

Ambient Light Sensor

Preliminary Version 0.2

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} [μ 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	μA
Illuminance range	E_V	0.01		10k	lx

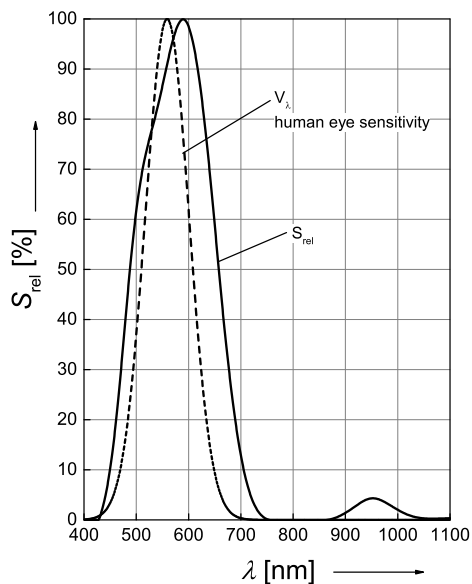
Characteristics ($T_A = 25\text{ °C}$)

Parameter	Symbol	Values	Unit
Spectral sensitivity ($V_{DD} = 5\text{ V}$, $E_V = 100\text{ lx}$, white LED)	S	1	$\mu\text{A/ lx}$
Wavelength of max. sensitivity	$\lambda_{S\ max}$	600	nm
Spectral range of sensitivity	$\lambda_{10\%}$	450	nm
	$\lambda_{10\%}$	705	nm
Dimensions of radiant sensitive area	L x W	0.33 x 0.33	mm x mm
Half angle	φ	± 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	μA
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

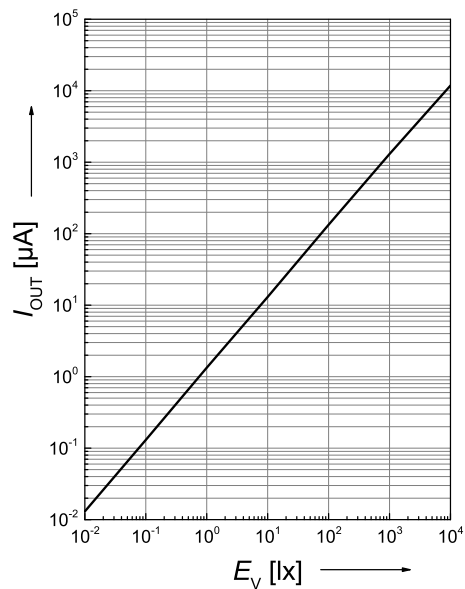
Relative Spectral Sensitivity ^{1) page 12}

