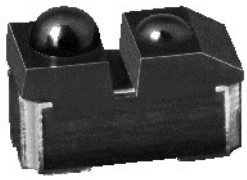
THE DATASHEET OF

TCND3000

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 µA
- 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: ≤ 200 klx
- High ambient light suppression for CIE standard illuminant A: ≤ 100 klx

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 charactristics/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	$T_{amb} \leq 25$ °C	P_V	180	mW
Storage temperature range		T_{stg}	- 40 to + 100	°C
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Thermal resistance junction/ambient		R_{thJA}	450	K/W
Soldering temperature	Acc. fig. 7	T_{sd}	260	°C
IR EMITTER LEDS (TRANSMITTER)				
Reverse voltage		V_{RS}	5	V
Forward current		I_{FS}	50	mA
Peak forward current	t_{ps} = 4 µs, t_S = 8 µs	I_{FS}	100	mA
Junction temperature		T_{jS}	105	°C
IR EMITTER LEDC (COMPENSATION)				
Reverse voltage		V_{RC}	5	V
Forward current		I_{FC}	50	mA
Peak forward current	t_{pc} = 4 µs, t_S = 8 µs	I_{FC}	100	mA
Junction temperature		T_{jC}	105	°C
DETECTOR				
Reverse voltage		V_{RD}	5	V
Junction temperature		T_{jD}	105	°C

Note

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

ABSOLUTE MAXIMUM RATINGS

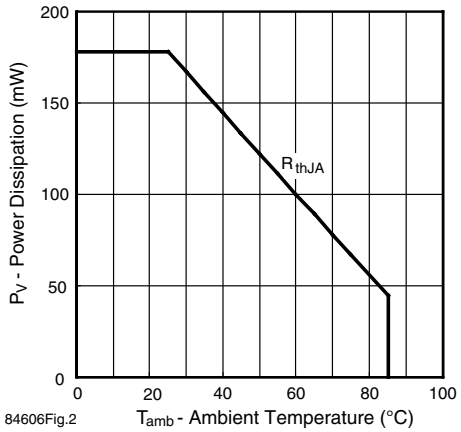


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

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 mA	I_{CA}		1.2		µA
Optical crosstalk sensing path	no reflective medium, I_{FS} = 10 mA	I_{CA}		0.9		µA
Compensation current	I_{FC} = 2 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 mA, t_p = 20 ms	V_{FS}		1.3		V
Reverse voltage	I_{RS} = 10 µA	V_{RS}	5			V
Junction capacitance		C_{js}		50		pF
Radiant intensity	I_{FS} = 10 mA, t_p = 20 ms	I_e		2	22	mW/sr
Angle of half intensity		φ_S		± 20		deg
Peak wavelength	I_{FS} = 10 mA	λ_{pS}	875	885		nm
Spectral bandwidth	I_{FS} = 10 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 mA, t_{pC} = 20 ms	V_{FC}		1.3		V
Reverse voltage	I_{RC} = 10 µA	V_{RC}	5			V
Junction capacitance		C_{jC}		50		pF
Peak wavelength	I_{FC} = 10 mA	λ_{pC}		885		nm
Spectral bandwidth	I_{FC} = 10 mA	$\Delta\lambda_C$		42		nm
DETECTOR						
Forward voltage	I_{FD} = 50 mA	V_{FD}		1	1.3	V
Breakdown voltage	I_{RD} = 100 µA, E = 0 lx	V_{BR}	5			V
Reverse dark current	V_{RD} = 10 V, E = 0 lx	I_{r0}		1	10	nA
Reverse light current	E_e = 1 mW/cm², λ = 870 nm, V_{RD} = 5 V	I_{ra}		5.6		µA
Temperature coefficient of I_{ra}	λ = 870 nm, V_{RD} = 5 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 °C, unless otherwise specified

