

# OSRAM SFH 7070

## Datasheet

Published by **ams-OSRAM AG**

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BIOFY®

# SFH 7070

Biomonitoring Sensor



## Applications

- Health Monitoring (Heart Rate Monitoring, Pulse Oximetry)

## Features

- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Multi chip package featuring two green emitters and one detector
- Package size: (WxDxH) 7.5 mm x 3.9 mm x 0.9 mm
- Light Barrier to block optical crosstalk
- optimized for strong PPG signal

## Ordering Information

Type  
SFH 7070

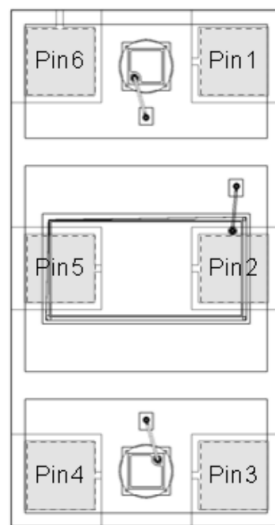
Ordering Code  
Q65111A9887

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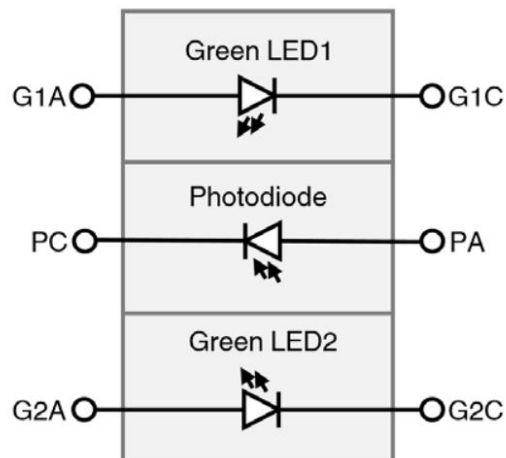
## Pin configuration

Pin	Name	Function
1	Green 1	Green LED 1 Cathode
2	PD	Photodiode Anode
3	Green 2	Green LED 2 Cathode
4	Green 2	Green LED 2 Anode
5	PD	Photodiode Cathode
6	Green 1	Green LED 1 Anode

Top view



## Block diagramm



## Maximum Ratings

 $T_A = 25\text{ °C}$ 

Parameter	Symbol		Values
Operating temperature range	$T_{op}$	min.	-40 °C
		max.	85 °C
Storage temperature range	$T_{stg}$	min.	-40 °C
		max.	85 °C
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 - HBM	$V_{ESD}$	max.	2 kV
<b>Green Emitters</b>			
Reverse voltage <sup>5)</sup>	$V_R$	max.	5 V
Forward current	$I_F (DC)$	max.	25 mA
Forward current pulsed $t_p = 5\text{ ms}$ , $D = 0.005$	$I_{F\ pulse}$	max.	300 mA
<b>Photodiode</b>			
Reverse voltage	$V_R$	max.	16 V

## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
<b>Green Emitter (single emitter)</b>			
Peak wavelength $I_F = 20\text{ mA}$	$\lambda_{\text{peak}}$	typ.	526 nm
Centroid Wavelength <sup>6)</sup> $I_F = 20\text{ mA}$	$\lambda_{\text{centroid}}$	min.	520 nm
		typ.	530 nm
		max.	540 nm
Spectral bandwidth at 50% of $I_{\text{max}}$ $I_F = 20\text{ mA}$	$\Delta\lambda$	typ.	32 nm
Half angle	$\phi$	typ.	$\pm 60\text{ °}$
Rise time (10% and 90%) $I_F = 100\text{ mA}$ , $t_p = 16\text{ }\mu\text{s}$ , $R_L = 50\text{ }\Omega$	$t_r$	typ.	60 ns
Fall time (10% and 90%) $I_F = 100\text{ mA}$ , $t_p = 16\text{ }\mu\text{s}$ , $R_L = 50\text{ }\Omega$	$t_f$	typ.	60 ns
Forward voltage <sup>7)</sup> $I_F = 20\text{ mA}$	$V_F$	typ.	2.4 V
		max.	2.8 V
Reverse current $V_R = 5\text{ V}$	$I_R$	.	Not designed for reverse operation
Radiant intensity $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$I_e$	typ.	4.8 mW / sr
Total radiant flux $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$\Phi_e$	typ.	15 mW
Temperature coefficient of brightness $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_I$	typ.	-0.35 % / K
Temperature coefficient of wavelength $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_\lambda$	typ.	0.03 nm / K
Temperature coefficient of voltage $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_V$	typ.	-3.6 mV / K

