

# OSRAM SFH 5711

## Datasheet

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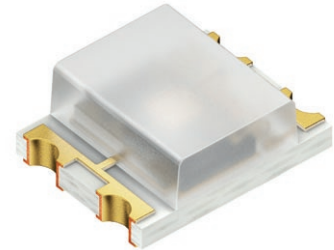
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Chip LED

# SFH 5711

High Accuracy Ambient Light Sensor



## Applications

- Ambient Light Sensing
- Rain, Light & Tunnel Sensing

## Features

- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Opto hybrid with logarithmic current output
- Perfect match to Human Eye Sensitivity ( $V_{\lambda}$ )
- Low temperature coefficient of spectral sensitivity
- High accuracy over wide illumination range

## Ordering Information

Type	Output current <sup>1)</sup> $E_v = 1000 \text{ lx; (white LED LW541C)}$ $I_{\text{OUT}}$	Ordering Code
SFH 5711-2/3-Z	27.5 ... 31.5 $\mu\text{A}$	Q65110A4513
SFH 5711-2/3 R33	27.5 ... 31.5 $\mu\text{A}$	Q65112A2568
SFH 5711-1/2-Z	25.5 ... 29.5 $\mu\text{A}$	on request (SFH 5711-1/2)
SFH 5711-3/4-Z	29.5 ... 33.5 $\mu\text{A}$	on request (SFH 5711-3/4)

Only one bin within one packing unit, see characteristics.

## Maximum Ratings

Parameter	Symbol		Values
Operating temperature	$T_{op}$	min.	-40 °C
		max.	100 °C
Storage temperature	$T_{stg}$	min.	-40 °C
		max.	100 °C
Output voltage	$V_{OUT}$	max.	6 V
Supply voltage	$V_{DD}$	max.	6 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	$V_{ESD}$	max.	2 kV

## Operating Conditions

Parameter	Symbol	Values	
Illuminance $T_A = -30\text{ °C} \dots 70\text{ °C}$	$E_V$	min. max.	3 lx 80000 lx
Illuminance $T_A = -40\text{ °C} \dots 100\text{ °C}$	$E_V$	min. max.	10 lx 80000 lx
Supply voltage	$V_{DD}$	min. max.	2.3 V 5.5 V

