

# Silicon NPN Phototransistor

## Version 1.3

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### SFH 3204



#### Features:

- **Spectral range of sensitivity:** (typ) 450 ... 1120 nm
- **Special:** Large viewing angle  $\pm 60^\circ$

#### Applications

- Miniature photointerrupters
- Sensor technology (e.g. mobile phone)
- For control and drive circuits

#### Ordering Information

Type:	Photocurrent	Ordering Code
	$I_{PCE}$ [ $\mu A$ ] $\lambda = 950 \text{ nm}$ , $E_e = 0.1 \text{ mW/cm}^2$ , $V_{CE} = 5 \text{ V}$	
SFH 3204	$\geq 32$	Q65110A2506

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

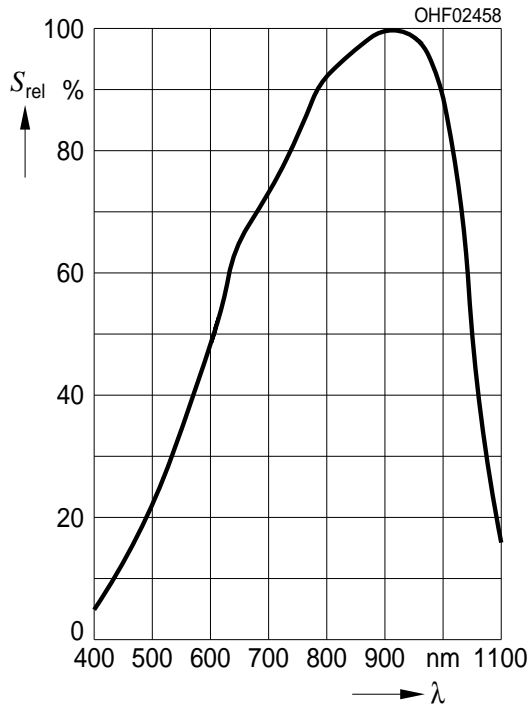
Parameter	Symbol	Values	Unit
Operating and storage temperature range	$T_{op}; T_{stg}$	-40 ... 100	°C
Collector-emitter voltage	$V_{CE}$	15	V
Collector-emitter voltage ( $t < 2\text{ min}$ )	$V_{CE}$	30	V
Collector current	$I_C$	15	mA
Collector surge current ( $\tau < 10\text{ }\mu\text{s}$ )	$I_{CS}$	75	mA
Emitter-collector voltage	$V_{EC}$	7	V
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2000	V

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

Parameter		Symbol	Values	Unit
Wavelength of max. sensitivity	(typ)	$\lambda_{S\text{ max}}$	920	nm
Spectral range of sensitivity	(typ)	$\lambda_{10\%}$	(typ) 450 ... 1120	nm
Radiant sensitive area	(typ)	A	0.04	mm <sup>2</sup>
Dimensions of chip area	(typ)	L x W	(typ) 0.38 x 0.38	mm x mm
Half angle	(typ)	$\varphi$	$\pm 60$	°
Capacitance ( $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ )	(typ)	$C_{CE}$	2.4	pF
Photocurrent ( $\lambda = 950\text{ nm}$ , $E_e = 0.1\text{ mW/cm}^2$ , $V_{CE} = 5\text{ V}$ )		$I_{PCE}$	$\geq 32$	$\mu\text{A}$
Dark current ( $V_{CE} = 20\text{ V}$ , $E = 0$ )	(typ (max))	$I_{CE0}$	1 ( $\leq 50$ )	nA
Rise and fall time ( $I_C = 1\text{ mA}$ , $V_{CC} = 5\text{ V}$ , $R_L = 1\text{ k}\Omega$ )	(typ)	$t_r, t_f$	7	$\mu\text{s}$
Collector-emitter saturation voltage ( $I_C = 10\text{ }\mu\text{A}$ , $E_e = 0.1\text{ mW/cm}^2$ )	(typ)	$V_{CEsat}$	140	mV