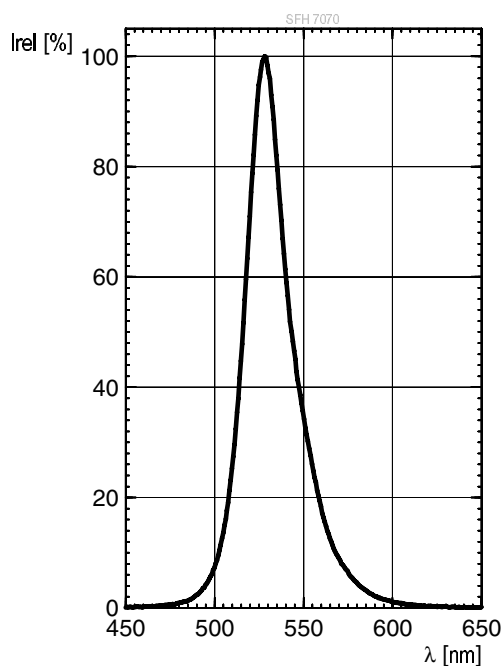
## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
<b>Photodiode</b>			
Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$	typ.	635 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	402 ... 694 nm
Photocurrent $E_e = 0.1\text{ mW/cm}^2$ , $\lambda = 530\text{ nm}$ , $V_R = 5\text{ V}$	$I_P$	typ.	0.985 $\mu\text{A}$
Radiation sensitive area	A	typ.	3.46 mm <sup>2</sup>
Dimensions of radiant sensitive area	L x W	typ.	1.29 x 2.69 mm x mm
Half angle	$\phi$	typ.	$\pm 57\text{ °}$
Dark current $V_R = 5\text{ V}$ , $E_e = 0\text{ mW/cm}^2$	$I_R$	typ. max.	0.4 nA 5 nA
Spectral sensitivity of the chip $\lambda = 530\text{ nm}$	$S_\lambda$	typ.	0.31 A / W
Spectral sensitivity of the chip $\lambda \geq 690\text{ nm}$	$S_{IR}$	typ.	0.02 A / W
Open-circuit voltage $E_e = 0.1\text{ mW/cm}^2$ , $\lambda = 530\text{ nm}$	$V_O$	typ.	390 mV
Short-circuit current $E_e = 0.1\text{ mW/cm}^2$ , $\lambda = 530\text{ nm}$	$I_{SC}$	typ.	0.984 $\mu\text{A}$
Rise time $V_R = 5\text{ V}$ , $R_L = 50\ \Omega$ , $\lambda = 530\text{ nm}$	$t_r$	typ.	40 ns
Fall time $V_R = 5\text{ V}$ , $R_L = 50\ \Omega$ , $\lambda = 530\text{ nm}$	$t_f$	typ.	40 ns
Forward voltage $I_F = 10\text{ mA}$ , $E = 0\text{ mW/cm}^2$	$V_F$	typ.	0.84 V
Capacitance $V_R = 5\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0\text{ mW/cm}^2$	$C_0$	typ.	55 pF

