OSRAM SFH 7776

Datasheet

Not for new design

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Chip on board

SFH 7776

Ambient Light and Proximity Sensor with Integrated 850nm IR Emitter



Applications

- 3D Sensing

Features

- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- PS and ALS Interrupt function
- I^2C interface (max. 400kHz)
- Miniature package

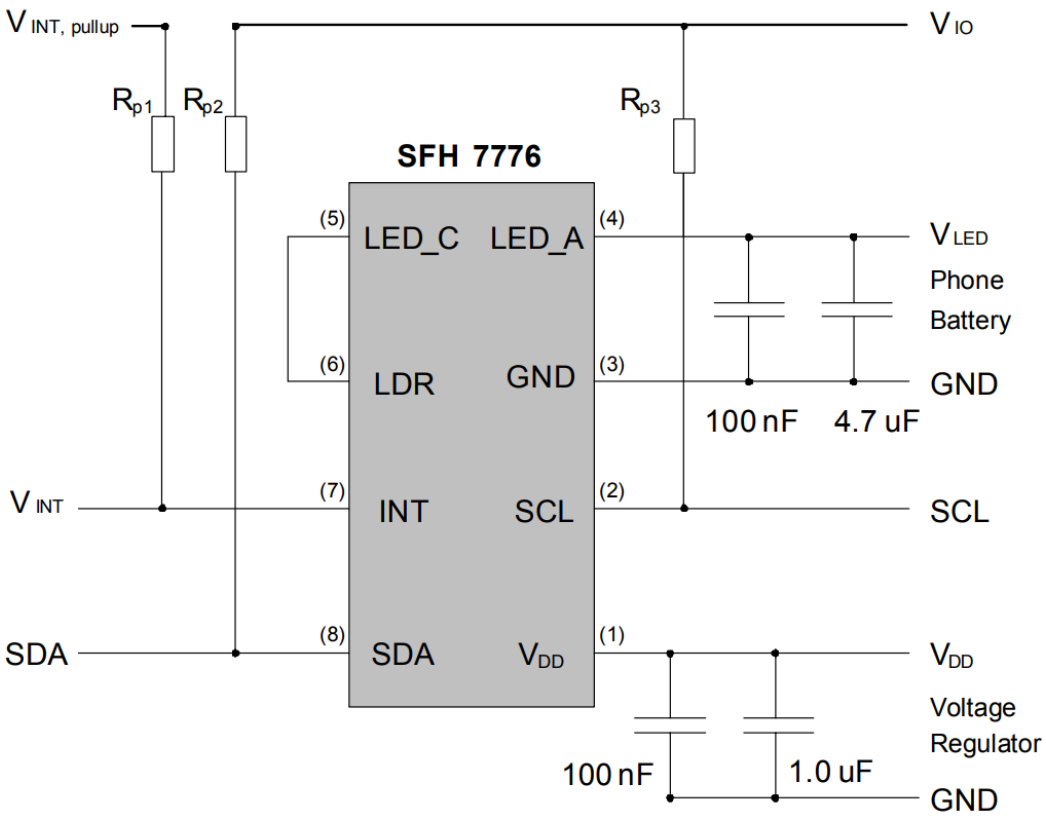
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Ordering Information

Type	Ordering Code
SFH 7776	Q65111A4188

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Application diagram



- Bypass capacitors for VDD and VLED are required for proper operation of the device.
- Proposed size for the pull-up resistors Rp1, Rp2 and Rp3 are 10kOhm

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Pin description

Pin	Name	Function
1	V_{DD}	Power supply pin
2	SCL	I^2C bus serial clock pin
3	GND	Ground pin
4	LED_A	Anode of the LED
5	LED_C	Cathode of the LED
6	LDR	LED driver pin
7	INT	Interrupt pin; open drain output; configured via I2C bus
8	SDA	I^2C bus serial data pin

Short Evaluation program

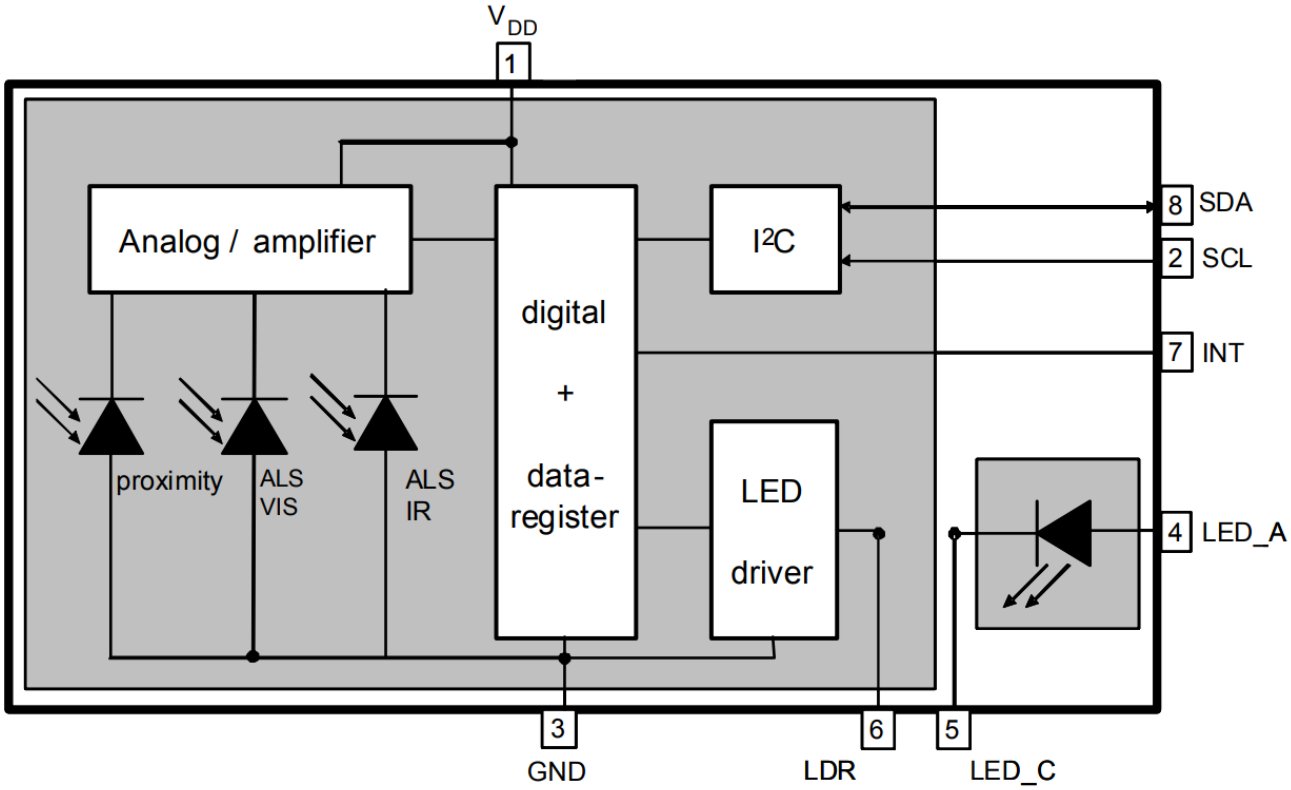
Address	Command	Action
0x42	0x3F	set LED pulse current to 200mA and ALS gain to x128
0x41	0x06	activate ALS & PS with a measurement repetition time of 100ms
Wait 100ms		
0x44	read data	read LSB of proximity measurement data
0x45	read data	read MSB of proximity measurement data
0x46	read data	read LSB of ambient light measurement of VIS diode
0x47	read data	read MSB of ambient light measurement of VIS diode
0x48	read data	read LSB of ambient light measurement of IR diode
0x49	read data	read MSB of ambient light measurement of IR diode

I^2C interface

- I/O-pins are open drain type and logic high level is set with external pull-up resistor
- SFH 7776 operates in slave mode. Slave address is 0111001 (0x39h)
- Designed for the I^2C Fast mode (400 kb/s)
- Interrupt pin (INT): open-drain output (like SDA and SCL)

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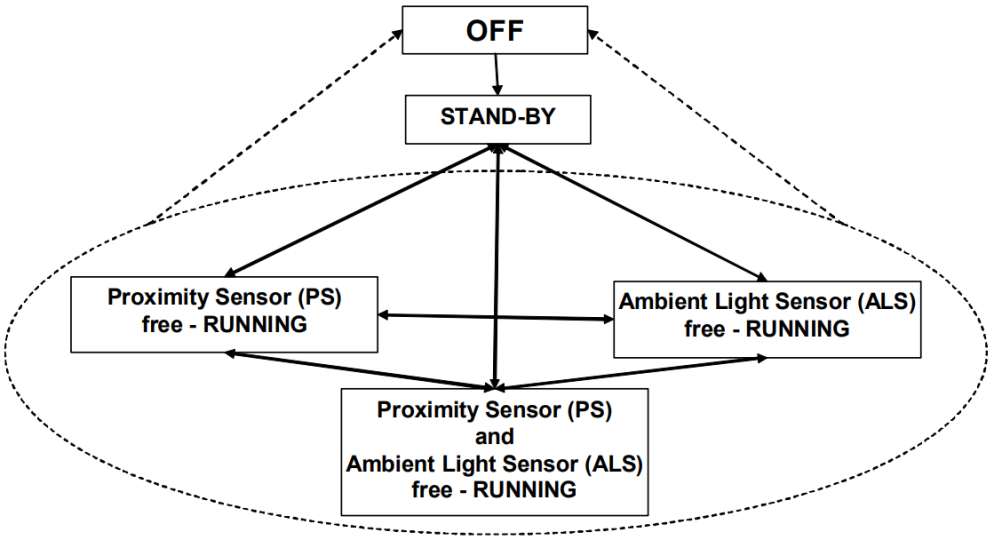
Block diagram



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Measurement modes

Mode	Description
OFF	The device is inactive. Other units may use the I2C bus without any restrictions; I/O pins and INT are in high Z state. There is no sink current through the LED
STAND-BY	This is the initial mode after power-up. IDD is typ. 0.8µA. No measurement is performed. Device can be activated by I2C bus communication. Data registers can be read and written.
ALS / PS free running	Measurements are triggered internally by the SFH 7776. Stand-by / active mode for ALS and PS measurement time, interrupt options and LED current can be adjusted via I2C register. Measurement results can be read from the data register, the status from the interrupt register



If V_{DD} exceeds the threshold voltage, the sensor will switch from OFF mode to STAND-By mode. As shown in the transition-diagram above it is possible to switch between all modes without any restriction.

