SFH 4646

MIDLED®

Narrow beam LED in MIDLED package (940 nm)

Applications

- Electronic Equipment
- Gesture Recognition
- Remote Control, Proximity, Ambient Light Sensing

Features:

- Package: clear silicone
- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- High Power Infrared LED (35 mW)
- Short switching times
- Narrow half angle (± 10°)
- Taping as Sidelooker
- Also available as Toplooker (SFH4641)

Ordering Information

Type	Radiant intensity [1] I_F = 70 mA; t_p = 20 ms I_e	Radiant intensity [1] typ. I_F = 70 mA; t_p = 20 ms I_e	Ordering Code
SFH 4646-TV	25 ... 125 mW/sr	55 mW/sr	Q65111A6148
SFH 4646-Z	25 ... 200 mW/sr	55 mW/sr	Q65110A8099

Maximum Ratings

T_A = 25 °C

Parameter	Symbol		Values
Operating temperature	T_{op}	min. max.	-40 °C 100 °C
Storage temperature	T_{stg}	min. max.	-40 °C 100 °C
Forward current	I_F	max.	70 mA
Surge current $t_p \leq 25$ µs; D = 0	I_{FSM}	max.	0.7 A
Reverse voltage [2)]	V_R	max.	12 V
Power consumption	P_{tot}	max.	140 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}	max.	2 kV

Characteristics

I_F = 70 mA; t_p = 20 ms; T_A = 25 °C

Parameter	Symbol		Values
Peak wavelength	λ_{peak}	typ.	950 nm
Centroid wavelength	$\lambda_{centroid}$	typ.	940 nm
Spectral bandwidth at 50% $I_{rel,max}$	$\Delta\lambda$	typ.	42 nm
Half angle	φ	typ.	10 °
Dimensions of active chip area	L x W	typ.	0.2 x 0.2 mm x mm
Rise time (10% / 90%) I_F = 70 mA; R_L = 50 Ω	t_r	typ.	12 ns
Fall time (10% / 90%) I_F = 70 mA; R_L = 50 Ω	t_f	typ.	12 ns
Forward voltage	V_F	typ. max.	1.6 V 2 V
Forward voltage I_F = 500 mA; t_p = 100 µs	V_F	typ. max.	2.4 V 3 V
Reverse current [2] V_R = 5 V	I_R	max. typ.	10 µA 0.01 µA
Radiant intensity [1] I_F = 500 mA; t_p = 25 µs	I_e	typ.	330 mW/sr
Total radiant flux [3]	Φ_e	typ.	35 mW
Temperature coefficient of voltage	TC_V	typ.	-1.3 mV / K
Temperature coefficient of brightness	TC_I	typ.	-0.5 % / K
Temperature coefficient of wavelength	TC_λ	typ.	0.3 nm / K
Thermal resistance junction solder point real [4]	R_{thJS}	max.	220 K / W
Thermal resistance junction ambient real [5]	R_{thJA}	max.	380 K / W