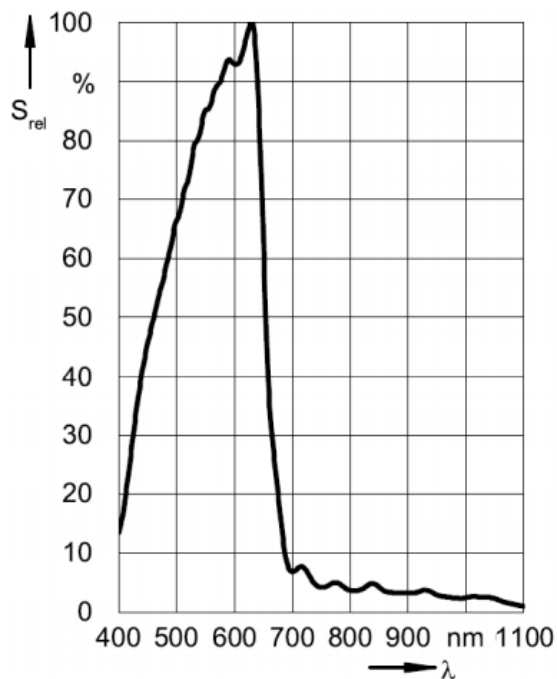
## Relative Spectral Emission <sup>1), 2)</sup>

