

# Ambient Light Sensor

## Preliminary Version 0.2

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### SFH 5701



#### Features:

- Analog output current is proportional to Ambient Light Intensity
- Spectral response close to human eye sensitivity
- Integrated dark current suppression
- Built in thermal compensation
- Linear response over 6 decades of illumination range

#### Applications

- Control of display backlighting
- Mobile devices
- Home automation/ smart speakers
- Smart TV
- Industrial displays
- Smart lighting control

#### Ordering Information

Type:	Output current $I_{OUT}$ [ $\mu A$ ] $V_{DD} = 5 V, E_V = 100 lx$ (white LED)	Ordering Code
SFH 5701	typ. 135	Q65112A5752

*Note:* Only one bin within one packing unit, see characteristics.

**Maximum Ratings** ( $T_A = 25\text{ °C}$ )

Parameter	Symbol	Values	Unit
Operation temperature range	$T_{op}$	-40 ... 100	°C
Storage temperature range	$T_{stg}$	-40 ... 100	°C
Supply voltage	$V_{ddmax}$	6	V
Supply current (internally limited)	$I_{ddmax}$	15	mA
Forward voltage	$V_F$	0.56	V
Forward current	$I_F$	0.5	mA
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2000	V
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-002 - CDM)	$V_{ESD}$	750	V
ESD withstand voltage (acc. to ANSI/ ESDA/ JESD22-A115-MM)	$V_{ESD}$	400	V

**Operating Conditions**

Parameter	Symbol	Values			Unit
		min	typ	max	
Supply voltage (for the choice of $R_{LOAD}$ refer to Appnote AN132)	$V_{dd}$	1.45		5.5	V
Supply current ( $V_{DD} = 5\text{ V}$ , for the choice of $R_{LOAD}$ refer to Appnote AN132)	$I_{dd}$	0.01		10k	$\mu\text{A}$
Illuminance range	$E_V$	0.01		10k	lx

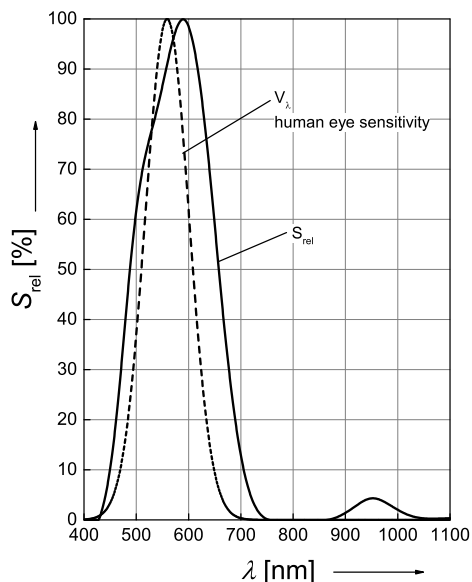
**Characteristics** ( $T_A = 25\text{ °C}$ )

Parameter	Symbol	Values	Unit
Spectral sensitivity ( $V_{DD} = 5\text{ V}$ , $E_V = 100\text{ lx}$ , white LED)	S	1	$\mu\text{A}/\text{lx}$
Wavelength of max. sensitivity	$\lambda_{S\ max}$	600	nm
Spectral range of sensitivity	$\lambda_{10\%}$ (min) $\lambda_{10\%}$ (max)	450 705	nm nm
Dimensions of radiant sensitive area	L x W	0.33 x 0.33	mm x mm
Half angle	$\varphi$	$\pm 60$	°
Output impedance	$Z_{OUT}$	10	$\text{M}\Omega$
Forward voltage ( $I_F = 200\ \mu\text{A}$ , $E = 0$ )	$V_F$	0.52	V

Parameter		Symbol	Values	Unit
Supply current ( $V_{DD} = 5\text{ V}$ , $E_V = 100\text{ lx}$ (white LED))	(typ)	$I_{dd}$	135	$\mu\text{A}$
Output dark current ( $V_{DD} = 5\text{ V}$ , $E_V = 0\text{ lx}$ )	(typ)	$I_{OUT\_dark}$	3.4	nA
	(max)	$I_{OUT\_dark}$	50	nA
Rise time ( $R_L = 33\text{ k}\Omega$ , $E_V = 100\text{ lx}$ , for different testing conditions refer to the Appnote AN132)	(typ)	$t_r$	14	ms
Temperature coefficient	(typ)	$T_{C\ IOUT}$	-0.07	%/ K