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Maximum Ratings

T_A = 25 °C

Parameter	Symbol		Values
Storage temperature range	T_{stg}	min. max.	-40 °C 100 °C
Operating temperature range	T_{op}	min. max.	-40 °C 85 °C
Maximum supply voltage between V_{DD} and GND	V_{DD}	max.	4.5 V
Maximum voltage of SDA, SCL to GND	V_{dig}	max.	4.5 V
Maximum voltage of INT to GND	V_{int}	max.	7 V
Maximum voltage of VLED to GND	V_{LED}	max.	7 V
Maximum Current of INT and SDA	I_{INT} / I_{SDA}	max.	7 mA
ESD withstand voltage acc. to ANSI / ESDA JEDEC JS-001-HBM	V_{ESD}	max.	2 kV

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Operating conditions

Parameter	Symbol		Values
Supply voltage	V_{DD}	min. typ. max.	2.3 V 2.5 V 3.6 V
Ripple on supply voltage V_{DDmin} and V_{DDmax} must stay in the V_{DD} range, DC … 100 MHz	$V_{DD,rip}$	max.	200 mV
V_{DD} threshold voltage voltage to initiate the start-up procedure	$V_{DD,th}$	typ. max.	1.7 V 2.3 V
Voltage for INT	V_{INT}	max.	5.5 V
Voltage for SCL and SDA	V_{IO}	min. max:	1.65 V 3.6 V
SDA and SCL input low level voltage	V_{SCL_low} V_{SDA_low}	max.	0.54 V
SDA and SCL input high level voltage	V_{SCL_high} V_{SDA_high}	min.	1.26 V
SDA and SCL input current	I_{SCL_low} I_{SDA_low}	min. max.	-10 µA 10 µA
INT output low level voltage (I_{INT} = 3 mA) When INT is active V_{INT} = low. When INT is inactive V_{INT} = high	V_{INT_low}	max.	0.4 V
Supply voltage LED	V_{LED}	min. typ. max.	2.3 V 3.5 V 5.5 V
Ripple V_{LED}	$V_{LED,rip}$	max.	200mV

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Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Conditions for OFF mode	$V_{DD,off}$	typ.	0.5 V
Current consumption in OFF mode V_{DD} < 0.5 V	$I_{DD,off}$	typ.	0 µA
STAND-BY mode current consumption Mode_control(41h) = 0x00; V_{DD} = 2.5 V	$I_{DD,stby}$	typ. max.	0.8 µA 1.5 µA
Proximity Sensor (PS)			
LED centroid wavelength (I_{LED} = 100mA)	$\lambda_{centroid}$	typ.	850 nm
LED Spectral bandwidth (I_{LED} = 100mA)	$\Delta\lambda$	typ.	30 nm
Temperature coefficient of optical power of LED	TC	typ.	-0.5 %/K
LED on time for one measurement	$t_{LED\ ON}$	min. typ. max.	80 µs 200 µs 300 µs
LED current, programmable V_{LED} > 2.3V for I_{LED} < 100mA V_{LED} > 3.0V for I_{LED} > 100mA	I_{LED}	min. max.	25 mA 200 mA
Accuracy of LED current source ALS_PS_CONTROL: LED Current (00b)	I_{LED}	min. typ. max.	22.5 mA 25 mA 27.5 mA
Mean current consumption in PS mode current consumption of the pulsed LED is not included; MODE_CONTROL(0x41h) = 0x03h; all other registers are default; V_{DD} = 2.5 V	I_{DD}	typ. max.	60 µA 150 µA
Mean current consumption in PS mode during the 200 µs LED pulse (tLED ON) current consumption of the pulsed LED is not included	I_{DD}	typ. max.	6.5 mA 8.5 mA
Typical detection distance KODAK grey card 100x130mm2, R = 90% I_{LED} = 200mA, V_{DD} = 2.5V, E_V = 0lx; high threshold = 11 counts	h_{on}	typ.	10 cm

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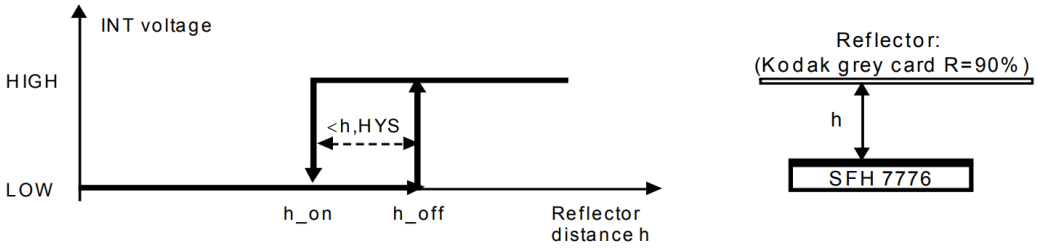
Characteristics (continued)

T_A = 25 °C

Parameter	Symbol		Values
Proximity Sensor (PS)			
Typical none detection distance [1)] KODAK grey card 100x130mm², R = 90% I_{LED} = 200mA, V_{DD} = 2.5V, E_V = 0lx; high threshold = 8 counts	h_{off}	typ.	12 cm
PS sensor output with human skin reflector I_{LED} = 200mA, V_{DD} = 2.5, h = 0mm: skin directly on top of the sensor	PS_{out}	typ.	850 counts
Temperature coefficient of the PS signal I_{LED} = 200mA, V_{DD} = 2.5V, R = 90%, AReflector = 10x13cm², h = 4cm	TK_{PS}	typ.	0.15 %/K

Example of PS Hysteresis

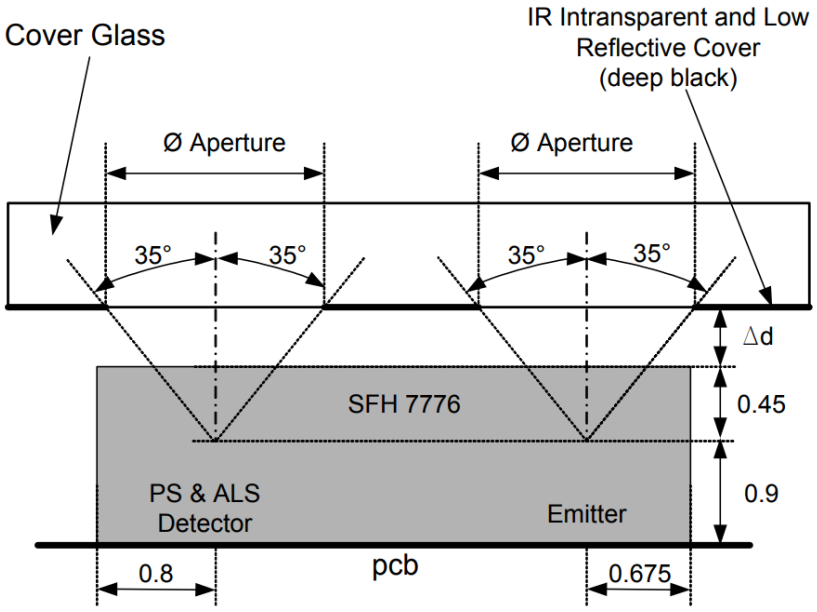
The switching distance h is specified from top sensor surface to the reflector.

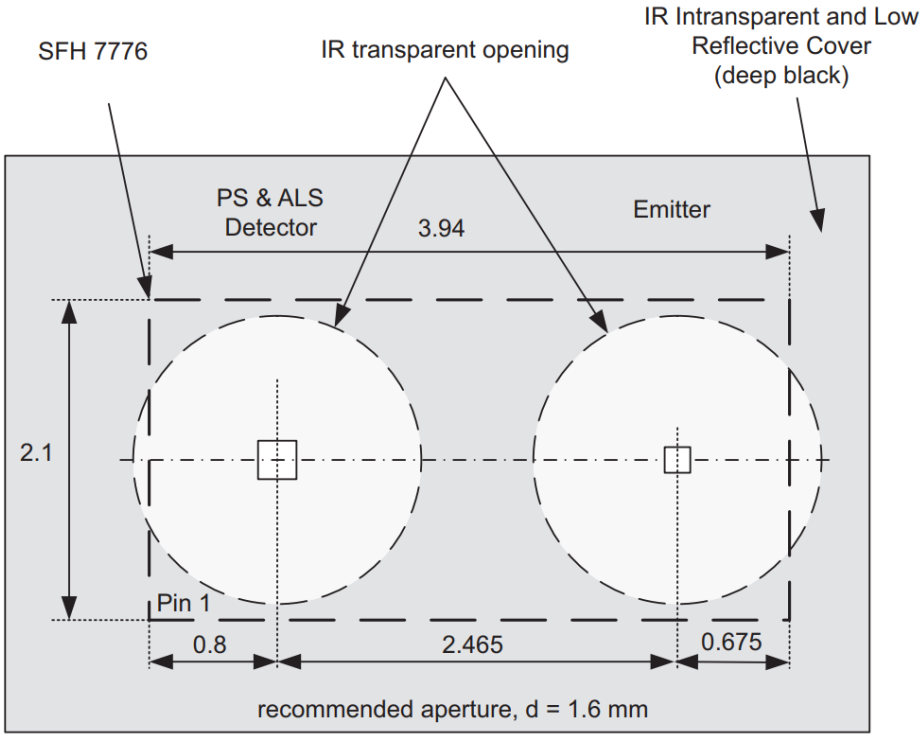


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Dimensions of proposed optical aperture

(optical aperture: IR transmitting opening in cover glass)





