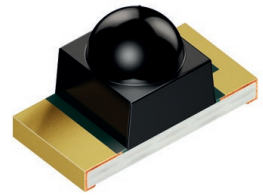


SFH 4059S

CHIPLED® Lens

High Power Infrared Emitter (850 nm)



Applications

- Industrial Automation (Machine controls, Light barriers, Vision controls)

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 package: (LxWxH) 3.2 mm x 1.6 mm x 1.85 mm

Ordering Information

Type	Irradiance ¹⁾ $I_F = 50 \text{ mA}; t_p = 20 \text{ ms}$ E_e	Irradiance ¹⁾ typ. $I_F = 50 \text{ mA}; t_p = 20 \text{ ms}$ E_e	Ordering Code
SFH 4059S	6.3 ... 32.0 mW/cm ²	16 mW/cm ²	Q65111A2990
SFH 4059S-RS	10.0 ... 32.0 mW/cm ²	16 mW/cm ²	Q65111A5306

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

$T_A = 25\text{ °C}$

Parameter	Symbol	Values
Operating temperature	T_{op}	min. -40 °C max. 85 °C
Storage temperature	T_{stg}	min. -40 °C max. 85 °C
Reverse voltage ²⁾	V_R	max. 12 V
Forward current	I_F	max. 50 mA
Surge current $t_p \leq 300\ \mu\text{s}; D = 0$	I_{FSM}	max. 0.7 A
Power consumption	P_{tot}	max. 175 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}	max. 2 kV

Characteristics

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

Parameter	Symbol		Values
Peak wavelength	λ_{peak}	typ.	860 nm
Centroid wavelength	$\lambda_{\text{centroid}}$	typ.	850 nm
Spectral bandwidth at 50% $I_{\text{rel,max}}$	$\Delta\lambda$	typ.	30 nm
Half angle	φ	typ.	15 °
Dimensions of active chip area	L x W	typ.	0.3 x 0.3 mm x mm
Rise time (10% / 90%) $I_F = 50 \text{ mA}$; $R_L = 50 \text{ }\Omega$	t_r	typ.	15 ns
Fall time (10% / 90%) $I_F = 50 \text{ mA}$; $R_L = 50 \text{ }\Omega$	t_f	typ.	15 ns
Forward voltage	V_F	typ. max.	2.95 V 3.45 V
Forward voltage $I_F = 700 \text{ mA}$; $t_p = 100 \text{ }\mu\text{s}$	V_F	typ.	4 V
Reverse current ²⁾ $V_R = 5 \text{ V}$	I_R	max. typ.	10 μA 0.01 μA
Total radiant flux ³⁾	Φ_e	typ.	50 mW
Radiant intensity	I_e	typ.	95 mW/sr
Temperature coefficient of brightness	TC_I	typ.	-0.5 % / K
Temperature coefficient of voltage	TC_V	typ.	-2 mV / K
Temperature coefficient of wavelength	TC_λ	typ.	0.3 nm / K
Thermal resistance junction ambient real ⁴⁾	R_{thJA}	max.	420 K / W
Thermal resistance junction solder point real ⁵⁾	R_{thJS}	max.	260 K / W

Radiant Intensity measured with a detector (11.3 mm diameter) in 100 mm distance ($\Omega = 0.01 \text{ sr}$) to the device surface

Brightness Groups

$T_A = 25\text{ °C}$

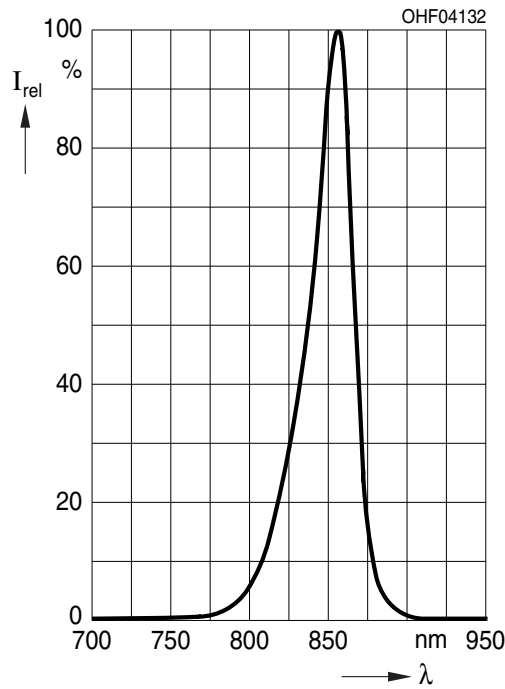
Group	Irradiance ¹⁾ $I_F = 50\text{ mA}; t_p = 20\text{ ms}$ min. E_e	Irradiance ¹⁾ $I_F = 50\text{ mA}; t_p = 20\text{ ms}$ max. E_e
	Q	6.3 mW/cm ²
R	10.0 mW/cm ²	20.0 mW/cm ²
S	16.0 mW/cm ²	32.0 mW/cm ²

Only one group in one packing unit (variation lower 2:1).