## Characteristics

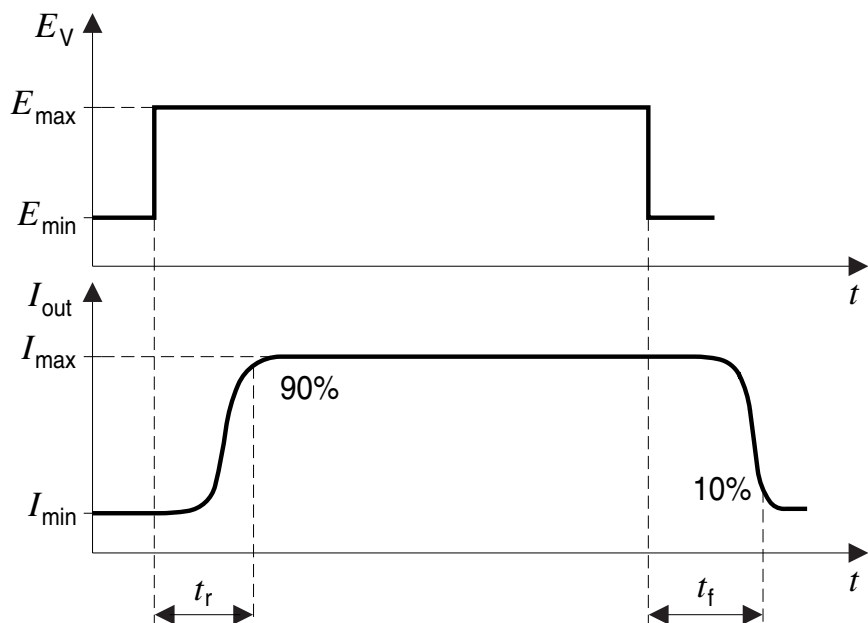
$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Output voltage example: $V_{CC} = 5.5\text{ V}$ ; general $V_{CC} - 0.5\text{ V}$	$V_{OUT}$	typ.	5 V
Wavelength of maximum sensitivity	$\lambda_{S\text{ max}}$	typ.	540 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	475 ... 650 nm
Dimensions of active chip area	L x W	typ.	0.4 x 0.4 mm x mm
Half angle	$\varphi$	typ.	85 °
Output dark current $E_v = 0\text{ lx}$	$I_{OUT\_dark}$	max. typ.	100 nA 0.1 nA
Current consumption $E_v = 0\text{ lx}$ ; $V_{CC} = 2.5\text{ V}$	$I_{DD}$	typ. max.	0.41 mA 0.5 mA
Current consumption $E_v = 0\text{ lx}$ ; $V_{CC} = 5\text{ V}$	$I_{DD}$	typ.	0.42 mA
Current consumption $E_v = 1000\text{ lx}$ ; $V_{CC} = 2.5\text{ V}$	$I_{DD}$	typ. max.	0.46 mA 0.55 mA
Current consumption $E_v = 1000\text{ lx}$ ; $V_{CC} = 5\text{ V}$	$I_{DD}$	typ.	0.47 mA
Power on time $E_v = 1000\text{ lx}$ ; $V_{CC} = 0$ ; $V \rightarrow V_{CC}$	$t_{on}$	typ. max.	0.1 1.2
Rise time $R_L = 25\text{ k}\Omega$ ; $C = 1000\text{ pF}$ ; Fig.: Definition of Response Time, $E_v = 100 \rightarrow 1000\text{ lx}$	$t_r$	typ.	50 $\mu\text{s}$
Fall time $R_L = 25\text{ k}\Omega$ ; $C = 1000\text{ pF}$ ; Fig.: Definition of Response Time, $E_v = 1000 \rightarrow 100\text{ lx}$	$t_f$	typ.	180 $\mu\text{s}$
Output capacitance	$C_{Out}$	typ.	4 pF
Transfer function	G	min. typ. max.	9.5 $\mu\text{A / dec}$ 10 $\mu\text{A / dec}$ 10.5 $\mu\text{A / dec}$
Output accuracy over temperature range $E_v = 1000\text{ lx}$ ; $T_A = -30\text{ °C} \dots 70\text{ °C}$	$\Delta I_{OUT}$	min. max.	-1.5 $\mu\text{A}$ 1.5 $\mu\text{A}$
Output accuracy over temperature range $E_v = 1000\text{ lx}$ ; $T_A = -40\text{ °C} \dots 100\text{ °C}$	$\Delta I_{OUT}$	min. max.	-2 $\mu\text{A}$ 2 $\mu\text{A}$
Output accuracy over temperature range $E_v = 1000\text{ lx}$ ; $T_A = 0\text{ °C} \dots 50\text{ °C}$	$\Delta I_{OUT}$	min. max.	-0.7 $\mu\text{A}$ 0.7 $\mu\text{A}$

## Photocurrent Groups

Group	Output current <sup>1)</sup>	Output current <sup>1)</sup>
	$E_v = 1000 \text{ lx; (white LED LW 541C)}$ min. $I_{\text{OUT}}$	$E_v = 1000 \text{ lx; (white LED LW 541C)}$ max. $I_{\text{OUT}}$
1	25.5 $\mu\text{A}$	27.5 $\mu\text{A}$
2	27.5 $\mu\text{A}$	29.5 $\mu\text{A}$
3	29.5 $\mu\text{A}$	31.5 $\mu\text{A}$
4	31.5 $\mu\text{A}$	33.5 $\mu\text{A}$