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



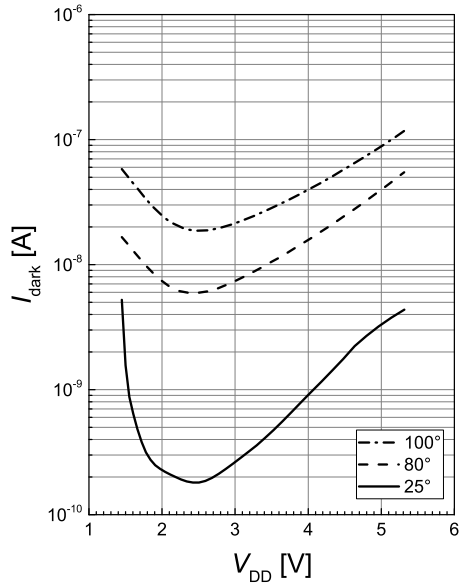
Output Current ^{1) page 12}

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



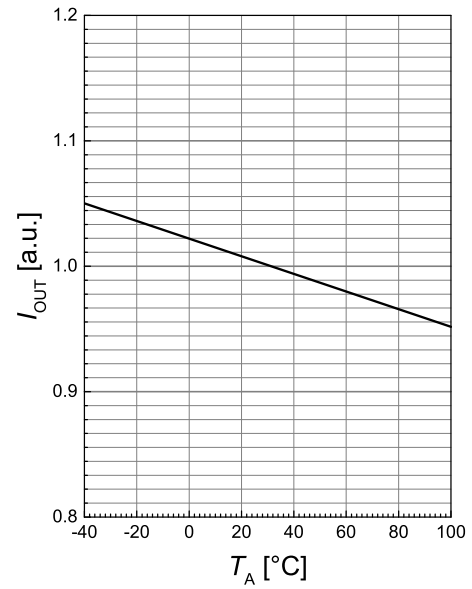
Dark Current ^{1) page 12}

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



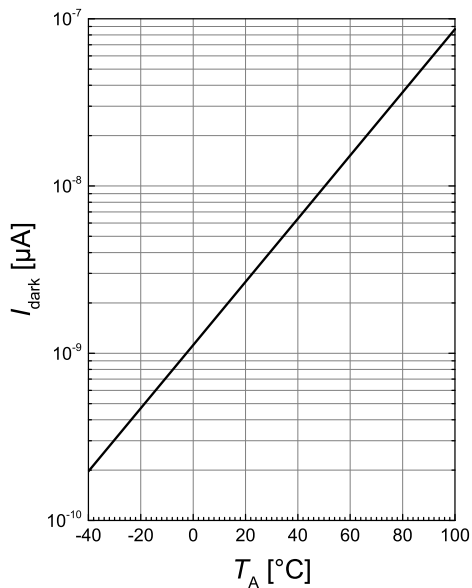
Output Current ^{1) page 12}

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



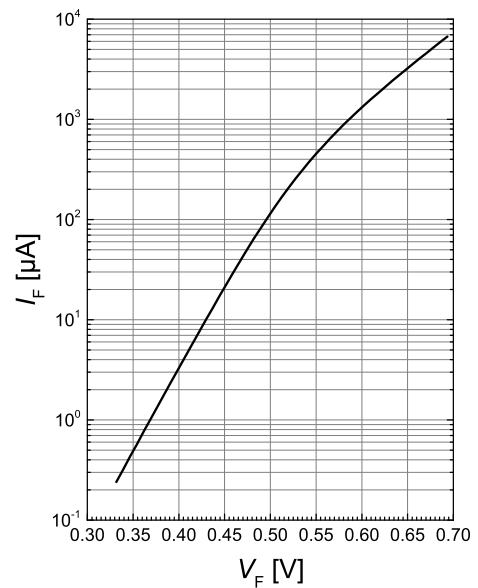
Dark Current ^{1) page 12}