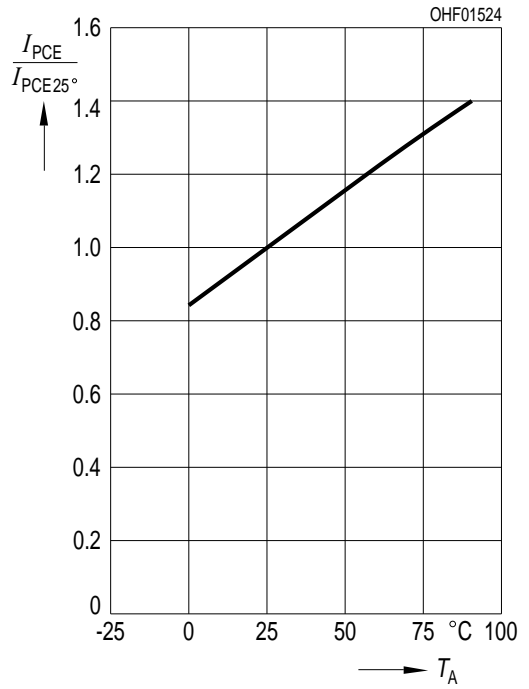
**Relative Spectral Sensitivity** <sup>1) page 11</sup>

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



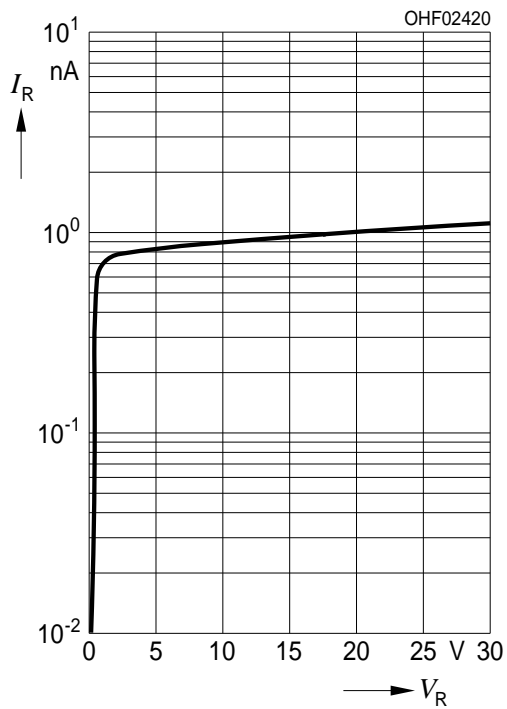
**Photocurrent** <sup>1) page 11</sup>

$I_{PCE} / I_{PCE}(25^\circ\text{C}) = f(T_A), V_{CE} = 5\text{ V}$