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



## Relative Spectral Sensitivity <sup>1), 2)</sup>

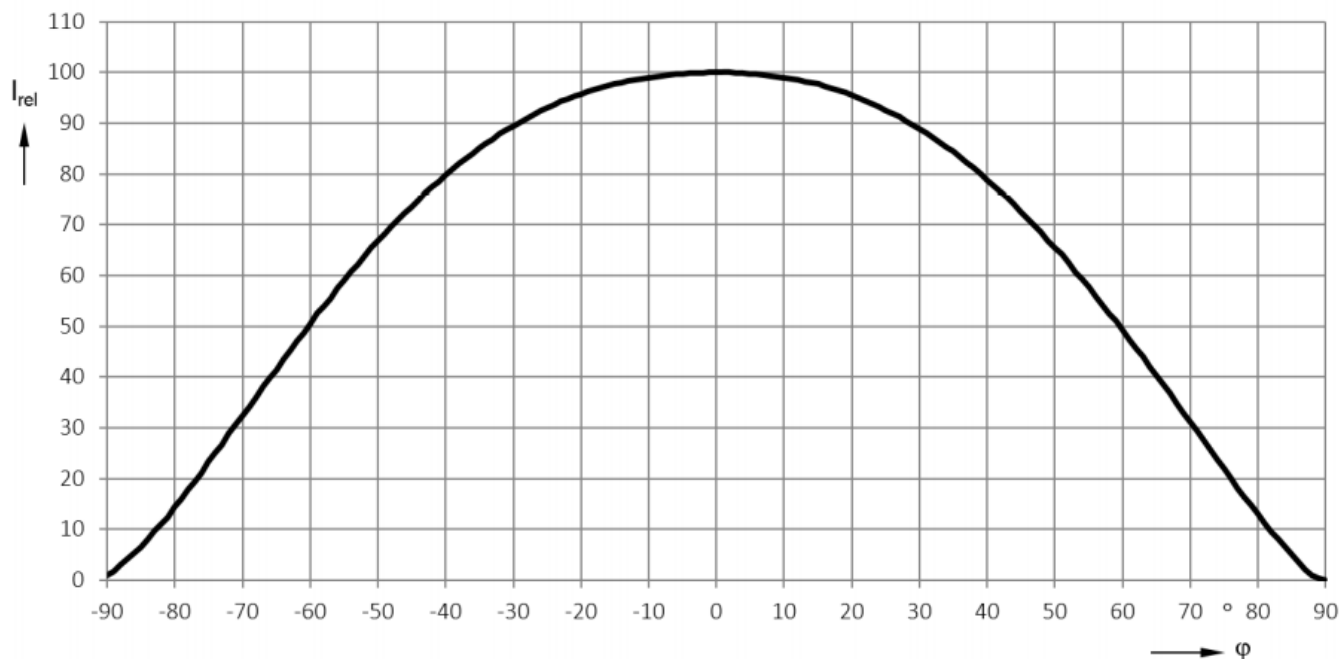
- photodiode:  $S_{rel} = f(\lambda)$





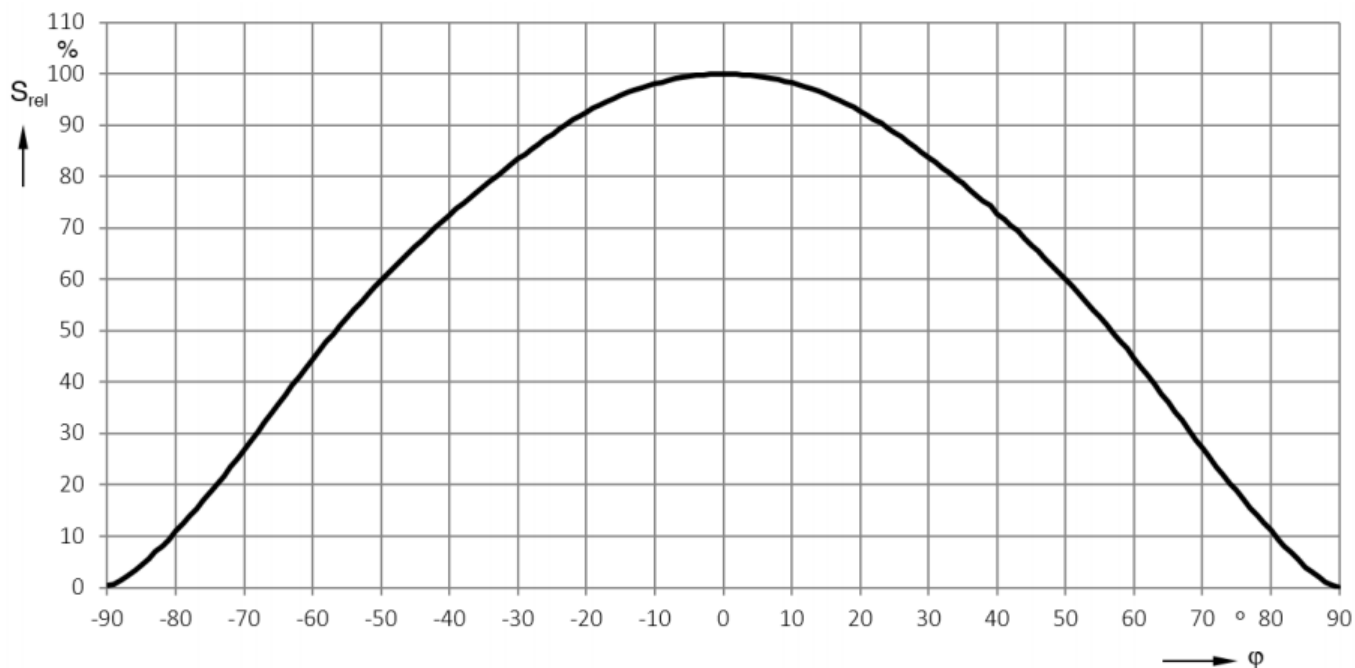
## Radiation Characteristics <sup>1), 2)</sup>

- true green:  $I_{e,rel} = f(\varphi)$



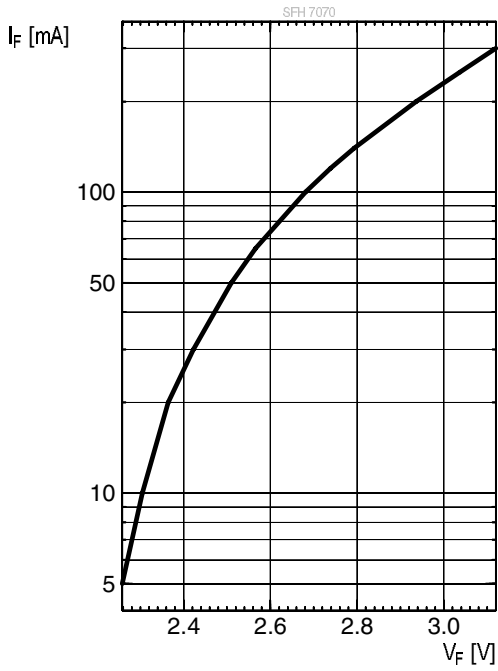
## Directional Characteristics <sup>1), 2)</sup>