Dimensions in mm

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Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Ambient Light Sensor: ALS VIS and ALS IR diode			
Wavelength of max. sensitivity for ALS VIS	λ_{Smax}	typ.	560 nm
Spectral range of sensitivity (10 % of S_{max}) of ALS VIS	$\lambda_{S10\%}$	min. max.	450 nm 950 nm
Wavelength of max. sensitivity of ALS IR	λ_{Smax}	typ.	880 nm
Spectral range of sensitivity (10 % of S_{max}) of ALS IR	$\lambda_{S10\%}$	min. max.	830 nm 1050 nm
Illuminance measurement range is programmable the maximum ALS sensitivity can be reached with the ALS high sensitivity mode → 400ms ALS integration time MODE_CONTROL (0x41h) = 0Ah or 0Bh		min. max.	0.0022 lx 73000 lx
ALS VIS sensor output 1000lx; white LED; VDD = 2.5V MODE_CONTROL (0x41h) = 08h ALS_PS_CONTROL (0x42h): Gain X1	ALS_{VIS_out}	min. typ. max.	750 counts 900 counts 1080 counts
ALS IR sensor output 324µW/cm2; IRED 850nm; VDD = 2.5V MODE_CONTROL (0x41h) = 08h ALS_PS_CONTROL (0x42h): Gain = X1	ALS_{IR_out}	min. typ. max.	460 counts 550 counts 660 counts
ALS VIS sensor output at darkness MODE_CONTROL (0x41h) 08h ALS_PS_CONTROL (0x42h): Gain = X1	ALS_{VIS_out}	min. typ. max.	0 counts 0 counts 2 counts
ALS IR sensor output at darkness MODE_CONTROL (0x41h) = 08h ALS_PS_CONTROL (0x42h): Gain = X1	ALS_{IR_out}	min. typ. max.	0 counts 0 counts 2 counts

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Characteristics (continued)

T_A = 25 °C

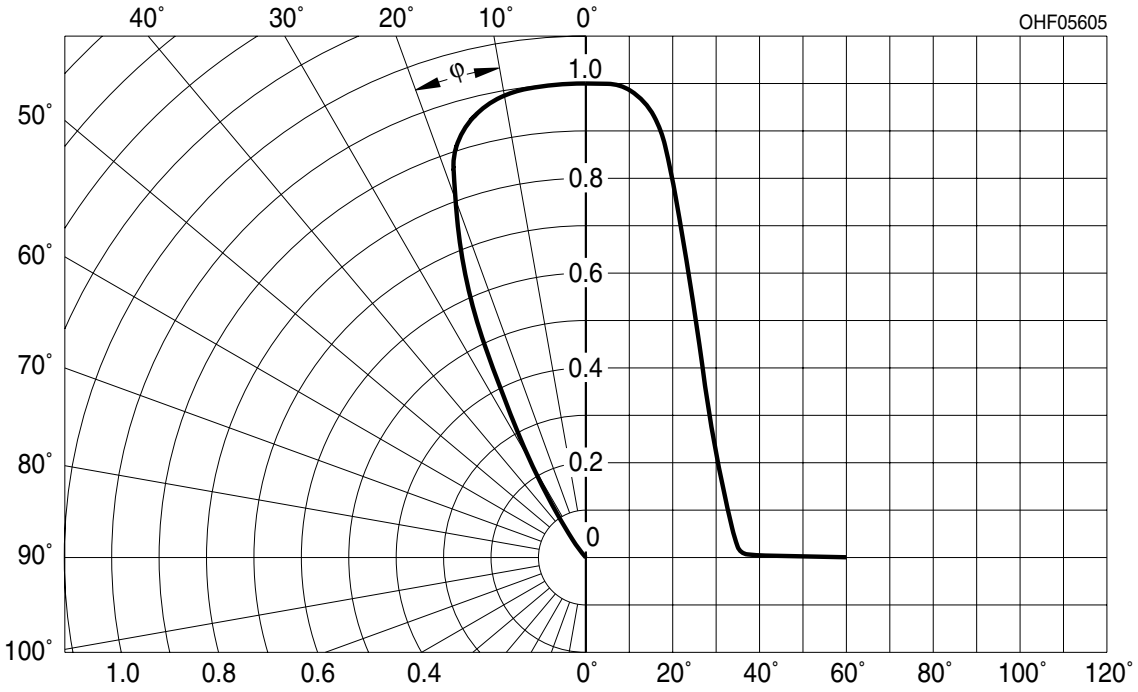
Parameter	Symbol		Values
Ambient Light Sensor: ALS VIS and ALS IR diode			
Resolution of the digital output signal based on gain settings for ALS VIS: MODE_CONTROL (0x41h) = 08h; $t_{int\ ALS}$ = 100ms Gain X1 Gain X2 Gain X64 Gain X128 High sensitive mode: MODE_CONTROL (0x41h) = 0Ah; $t_{int\ ALS}$ = 400ms Gain X128 (V_{DD} = 2.5V; white LED) - Gain settings at ALS_PS_CONTROL (0x42h)	ALS_{VIS_out}	 typ. typ. typ. typ. typ.	 1.1 lx/count 0.55 lx/count 0.018 lx/count 0.009 lx/count 0.002 lx/count
Typical temperature coefficient for ALS measurement 1000lx; white LED; V_{DD} = 2.5V	TC_{Ev}	typ.	0.2 % / K
Mean current consumption MODE_CONTROL (0x41h) = 08h other registers are default	I_{DD}	typ. max.	90 µA 150 µA
Typical error by Flicker noise caused by bulbs (f=50 or 60 Hz) or fluorescent lamps		max.	3 %

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Radiation Characteristics 1), 2)

IR Emitter

$I_{rel} = f(\varphi)$

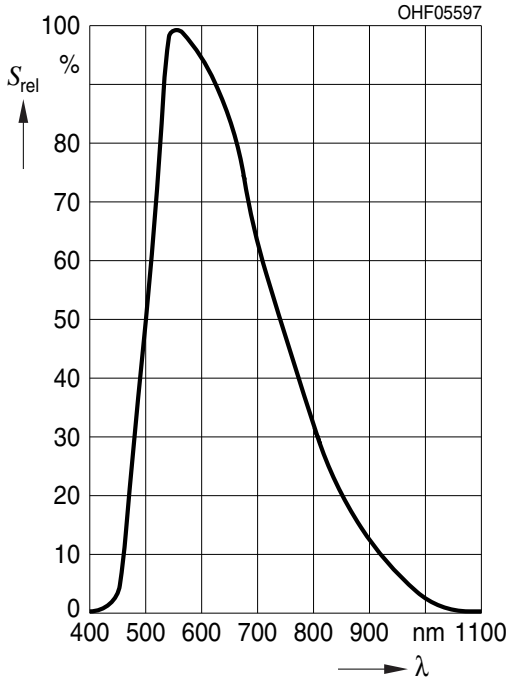


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Relative Spectral Sensitivity [1), 2)]

ALS VIS

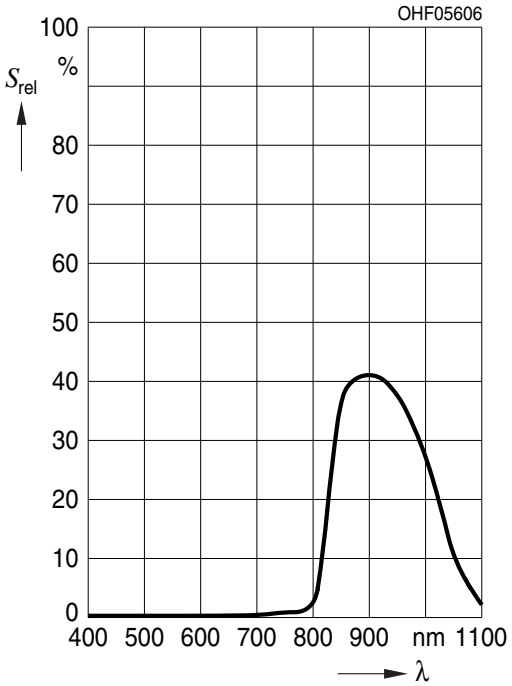
$S_{rel_VIS} = f(\lambda)$



Relative Spectral Sensitivity [1), 2)]

ALS IR

$S_{rel_IR} = f(\lambda)$; 100% = maximum sensitivity of ALS VIS diode

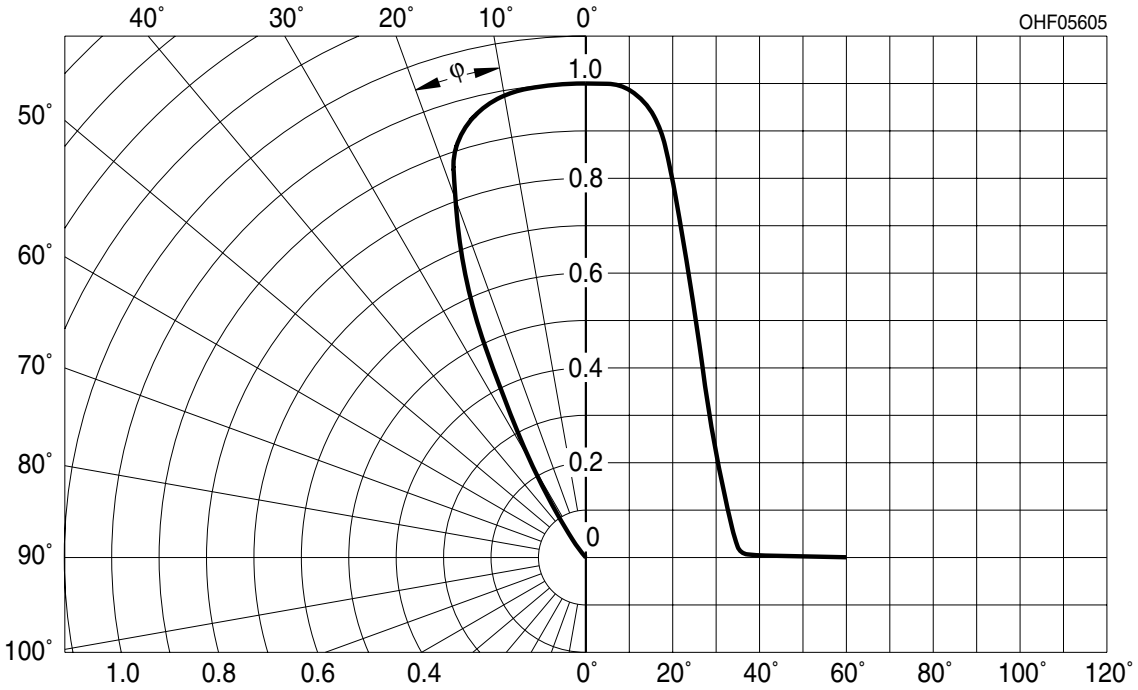


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Directional Characteristics [1], [2]

