

# Narrow beam LED in Mini MIDLED package (940 nm)

## Version 1.3

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### SFH 4441



#### Features:

- Highly Efficient Infrared LED
- Short switching times
- Narrow halfangle ( $\pm 17^\circ$ )
- Low profile component

#### Applications

- Sensor technology
- For control and drive circuits
- Proximity sensor
- Mobile devices

#### Notes

Depending on the mode of operation, these devices emit highly concentrated non visible infrared light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1 and IEC 62471.

#### Ordering Information

Type:	Radiant Intensity $I_e$ [mW/sr] $I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$	Ordering Code
SFH 4441	65 ( $\geq 25$ )	Q65111A4266

*Note:* Measured at a solid angle of  $\Omega = 0.01 \text{ sr}$

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

Parameter	Symbol	Values	Unit
Operation and storage temperature range	$T_{op}; T_{stg}$	-40 ... 85	°C
Reverse voltage	$V_R$	5	V
Forward current	$I_F$	100	mA
Surge current ( $t_p = 300\text{ }\mu\text{s}$ , $D = 0$ )	$I_{FSM}$	1	A
Power consumption	$P_{tot}$	180	mW
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2	kV
Thermal resistance junction - ambient <sup>1) page 13</sup>	$R_{thJA}$	400	K / W
Thermal resistance junction - soldering point <sup>2) page 13</sup>	$R_{thJS}$	200	K / W

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

Parameter		Symbol	Values	Unit
Peak wavelength ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\lambda_{peak}$	950	nm
Centroid wavelength ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\lambda_{centroid}$	940	nm
Spectral bandwidth at 50% of $I_{max}$ ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\Delta\lambda$	42	nm
Half angle	(typ)	$\varphi$	$\pm 17$	°
Dimensions of active chip area	(typ)	L x W	0.3 x 0.3	mm x mm
Rise and fall time of $I_e$ ( 10% and 90% of $I_{e\ max}$ ) ( $I_F = 100\text{ mA}$ , $R_L = 50\text{ }\Omega$ )	(typ)	$t_r, t_f$	12	ns
Forward voltage ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ (max))	$V_F$	1.5 ( $\leq 1.8$ )	V
Forward voltage ( $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ )	(typ (max))	$V_F$	2.3 ( $\leq 3$ )	V
Reverse current ( $V_R = 5\text{ V}$ )		$I_R$	not designed for reverse operation	$\mu\text{A}$
Total radiant flux ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\Phi_e$	50	mW

Parameter		Symbol	Values	Unit
Temperature coefficient of $I_e$ or $\Phi_e$ ( $I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ)	$TC_I$	-0.5	% / K
Temperature coefficient of $V_F$ ( $I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ)	$TC_V$	-1.3	mV / K
Temperature coefficient of wavelength ( $I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ)	$TC_\lambda$	0.3	nm / K

**Grouping** ( $T_A = 25 \text{ }^\circ\text{C}$ )

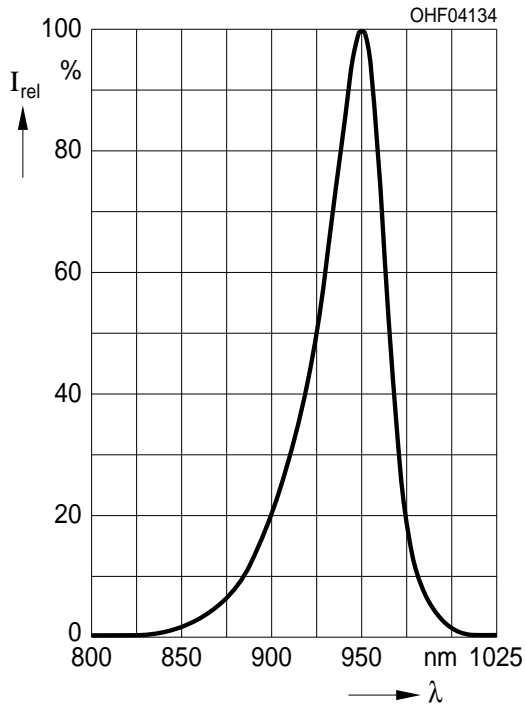
Group	Min Radiant Intensity	Max Radiant Intensity	Typ Radiant Intensity
	$I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$ $I_{e, \text{min}}$ [mW / sr]	$I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$ $I_{e, \text{max}}$ [mW / sr]	$I_F = 1 \text{ A}$ , $t_p = 25 \text{ } \mu\text{s}$ $I_{e, \text{typ}}$ [mW / sr]
SFH 4441-T	25	50	300
SFH 4441-U	40	80	480
SFH 4441-V	63	125	750
SFH 4441-AW	100	200	1200