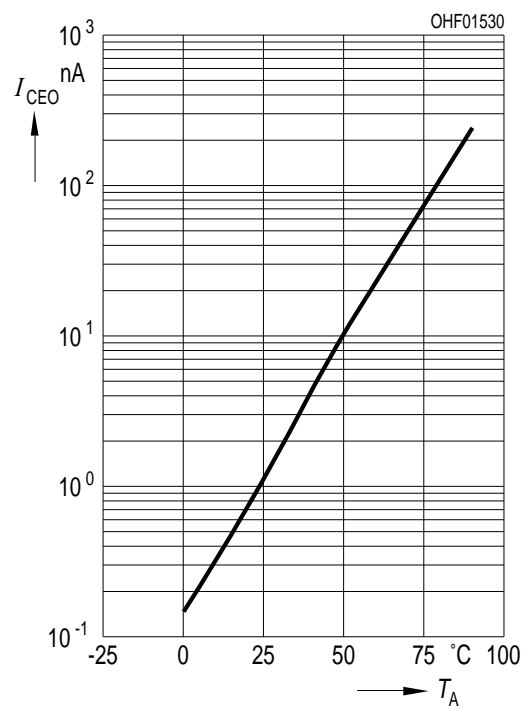
**Dark Current** <sup>1) page 11</sup>

$I_{CEO} = f(V_{CE}), E = 0$



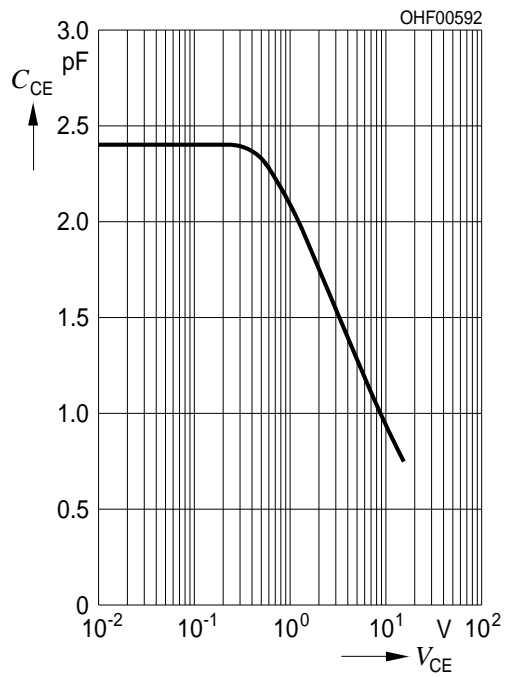
**Dark Current** <sup>1) page 11</sup>

$I_{CEO} = f(T_A), E = 0, V_{CE} = 20\text{ V}$



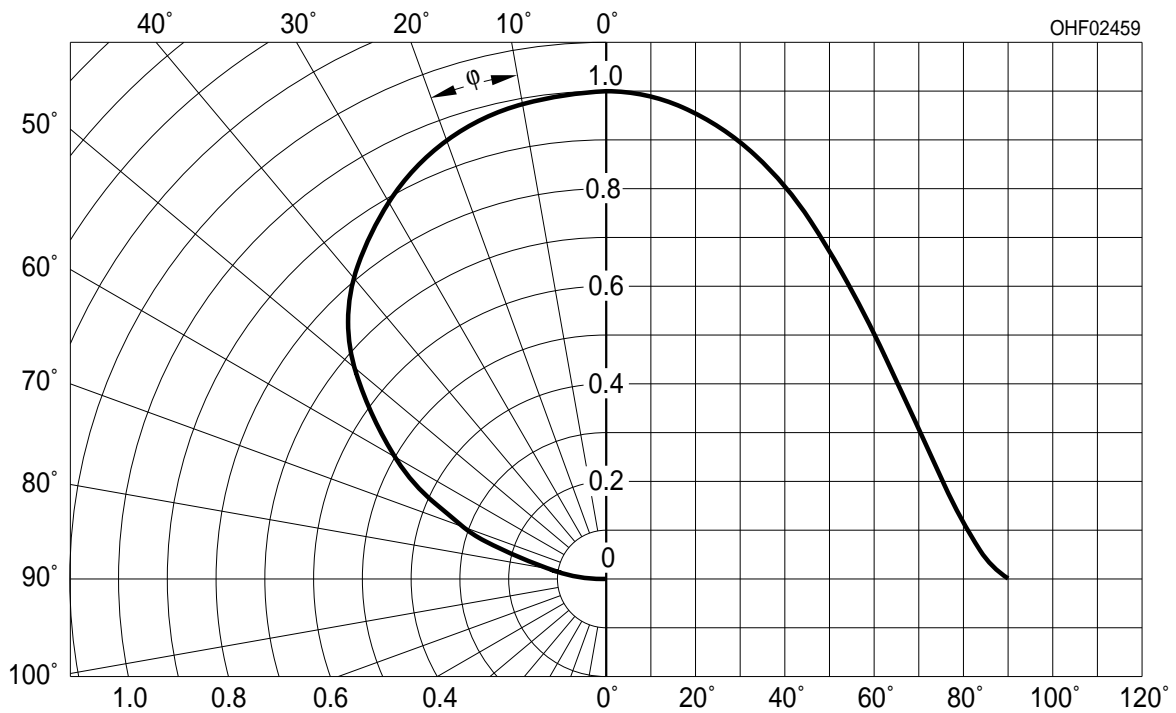
**Collector-Emitter Capacitance** <sup>1) page 11</sup>