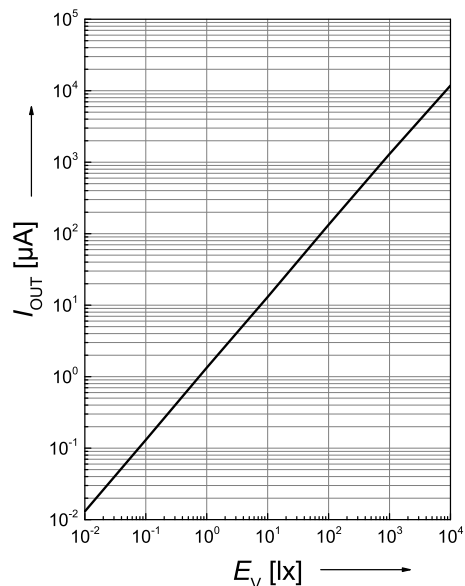
**Relative Spectral Sensitivity** <sup>1) page 12</sup>

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



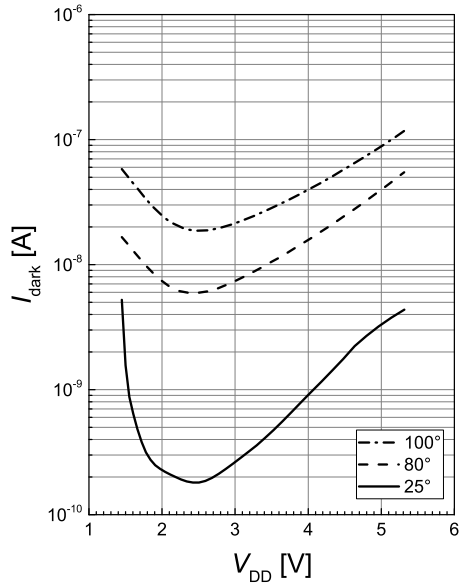
**Output Current** <sup>1) page 12</sup>

$I_{OUT} = f(E_V)$ ; white LED;  $V_{DD} = 5\text{ V}$



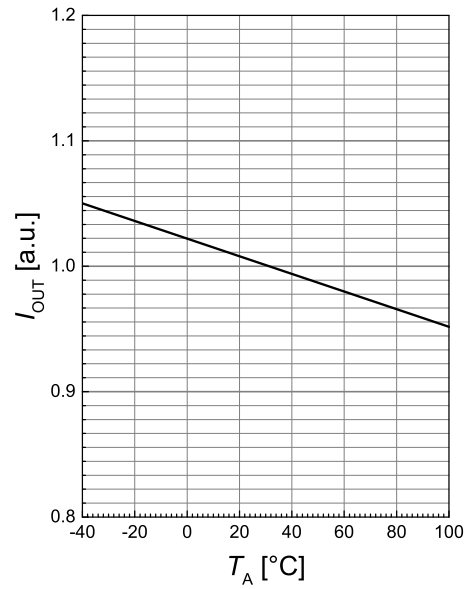
**Dark Current** <sup>1) page 12</sup>

$$I_{\text{dark}} = f(V_{\text{DD}})$$



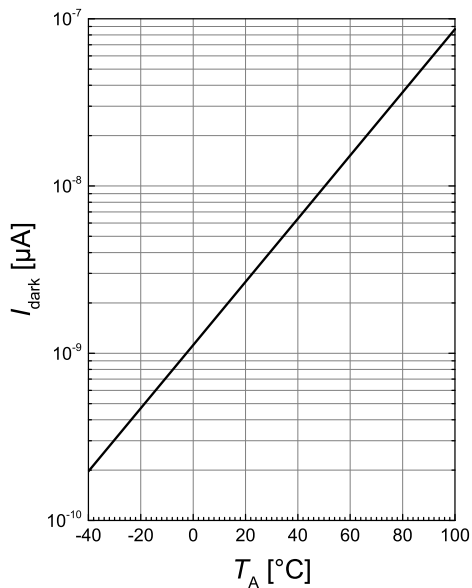
**Output Current** <sup>1) page 12</sup>

$$I_{\text{OUT}}(T) / I_{\text{OUT}}(25^\circ\text{C}) = f(T_A); E_v = 100\text{lx}; \text{white LED}; V_{\text{DD}} = 5 \text{ V}$$