Note: measured at a solid angle of  $\Omega = 0.01 \text{ sr}$

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

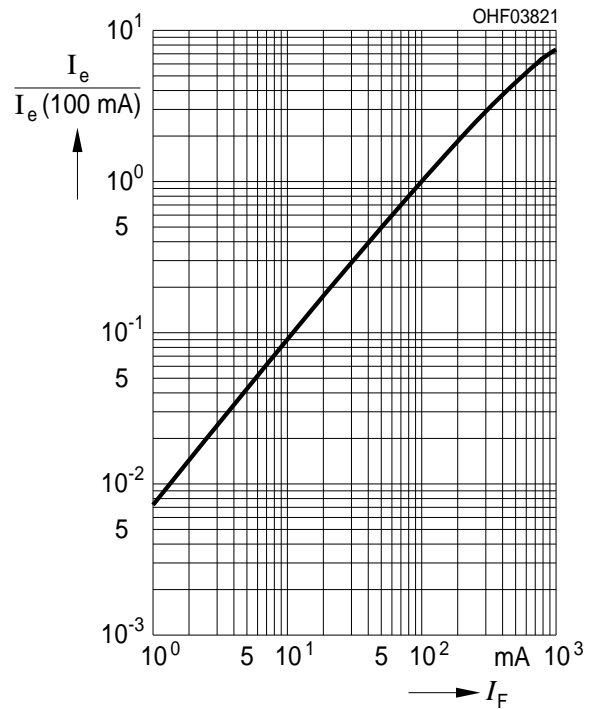
**Relative Spectral Emission** <sup>3) page 13</sup>

$I_{rel} = f(\lambda), T_A = 25^\circ\text{C}$



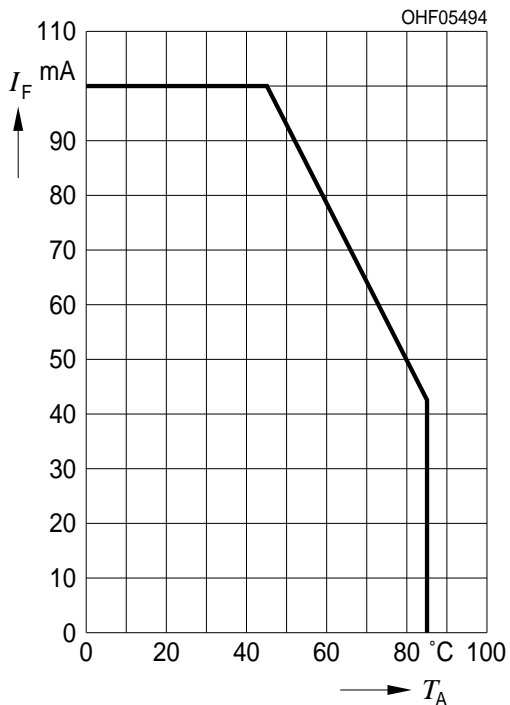
**Radiant Intensity** <sup>3) page 13</sup>

$I_e / I_e(100\text{ mA}) = f(I_F), \text{ single pulse, } t_p = 25\ \mu\text{s}, T_A = 25^\circ\text{C}$