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0$

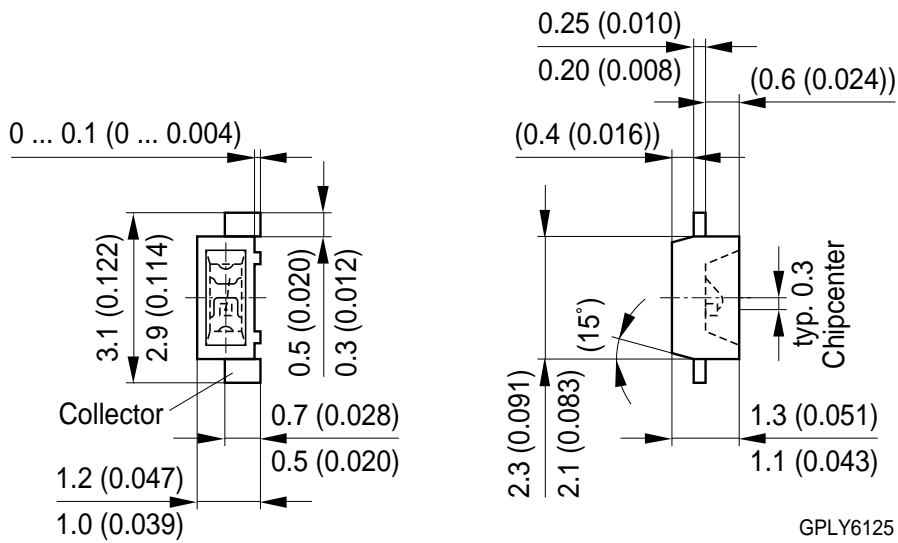


**Directional Characteristics** <sup>1) page 11</sup>

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



Package Outline

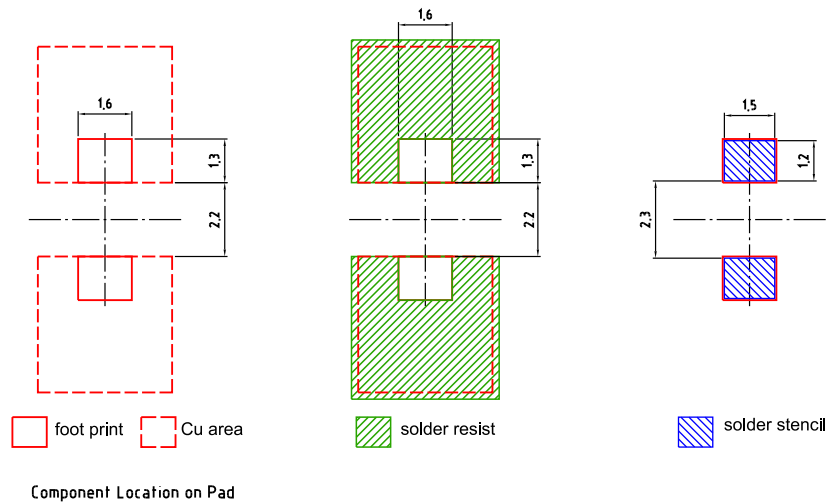


Dimensions in mm (inch).

Approximate Weight:

6 mg

Recommended Solder Pad

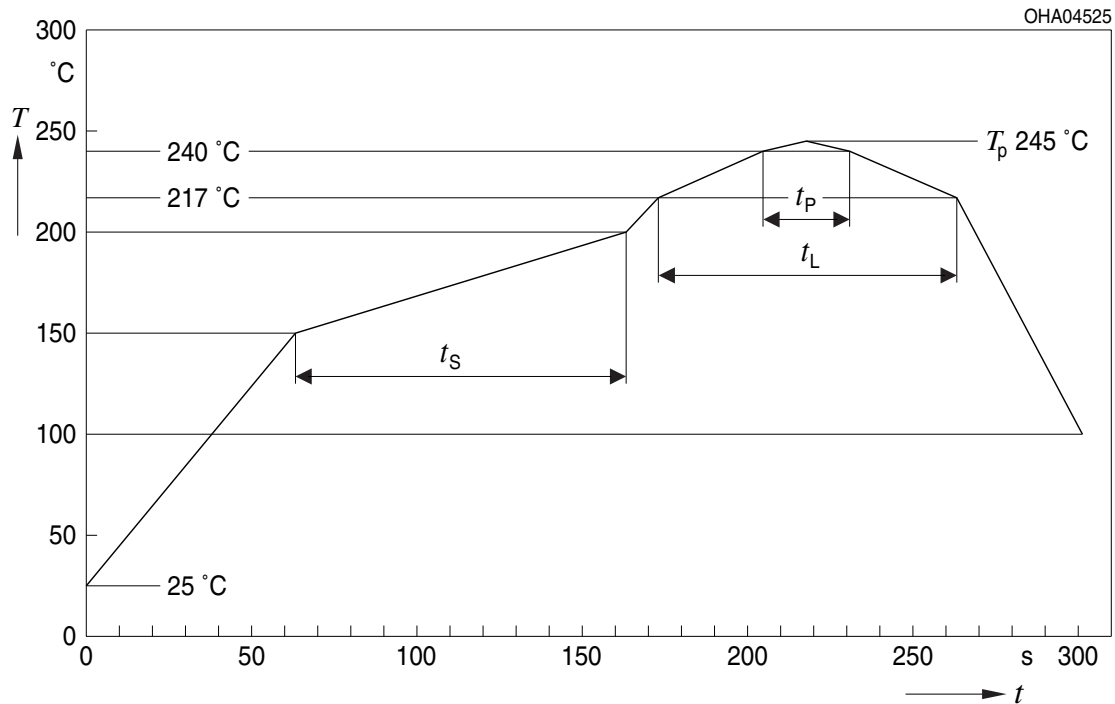


Dimensions in mm.