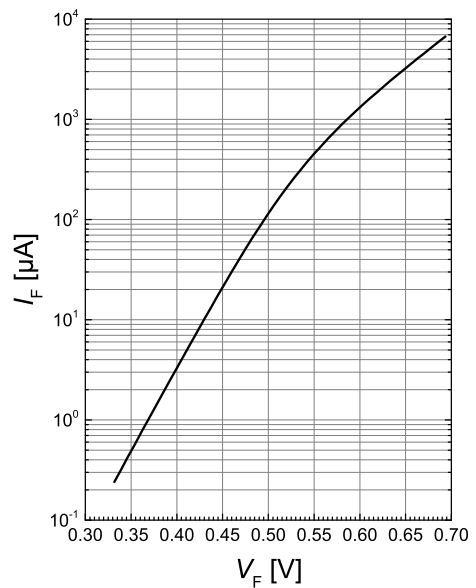
**Dark Current** <sup>1) page 12</sup>

$$I_{\text{dark}} = f(T_A)$$



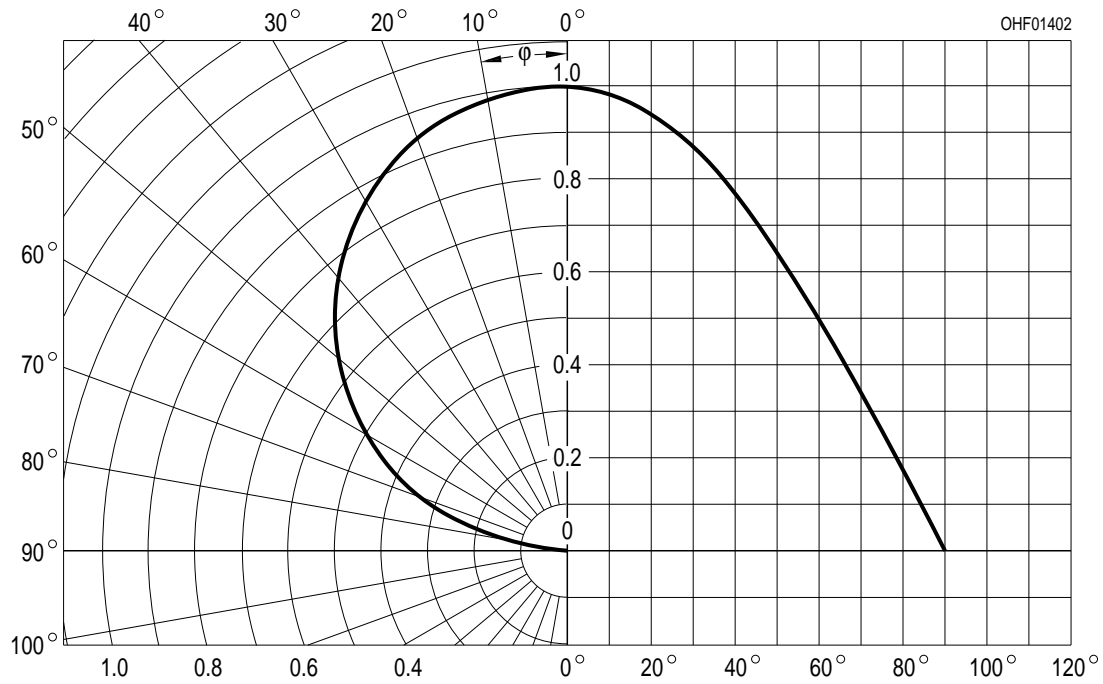
**Forward Current** <sup>1) page 12</sup>