BASIC CHARACTERISTICS

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

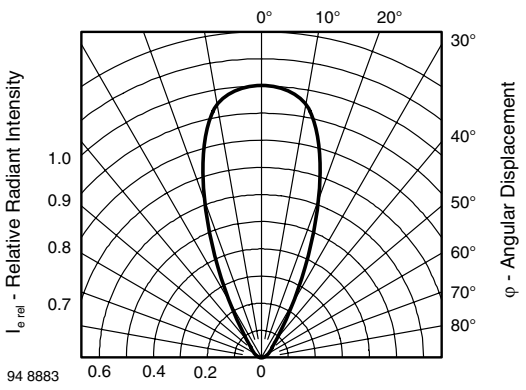


Fig. 2 - Relative Radiant Intensity vs. Angular Displacement

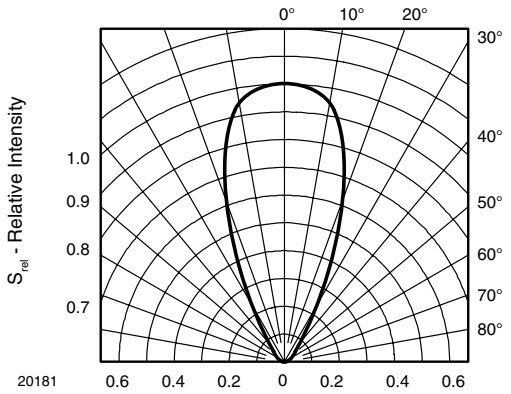


Fig. 3 - Relative Radiant Sensitivity vs. Angular Displacement

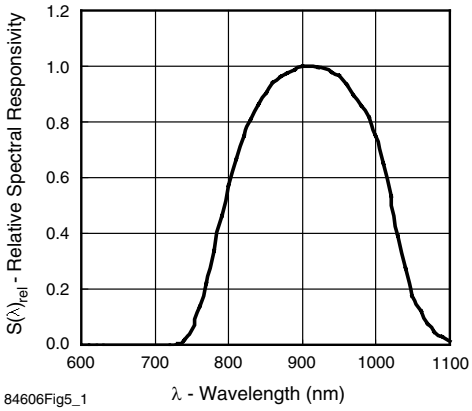


Fig. 4 - Relative Spectral Sensitivity vs. Wavelength

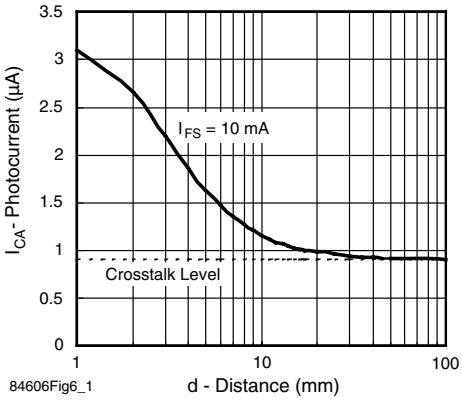


Fig. 5 - Photocurrent vs. Distance

APPLICATION CIRCUIT

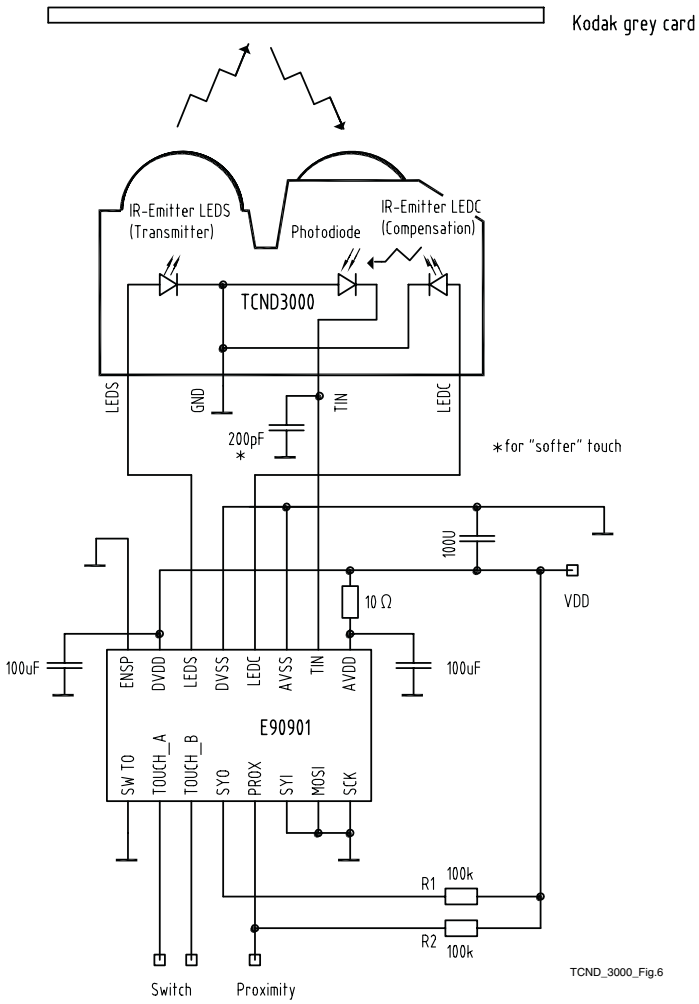
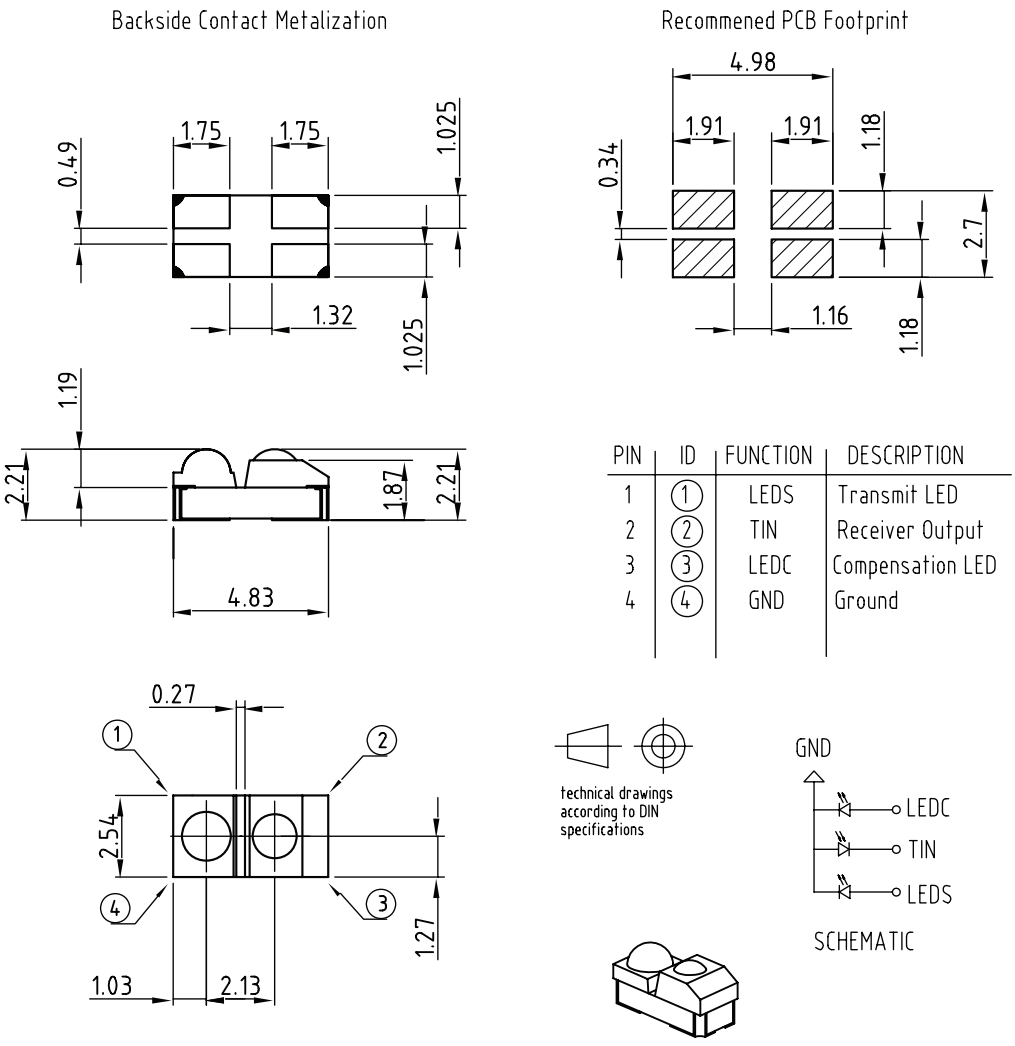