Brightness Groups

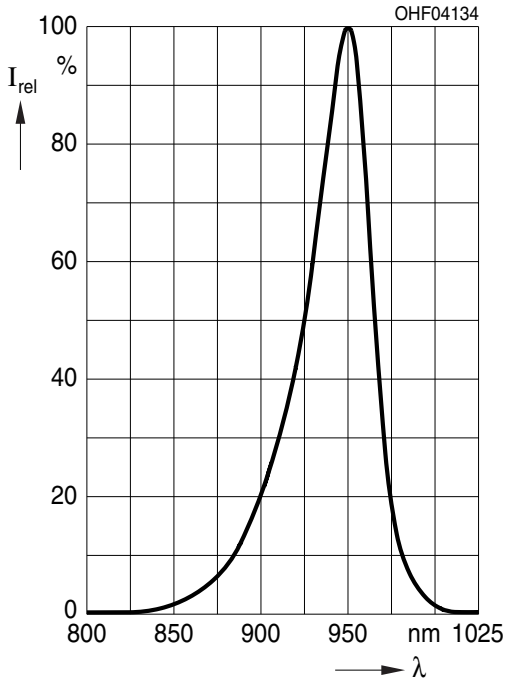
T_A = 25 °C

Group	Radiant intensity I_F = 70 mA; t_p = 20 ms min. I_e	Radiant intensity I_F = 70 mA; t_p = 20 ms max. I_e
T	25 mW/sr	50 mW/sr
U	40 mW/sr	80 mW/sr
V	63 mW/sr	125 mW/sr
AW	100 mW/sr	200 mW/sr

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

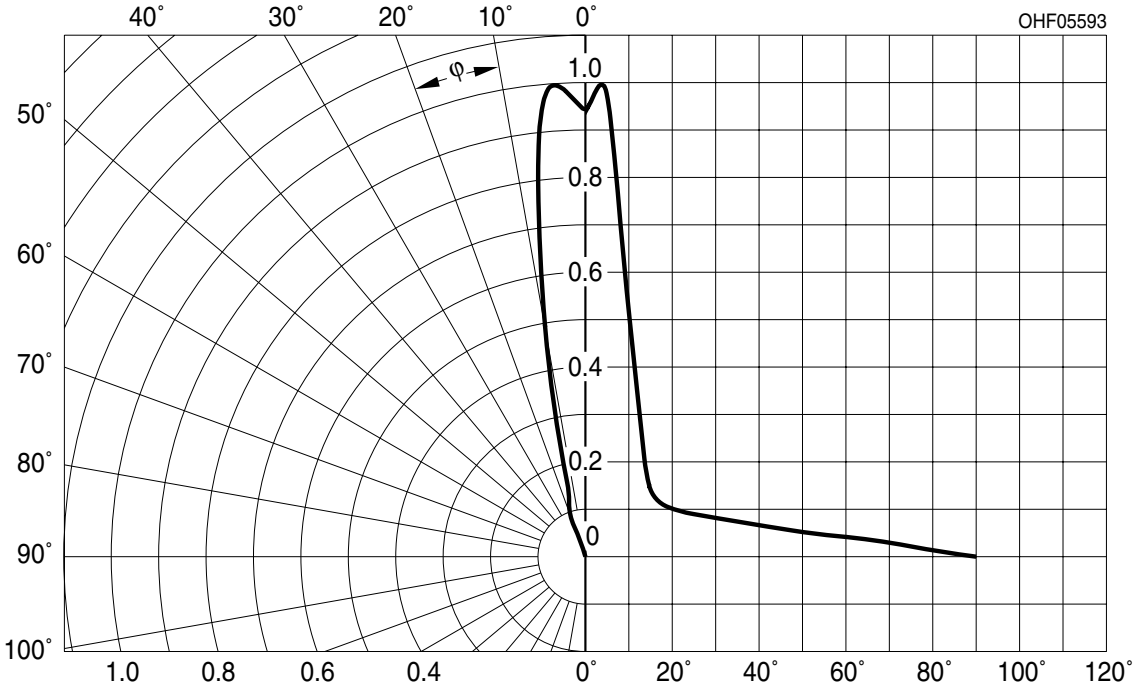
Relative Spectral Emission [6), 7)]