$$I_F = f(V_F)$$

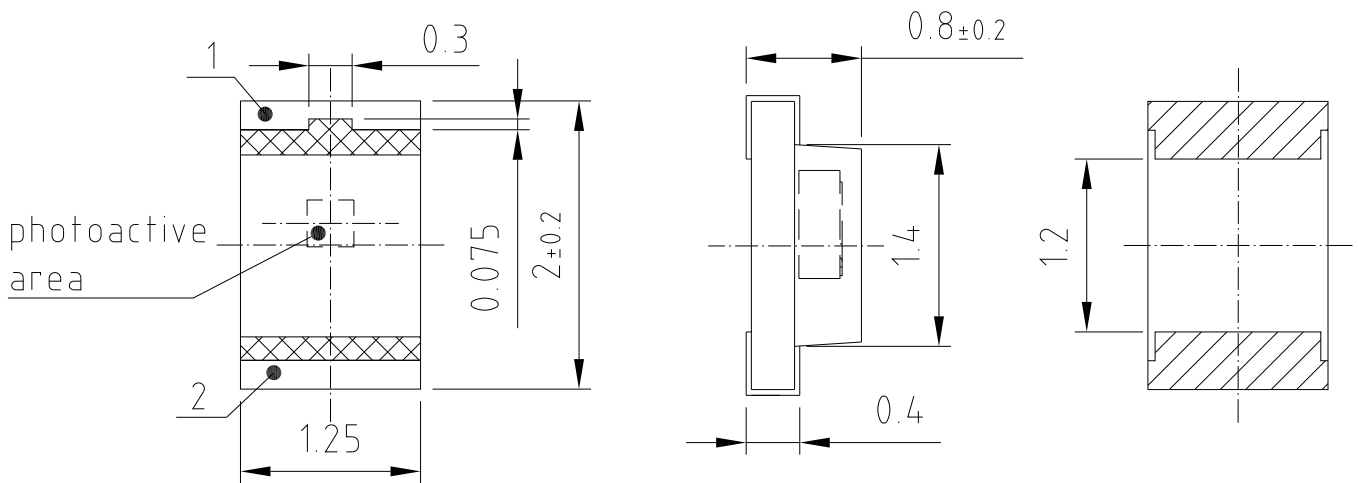


**Directional Characteristics (Horizontal)** <sup>1) page 12</sup>

Photodiode  $S_{rel} = f(\phi)$



**Package Outline**



general tolerance  $\pm 0.1$   
lead finish Au

C67062-A0260-A1KA-01

Dimensions in mm.

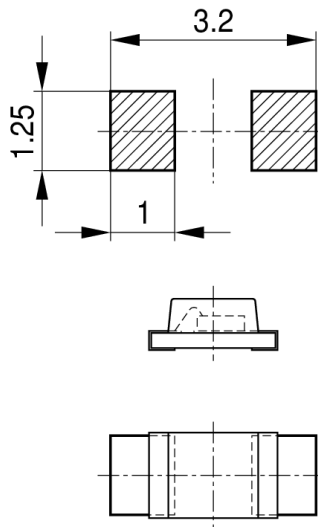
**Pinning**

Pin	Description
1	anode (OUT)
2	cathode (VDD)