- photodiode:  $S_{rel} = f(\lambda)$ ;  $\lambda = 530\text{nm}$



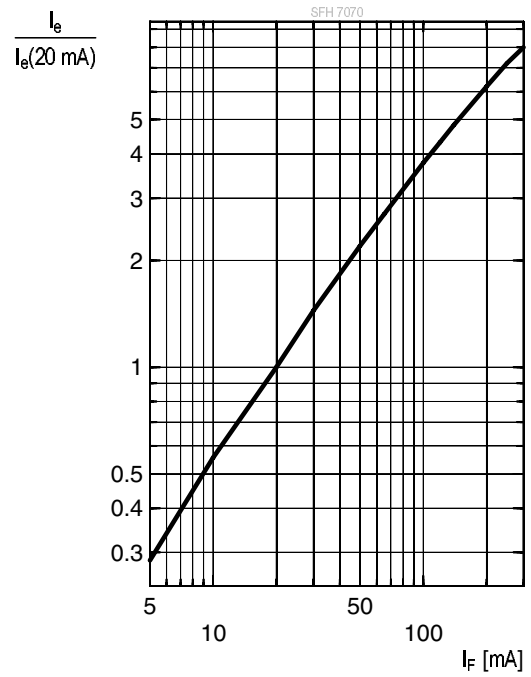
**Forward current** 1), 2)

- true green:  $I_F = f(V_F)$ ; single pulse;  $t_p = 100 \mu s$



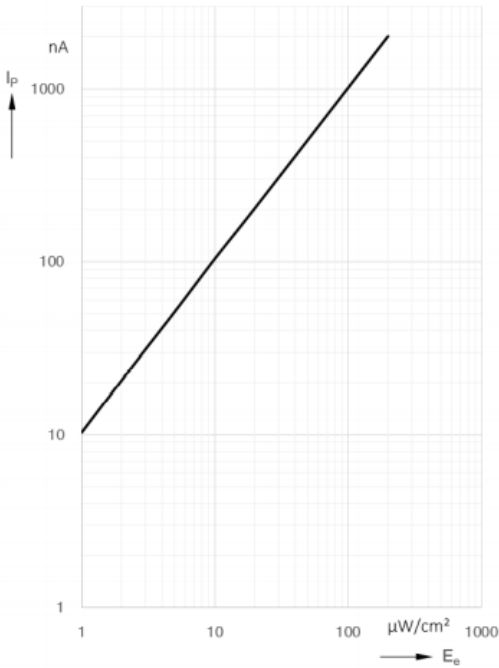
**Relative Radiant Intensity** 1), 2)

- true green:  $I_e/I_{e(20mA)} = f(I_F)$ ; single pulse;  $t_p = 25 \mu s$



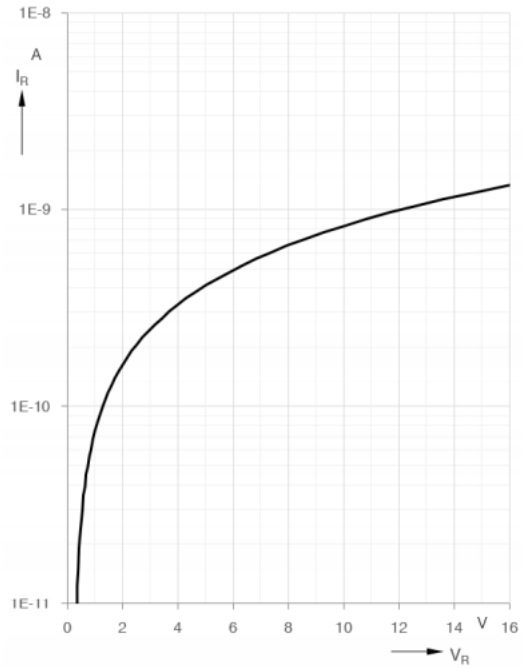
**Photocurrent** 1), 2)