ALS VIS diode

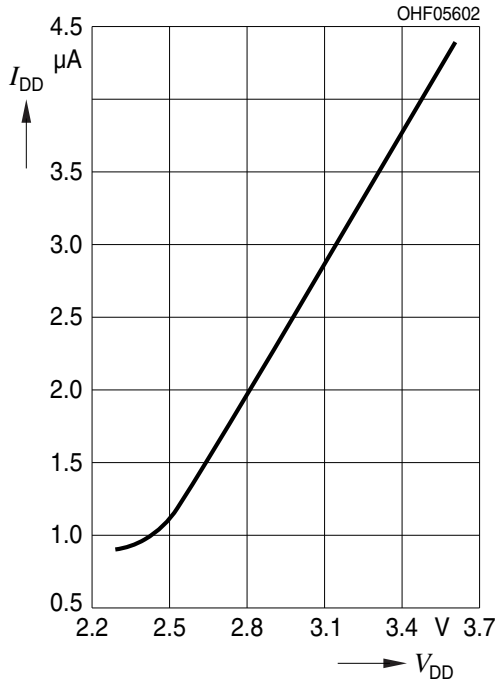
$S_{rel} = f(\varphi)$



Current Consumption [1], [2]

standby mode

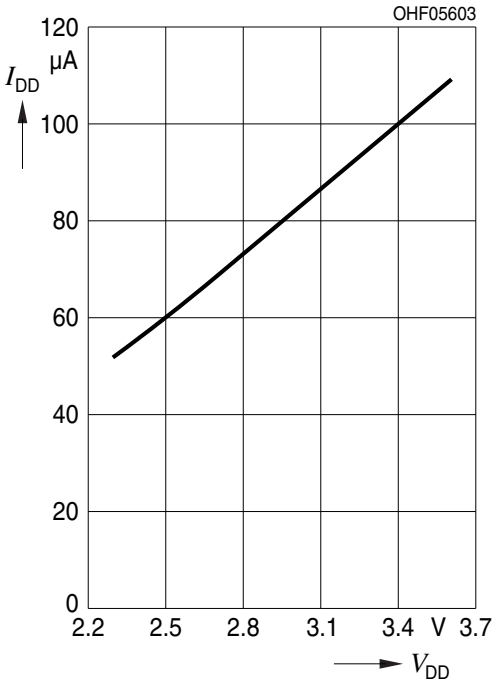
$I_{DD} = f(V_{DD})$; Register 0x41 = 0x00



Current Consumption [1], [2]

PS mode

$I_{DD} = f(V_{DD})$; Register 0x41 = 0x03

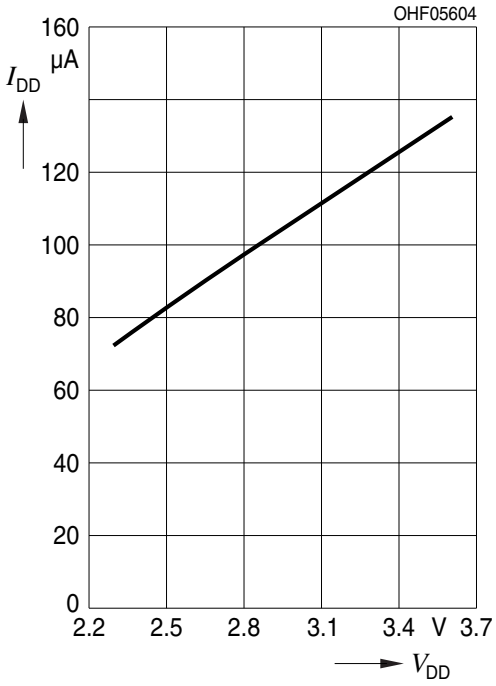


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Current Consumption [1], [2]

ALS mode

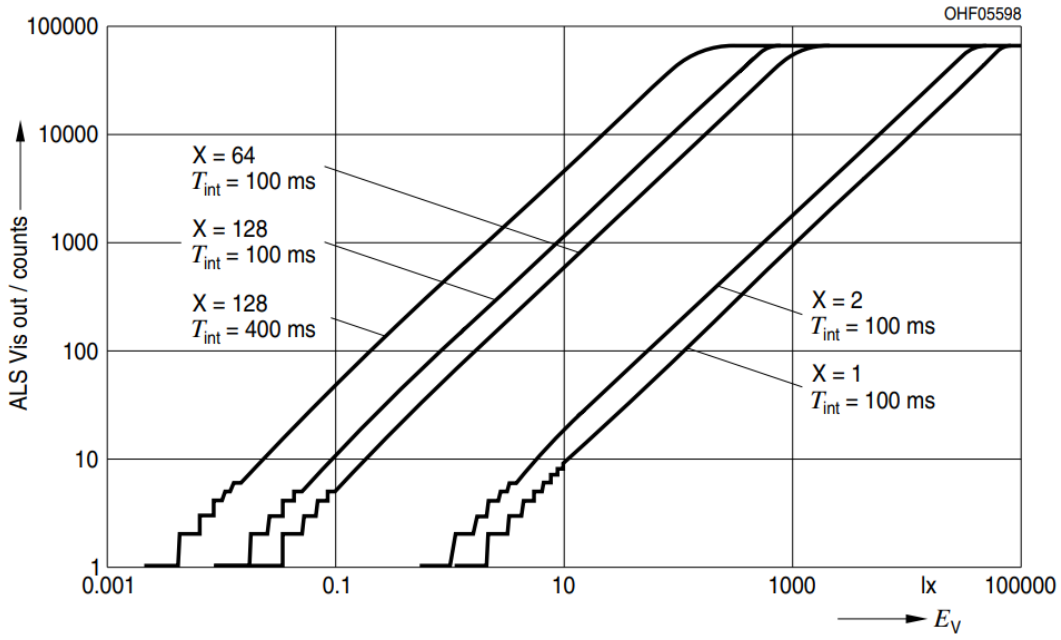
$I_{DD} = f(V_{DD})$; Register 0x41 = 0x08



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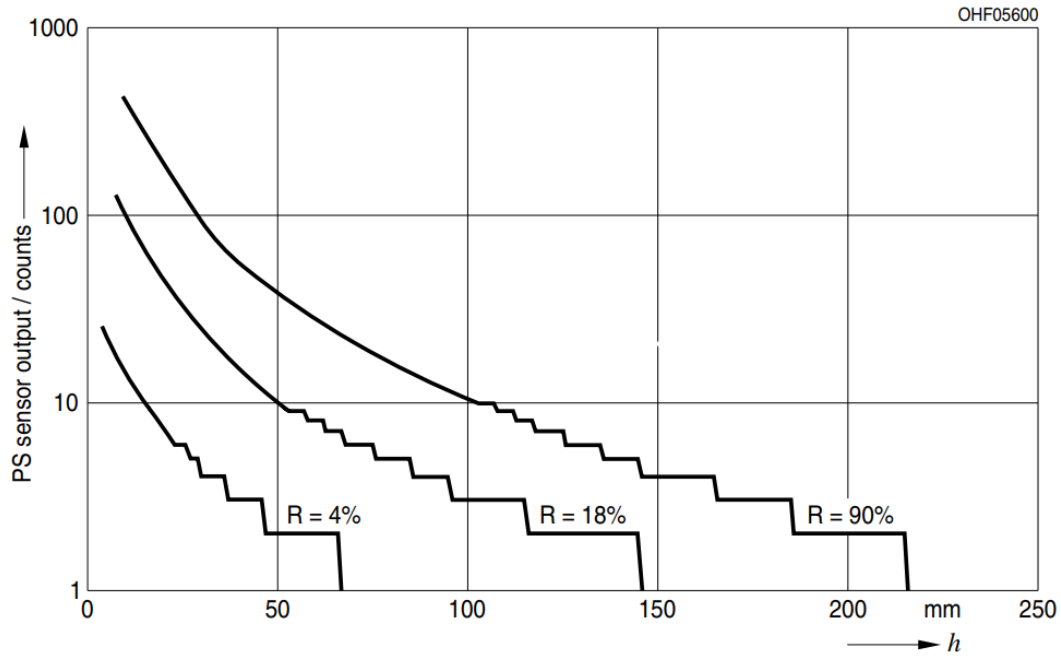
ALS VIS sensitivity ranges

ALS VIS output(E_v); white LED; f(sensitivity settings);
T_{int}: integration time (register 0x41h); X: gain settings (register 0x42h)



PS sensitivity f(R = reflectivity)