I_{rel} = f (λ); I_F = 70 mA; t_p = 20 ms



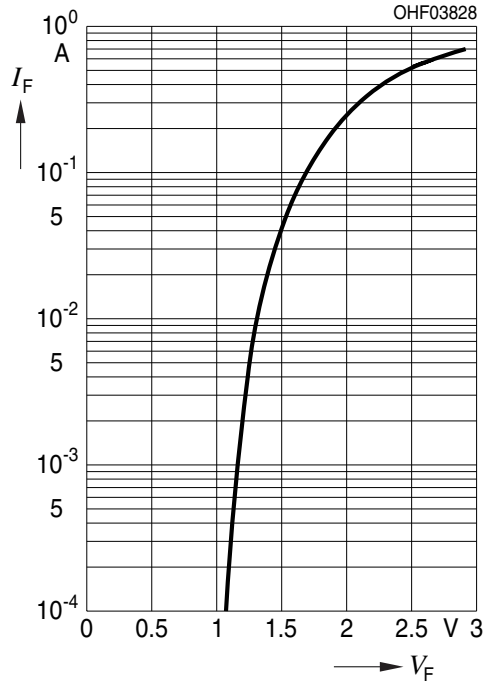
Radiation Characteristics [6), 7)]

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



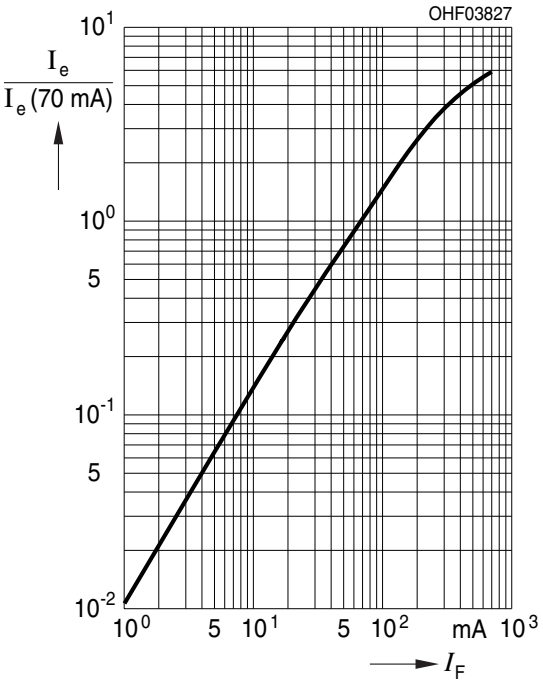
Forward current [6), 7)]

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



Relative Radiant Intensity [6), 7)]