**Approximate Weight:**

3.8 mg

**Recommended Solder Pad**



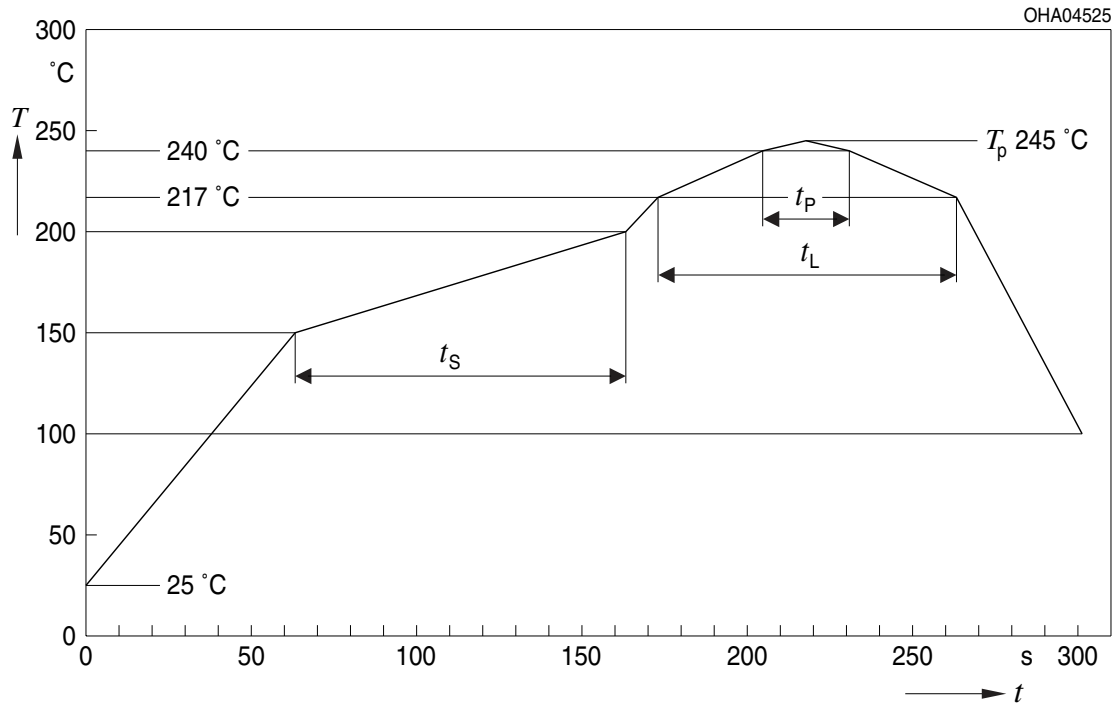
Component location on pad

OHFP2578

Dimensions in mm.

**Reflow Soldering Profile**

Product complies to MSL Level 4 acc. to JEDEC J-STD-020E

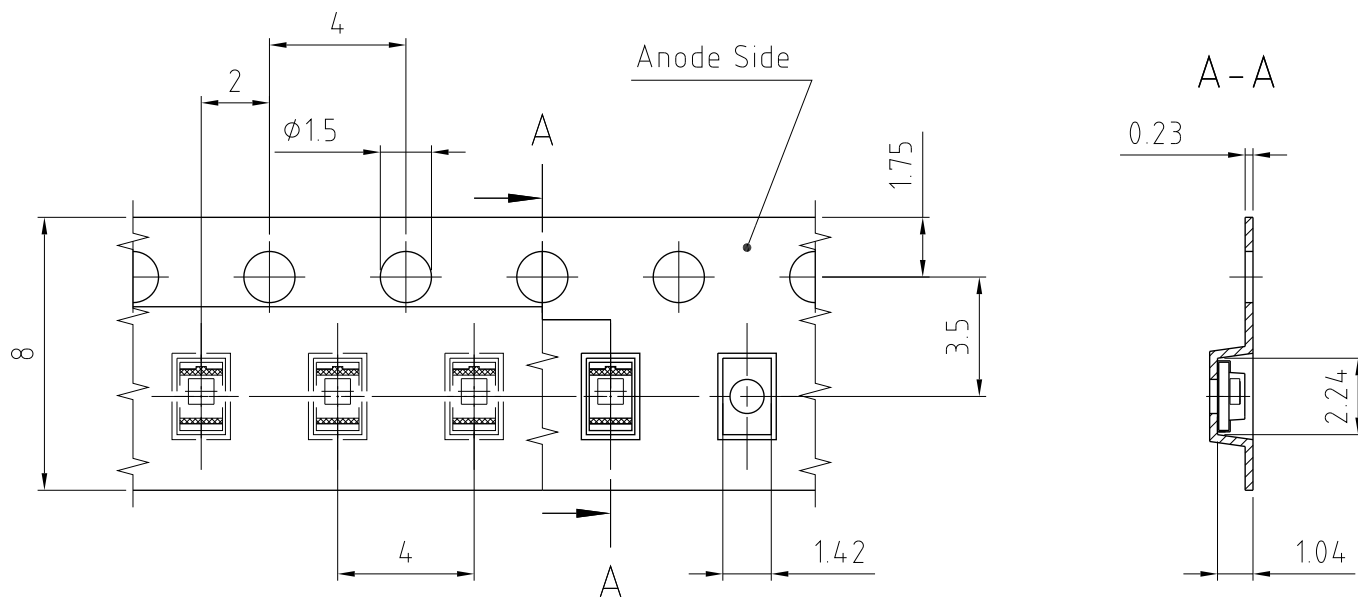


OHA04612

Profile Feature Profil-Charakteristik	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Unit Einheit
		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