- photodiode:  $I_p = f(E_e)$ ;  $\lambda = 530 \text{ nm}$ ;  $V_R = 5 \text{ V}$



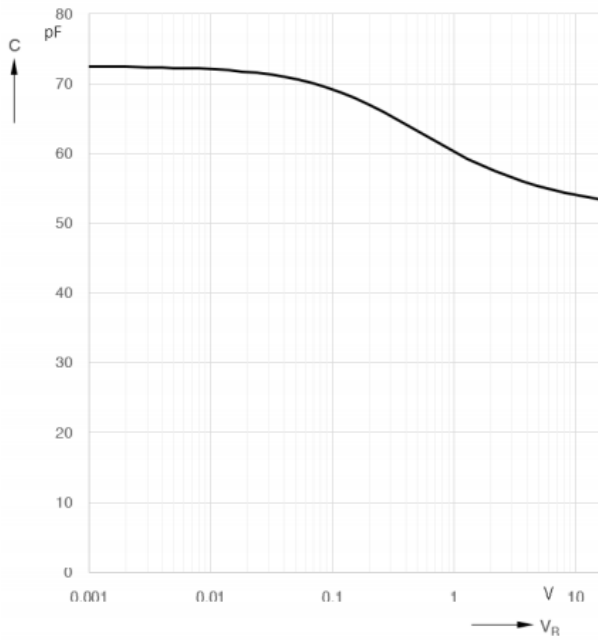
**Dark Current** 1), 2)

- photodiode:  $I_R = f(V_R)$ ;  $E = 0$

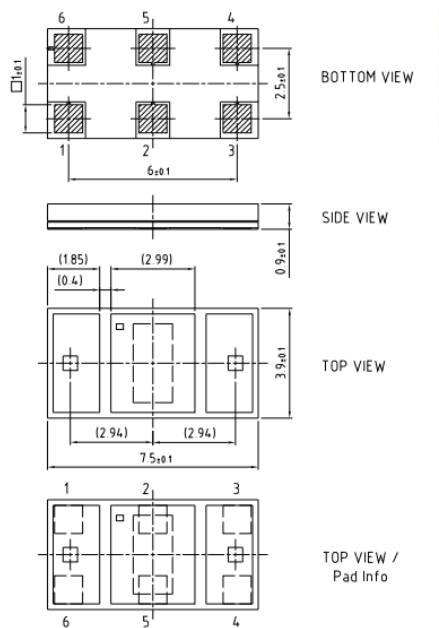


## Capacitance <sup>1), 2)</sup>

■ photodiode:  $C = f(V_R)$ ;  $f = 1\text{MHz}$ ;  $E = 0$



## Dimensional Drawing <sup>3)</sup>



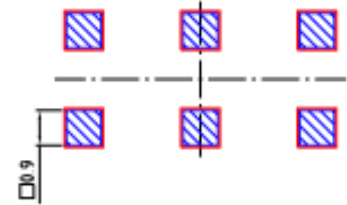
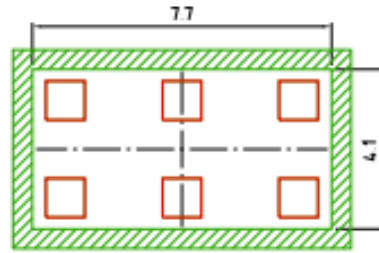
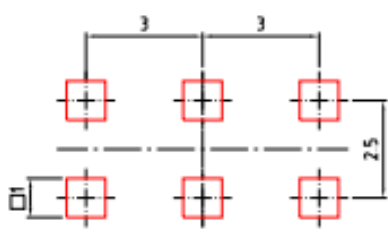
C63062-A4310-A1-02

