

OSRAM SFH 4059BSR

Datasheet

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Chip LED Lens

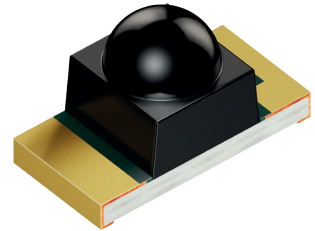
SFH 4059BSR

Infrared Emitter (850 nm)

Maximum Power. Compact Size. Double-Stack Performance.

The SFH 4059BSR combines a compact CHIPLED package with a double-stack emitter design for high radiant intensity and excellent efficiency. Operating at 850 nm, it is ideal for applications requiring long detection distances and reliable sensing performance.

Reverse variant of the SFH 4059BS with identical optical performance.



Applications

- Access control & security
- Appliances & tools
- Eye, face and hand tracking
- Factory automation

Features

- Package: black epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- High optical power
- Double stack emitter
- Very small SMT package
- Reverse mount

Ordering Information

$I_F = 50\text{ mA}$; $t_p = 20\text{ ms}$

Type	Irradiance ¹⁾²⁾ $I_F = 50\text{ mA}$; $t_p = 20\text{ ms}$ E_e	Irradiance typ. $I_F = 50\text{ mA}$; $t_p = 20\text{ ms}$ E_e	Ordering Code
SFH 4059BSR	18.0 ... 45.0 mW/cm ²	30 mW/cm ²	Q65115A3277

E_e measured in the near field with a detector (7.2 mm diameter) in 20 mm distance ($\Omega = 0.1\text{ sr}$) to the device surface

Maximum Ratings

 $T_s = 25\text{ °C}$

Parameter	Symbol		Values
Operating temperature	T_{op}	min. max.	-40 °C 85 °C
Storage temperature	T_{stg}	min. max.	-40 °C 85 °C
Junction temperature	T_j	max.	100 °C
Forward current	I_F	min. max.	1 mA 70 mA
Forward current pulsed $t_p \leq 250\text{ }\mu\text{s}$; $D \leq 0.5\text{ }\%$	$I_{F\text{ pulse}}$	max.	0.7 A
Reverse voltage ³⁾	V_R	max.	5 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}	max.	2 kV

Characteristics

 $I_F = 50 \text{ mA}$; $t_p = 20 \text{ ms}$; $T_s = 25 \text{ °C}$

Parameter	Symbol		Values
Peak wavelength	λ_{peak}	typ.	860 nm
Centroid wavelength	$\lambda_{\text{centroid}}$	typ.	850 nm
Spectral bandwidth at 50% $I_{\text{rel,max}}$ (FWHM)	$\Delta\lambda$	typ.	30 nm
Half angle	φ	typ.	12 °
Rise time (10% / 90%) $I_F = 100 \text{ mA}$; $R_L = 2 \Omega$	t_r	typ.	12 ns
Fall time (10% / 90%) $I_F = 100 \text{ mA}$; $R_L = 2 \Omega$	t_f	typ.	12 ns
Forward voltage ⁴⁾	V_F	min.	2.05 V
		typ.	2.80 V
		max.	3.25 V
Forward voltage $I_F = 500 \text{ mA}$; $t_p = 100 \mu\text{s}$	V_F	typ.	3.30 V
Reverse current ³⁾ $V_R = 5 \text{ V}$	I_R	typ.	0.01 μA
		max.	10 μA
Radiant intensity ⁵⁾ $I_F = 50 \text{ mA}$; $t_p = 20 \text{ ms}$	I_e	typ.	130 mW/sr
Radiant intensity ⁵⁾ $I_F = 100 \text{ mA}$; $t_p = 20 \text{ ms}$	I_e	typ.	265 mW/sr
Total radiant flux ⁶⁾ $I_F = 50 \text{ mA}$; $t_p = 20 \text{ ms}$	Φ_e	typ.	60 mW
Total radiant flux ⁶⁾ $I_F = 100 \text{ mA}$; $t_p = 20 \text{ ms}$	Φ_e	typ.	125 mW
Thermal resistance junction solder point real ⁷⁾	$R_{\text{thJS real}}$	typ.	170 K / W
		max.	210 K / W