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

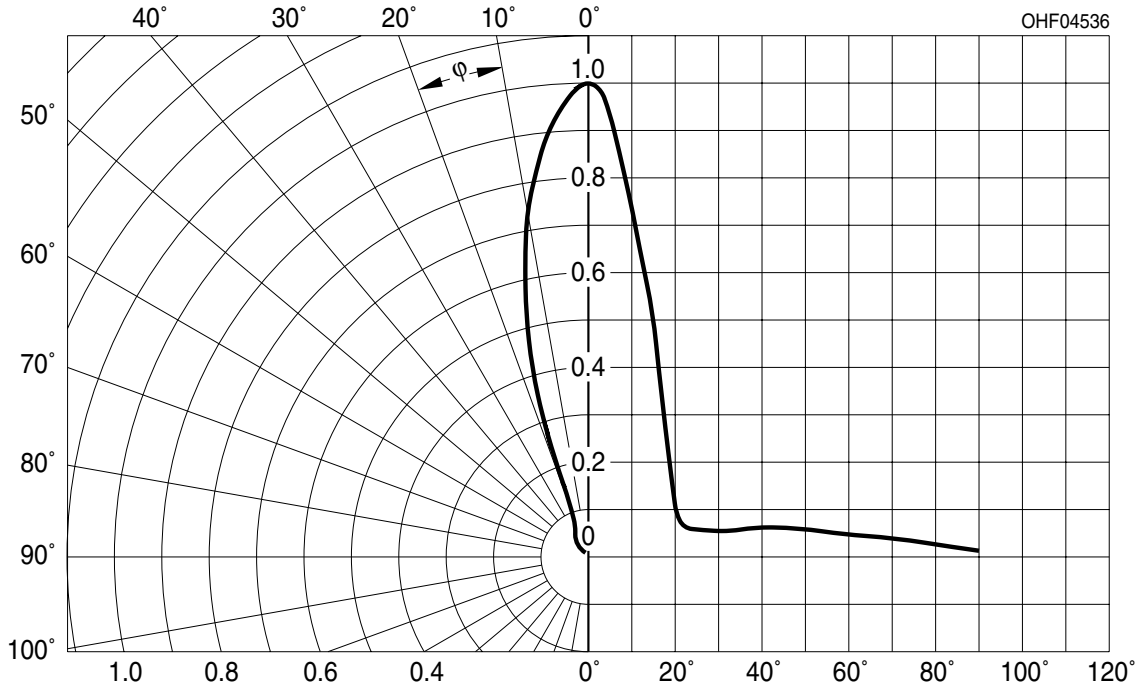
Relative Spectral Emission ^{6), 7)}

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



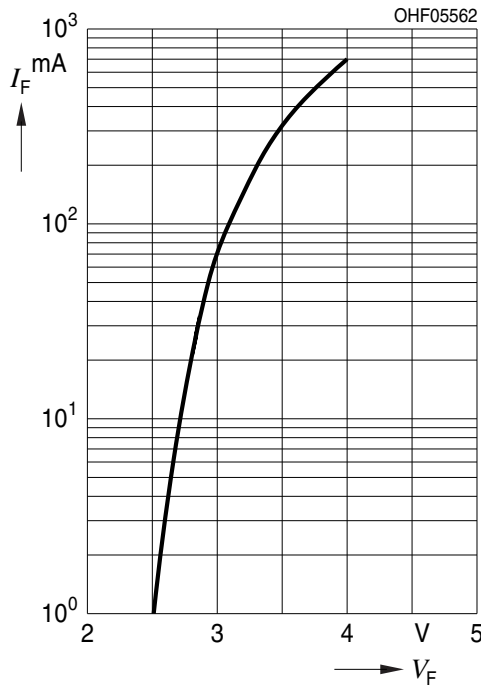
Radiation Characteristics ^{6), 7)}

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



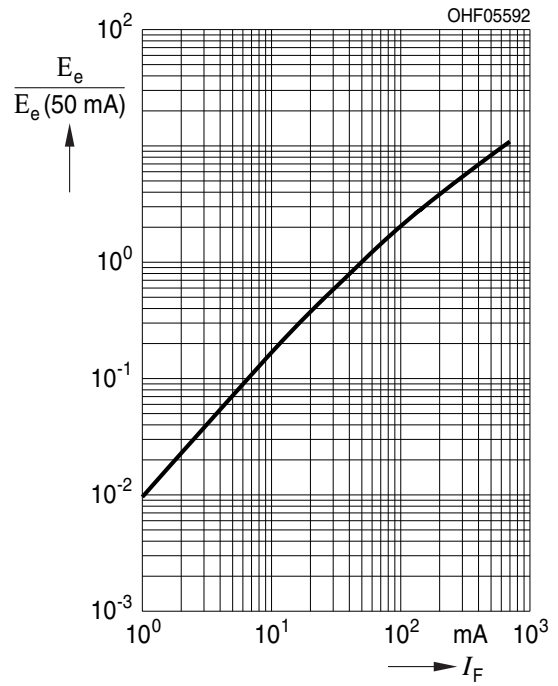