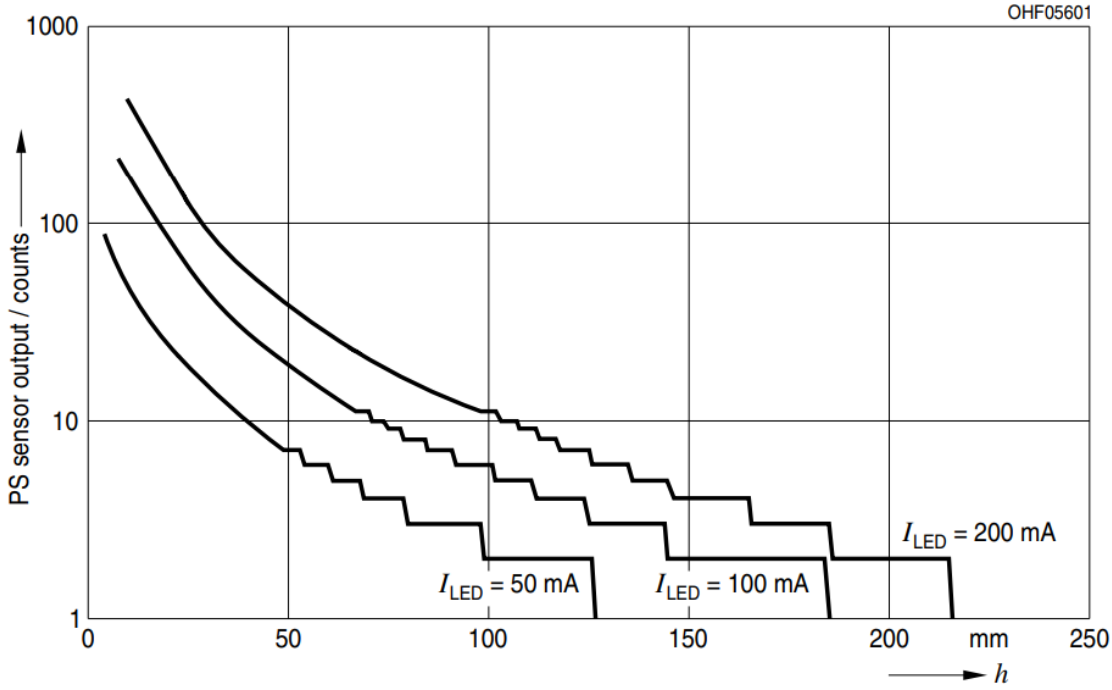
V_{DD}=2.5V; I_{LED}=200mA; T_{rep}=100ms; $A_{Reflector}$=10x13cm^2



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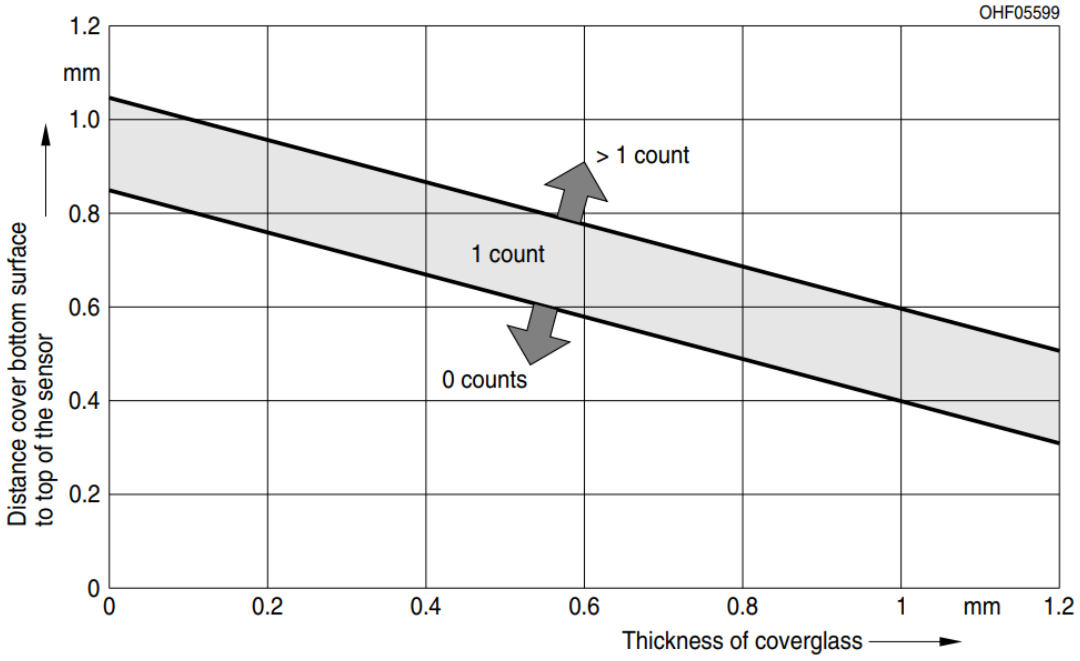
PS sensitivity f(I_{LED})

V_{DD}=2.5V; T_{rep}=100ms; R=90%; $A_{Reflector}$=10x13cm^2



Typical crosstalk free range

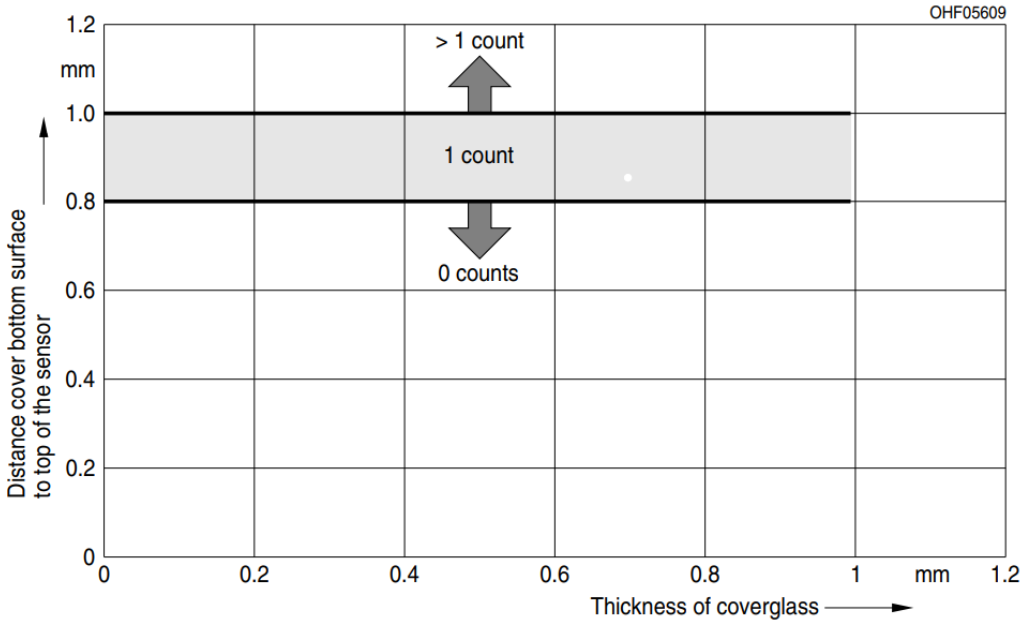
V_{DD}=2.5V; I_{LED}=200mA; T_{rep}=100ms; glass without ink and one single IR transmissive opening



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Typical crosstalk free range

V_{DD}=2.5V; I_{LED}=200mA; T_{rep}=100ms; glass without ink and a two separate IR transmissive openings for emitter and detector



Note for crosstalk free range: The displayed crosstalk free ranges for a single or two hole IR transmissive opening are measured with a clear cover. Depending on the used ink the crosstalk level can differ and needs to be measured. OSRAM OS provides costumer related application support and measurements – please contact your OSRAM OS marketing or sales partner, if support is required.

As the measurement results show the typical performance of the sensor OSRAM OS recommends to design inn a additional safety guard in the distance of the cover bottom surface to the top of the sensor of 200µm. e.g.: for a 0.5mm thick cover window with two holes and an acceptable crosstalk level of 0 counts the distance of the cover window bottom surface to the top of the sensor should not exceed 0.6mm (typ. it would be 0.8mm)

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SYSTEM_CONTROL register (0x40h)

The SYSTEM_CONTROL register is used to control the software (SW) reset and the interrupt function (INT). Manufacturer ID and Part ID can be read.

R/W-Register 0x40

Bit	7	6	5	4	3	2	1	0
	SW reset	INT reset	Manufacturer ID (Read only)			Part ID (Read only)		
default	0 Initial reset is not started	0 INT pin status is not initialized	001			001		
	0 Initial reset is not started	0 INT pin status is not initialized						
	1 Initial reset started	1 INT pin become inactive (high impedance)						

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MODE_CONTROL register (0x41h)

CONTROL of PS and ALS operating modes and time settings.

Repetition time is the time between two separate measurements. Integration time is the duration for one measurement. ALS high sensitivity modes are 1010 and 1011 with an increased integration time of 400ms. In PS operating mode: “normal mode” only one PS measurement is performed during one PS repetition time. In PS operating mode: “twice mode” two independent PS measurement are performed within one PS repetition time. Both measurements are independent and can trigger the interrupt. This feature can be used to decrease the interrupt update time if the persistence function (register 0x43h) is used.

R/W-Register 0x41

Bit	7	6	5	4	3	2	1	0	Repetition / Integration time	Repetition time
	Reserved			PS operating mode					ALS	PS
default				0 normal mode	0	0	0	0	standby	standby
				0 normal mode	0	0	0	0	standby	standby
				1 twice mode	0	0	0	1	standby	10ms
					0	0	1	0	standby	40ms
					0	0	1	1	standby	100ms
					0	1	0	0	standby	400ms
					0	1	0	1	100ms / 100ms	standby
					0	1	1	0	100ms / 100ms	100ms
					0	1	1	1	100ms / 100ms	400ms
					1	0	0	0	400ms / 100ms	standby
					1	0	0	1	400ms / 100ms	100ms
					1	0	1	0	400ms / 400ms	standby
					1	0	1	1	400ms / 400ms	400ms
					1	1	0	0	50ms / 50 ms	50ms
					Rest forbidden					

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ALS_PS_CONTROL register (0x42h)

ALS and PS Control of set the PS output mode, the ALS gain and the LED current. In the “Infrared DC level output” PS mode (bit <6> = 1) the sensor measures the infrared DC ambient level. The proximity value of the reflected signal is not available in this mode.