**Taping**

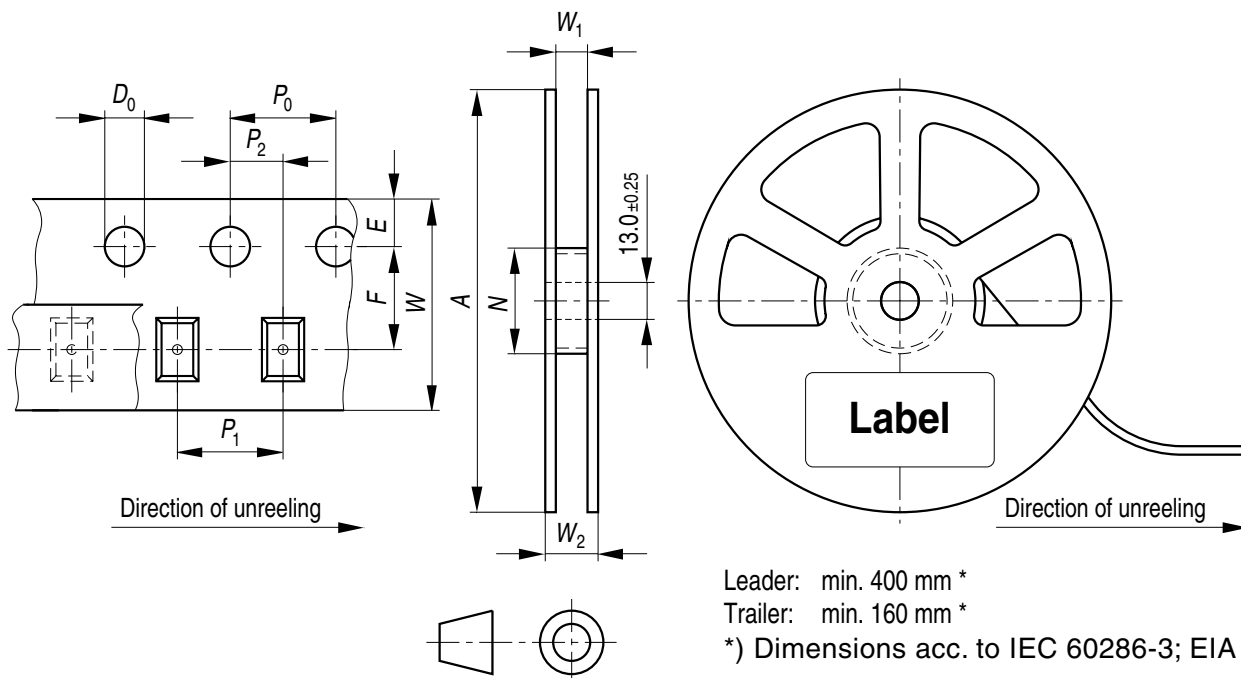


C67062-A0260-B1-03

Dimensions in mm.

**Tape and Reel**

8 mm tape with 3000 pcs. on  $\phi 180$  mm reel



Leader: min. 400 mm \*

Trailer: min. 160 mm \*

\*) Dimensions acc. to IEC 60286-3; EIA 481-D

OHAY0324



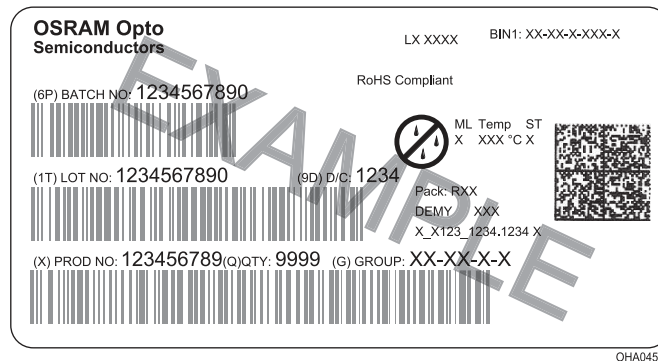
**Tape dimensions [mm]**

W	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	D <sub>0</sub>	E	F
8 + 0.3 / -0.1	4 ± 0.1	2 ± 0.05 or 4 ± 0.1	2 ± 0.05	1.5 ± 0.1	1.75 ± 0.1	3.5 ± 0.05