E062.3010.37-02

### Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020D.01



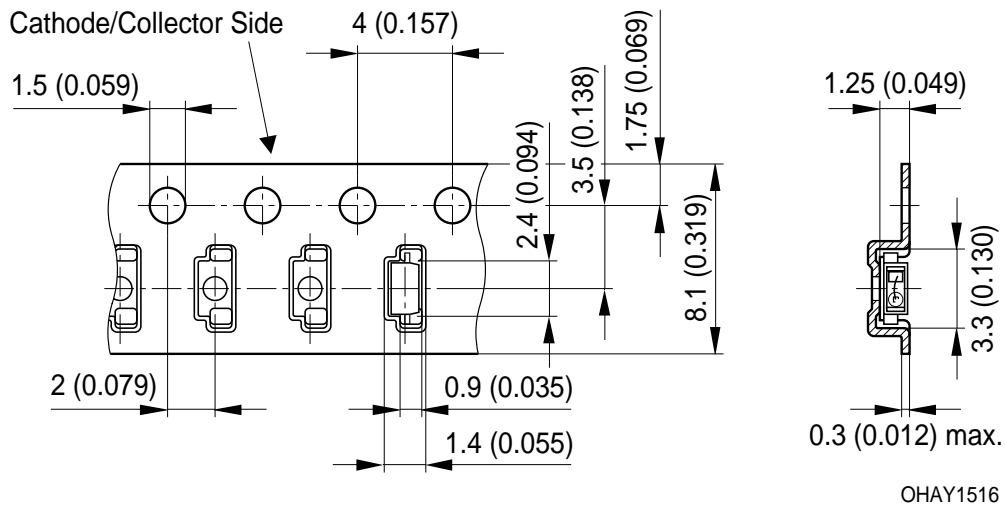
OHA04612

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

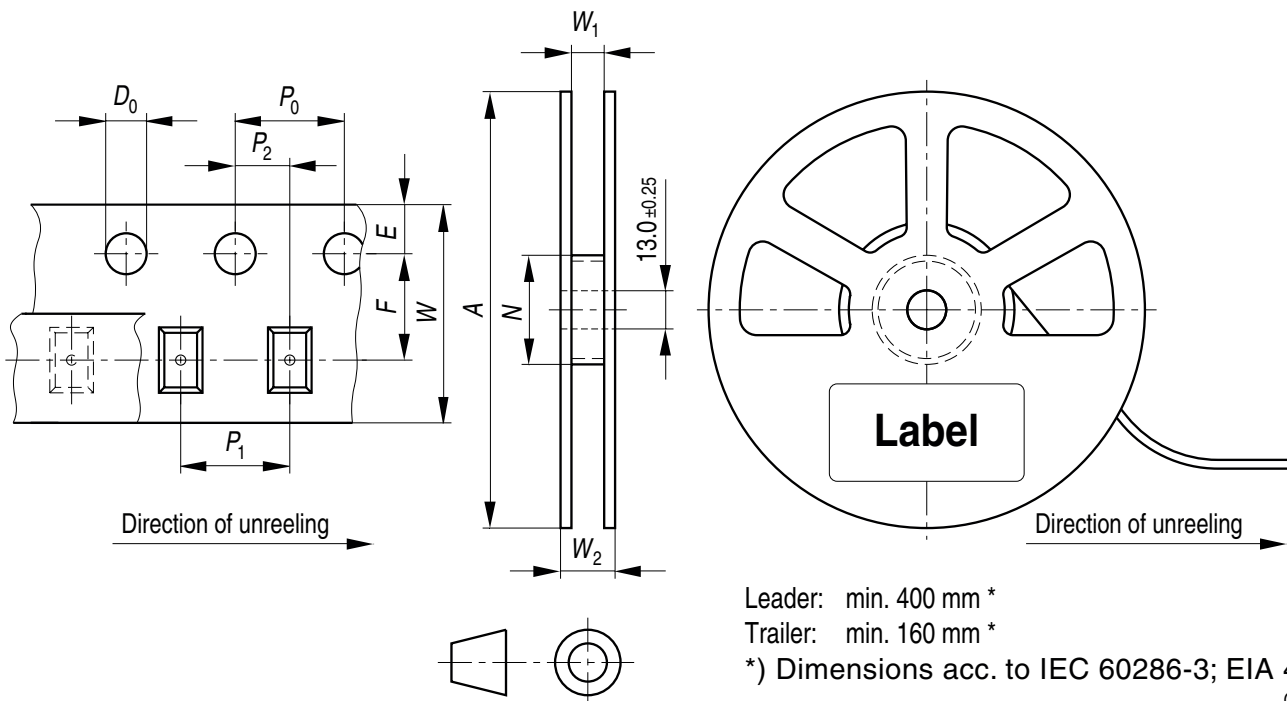
Taping



Dimensions in mm (inch).