Brightness Groups

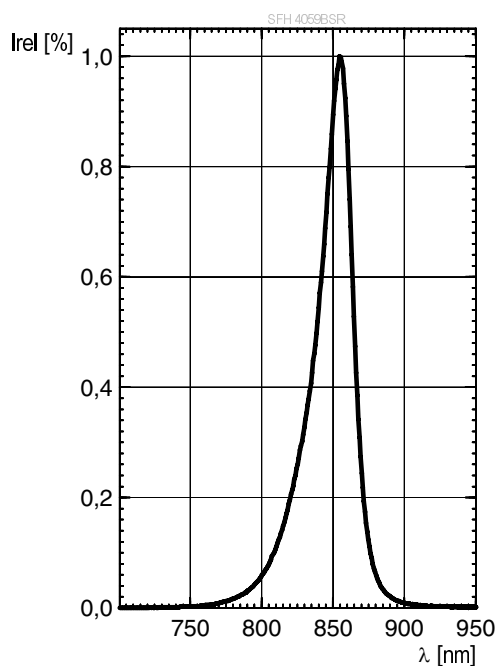
Group	Irradiance ¹⁾²⁾ $I_F = 50 \text{ mA}; t_p = 20 \text{ ms}$ min. E_e	Irradiance ¹⁾²⁾ $I_F = 50 \text{ mA}; t_p = 20 \text{ ms}$ max. E_e
S1	18.0 mW/cm ²	22.4 mW/cm ²
S2	22.4 mW/cm ²	28.0 mW/cm ²
T1	28.0 mW/cm ²	35.5 mW/cm ²
T2	35.5 mW/cm ²	45.0 mW/cm ²

Only one group in one packing unit.

E_e measured in the near field with a detector (7.2 mm diameter) in 20 mm distance ($\Omega = 0.1 \text{ sr}$) to the device surface

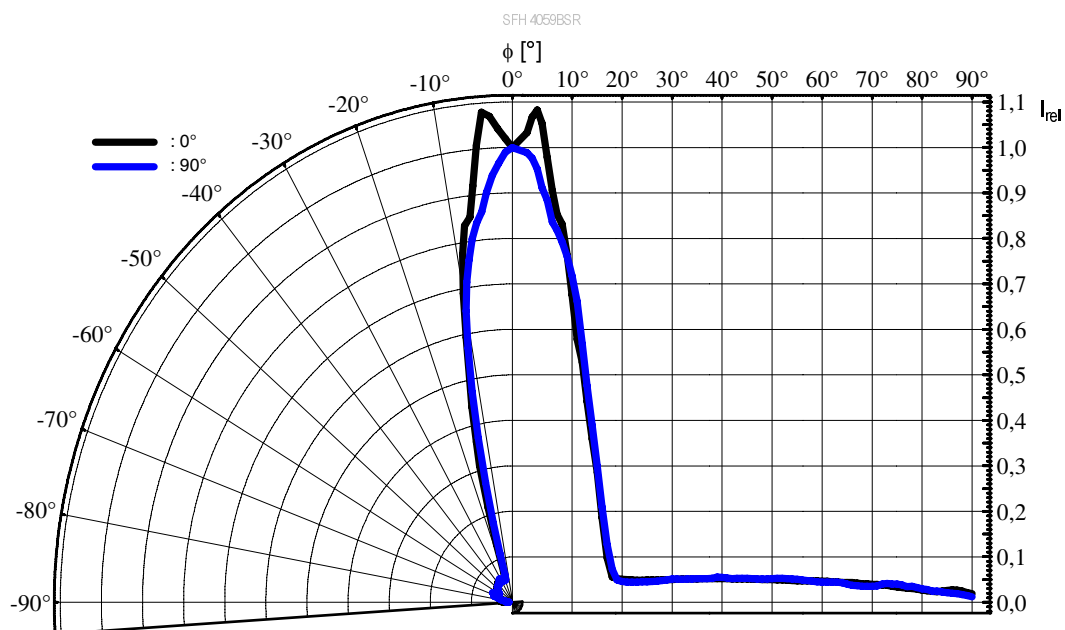
Relative Spectral Emission 8), 9)