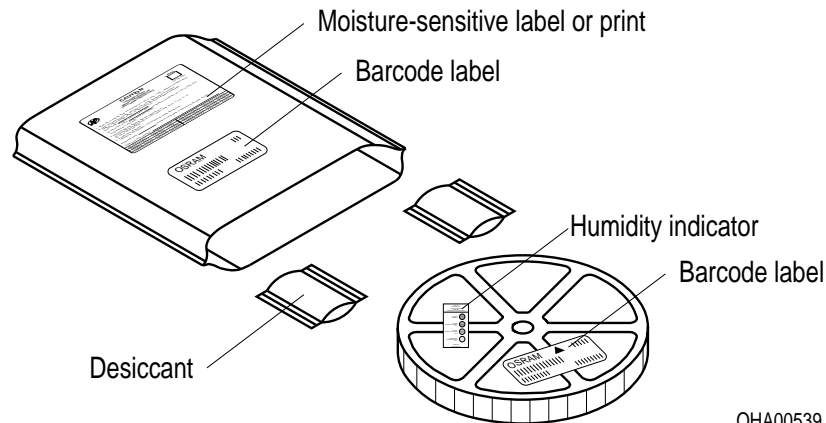
**Reel dimensions [mm]**

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2max</sub>
180	8	60	8.4 + 2	14.4

**Barcode-Product-Label (BPL)**



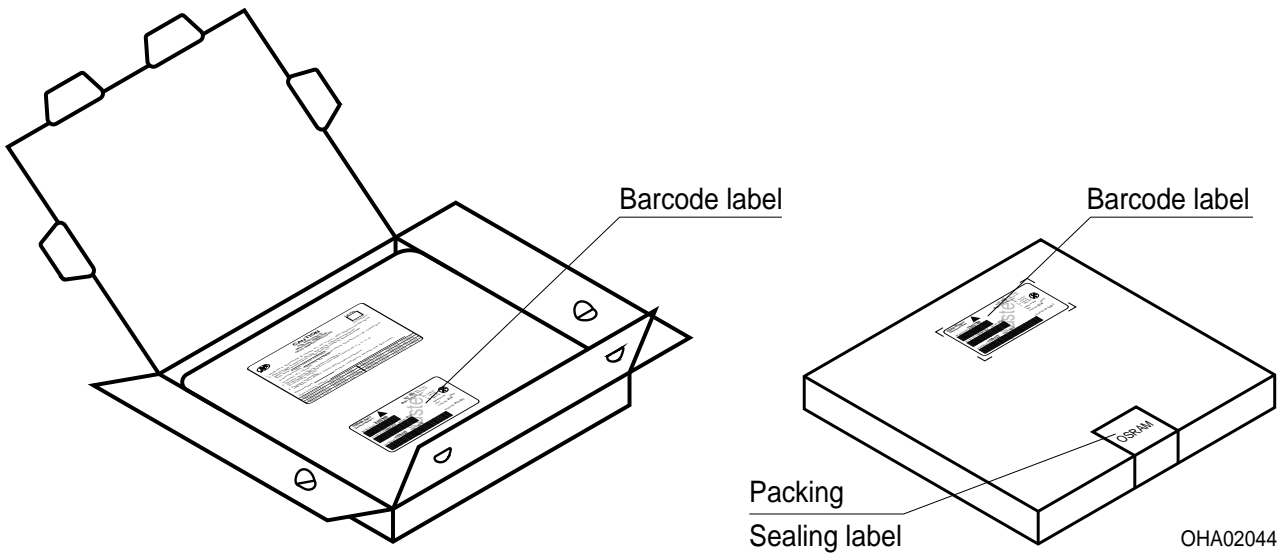
**Dry Packing Process and Materials**



**Note:**

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card. Regarding dry pack you will find further information in the internet. Here you will also find the normative references like JEDEC.

Transportation Packing and Materials



OHA02044

Dimensions of transportation box in mm

Width	Length	Height
200 ± 5	195 ± 5	30 ± 5

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## Glossary

- <sup>1)</sup> **Typical Values:** Due to the special conditions of the manufacturing processes of LED, 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.

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