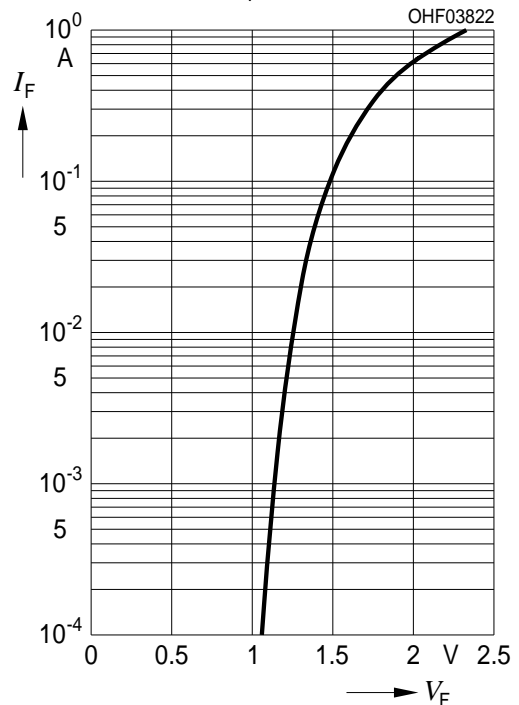
**Max. Permissible Forward Current**

$I_{F, max} = f(T_A), R_{thJA} = 400\text{ K/W}$



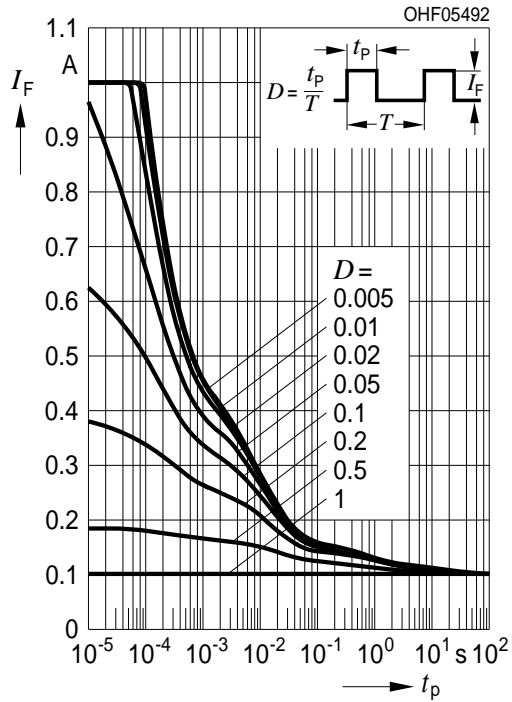
**Forward Current** <sup>3) page 13</sup>

$I_F = f(V_F), \text{ single pulse, } t_p = 100\ \mu\text{s}, T_A = 25^\circ\text{C}$



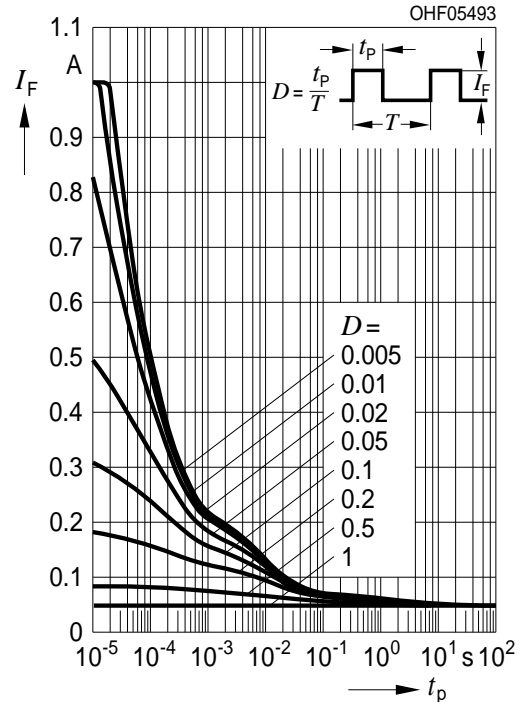
**Permissible Pulse Handling Capability**

