{ mA}$, $t_p = 20 \text{ ms}$	V_{FS}		1.3		V
Reverse voltage	$I_{RS} = 10 \text{ }\mu\text{A}$	V_{RS}	5			V
Junction capacitance		C_{js}		50		pF
Radiant intensity	$I_{FS} = 10 \text{ mA}$, $t_p = 20 \text{ ms}$	I_e		2	22	mW/sr
Angle of half intensity		ϕ_S		± 20		deg
Peak wavelength	$I_{FS} = 10 \text{ mA}$	λ_{pS}	875	885		nm
Spectral bandwidth	$I_{FS} = 10 \text{ mA}$	$\Delta\lambda_S$		42		nm
Virtual source diameter	DIN EN ISO 1146/1:2005	d		1.4		mm
IR EMITTER LEDC (COMPENSATION)						
Forward voltage	$I_{FC} = 10 \text{ mA}$, $t_{pC} = 20 \text{ ms}$	V_{FC}		1.3		V
Reverse voltage	$I_{RC} = 10 \text{ }\mu\text{A}$	V_{RC}	5			V
Junction capacitance		C_{jC}		50		pF
Peak wavelength	$I_{FC} = 10 \text{ mA}$	λ_{pC}		885		nm
Spectral bandwidth	$I_{FC} = 10 \text{ mA}$	$\Delta\lambda_C$		42		nm
DETECTOR						
Forward voltage	$I_{FD} = 50 \text{ mA}$	V_{FD}		1	1.3	V
Breakdown voltage	$I_{RD} = 100 \text{ }\mu\text{A}$, $E = 0 \text{ lx}$	V_{BR}	5			V
Reverse dark current	$V_{RD} = 10 \text{ V}$, $E = 0 \text{ lx}$	I_{r0}		1	10	nA
Reverse light current	$E_e = 1 \text{ mW/cm}^2$, $\lambda = 870 \text{ nm}$, $V_{RD} = 5 \text{ V}$	I_{ra}		5.6		μA
Temperature coefficient of I_{ra}	$\lambda = 870 \text{ nm}$, $V_{RD} = 5 \text{ V}$	TK_{Ira}		0.2		%/K
Angle of half intensity		ϕ_D		± 20		deg
Wavelength of peak sensitivity		λ_P		910		nm
Range of spectral bandwidth		$\lambda_{0.5}$		790 to 1020		nm

Note

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

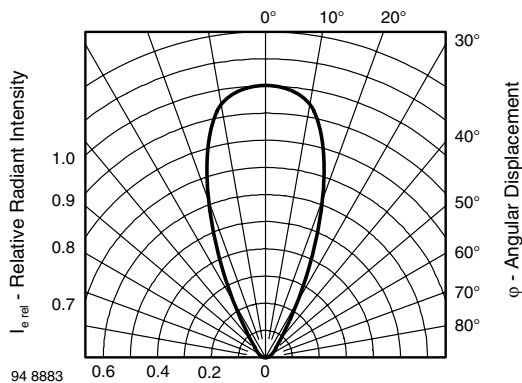
BASIC CHARACTERISTICS
 $T_{amb} = 25 \text{ }^\circ\text{C}$, unless otherwise specified