## Switching Time

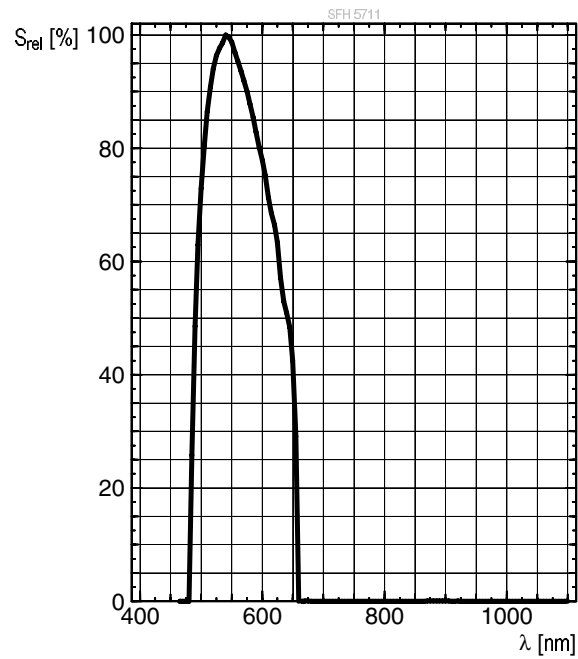


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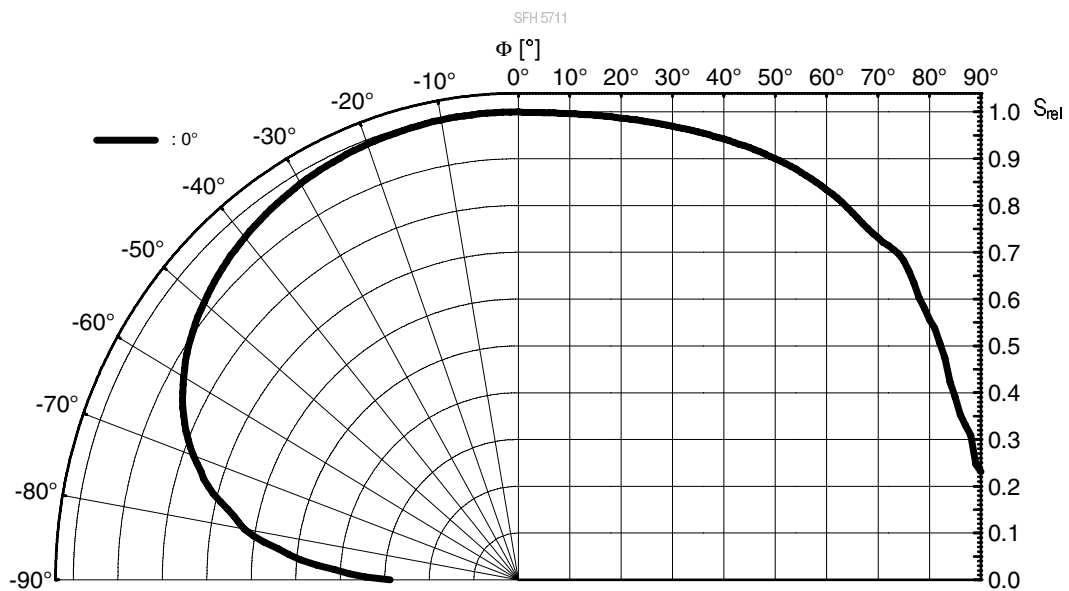
## Relative Spectral Sensitivity <sup>2), 3)</sup>

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



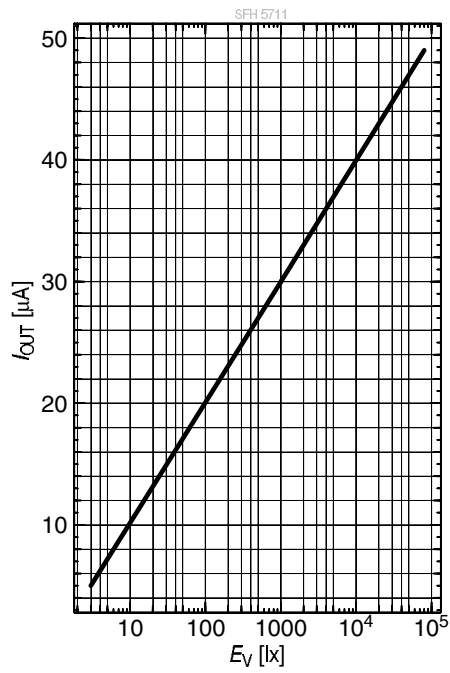
## Directional Characteristics <sup>2), 3)</sup>