Forward current ^{6), 7)}

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



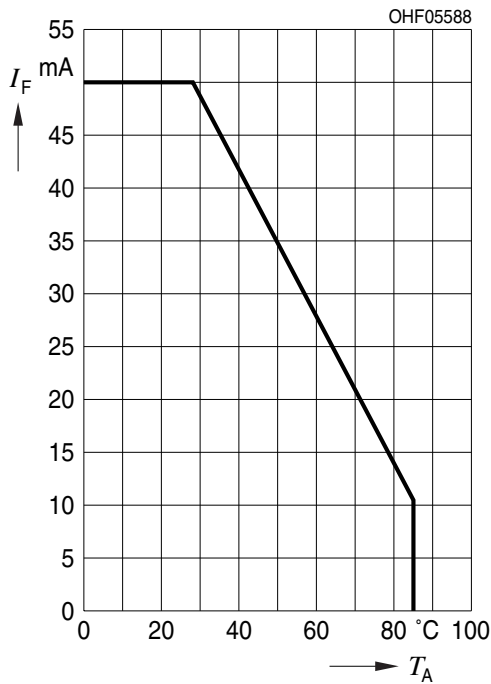
Irradiance ^{6), 7)}

$E_e/E_e(50mA) = f(I_F)$; single pulse; $t_p = 25 \mu s$



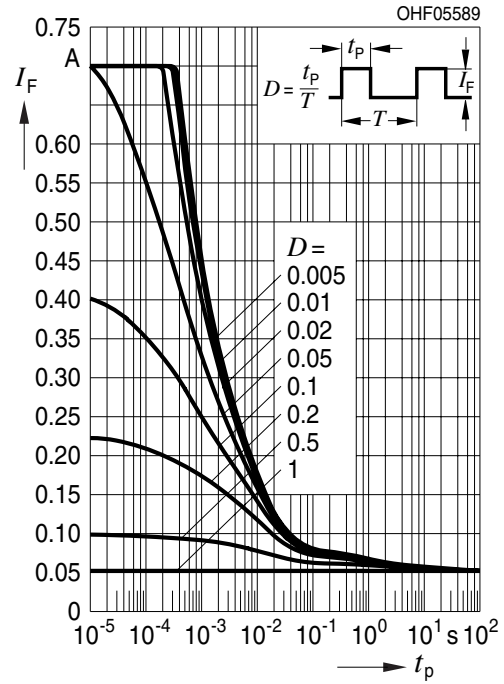
Max. Permissible Forward Current

$I_{F,max} = f(T_A); R_{thJA} = 420 \text{ K/W}$