$I_F = f(t_p)$ ,  $T_A = 25\text{ °C}$ , duty cycle  $D = \text{parameter}$



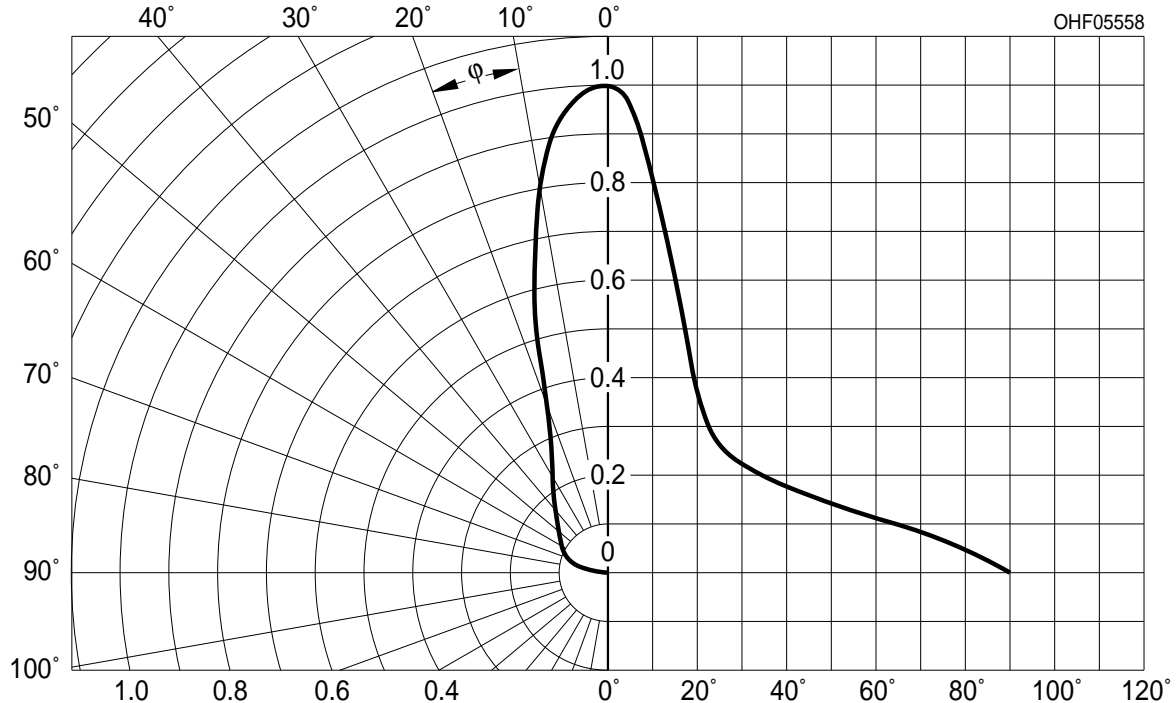
**Permissible Pulse Handling Capability**