$$I_{e,rel} = f(\lambda); I_F = 50 \text{ mA}; t_p = 20 \text{ ms}$$



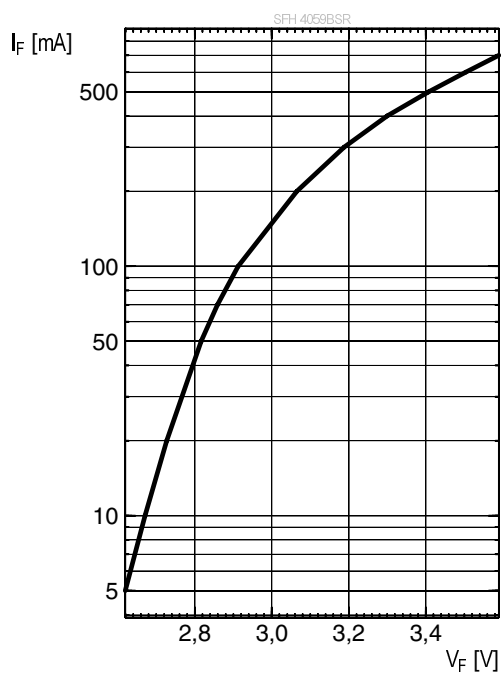
Radiation Characteristics 8), 9)