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



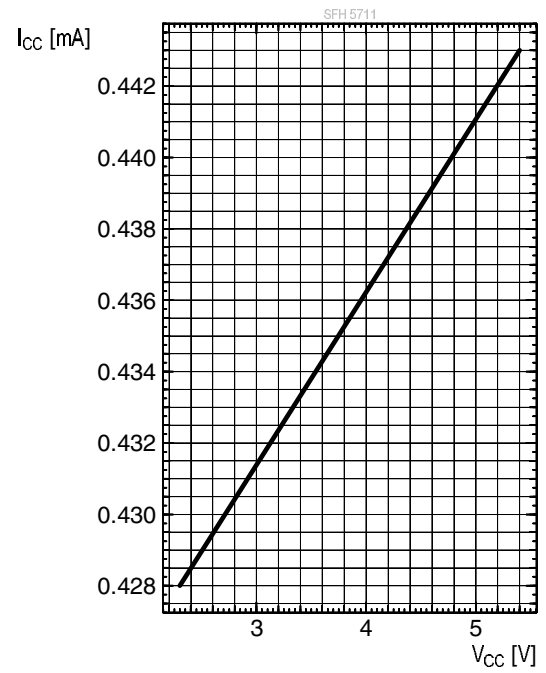
### Output Current <sup>2), 3)</sup>

$$I_{OUT} = f(E_V)$$

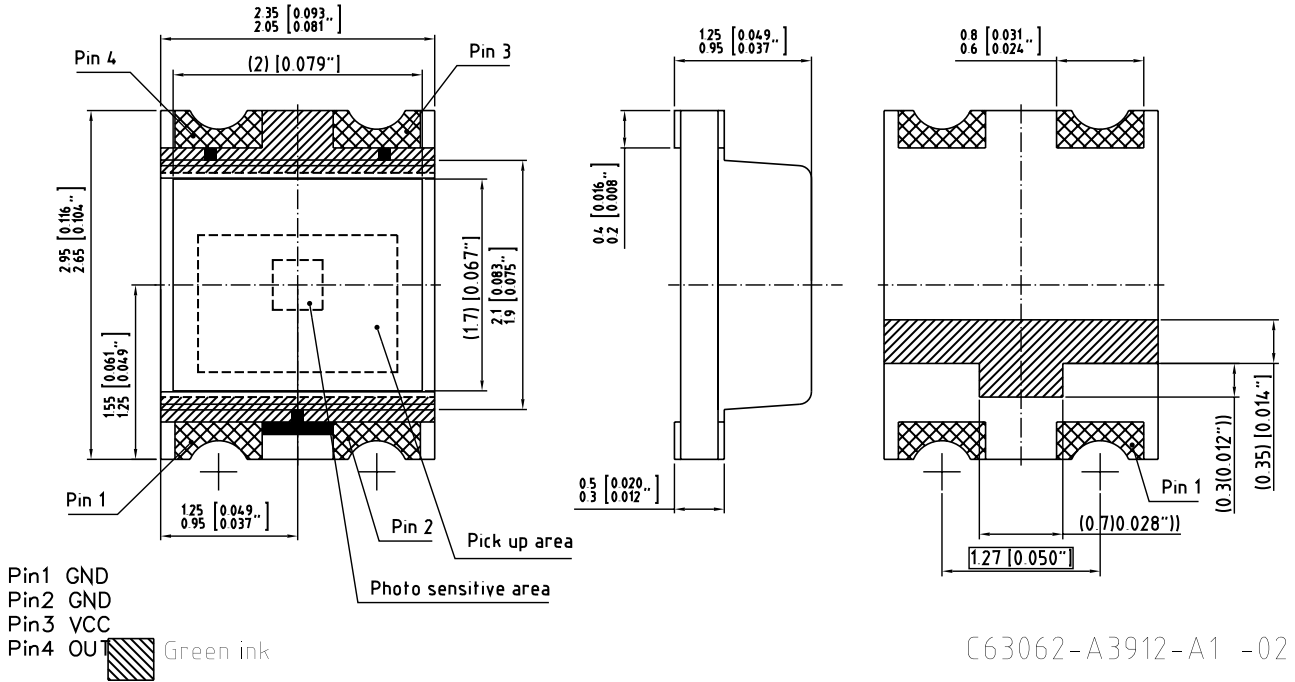