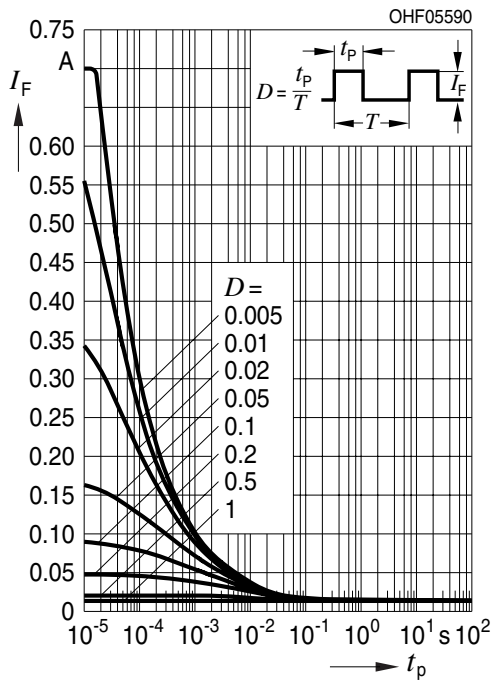
Permissible Pulse Handling Capability

$I_F = f(t_p); \text{duty cycle } D = \text{parameter}; T_A = 25^\circ\text{C}$

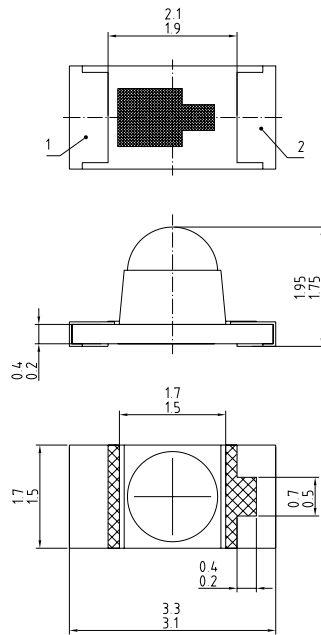


Permissible Pulse Handling Capability

$I_F = f(t_p); \text{duty cycle } D = \text{parameter}; T_A = 85^\circ\text{C}$



Dimensional Drawing ⁸⁾