$$I_{e,rel} = f(\phi)$$



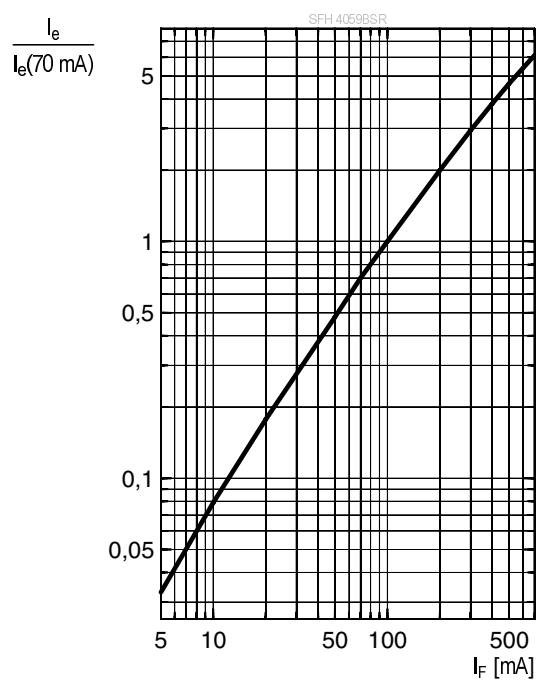
Forward current ^{8), 9)}

$I_F = f(V_F)$; single pulse; $t_p = 100 \mu s$



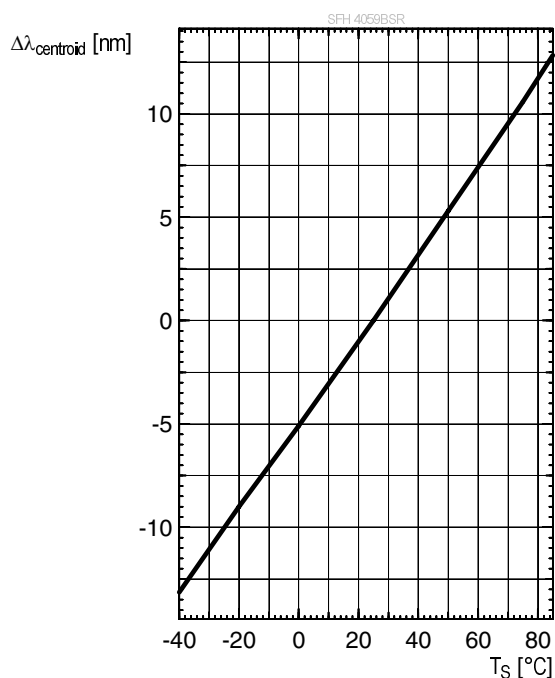
Relative Radiant Intensity ^{8), 9)}

$I_e/I_e(50mA) = f(I_F)$; single pulse; $t_p = 100 \mu s$



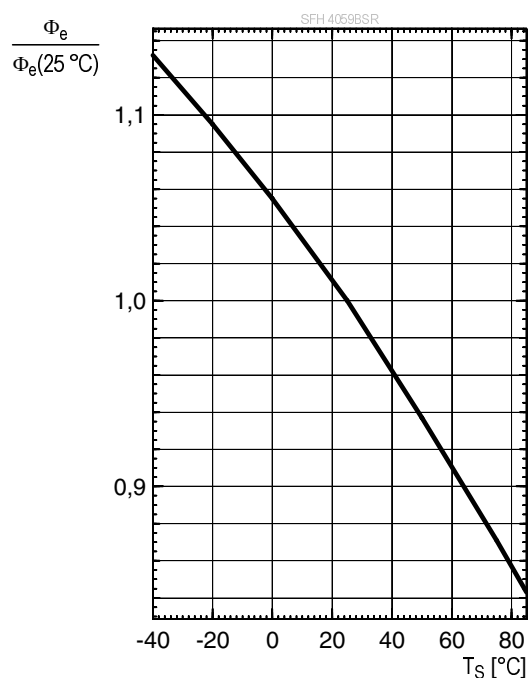
Centroid Wavelength ⁸⁾

$$\lambda_{\text{centroid}} = f(T_S); I_F = 50\text{mA}; t_p = 20\text{ms}$$



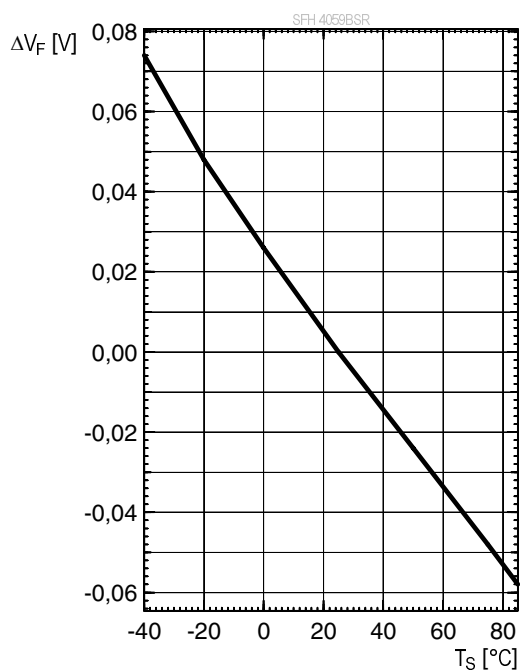
Relative Total Radiant Flux ⁸⁾

$$\Phi_{\text{rel}} = f(T_S); I_F = 50\text{mA}; t_p = 20\text{ms}$$



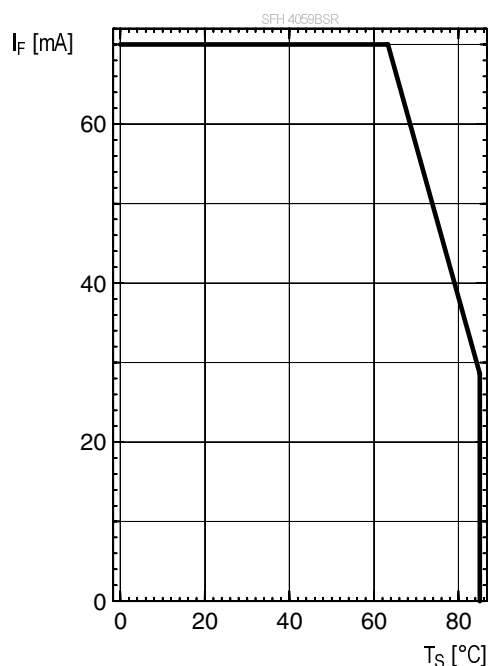