Dimensions in mm

## Further Information:

Approximate Weight: 44.0 mg

Recommended Solder Pad <sup>3)</sup>

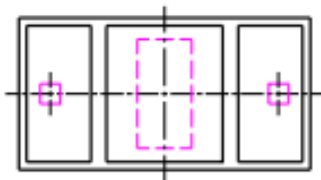


 Cu Solder pad

 solder resist

 solder stencil

Component Location on Pad

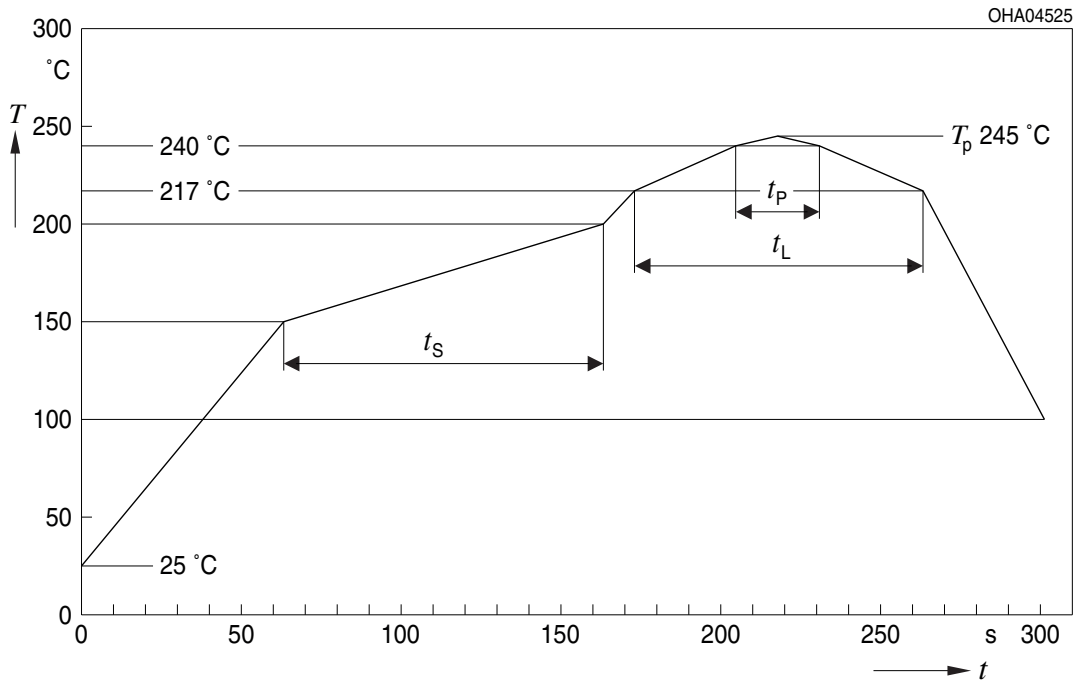


*Dimensions in mm (inch).*

E062.3010.204-02

## Reflow Soldering Profile

Product complies to MSL Level 4 acc. to JEDEC J-STD-020E

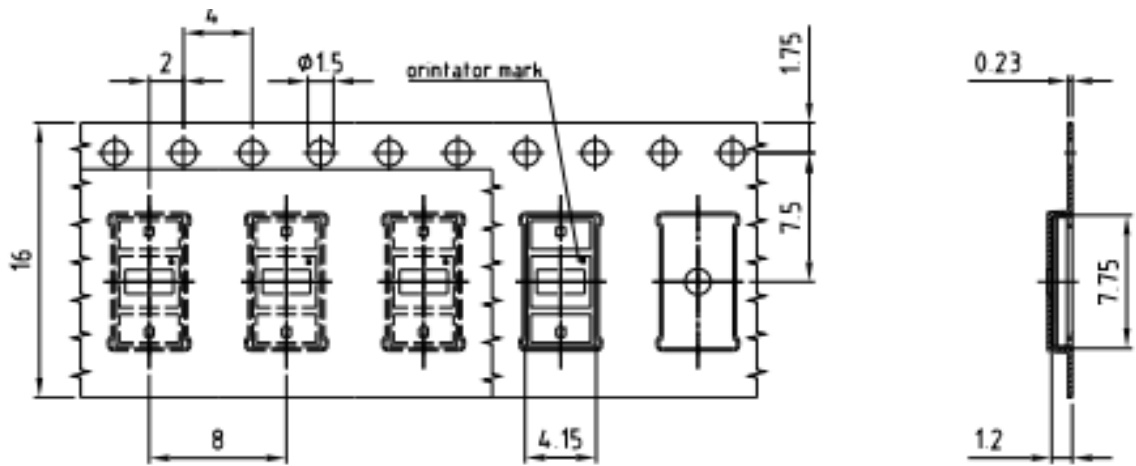


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$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