### Current Consumption <sup>2), 3)</sup>

$$I_{CC} = f(V_{CC});$$



Dimensional Drawing 4)

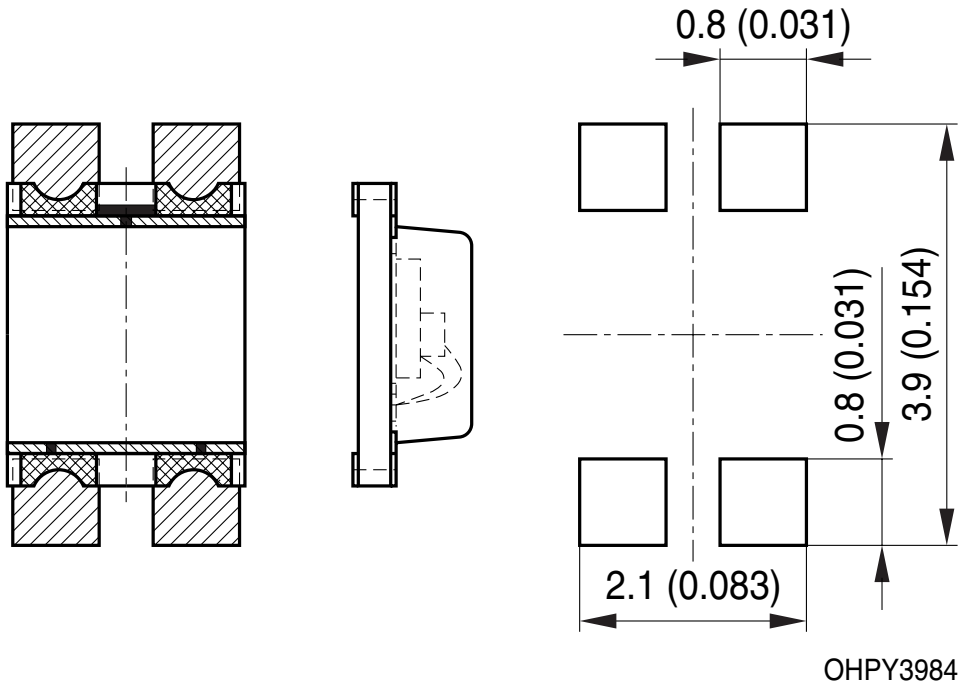


Further Information:

Approximate Weight: 9.8 mg

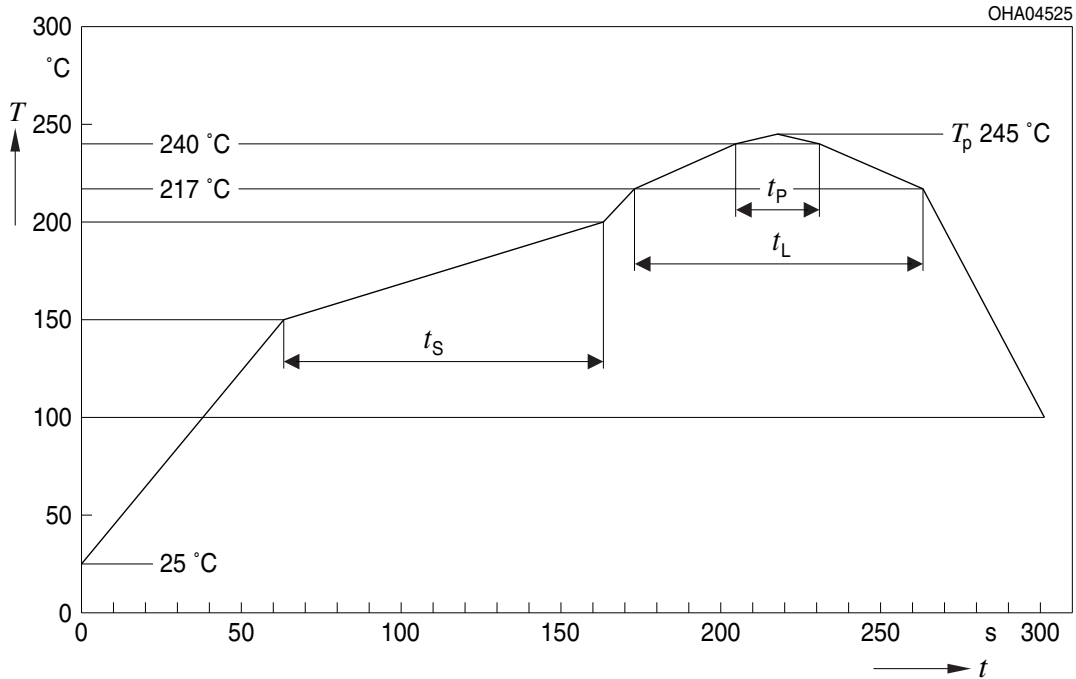
Pin	Description
1	GND
2	GND
3	V <sub>CC</sub>
4	I <sub>OUT</sub>

Recommended Solder Pad <sup>4)</sup>



## Reflow Soldering Profile

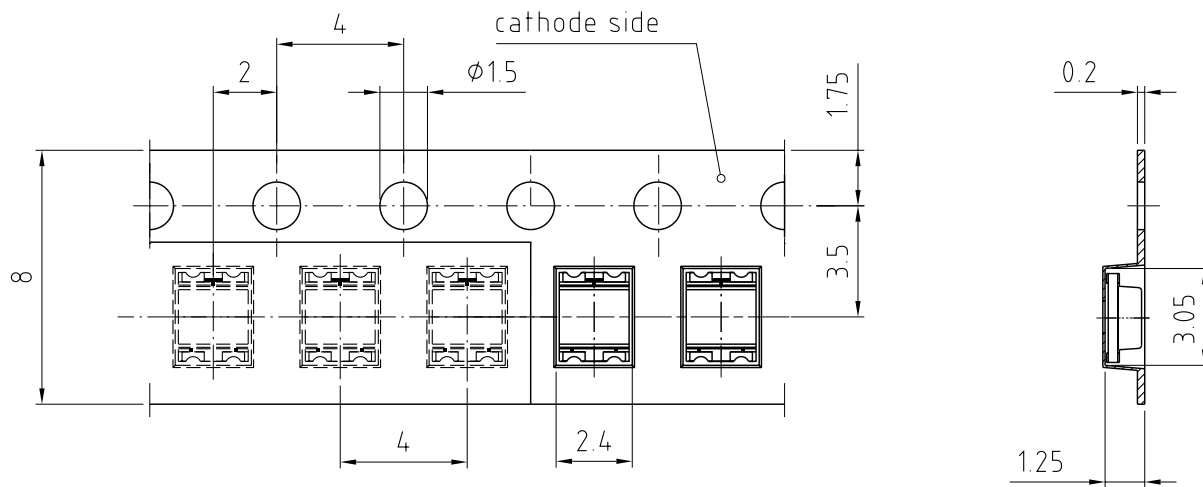
Product complies to MSL Level 3 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 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 <sup>*)</sup> $T_{Smax}$ 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 $T_p - 5\text{ K}$	$t_p$	10	20	30	s
Ramp-down rate* $T_p$ to 100 °C			3	6	K/s
Time 25 °C to $T_p$				480	s