Fig. 2 - Relative Radiant Intensity vs. Angular Displacement

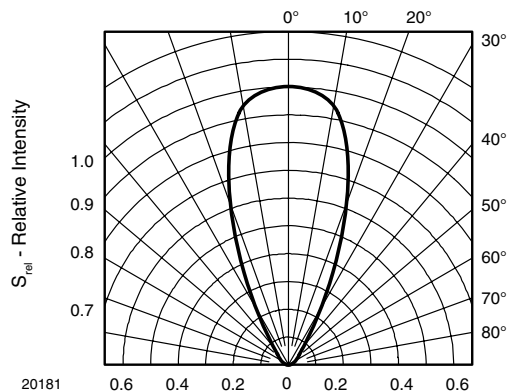
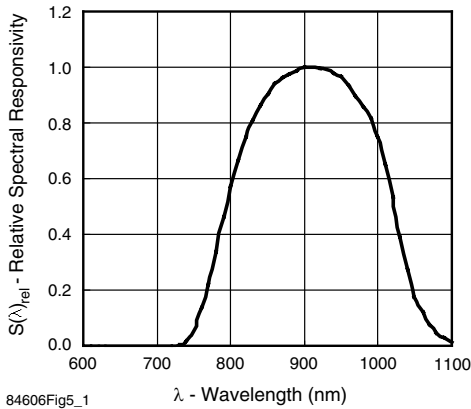
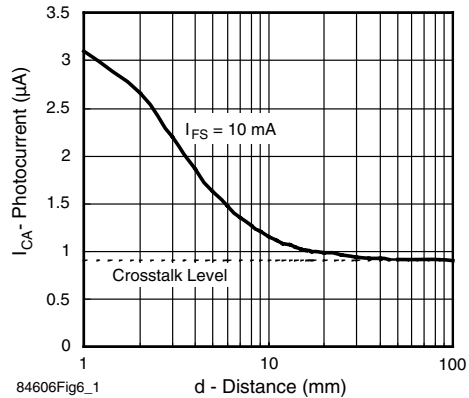