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



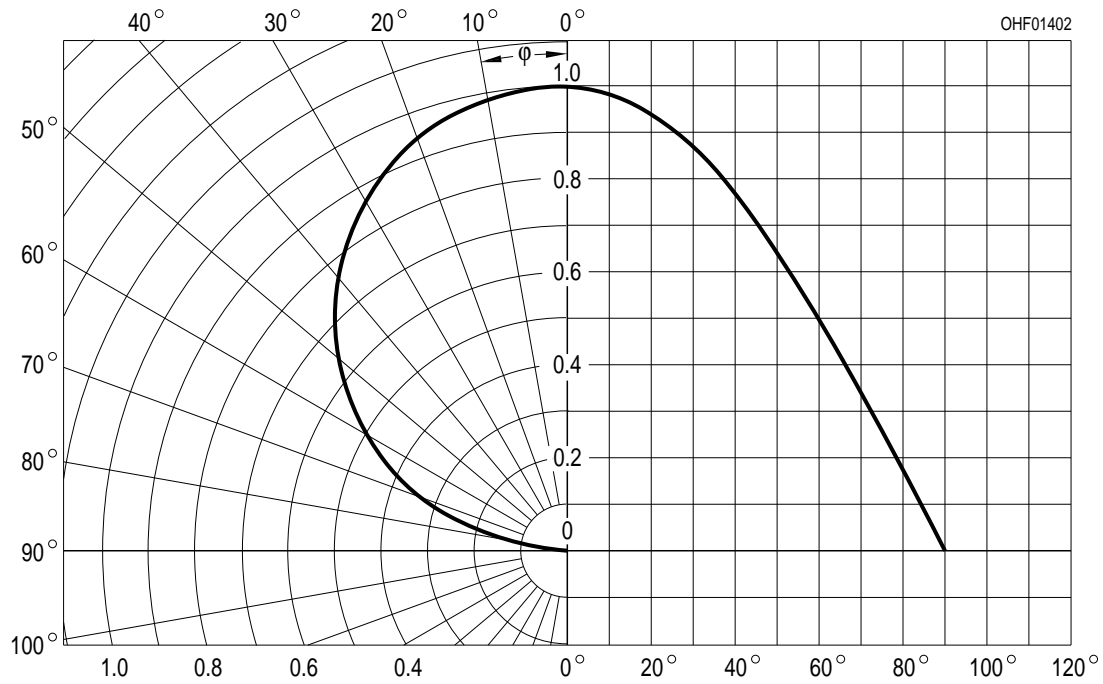
Forward Current ^{1) page 12}

$$I_F = f(V_F)$$

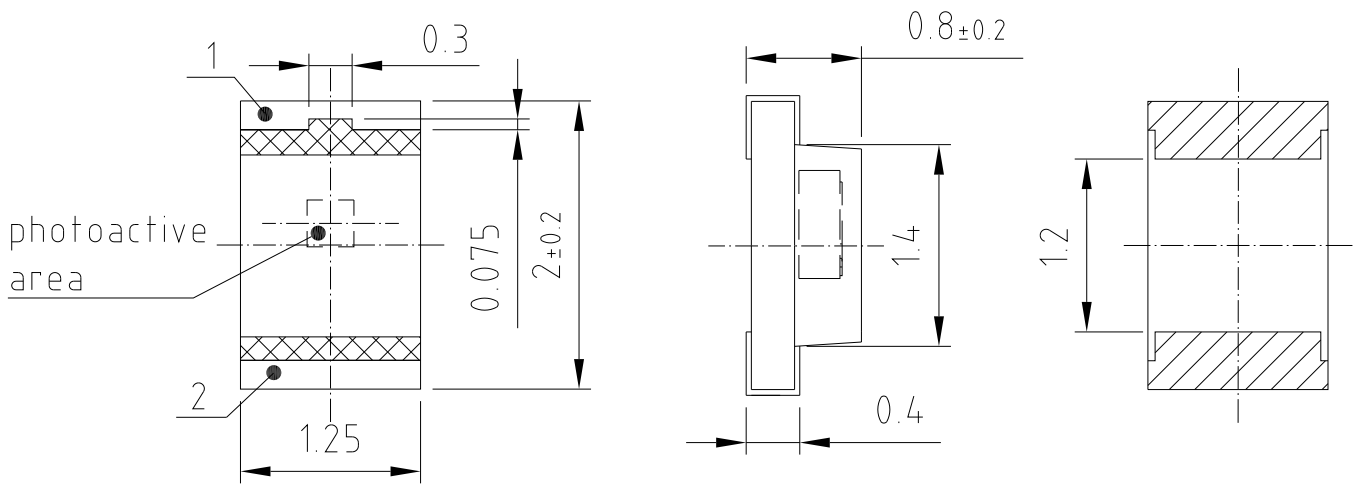


Directional Characteristics (Horizontal) ^{1) page 12}

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



Package Outline



general tolerance ± 0.1
 lead finish Au

C67062-A0260-A1KA-01

Dimensions in mm.

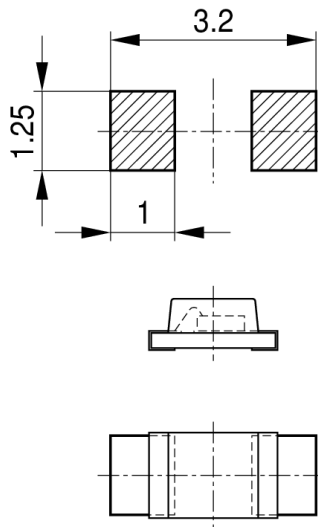
Pinning

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

Approximate Weight:

3.8 mg

Recommended Solder Pad



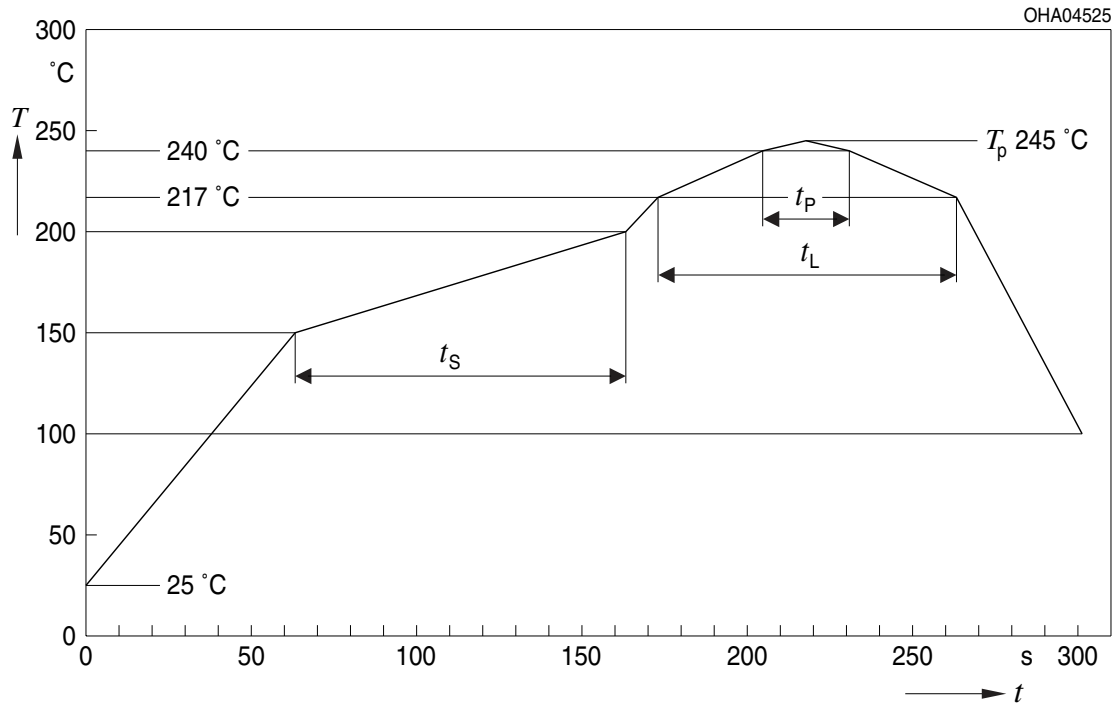
Component location on pad

OHFP2578

Dimensions in mm.