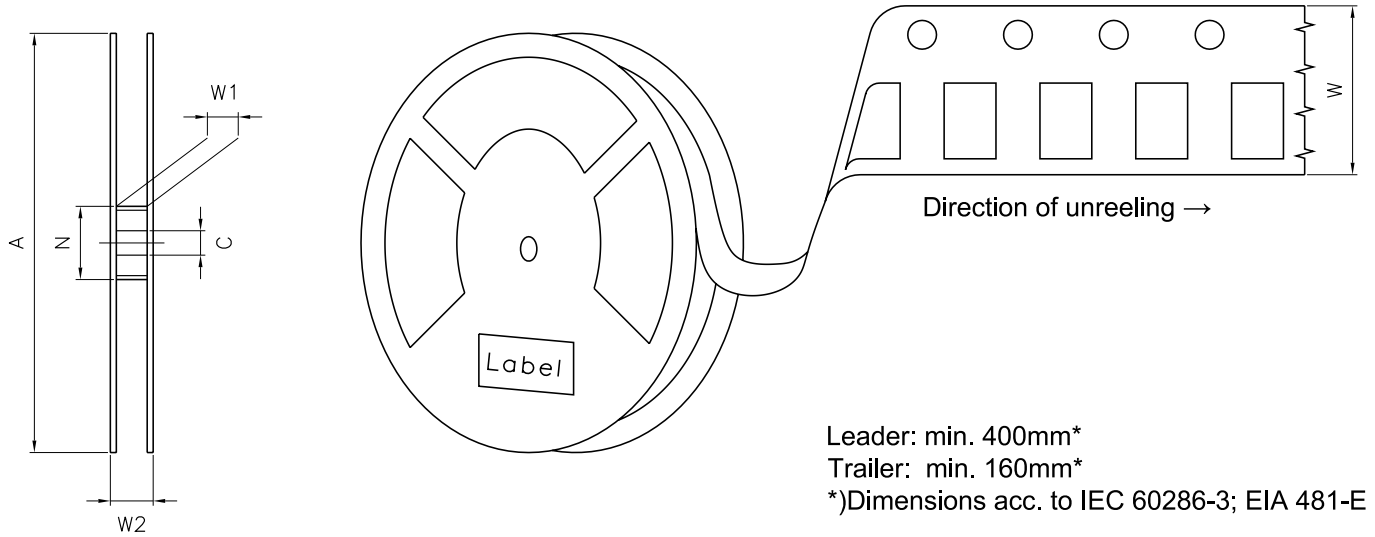
All temperatures refer to the center of the package, measured on the top of the component  
<sup>\*)</sup> slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