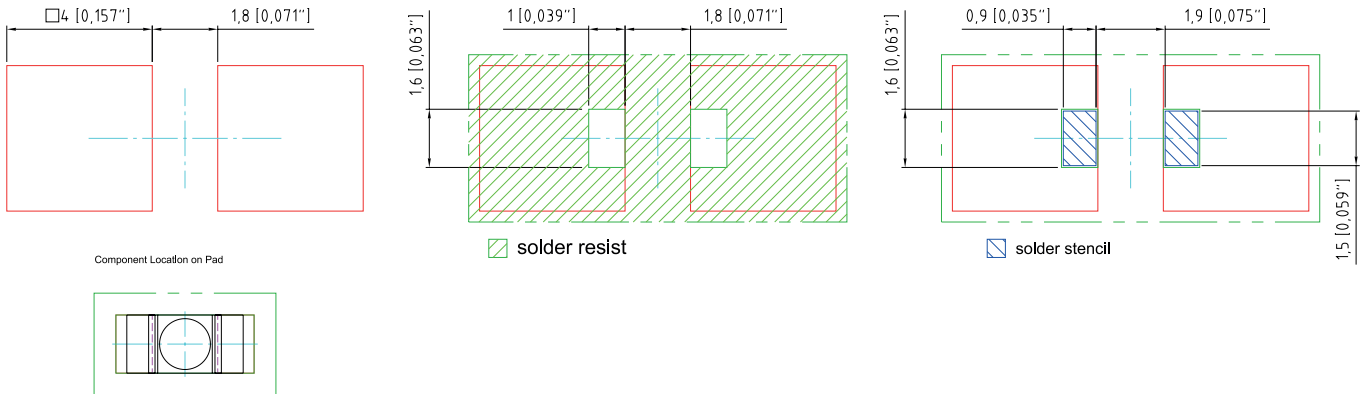
C63062-A4074-A1.-05

Approximate Weight: 8.0 mg

Package marking: Anode

Pin	Description
1	Cathode
2	Anode

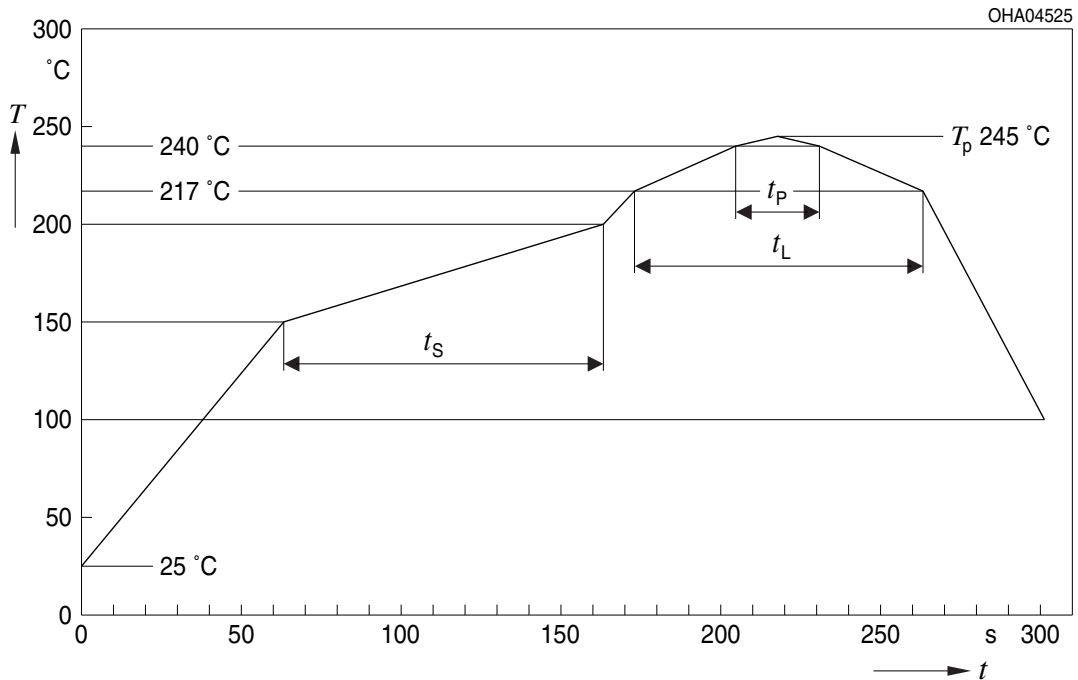
Recommended Solder Pad ⁸⁾



E062.3010.93-01

Reflow Soldering Profile

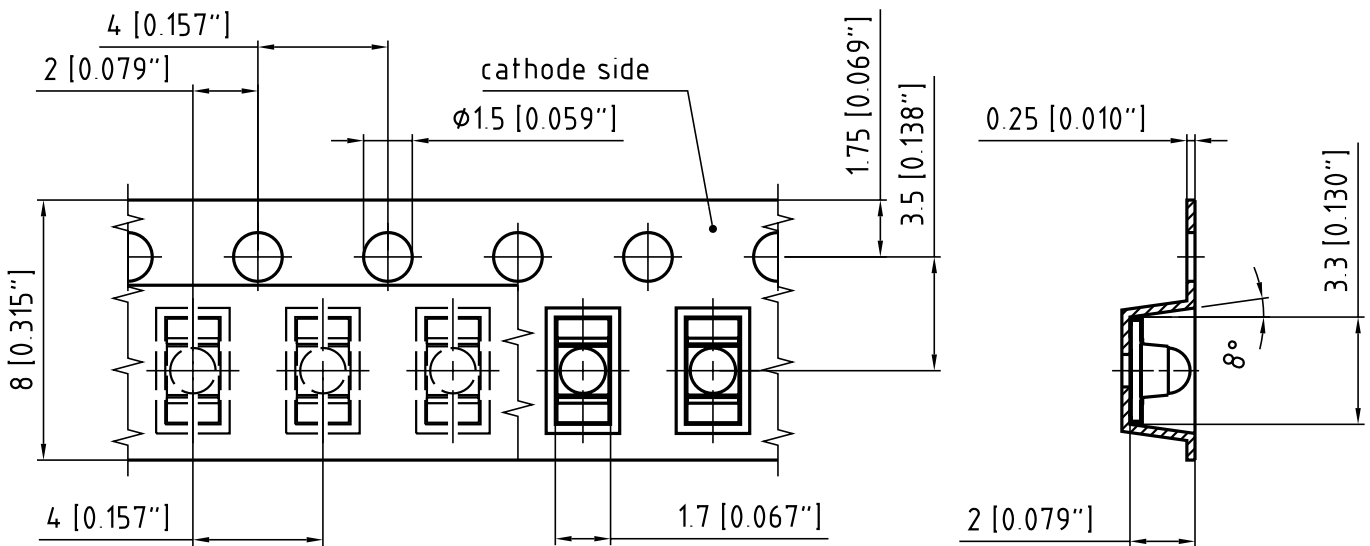
Product complies to MSL Level 3 acc. to JEDEC J-STD-020E