R/W-Register 0x42

Bit	7	6	5	4	3	2			1	0
	Reserved (read only)	PS output	ALS Gain for ALS VIS and ALS IR						LED current	
default	write 0	0 proximity output	0000				X1	X1	11 200mA	
		0 proximity output	0000				X1	X1	00 25 mA	
		1 Infrared DC level output	0100				X2	X1	01 50 mA	
			0101				X2	X2	10 100 mA	
			1010				X64	X64	11 200 mA	
			1110				X128	X64		
			1111				X128	X128		
			rest forbidden							

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PERSISTENCE Register (0x43h)

Setting of persistence interrupt function. Persistence function is only valid for the PS interrupt.

R/W-Register 0x43

Bit	7	6	5	4	3	2	1	0
	Reserved (read only)				Persistence			
default	0000				0001 Interrupt status is updated after each measurement			
					0000 Interrupt becomes active after each measurement (The mode indicates that a PS or ALS measurement has been finished and can be read via the register. It is independent of the ALS & PS measurement value and threshold settings)			
					0001 Interrupt status is updated after each measurement (The interrupt status is updated independently after each measurement. Active or Inactive status of the interrupt is depending on the values of the last measurement in combination with the interrupt settings: “interrupt mode” (register 0x4Ah) and “thresholds” register 0x4Ch and following.)			
					0010 Interrupt status is updated if two consecutive threshold judgement are the same (The interrupt status only changes if the interrupt judgement of 2 consecutive measurement results are the same and different to the current interrupt status.)			
					0011 … 1111 Interrupt status is updated if threshold judgement are the same over consecutive set times (3 …15) (This is the same procedure like in the 0010 persistence mode, but instead of 2 consecutive threshold judgments more are needed (3 to 15 depending on the setting) to change the interrupt status.) e.g.: 1010: 10 measurement results in a row need to fulfill the interrupt judgement to update the interrupt status			

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PS_DATA_LSBs Register (0x44h)

LSB of the PS output.

R-Register 0x44

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	0	0	0	0	0	0	0	0

PS_DATA_MSBs Register (0x45h)

MSB of the PS output.

R-Register 0x45

Bit	7	6	5	4	3	2	1	0
	not used	not used	not used	not used	2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	0	0	0	0

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ALS_VIS_DATA_LSBs Register (0x46h)

LSB of the ALS VIS output.

R-Register 0x46

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	0	0	0	0	0	0	0	0

ALS_VIS_DATA_MSBs Register (0x47h)

MSB of the ALS VIS output.

R-Register 0x47

Bit	7	6	5	4	3	2	1	0
	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	0	0	0	0

ALS_IR_DATA_LSBs Register (0x48h)

LSB of the ALS IR output.

R-Register 0x48

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	0	0	0	0	0	0	0	0

ALS_IR_DATA_MSBs Register (0x49h)

MSB of the ALS IR output.

R-Register 0x49

Bit	7	6	5	4	3	2	1	0
	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	0	0	0	0

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INTERRUPT_CONTROL register (0x4Ah)

Setting of the interrupt functions.

R/W-Register 0x4A

Bit	7	6	5	4	3	2	1	0
	PS INT status (read only)	ALS INT status (read only)	PS INT mode		INT assert	INT latch	INT trigger	
default	0 inactive	0 inactive	00 PS_TH is only active		0 INT “L” is stable	0 INT is latched	00 inactive	
	0 inactive	0 inactive	00 PS_TH (PS high threshold 0x4B & 0x4C) is only active		0 INT “L” is stable if newer measurement results is also interrupt active	0 INT is latched until INT registers is read or initialize	00 INT pin is inactive	
	1 active	1 active	01 PS_TH & PS_TL (PS high & low threshold) are active as hysteresis		1 INT “L” is de-assert and re-assert if newer measurement results is also interrupt active	1 INT is updated after each measurement	01 is triggered by PS only	
			10 PS_TH & PS_TL (PS high & low threshold) are active as outside detection				10 triggered by ALS only	
			11 forbidden				11 triggered by PS or ALS	

PS INT and ALS INT status (bit <7;6>): Directly after reading the register the interrupt status for PS and ALS and the INT Pin of the sensor is automatically set back to inactive status independent on the measurement results.

PS INT mode (bit <5;4>): The INT modes are only valid for the PS interrupt function. For description please see extra chapter “PS INT Modes” (at the end of the register chapter).

INT assert (bit <3>): Is used to adjust the sensor behavior to the used micro controller trigger settings. In case a repeated trigger in low state is needed the INT assert can be set to 1.

INT trigger (bit <2>): defines the source / sources for the interrupt.

INT latched (bit <1>): In latched mode the interrupt status stays active after the first activation. It is only released by reading the status are performing an interrupt reset.

Not for new design

PS_TH_LSBs register (0x4Bh)

LSB for the PS threshold “HIGH”.

R/W-Register 0x4B

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	1	1	1	1	1	1	1	1

PS_TH_MSBs register (0x4Ch)

MSB for the PS threshold “HIGH”.

R/W-Register 0x4C

Bit	7	6	5	4	3	2	1	0
					2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	1	1	1	1

PS_TL_LSBs register (0x4Dh)

LSB for the PS threshold “LOW”.

R/W-Register 0x4D

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	0	0	0	0	0	0	0	0

PS_TL_MSBs register (0x4Eh)

MSB for the PS threshold “LOW”.

R/W-Register 0x4E

Bit	7	6	5	4	3	2	1	0
					2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	0	0	0	0

Not for new design

ALS_VIS_TH_LSBs register (0x4Fh)

LSB for the ALS VIS threshold “HIGH”.

R/W-Register 0x4F

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	1	1	1	1	1	1	1	1

ALS_VIS_TH_MSBs register (0x50h)

MSB for the ALS VIS threshold ”HIGH”.

R/W-Register 0x50

Bit	7	6	5	4	3	2	1	0
	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
default	1	1	1	1	1	1	1	1

ALS_VIS_TL_LSBs register (0x51h)

LSB for the ALS VIS threshold “LOW”.

R/W-Register 0x51

Bit	7	6	5	4	3	2	1	0
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
default	0	0	0	0	0	0	0	0

ALS_VIS_TL_MSBs register (0x52h)

MSB for the ALS VIS threshold ”LOW”.

R/W-Register 0x52

Bit	7	6	5	4	3	2	1	0
	2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8
default	0	0	0	0	0	0	0	0

Not for new design

INT modes

The Interrupt function compares ALS and PS measurement values with the current interrupt threshold level. PS and ALS VIS Interrupt status is readable via register 0x4Ah or at the INT pin of the sensor.

The Interrupt persistence function is only valid for PS measurements and is defined in register (0x43h). The INT pin of the SFH 7776 is open drain output and should be pulled up to VINT,pullup by an external resistor. When VDD is supplied the INT pin is high impedance (inactive). The INT status becomes inactive by writing INT reset command, reading the INT status register or performing a software reset. The INT status stays in its last state when the sensor is set to the standby mode. In the INT active state “low” the sensor consumes ~25µA extra current. Therefore OSRAM recommends to set the INT state to high impedance before setting the sensor in standby mode.

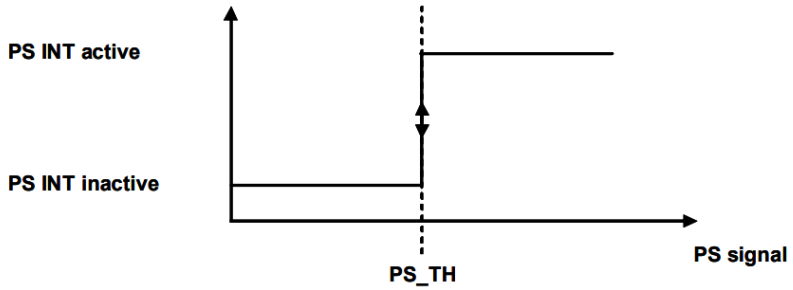
Following ALS and PS INT modes are described for the unlatched mode. In latched mode the switching back to the “inactive” INT state is depending on an interrupt reset or the read of the INT status register.

ALS INT mode:

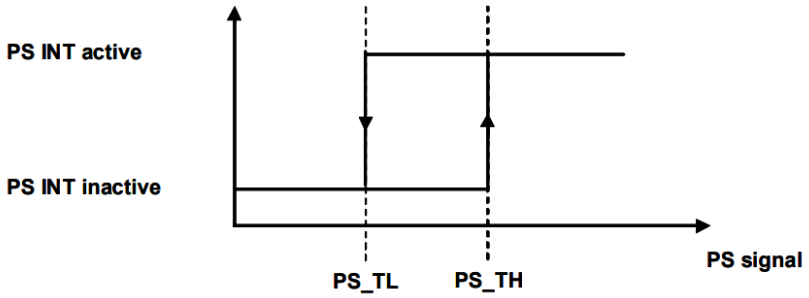
The ALS VIS threshold levels high (register 0x4Fh & 0x50h) and low (register 0x4Fh & 0x50h) are only valid for the ALS VIS measurement values. The ALS VIS INT mode is fixed and can not be adapted via register. The thresholds define a window with following functionality:
ALS INT is active, if the ALS VIS measurement values are outside the window.
ALS INT is inactive, if the ALS VIS measurement results are inside the window.

PS INT Modes: Bit <5;4> of INTERRUPT_CONTROL register (0x4Ah)

00 PS_TH is only active:
The INT state is active it the PS measurement result is equal or higher than the set PS_TH high threshold.
The INT state is inactive, if the PS measurement result is lower than the set PS_TH high threshold.