Taping <sup>4)</sup>



C63062-A3912-B1-03

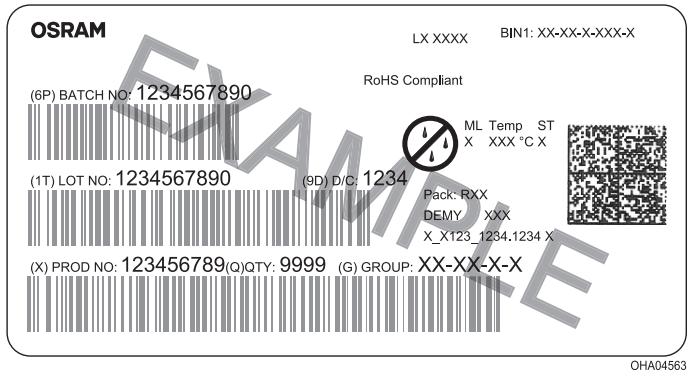
## Tape and Reel <sup>5)</sup>



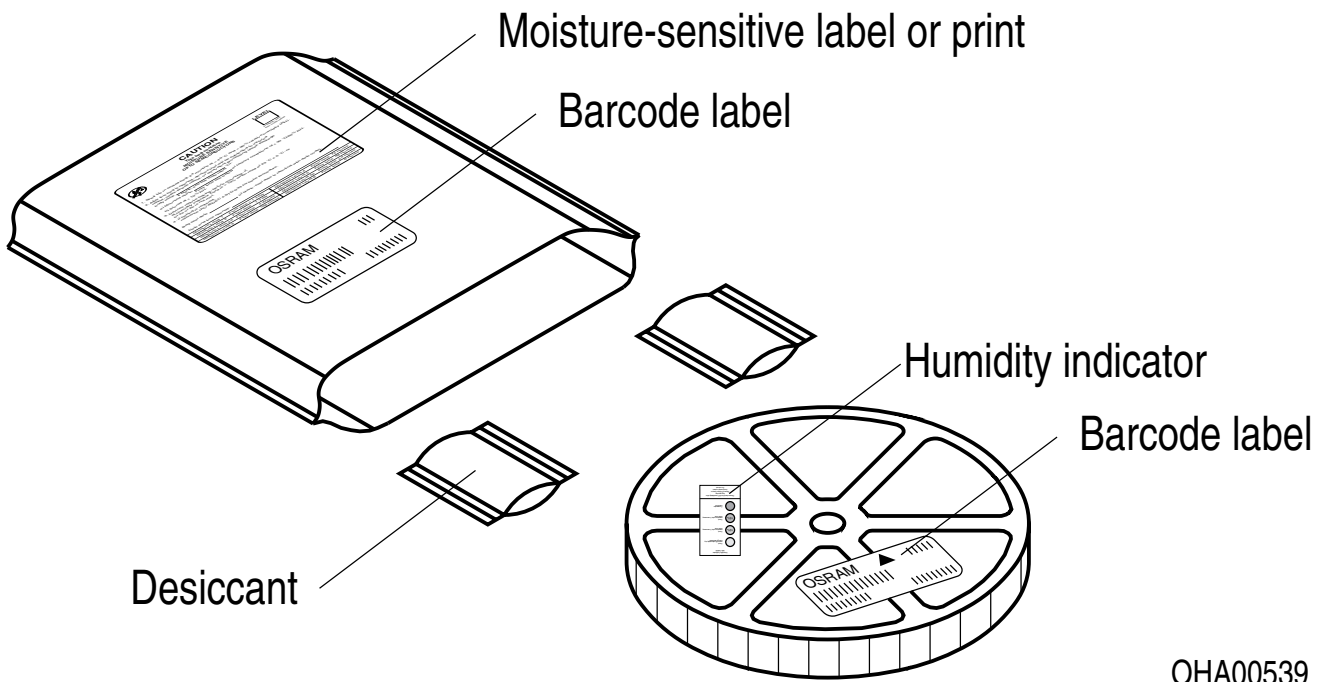
## Reel Dimensions

A	W	$N_{\min}$	$W_1$	$W_{2\max}$	Pieces per PU
180 mm	$8 + 0.3 / - 0.1$ mm	60 mm	$8.4 + 2$ mm	14.4 mm	2000

### Barcode-Product-Label (BPL)



### Dry Packing Process and Materials <sup>4)</sup>



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



## 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.

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## Glossary

- 1) **Photocurrent:** The photocurrent values are measured (by irradiating the devices with a homogenous light source and applying a voltage to the device) with a tolerance of  $\pm 11\%$ .
- 2) **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.
- 3) **Testing temperature:**  $T_A = 25^\circ\text{C}$  (unless otherwise specified)
- 4) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 5) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

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## Revision History

Version	Date	Change
1.9	2021-05-04	New Layout
1.10	2021-09-30	Brand
1.11	2024-03-14	Brand New Layout Applications Electro - Optical Characteristics (Diagrams) Dimensional Drawing Taping

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EU RoHS and China RoHS compliant product

此产品符合欧盟 RoHS 指令的要求；  
按照中国的相关法规和标准，  
不含有毒有害物质或元素。

**Published by ams-OSRAM AG**

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