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		°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

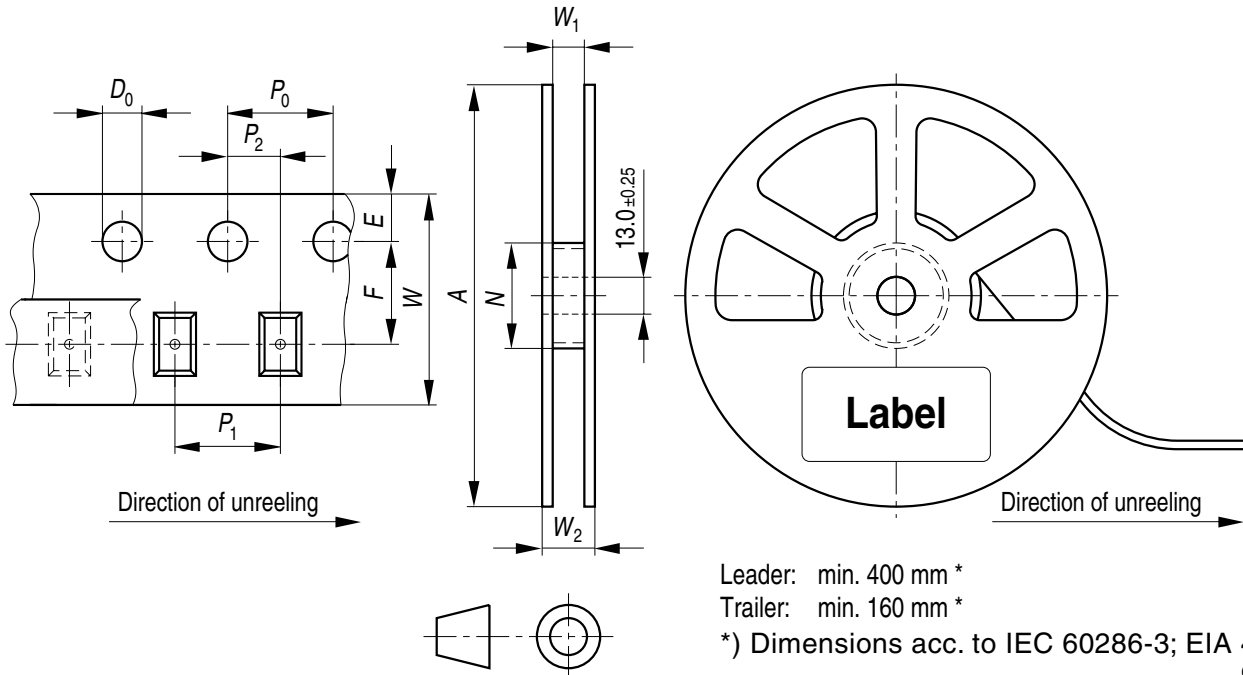
All temperatures refer to the center of the package, measured on the top of the component
 * slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁸⁾



C63062-A4074-B1-01

Tape and Reel ⁹⁾



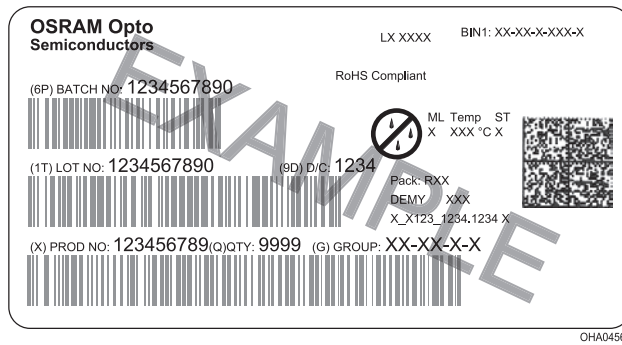
Leader: min. 400 mm *
 Trailer: min. 160 mm *