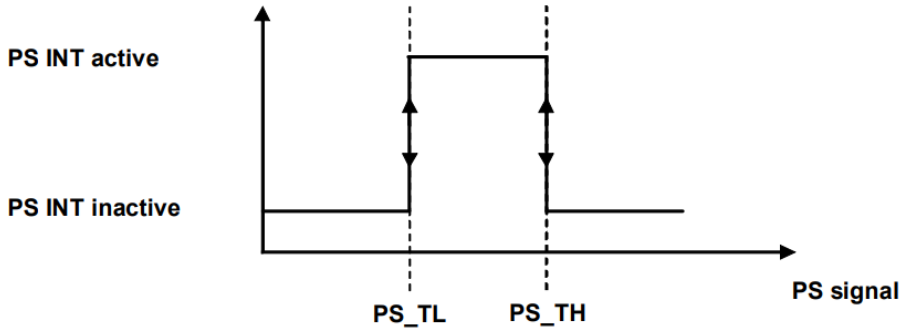


01 PS_TH & PS_TL (PS high & low threshold) are active as hysteresis:
PS_TH and PS_TL are working as a hysteresis. If the PS measurement signal is higher than the PS high threshold (PS_TH) the INT state is switched to active. If the PS measurement signal is lower than the PS low threshold (PS_TL) the INT state is inactive. If once interrupt signal becomes active, INT status is kept active until measurement result becomes less than PS_TL register value.



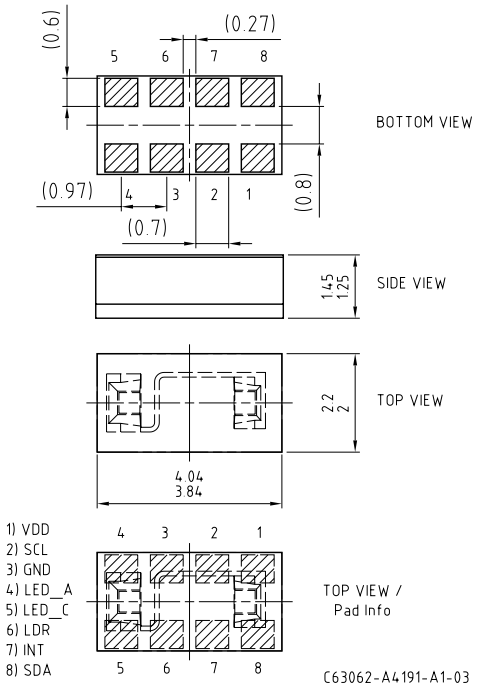
Not for new design

10 PS_TH & PS_TL (PS high & low threshold) are active as outside detection:
In case of “PS outside detection” mode interrupt signal inactive means that measurement result is within registered threshold level and interrupt signal active means measurement result is out of registered threshold level.



Not for new design

Dimensional Drawing [3)]

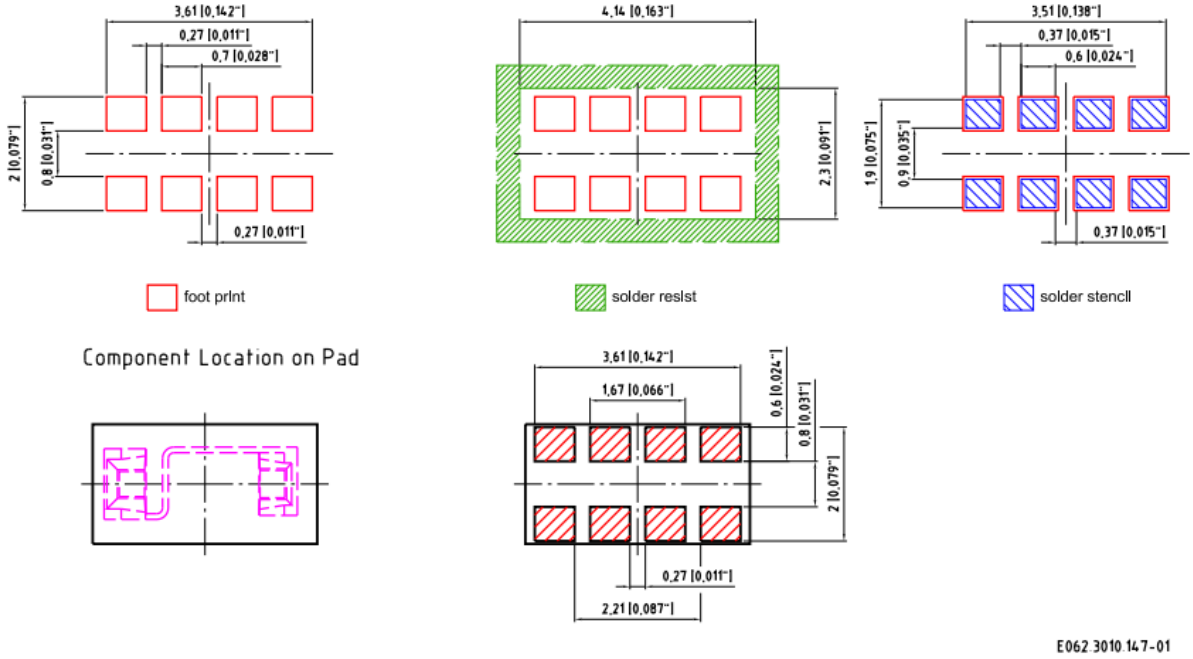


Further Information:

Approximate Weight: 15.0 mg

Not for new design

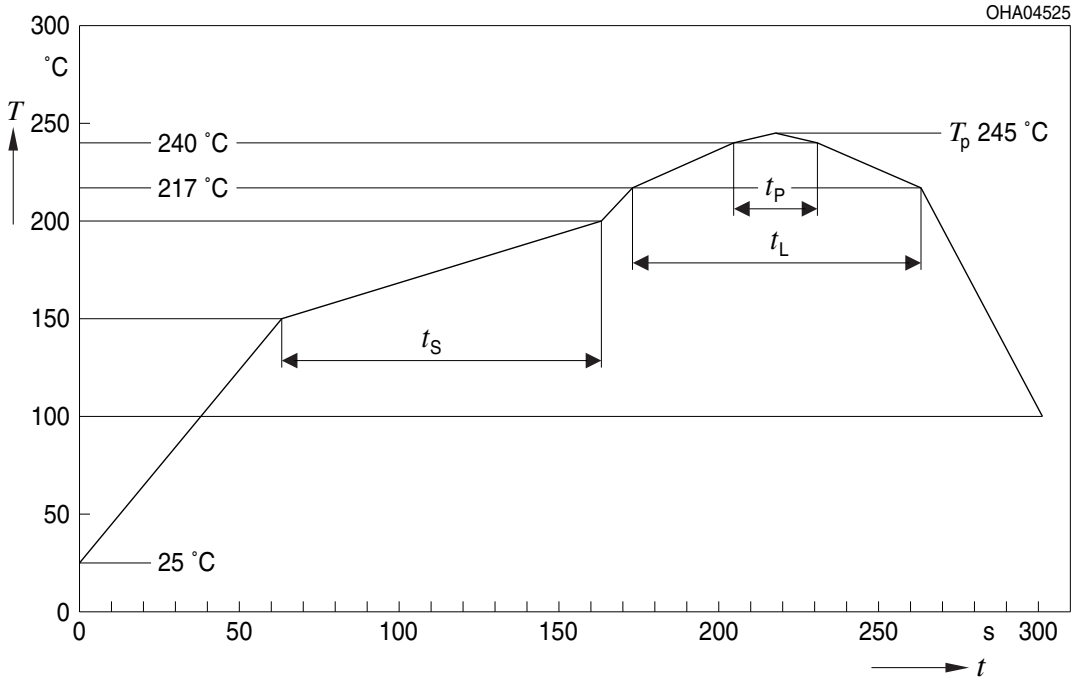
Recommended Solder Pad [3)]



Not for new design

Reflow Soldering Profile

Product complies to MSL Level 3 acc. to JEDEC J-STD-020E

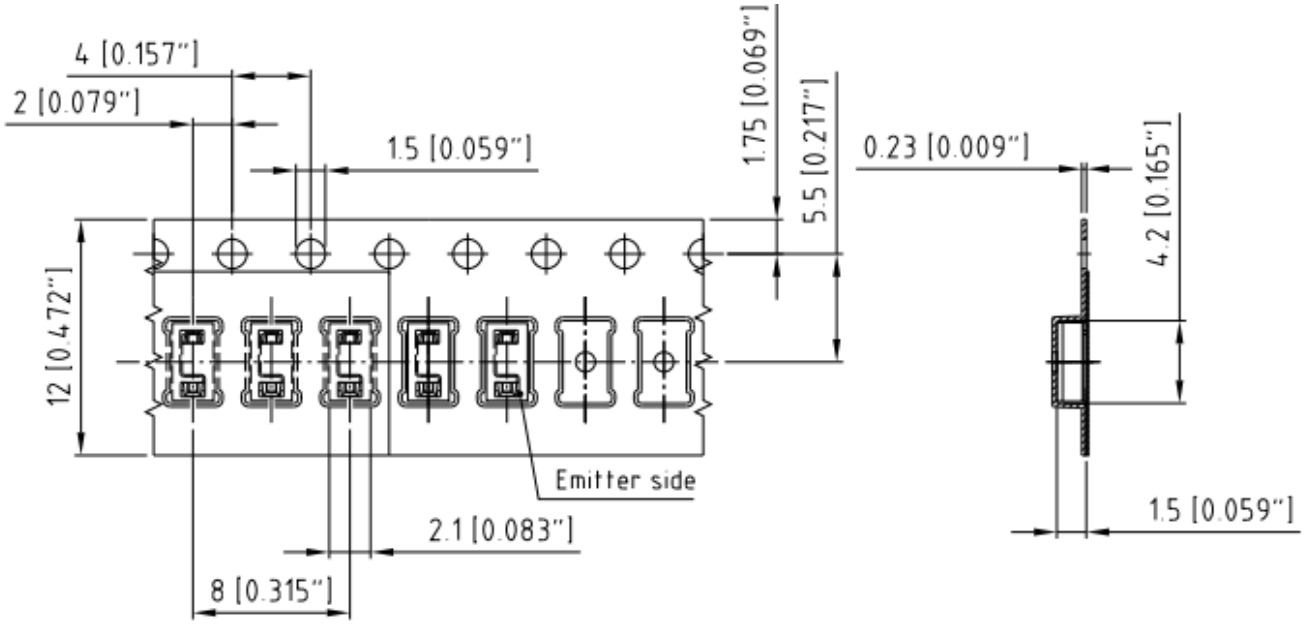


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time t_S T_{Smin} to T_{Smax}	t_S	60	100	120	s
Ramp-up rate to peak*) T_{Smax} to T_P			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature	t_L		80	100	s
Peak temperature	T_P		245	260	°C
Time within 5 °C of the specified peak temperature T_P - 5 K	t_P	10	20	30	s
Ramp-down rate* T_P to 100 °C			3	6	K/s
Time 25 °C to T_P				480	s