$I_e/I_e(70mA) = f(I_F)$; single pulse; $t_p = 25\ \mu s$

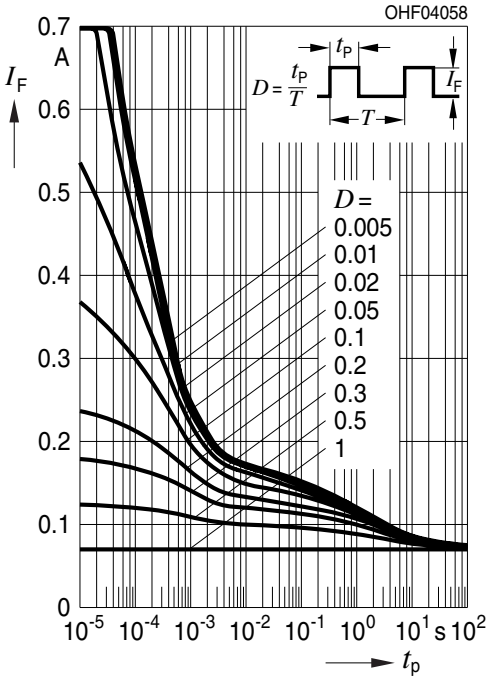


Max. Permissible Forward Current

$I_{F,max} = f(T_A)$; R_{thJA} = 380 K / W

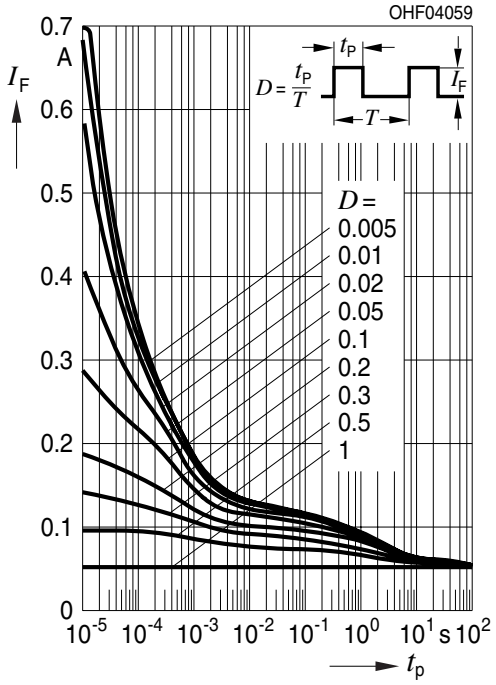
Permissible Pulse Handling Capability

$I_F = f(t_p)$; duty cycle D = parameter; T_A = 25°C

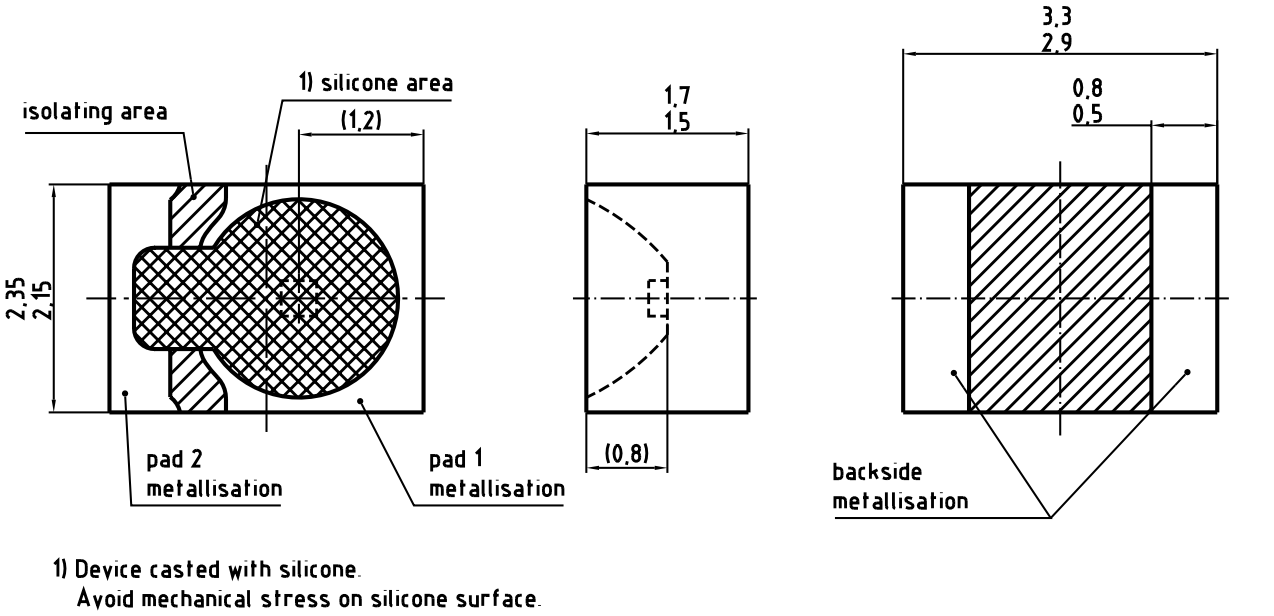


Permissible Pulse Handling Capability

$I_F = f(t_p)$; duty cycle D = parameter; T_A = 85°C



Dimensional Drawing [8)]