Reflow Soldering Profile

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

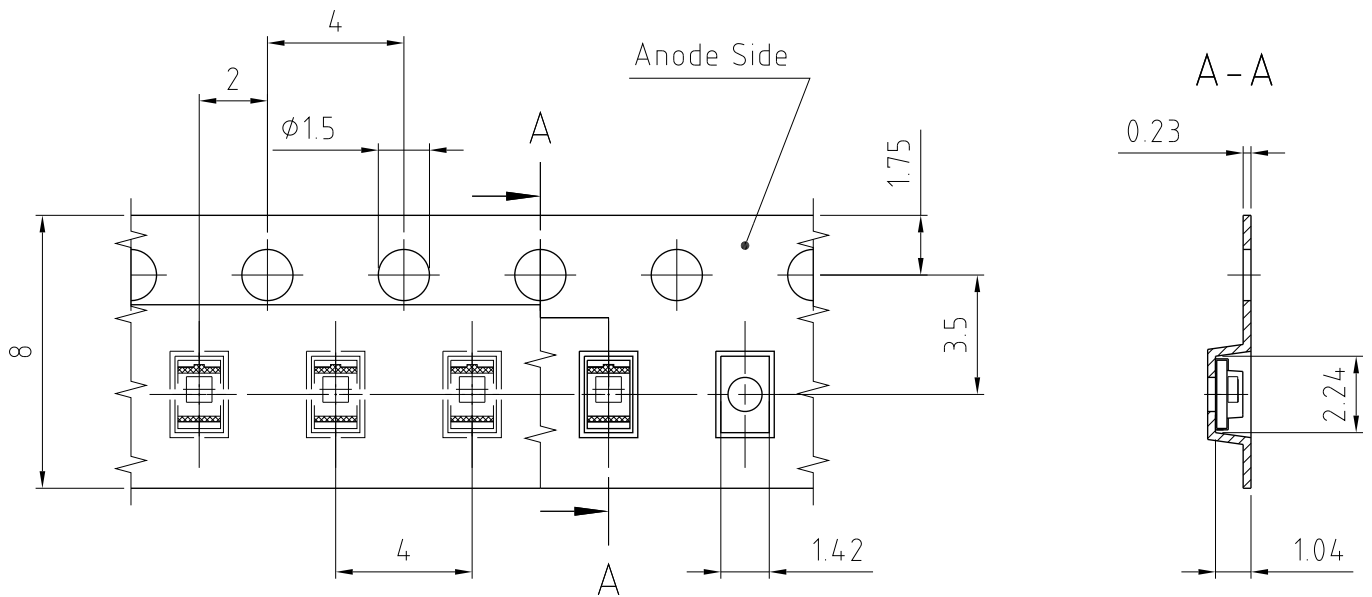


OHA04612

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

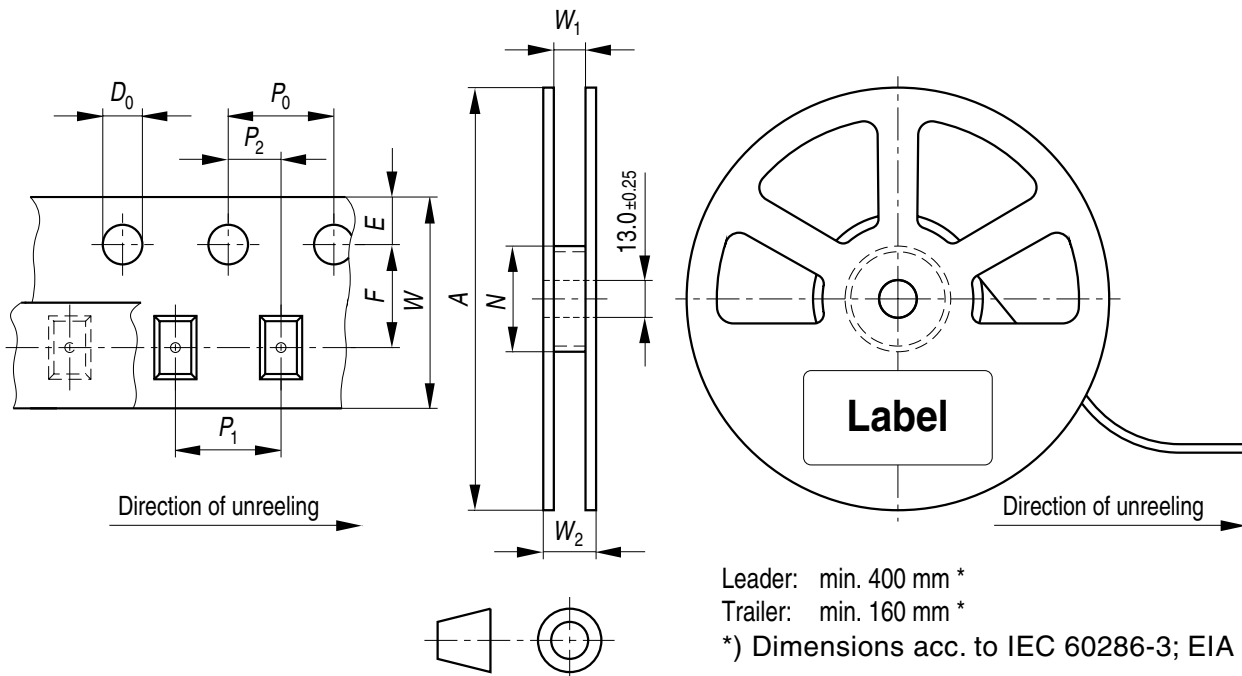


C67062-A0260-B1-03

Dimensions in mm.