Forward Voltage ⁸⁾

$$V_F = f(T_S); I_F = 50\text{mA}; t_p = 20\text{ms}$$



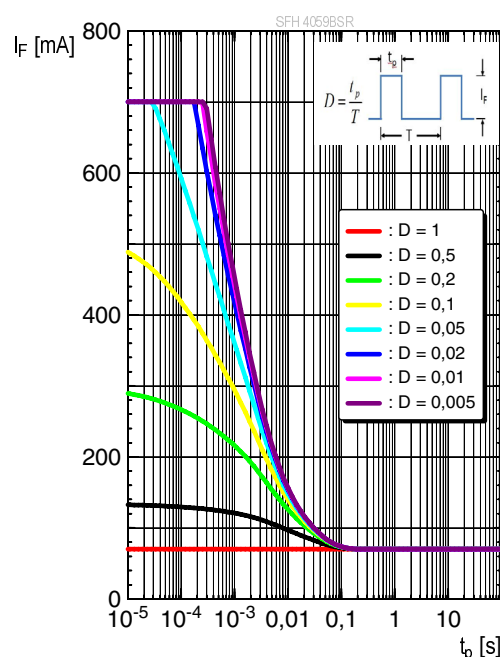
Max. Permissible Forward Current

$$I_F = f(T_S); R_{th_{js}} = 210 \text{ K/W}$$



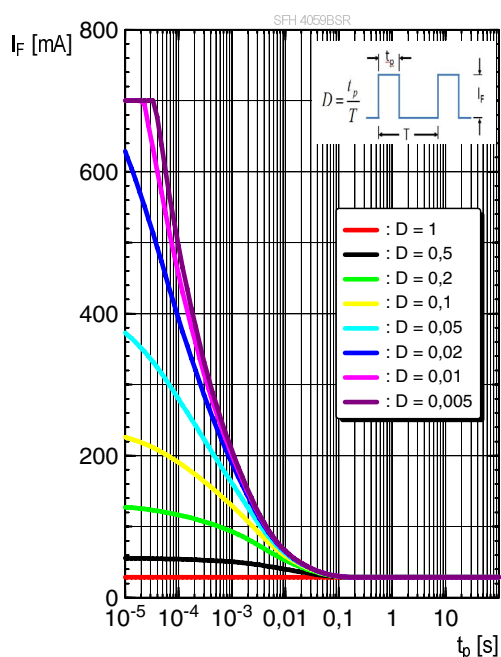
Permissible Pulse Handling Capability

$$I_F = f(t_p); D = \text{parameter}; T_S = 25 \text{ °C}$$

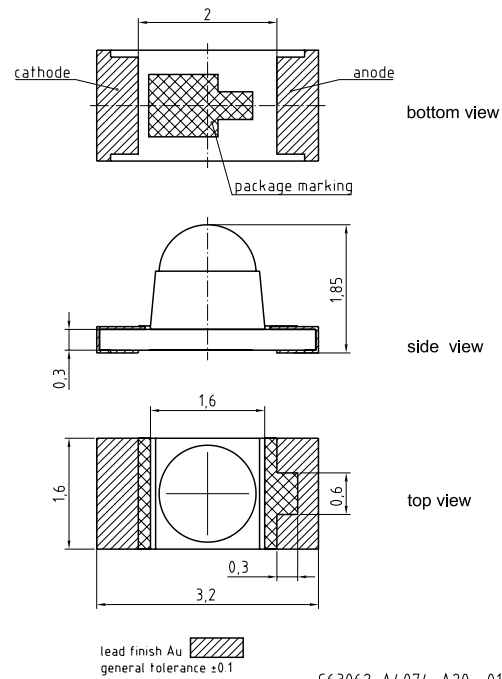


Permissible Pulse Handling Capability

$$I_F = f(t_p); D = \text{parameter}; T_S = 85 \text{ °C}$$



Dimensional Drawing ¹⁰⁾

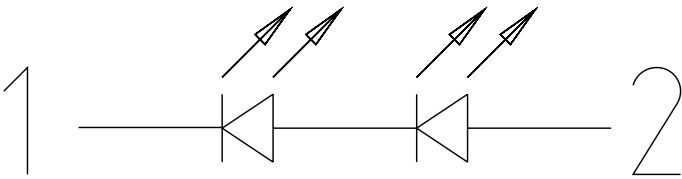


Further Information:

Approximate Weight: 8.0 mg

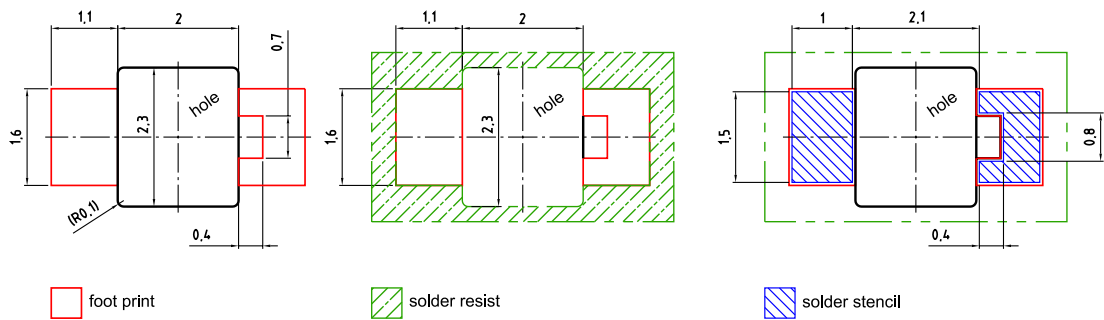
Package marking: Anode

Electrical Internal Circuit

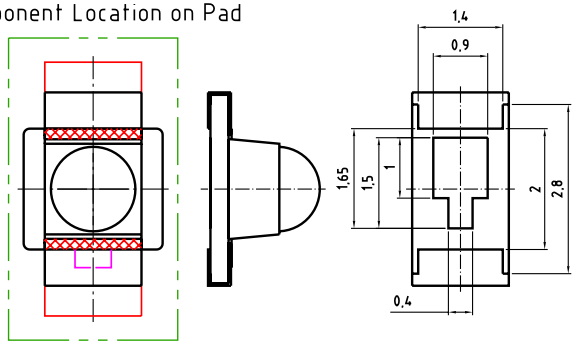


Pin	Description
1	Cathode
2	Anode

Recommended Solder Pad ¹⁰⁾



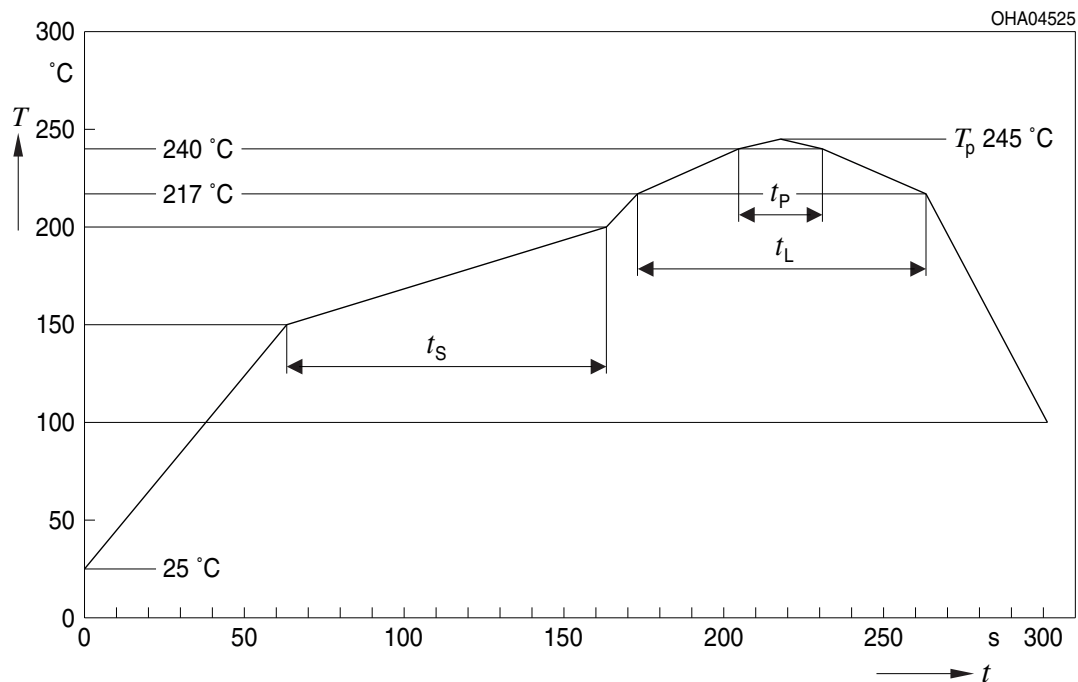
Component Location on Pad



E062 3010 165-03

Reflow Soldering Profile

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

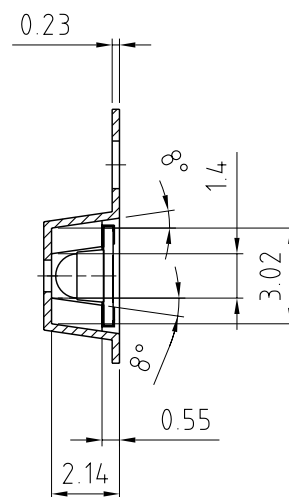
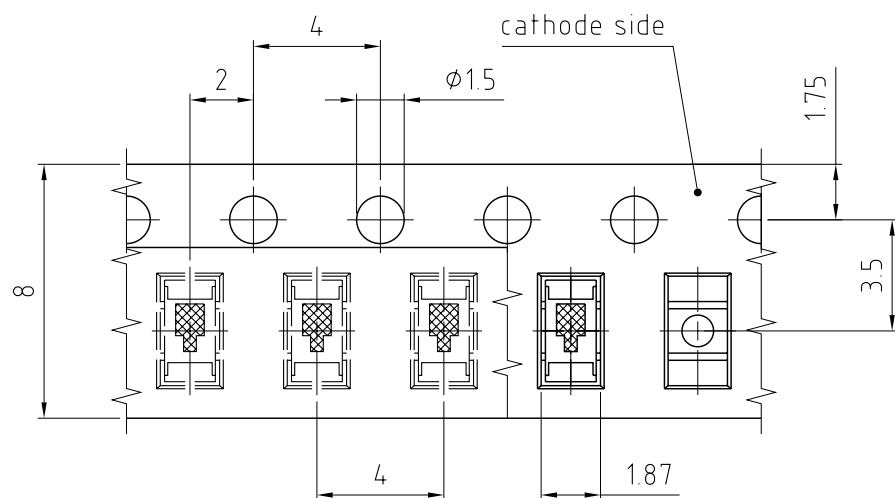