Tape and Reel

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



## 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

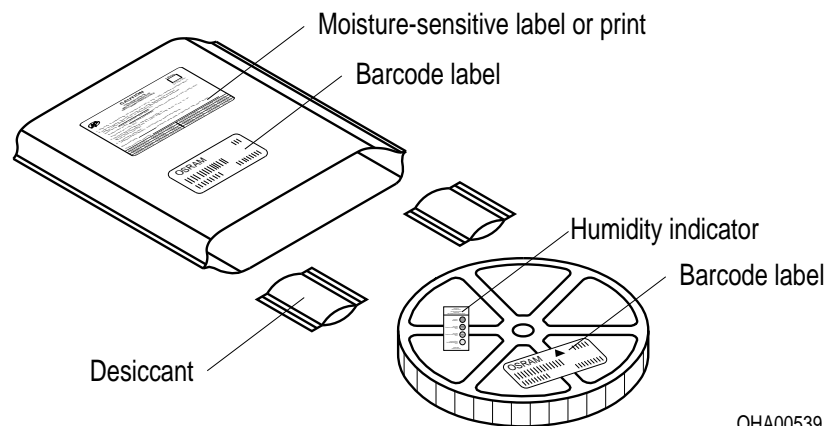
## Reel dimensions [mm]

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

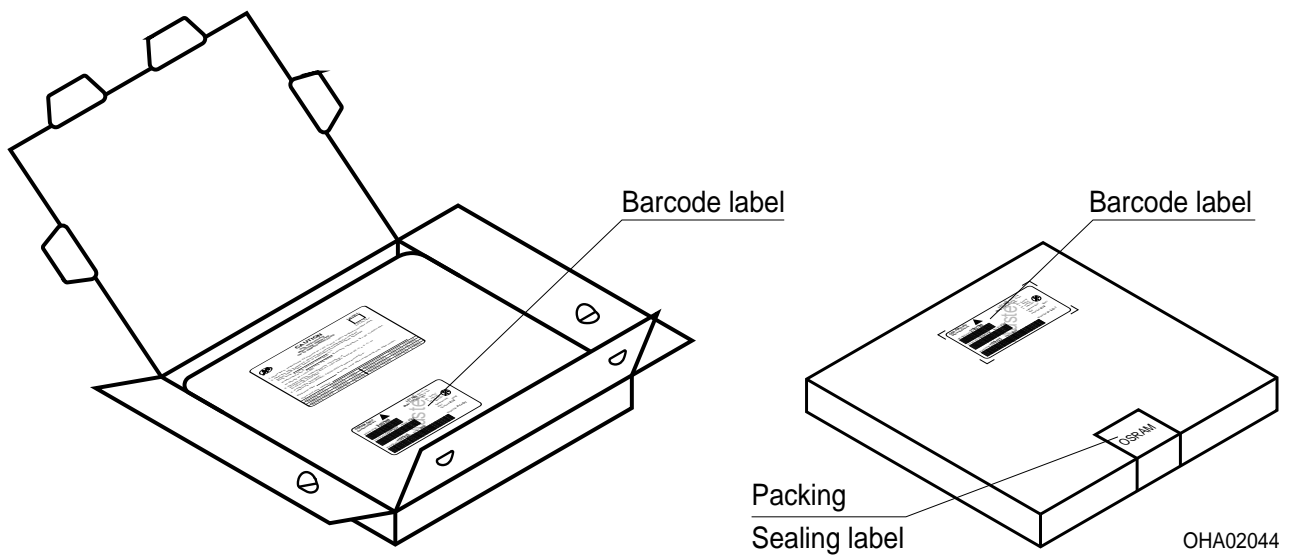


## Note:

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



## Dimensions of transportation box in mm

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

**Disclaimer**

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

**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 in the Internet.

**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.

**Components used in life-support devices or systems must be expressly authorized for such purpose!**

Critical components\* may only be used in life-support devices\*\* or systems with the express written approval of OSRAM OS.

\*) A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

\*\*) Life support devices or systems are intended (a) to be implanted in the human body, or (b) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health and the life of the user may be endangered.

**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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