Fig. 6 - Test Circuit

PACKAGE DIMENSIONS in millimeters



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

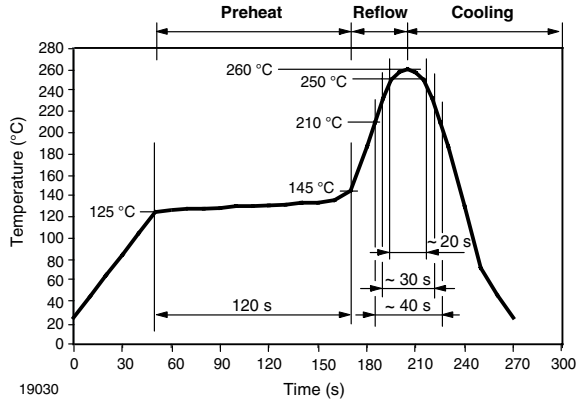


Fig. 7 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

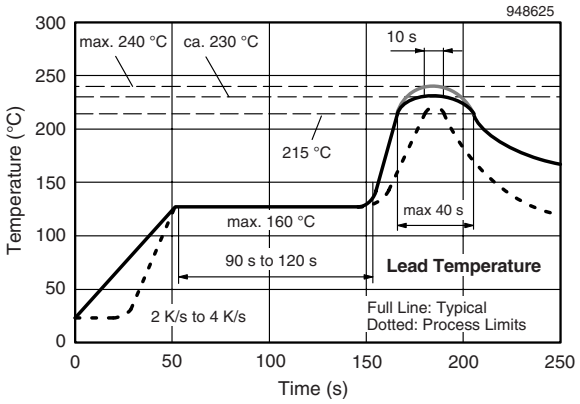


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

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 °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 %.

Disclaimer

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

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