Tape and Reel

8 mm tape with 3000 pcs. on ϕ 180 mm reel



Leader: min. 400 mm *

Trailer: min. 160 mm *

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

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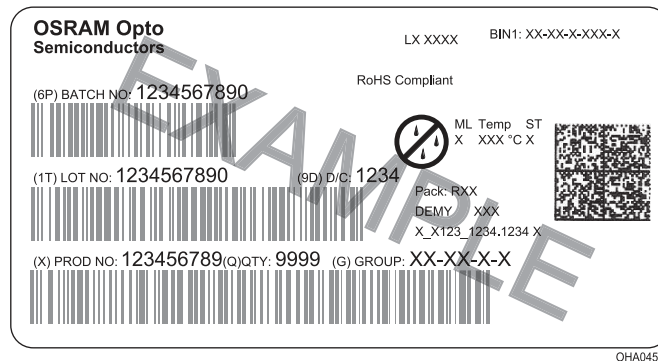
Tape dimensions [mm]

W	P ₀	P ₁	P ₂	D ₀	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

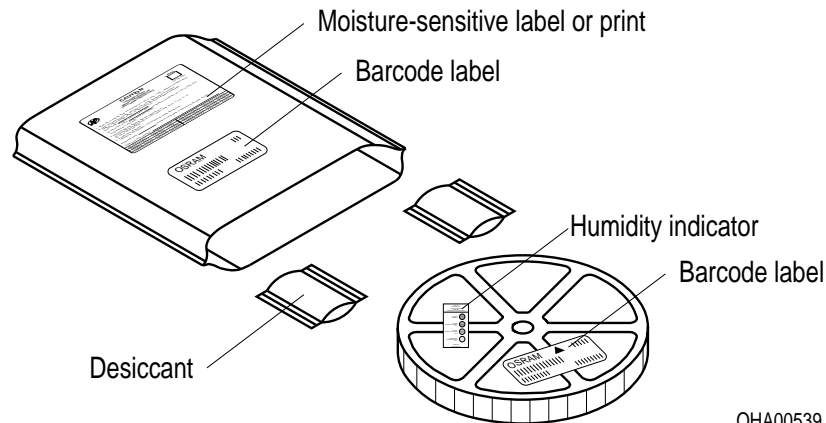
Reel dimensions [mm]

A	W	N _{min}	W ₁	W _{2max}
180	8	60	8.4 + 2	14.4

Barcode-Product-Label (BPL)



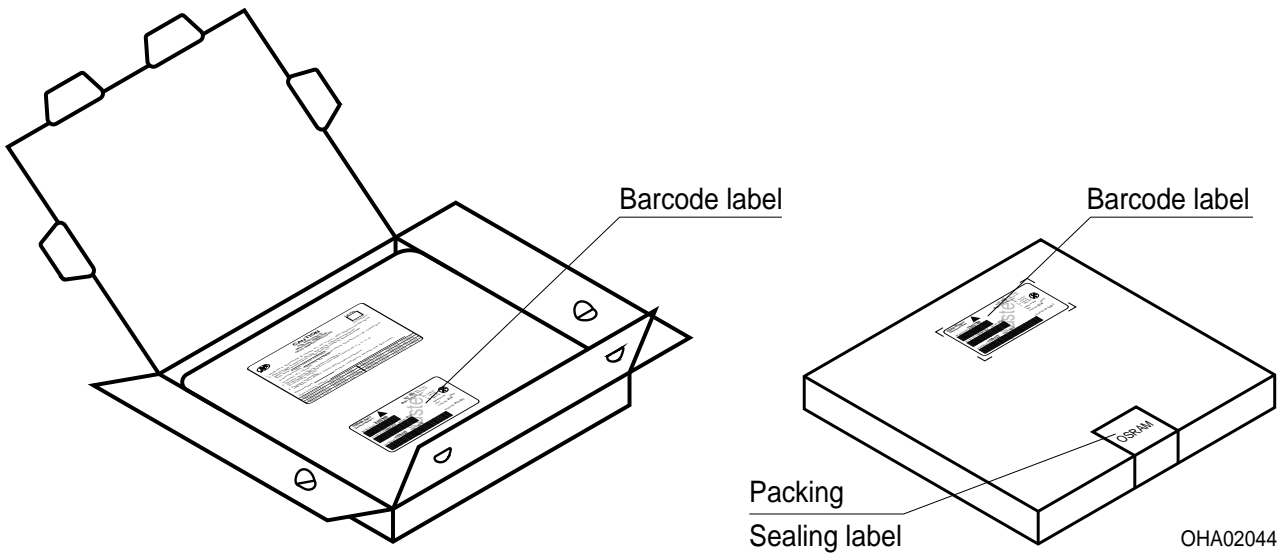
Dry Packing Process and Materials



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



Dimensions of transportation box in mm

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

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Glossary

- ¹⁾ **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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