$I_F = f(t_p)$ ,  $T_A = 85\text{ °C}$ , duty cycle  $D = \text{parameter}$

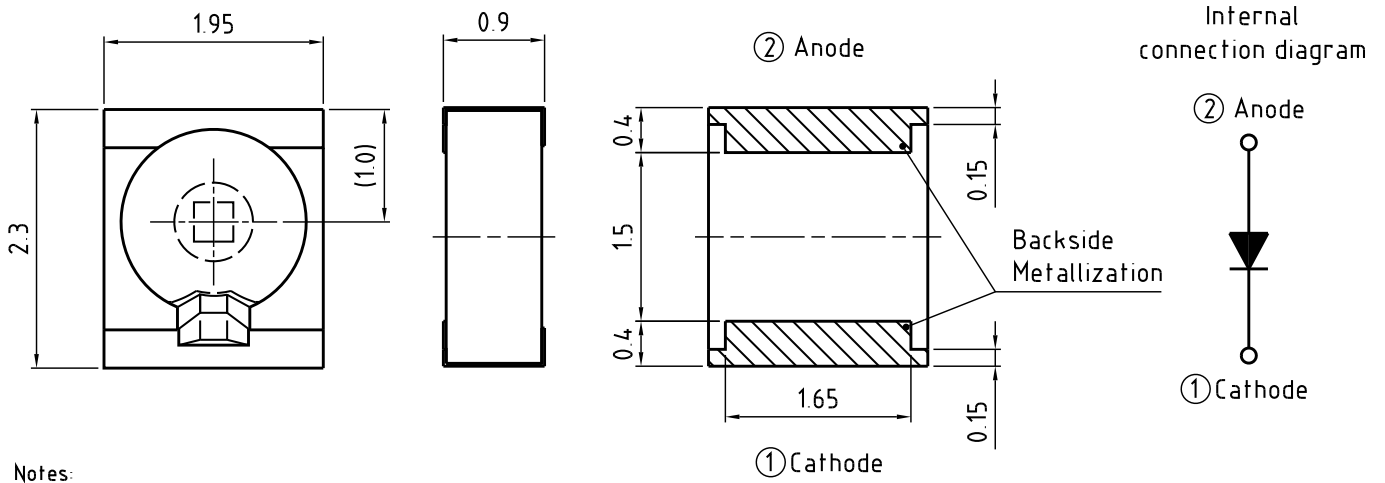


**Radiation Characteristics** <sup>3) page 13</sup>

$I_{rel} = f(\phi)$ ,  $T_A = 25\text{ °C}$



Package Outline



- Notes:
- 1. Unspecified tolerance shall be  $\pm 0.15$
  - 2. Dimension in parenthesis are shown for reference

C67062-A0032-A1-05

Dimensions in mm.