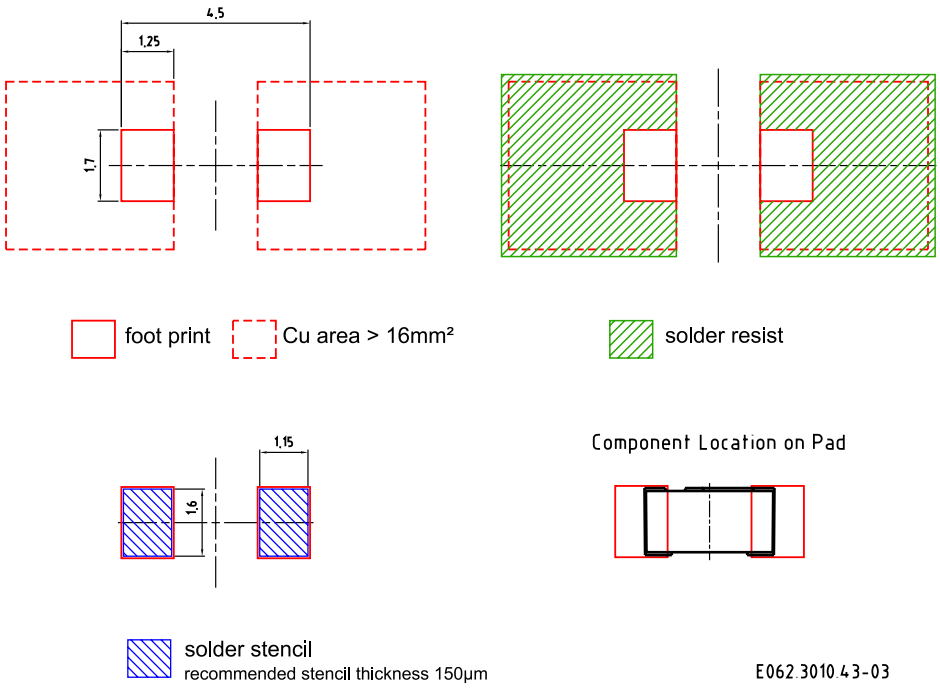
1) Device casted with silicone.
Avoid mechanical stress on silicone surface.

C63062-A3811-A1...-15

Approximate Weight: 23.0 mg

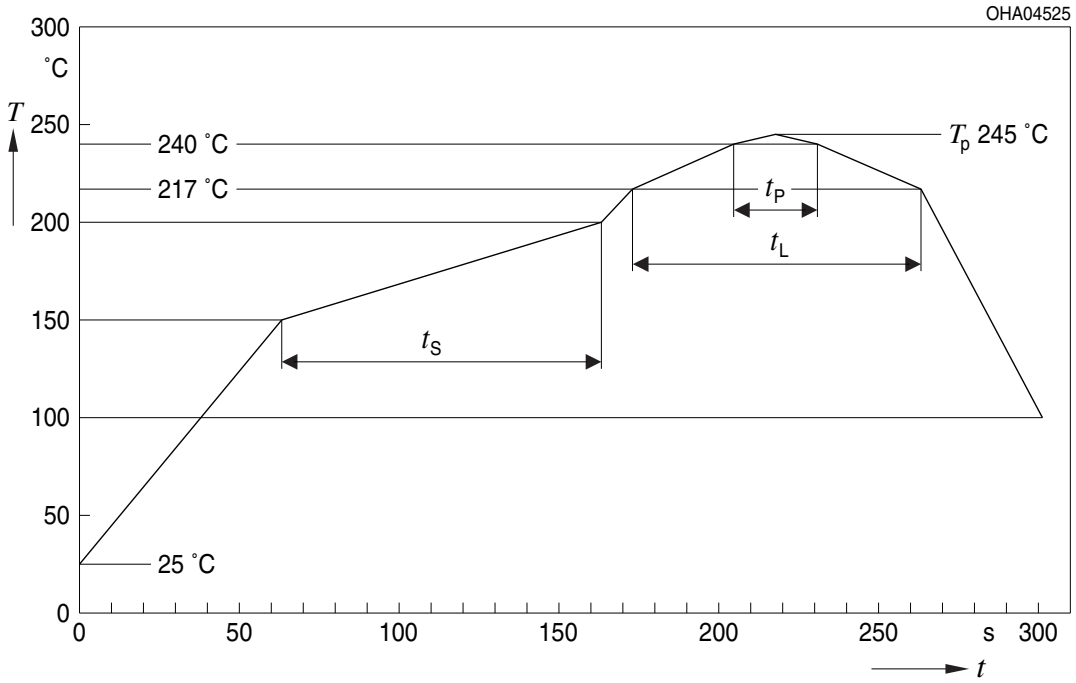
Pin	Description
1	Anode
2	Cathode

Recommended Solder Pad [8)]