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat ^{*)} 25 °C to 150 °C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak ^{*)} T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		$^{\circ}\text{C}$
Time above liquidus temperature	t_L		80	100	s
Peak temperature	T_p		245	260	$^{\circ}\text{C}$
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

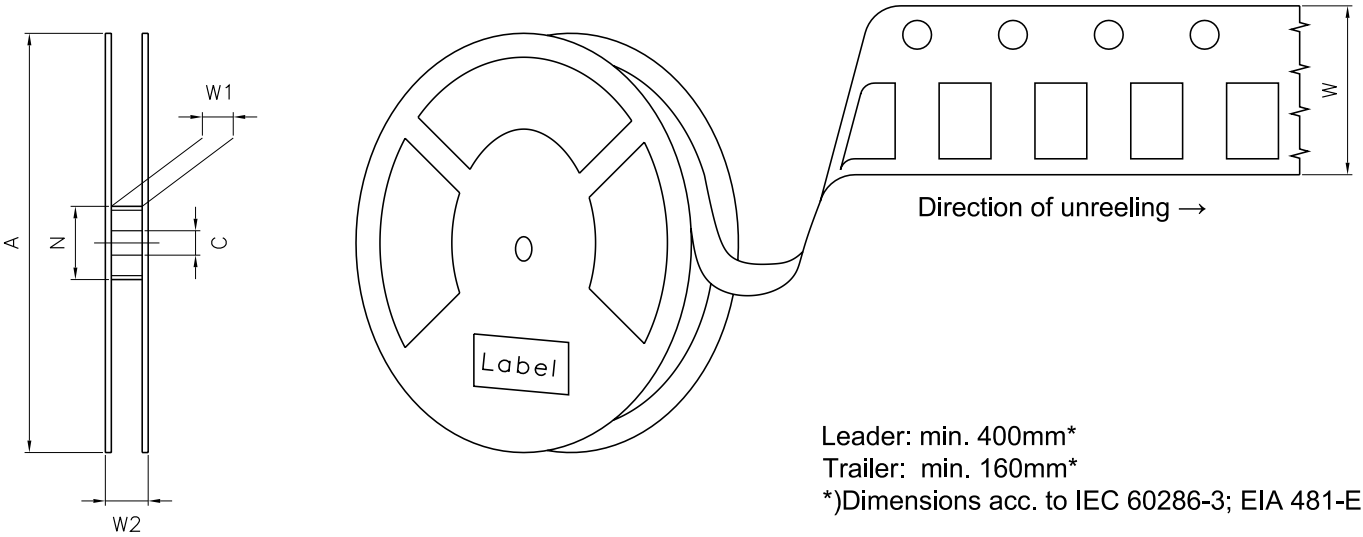
* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ¹⁰⁾



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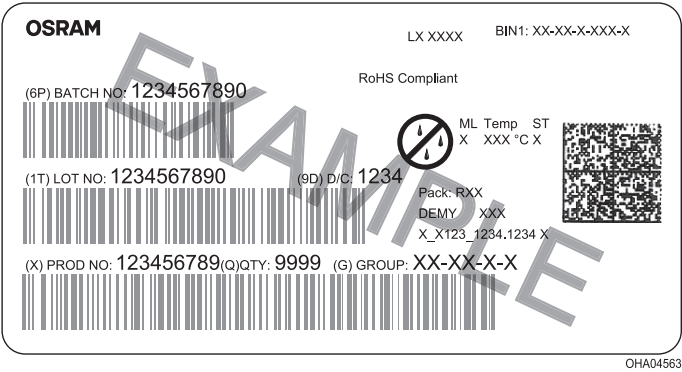
Tape and Reel ¹¹⁾