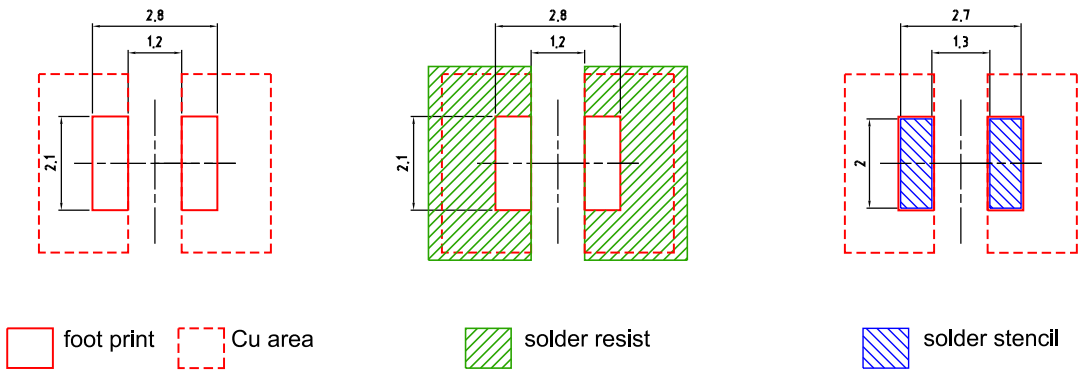
**Package**

Mini MIDLED, Silicone, colourless, clear

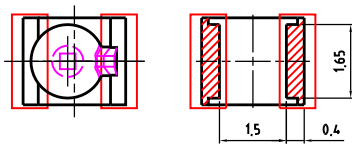
**Approximate Weight:**

10 mg

**Recommended Solder Pad**



**Component Location on Pad**



E062.3010.121 -02

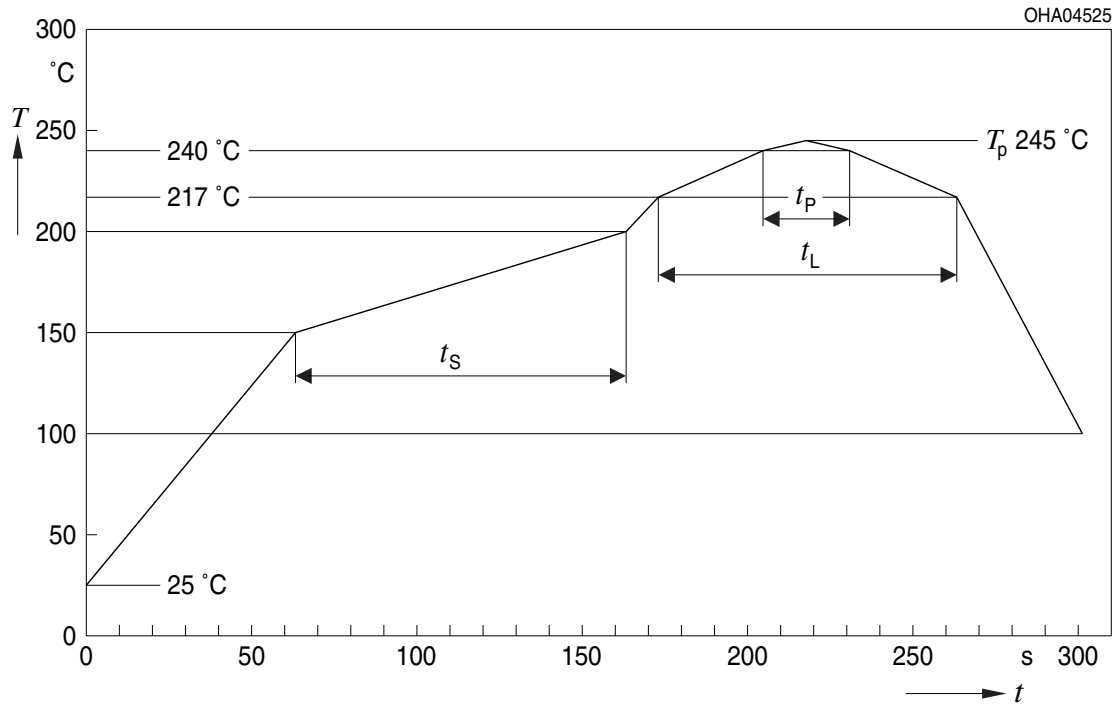
*Dimensions in mm (inch).*

**Handling indication**

The package is casted with silicone. Mechanical stress at the surface of the unit should be as low as possible.

### Reflow Soldering Profile

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



OHA04612

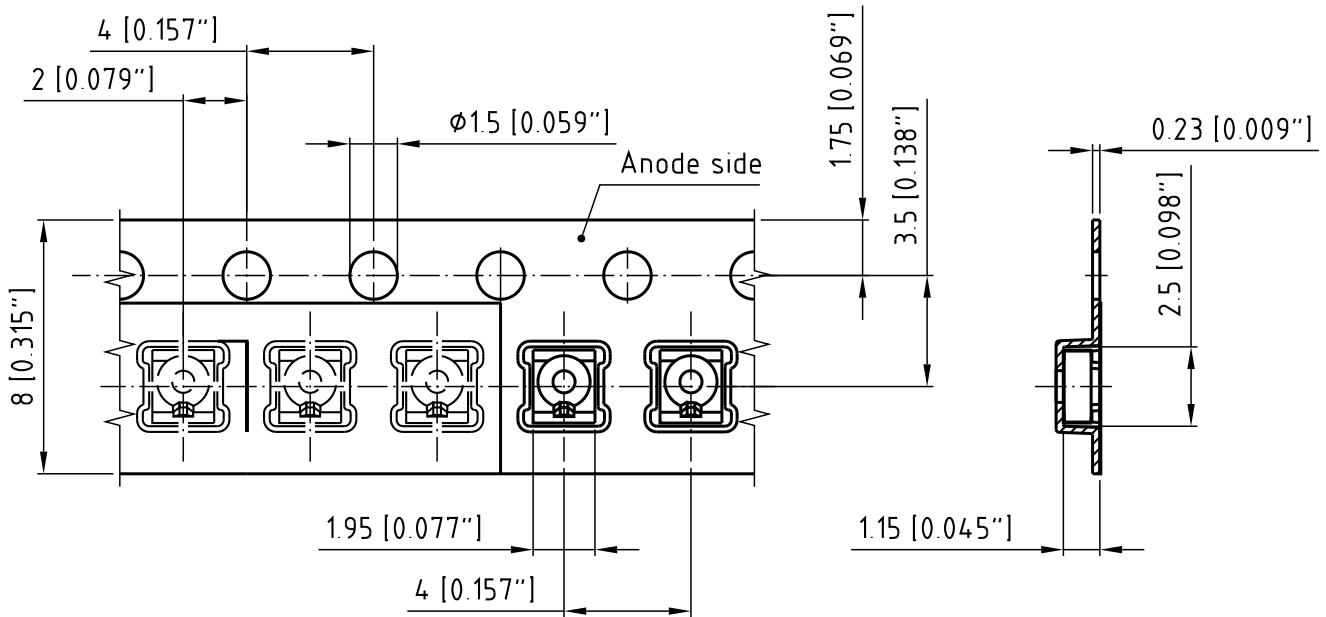
Profile Feature Profil-Charakteristik	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Unit Einheit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak*) $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		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**