Fig. 3 - Relative Radiant Sensitivity vs. Angular Displacement

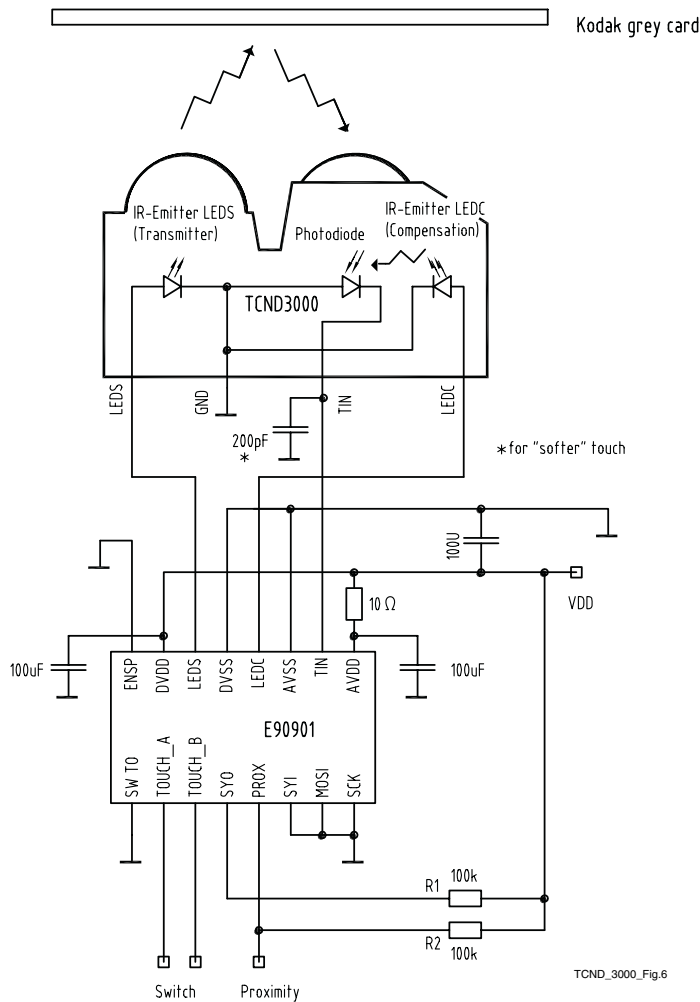


84606Fig5_1
Fig. 4 - Relative Spectral Sensitivity vs. Wavelength



84606Fig6_1
Fig. 5 - Photocurrent vs. Distance

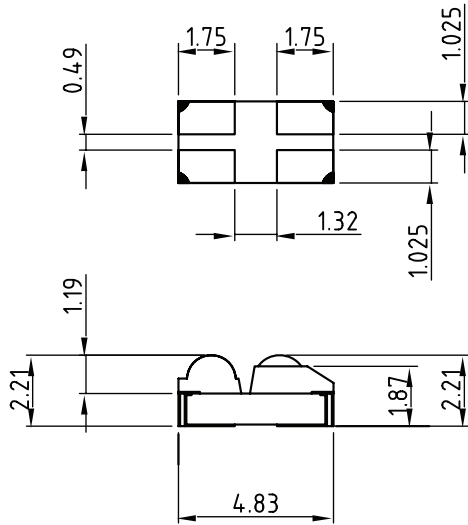
APPLICATION CIRCUIT



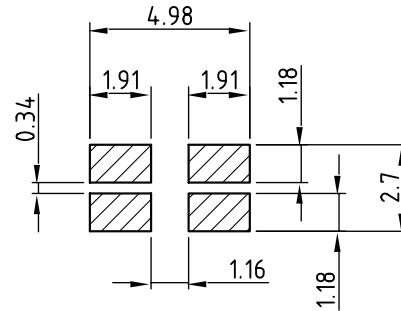
TCND_3000_Fig.6
Fig. 6 - Test Circuit

PACKAGE DIMENSIONS in millimeters

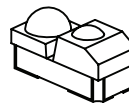
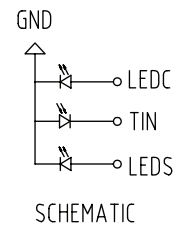
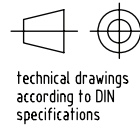
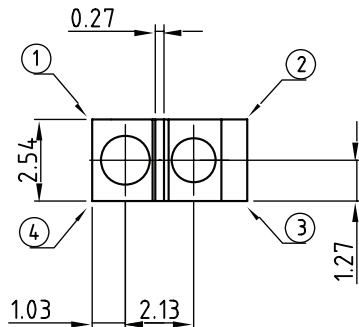
Backside Contact Metalization



Recommended PCB Footprint



PIN	ID	FUNCTION	DESCRIPTION
1	①	LEDS	Transmit LED
2	②	TIN	Receiver Output
3	③	LEDC	Compensation LED
4	④	GND	Ground


 Not indicated tolerances ± 0.2

Drawing-No.: 6.550-5265.01-4

Issue: 2; 25.10.04

84606 Dimensions

REFLOW SOLDER PROFILES

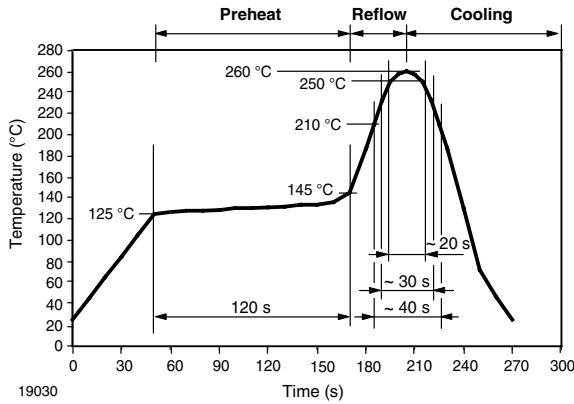


Fig. 7 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

FLOOR LIFE

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:
 Floor life: 4 weeks
 Conditions: $T_{amb} < 30\text{ }^{\circ}\text{C}$, $RH < 60\%$
 Moisture sensitivity level 2a, acc. to J-STD-020.

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at 40 °C (+ 5 °C), RH < 5 %.

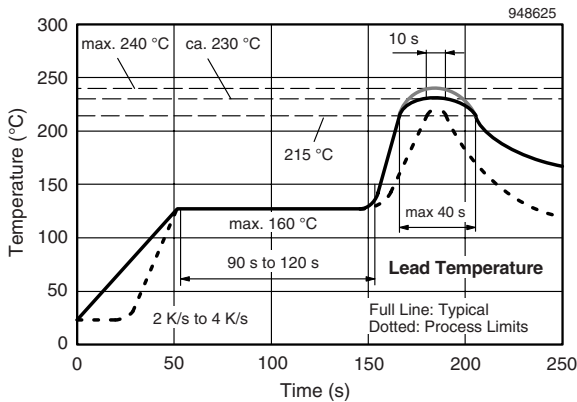


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.