All temperatures refer to the center of the package, measured on the top of the component
* slope calculation DT/Dt: Dt max. 5 s; fulfillment for the whole T-range

Not for new design

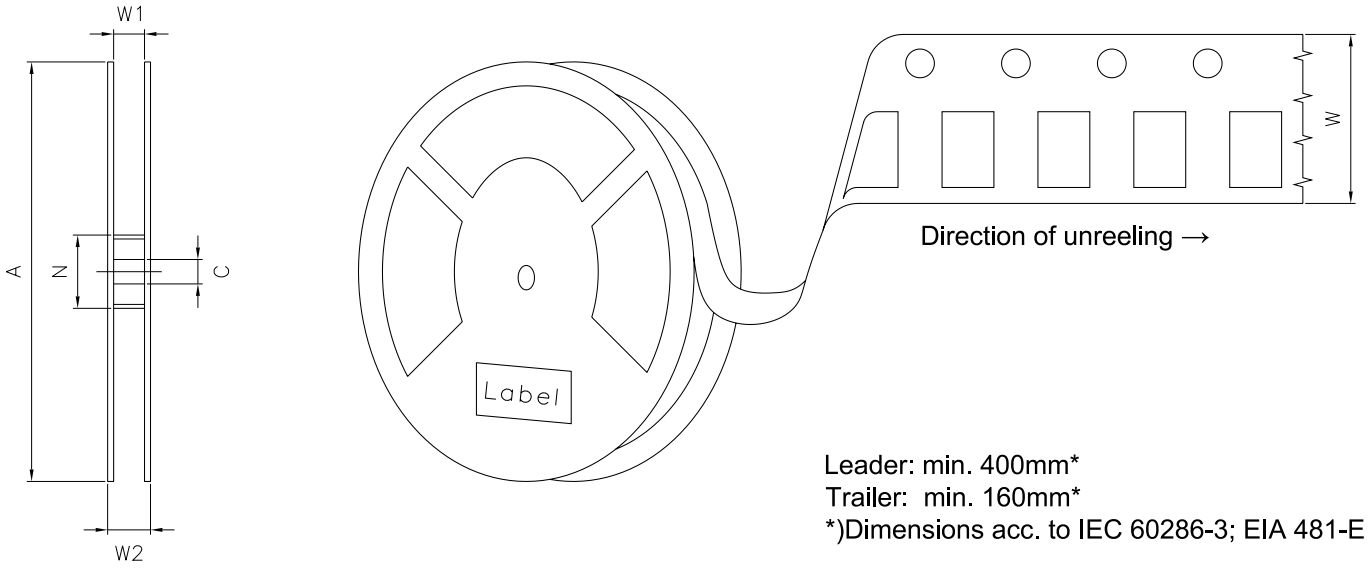
Taping [3)]



C63062-A4191-B6 -01

Not for new design

Tape and Reel [4)]



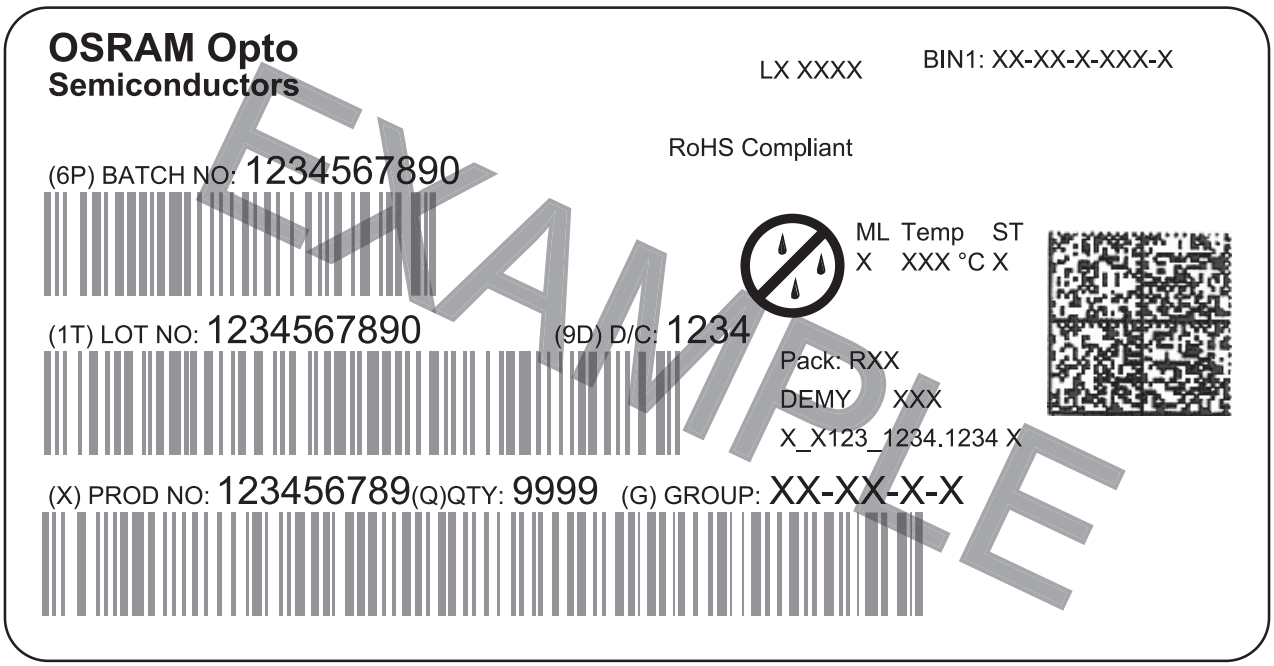
Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

Reel Dimensions

A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	12 + 0.3 / - 0.1 mm	60 mm	12.4 + 2 mm	18.4 mm	2000

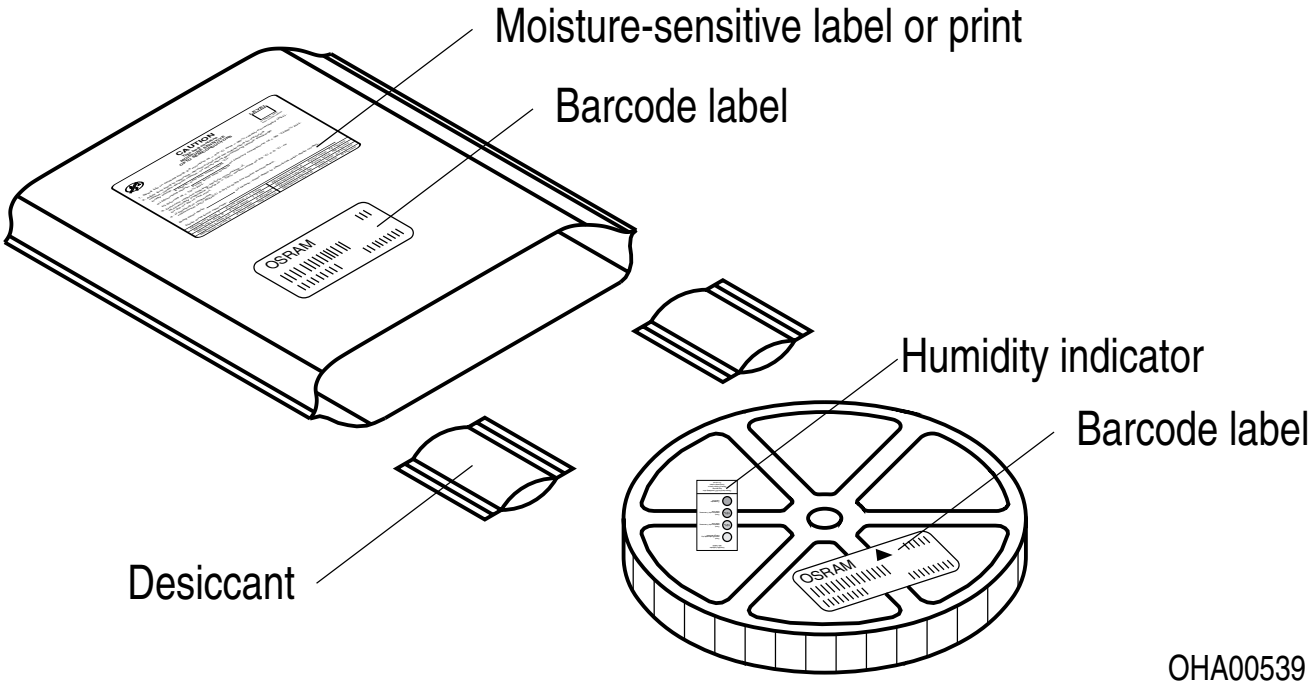
Not for new design

Barcode-Product-Label (BPL)



OHA04563

Dry Packing Process and Materials [3)]



OHA00539

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

Not for new design

Disclaimer

Attention please!

The information describes the type of component and shall not be considered as assured characteristics.
Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.
For information on the types in question please contact our Sales Organization.
If printed or downloaded, please find the latest version on our website.

Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office. By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

Product and functional safety devices/applications or medical devices/applications

Our components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.
Our products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using our components in product safety devices/ applications or medical devices/applications, buyer and/or customer has to inform our local sales partner immediately and we and buyer and /or customer will analyze and coordinate the customer-specific request between us and buyer and/or customer.

Not for new design

Glossary

1) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.

2) **Testing temperature:** TA = 25°C (unless otherwise specified)

3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ±0.1 and dimensions are specified in mm.

4) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Not for new design

Revision History

Version	Date	Change
1.3	2021-10-11	New Layout
1.4	2022-03-22	New Layout
1.5	2022-09-29	Applications Not for new design

Not for new design

Not for new design

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