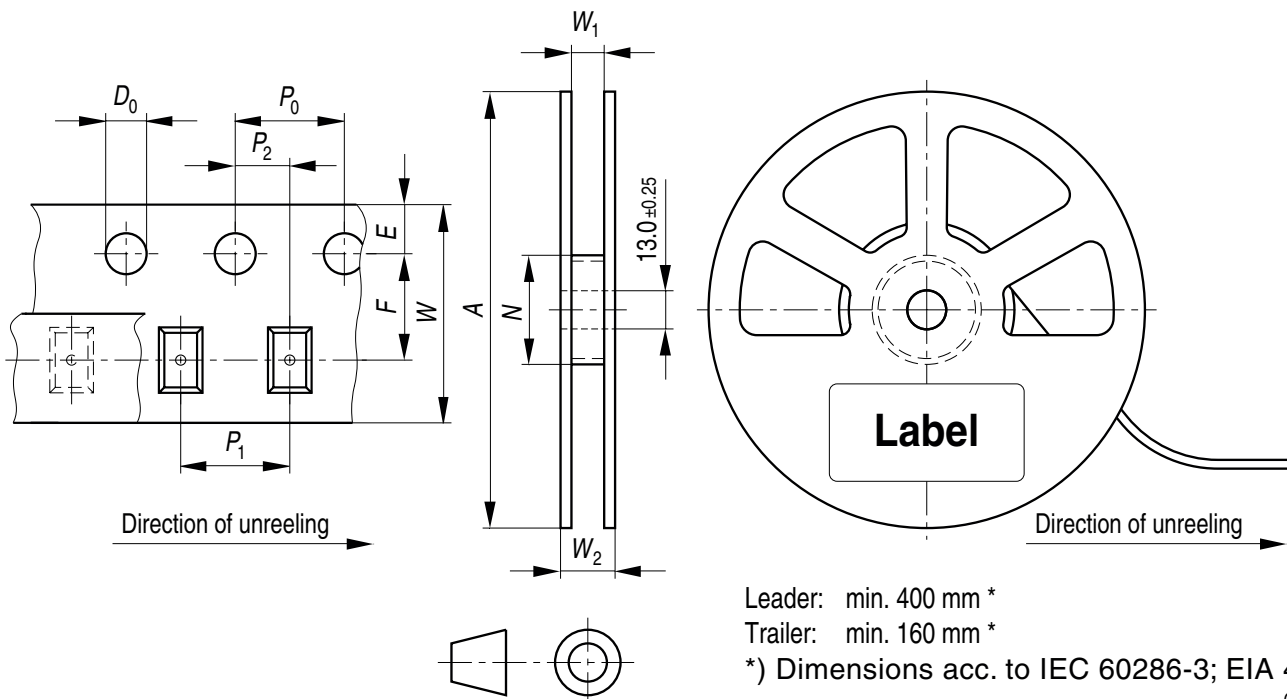


C67062-A0032-B6 -02

*Dimensions in mm (inch).*

**Tape and Reel**

8 mm tape with 3000 pcs. on  $\phi$  180 mm reel



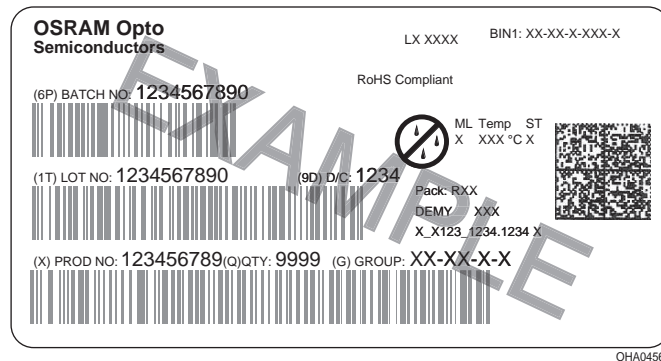
## Tape dimensions [mm]