Reflow Soldering Profile

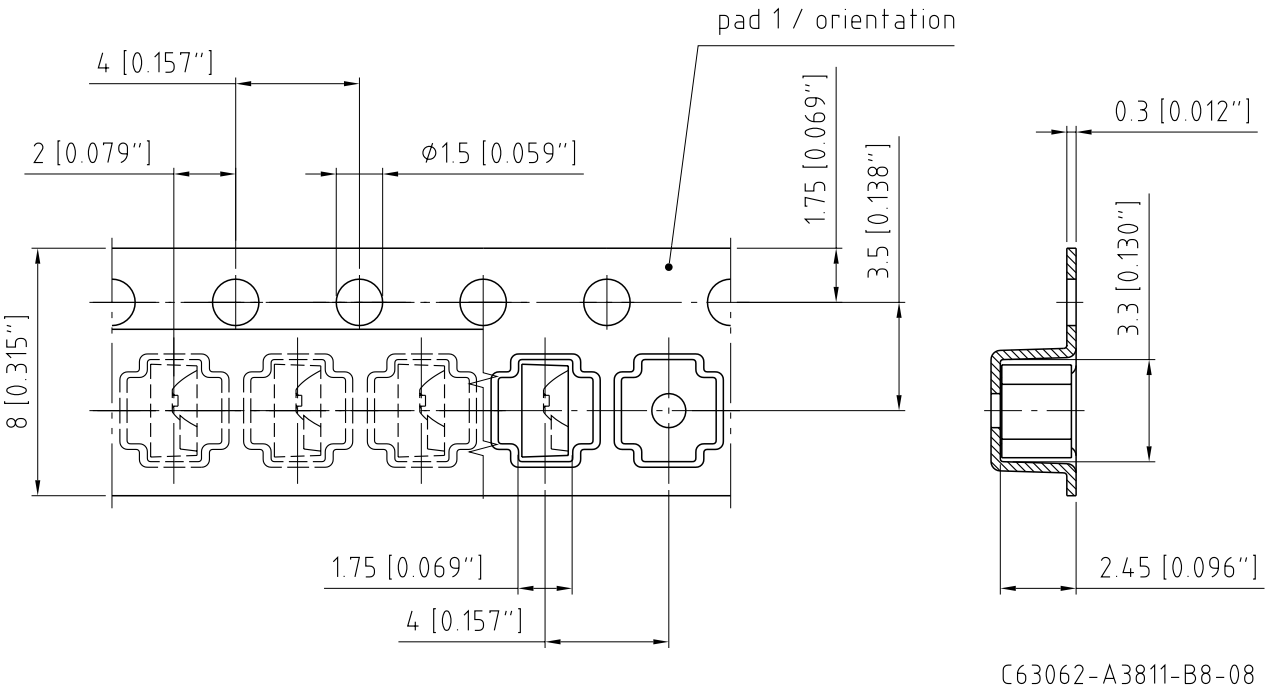
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