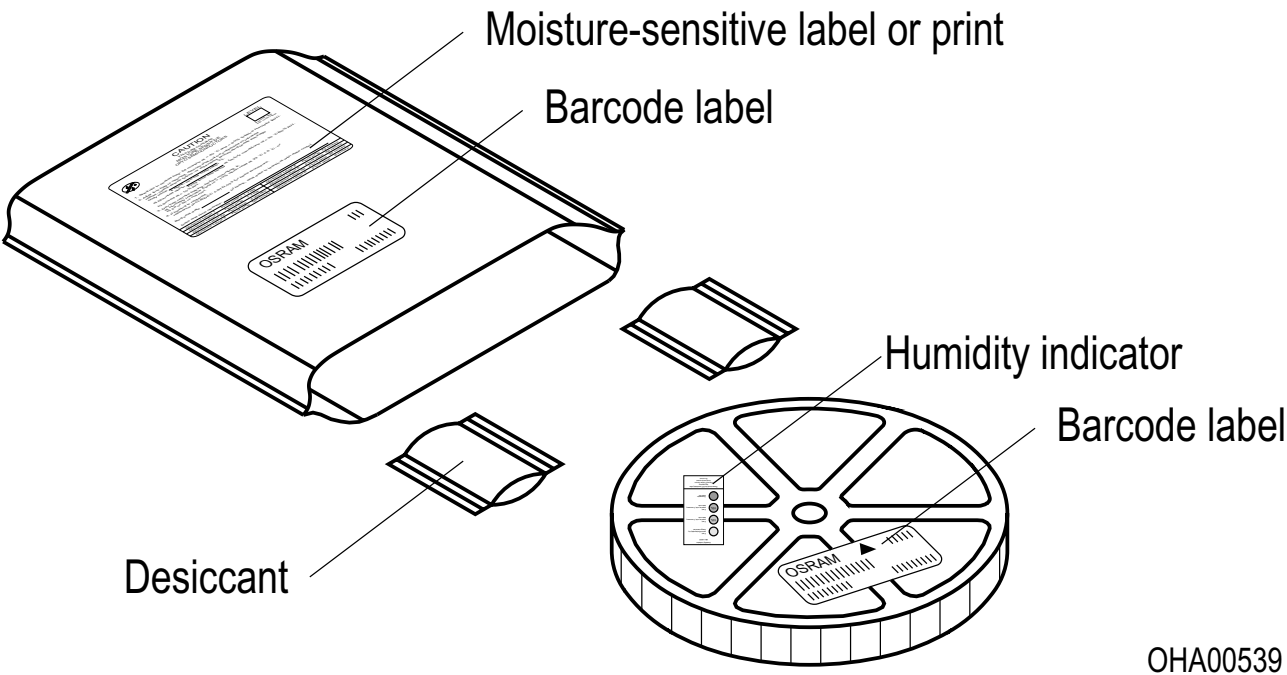
Reel Dimensions

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 ¹⁰⁾



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

Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet falls into **exempt risk group - Exempt**.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit <https://ams-osram.com/support/application-notes>

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.

Glossary

- 1) **Irradiance:** Measured at a solid angle of $\Omega = 0.1$ sr
- 2) **Brightness:** The brightness values are measured with a tolerance of $\pm 11\%$.
- 3) **Reverse Operation:** This product is intended to be operated applying a forward current within the specified range. Applying any continuous reverse bias or forward bias below the voltage range of light emission shall be avoided because it may cause migration which can change the electro-optical characteristics or damage the LED.
- 4) **Forward Voltage:** The forward voltages are measured with a tolerance of ± 0.1 V.
- 5) **Radiant intensity:** Measured at a solid angle of $\Omega = 0.01$ sr
- 6) **Total radiant flux:** Measured with integrating sphere.
- 7) **Thermal resistance:** junction - soldering point, of the device only, mounted on an ideal heatsink (e.g. metal block)
- 8) **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.
- 9) **Testing temperature:** $T_A = 25^\circ\text{C}$ (unless otherwise specified)
- 10) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 11) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Revision History

Version	Date	Change
1.0	2026-09-09	Initial Version



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。

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