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

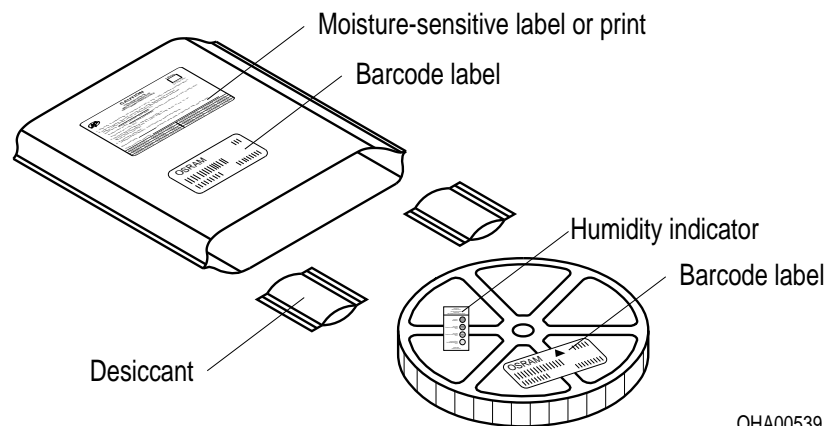
## Reel dimensions [mm]

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)



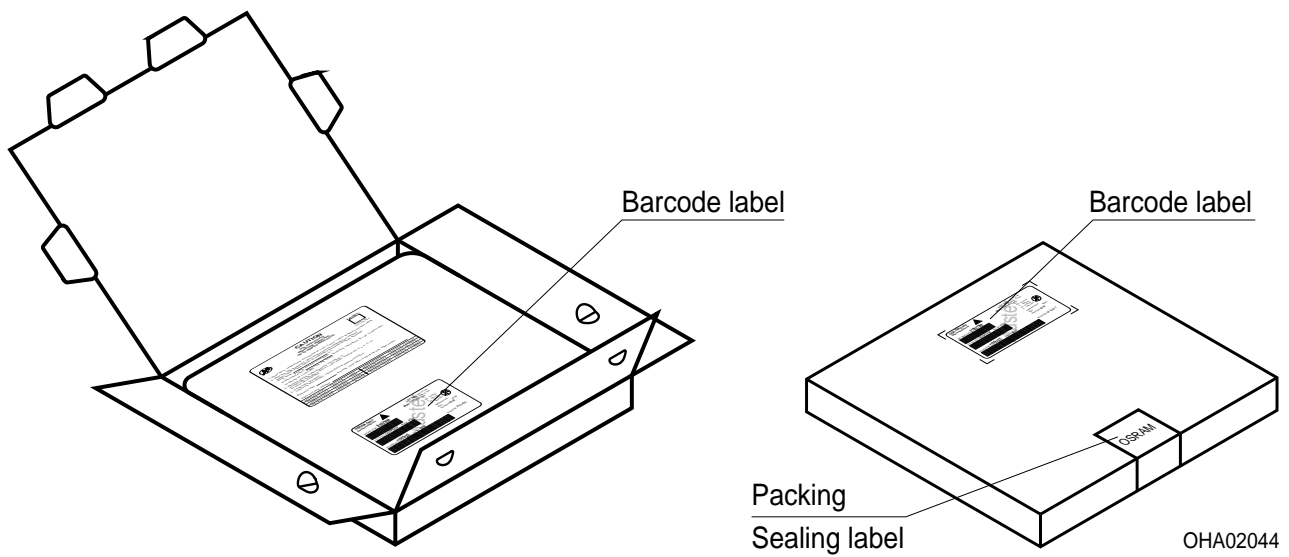
## Dry Packing Process and Materials



## 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

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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.

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For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version in the Internet.

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\*\*) 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**

- 1) **Thermal resistance:** junction -ambient, mounted on PC-board (FR4), pads size 16 mm<sup>2</sup> each
- 2) **Thermal resistance:** junction - soldering point, of the device only, mounted on an ideal heatsink (e.g. metal block)
- 3) **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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