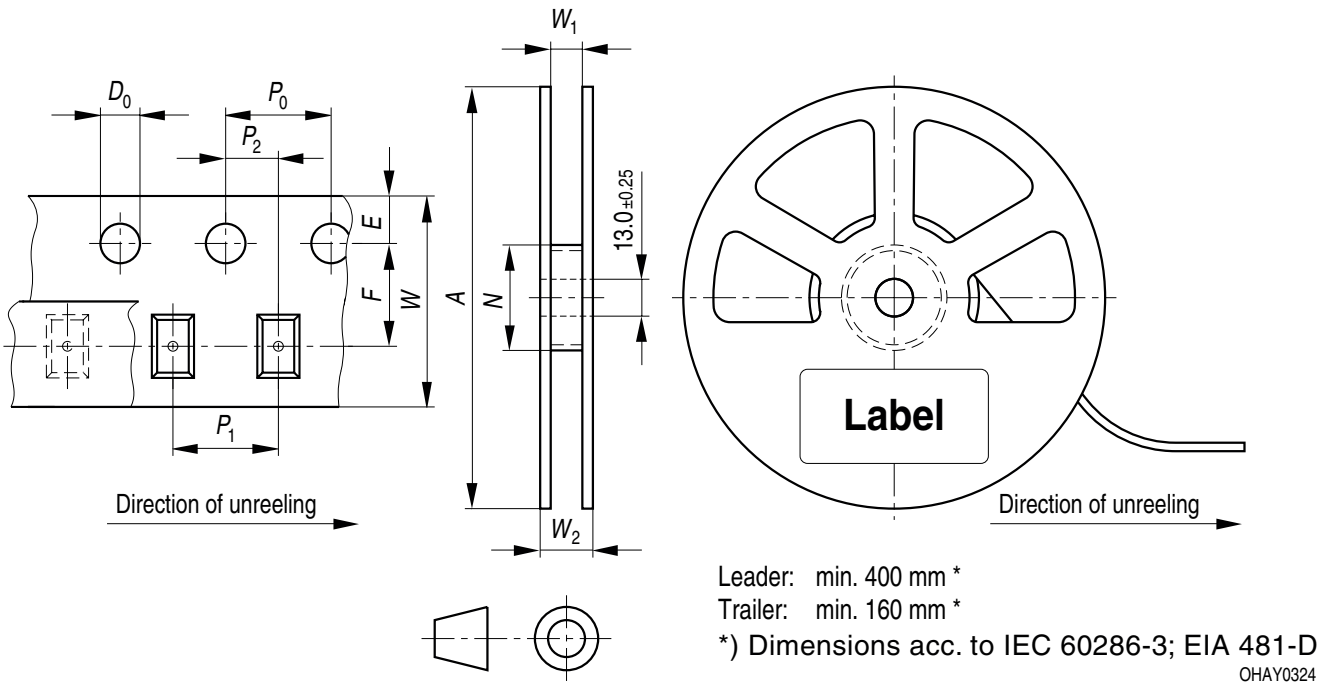
Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time t_S T_{Smin} to T_{Smax}	t_S	60	100	120	s
Ramp-up rate to peak*) T_{Smax} to T_P			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature	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)]



Tape and Reel [9)]

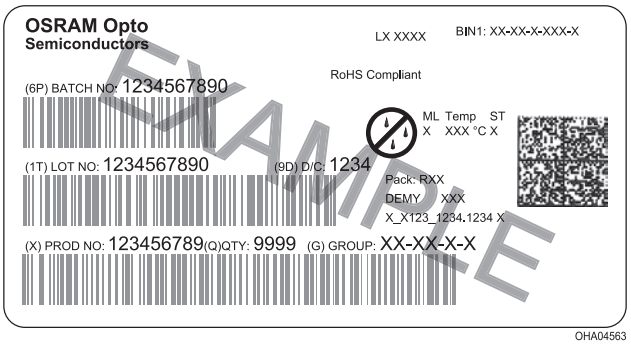


Leader: min. 400 mm *
Trailer: min. 160 mm *
*) Dimensions acc. to IEC 60286-3; EIA 481-D
OHAY0324