*) Dimensions acc. to IEC 60286-3; EIA 481-D
 OHAY0324

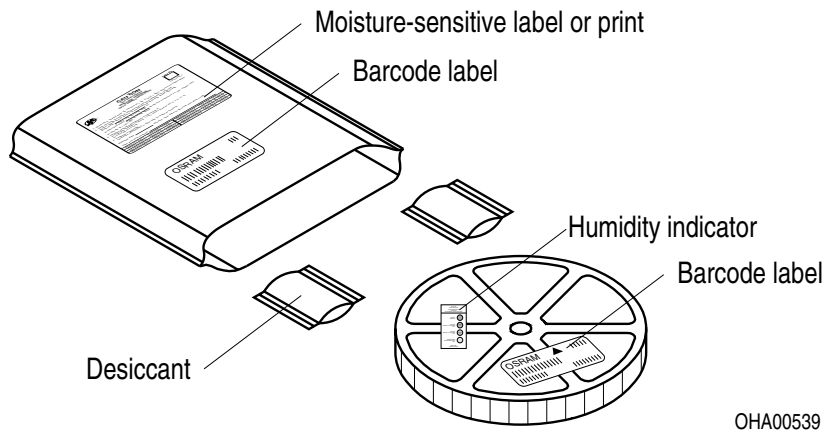
Reel dimensions [mm]

A	W	N _{min}	W ₁	W _{2 max}	Pieces per PU
180 mm	8 + 0.3 / - 0.1	60	8.4 + 2	14.4	2000

Barcode-Product-Label (BPL)

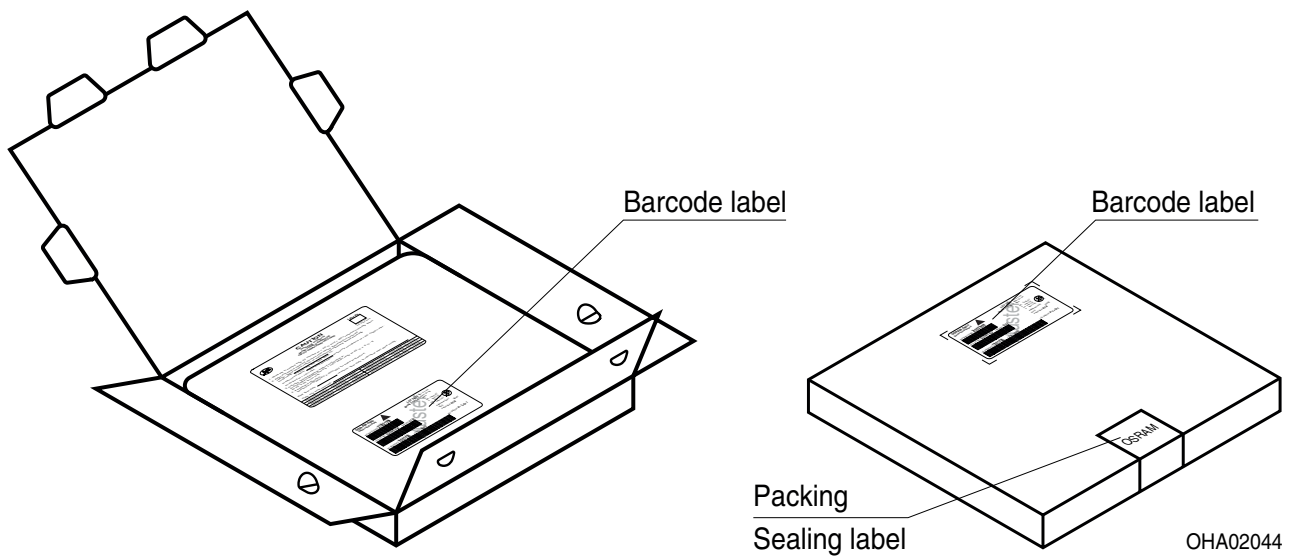


Dry Packing Process and Materials ⁸⁾



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

Transportation Packing and Materials ⁸⁾



Dimensions of transportation box in mm

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

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 LED specified in this data sheet fall into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. As is also true when viewing other bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

For further application related informations please visit www.osram-os.com/appnotes

Disclaimer

Disclaimer

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

Attention please!

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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.

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Glossary

- 1) **Irradiance:** Measured at a solid angle of $\Omega = 0.1$ sr
- 2) **Reverse Operation:** Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed.
- 3) **Total radiant flux:** Measured with integrating sphere.
- 4) **Thermal resistance:** junction - ambient, mounted on PC-board (FR4), pads size 16 mm² each
- 5) **Thermal resistance:** junction - soldering point, of the device only, mounted on an ideal heatsink (e.g. metal block)
- 6) **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.
- 7) **Testing temperature:** $T_A = 25^\circ\text{C}$
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

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