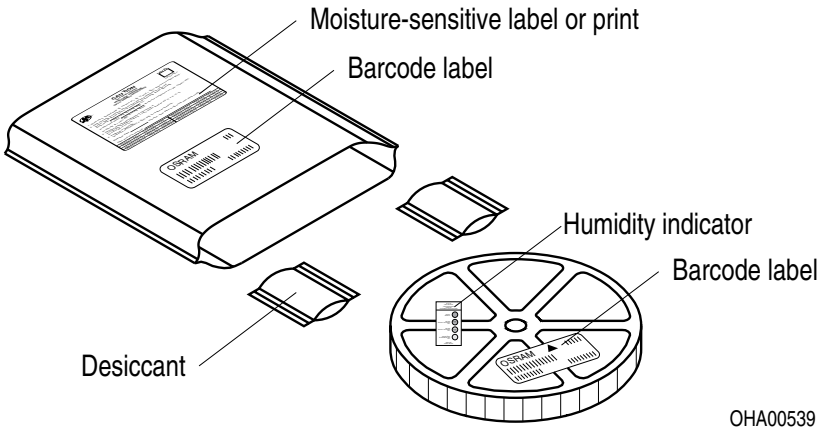
Reel dimensions [mm]

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)

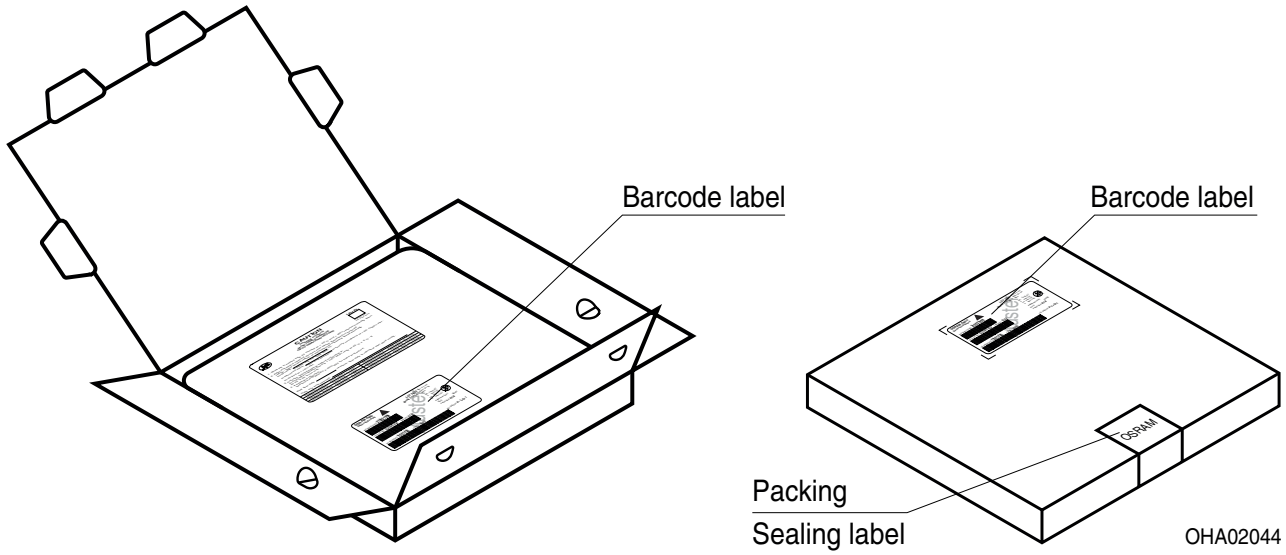


Dry Packing Process and Materials [8)]



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 device specified in this data sheet falls into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, conditions of the 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. When looking at 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.

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 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.

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Glossary

1) **Radiant intensity**: Measured at a solid angle of Ω = 0.01 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 - soldering point, of the device only, mounted on an ideal heatsink (e.g. metal block)

5) **Thermal resistance**: junction - ambient, mounted on PC-board (FR4), padsize 16 mm² each

6) **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.

7) **Testing temperature**: T_A = 25°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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