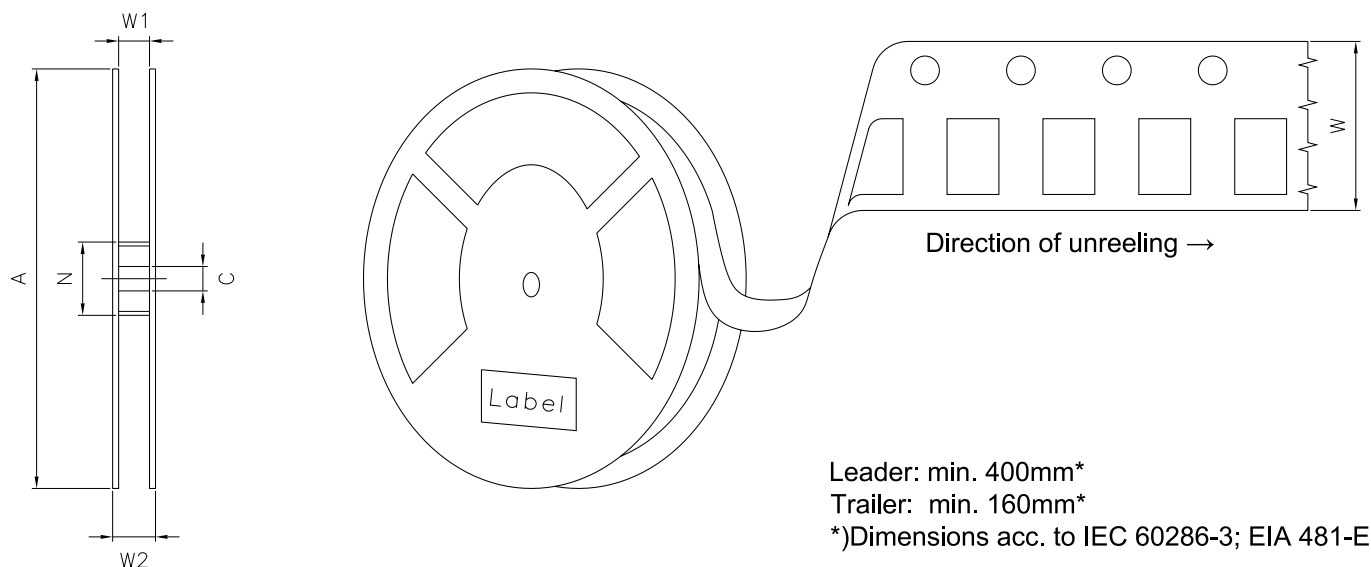
Taping <sup>3)</sup>



C63062-A4 310-B2 -02

*Dimensions in mm [inch].*

## Tape and Reel <sup>4)</sup>



## Reel Dimensions

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2 max</sub>	Pieces per PU
180 mm	16 + 0.3 / - 0.1 mm	60/100 mm	16.4 + 2 mm	22.4 mm	1500



### Barcode-Product-Label (BPL)

**OSRAM Opto Semiconductors** LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890

(1T) LOT NO: 1234567890 (9D) D/C: 1234

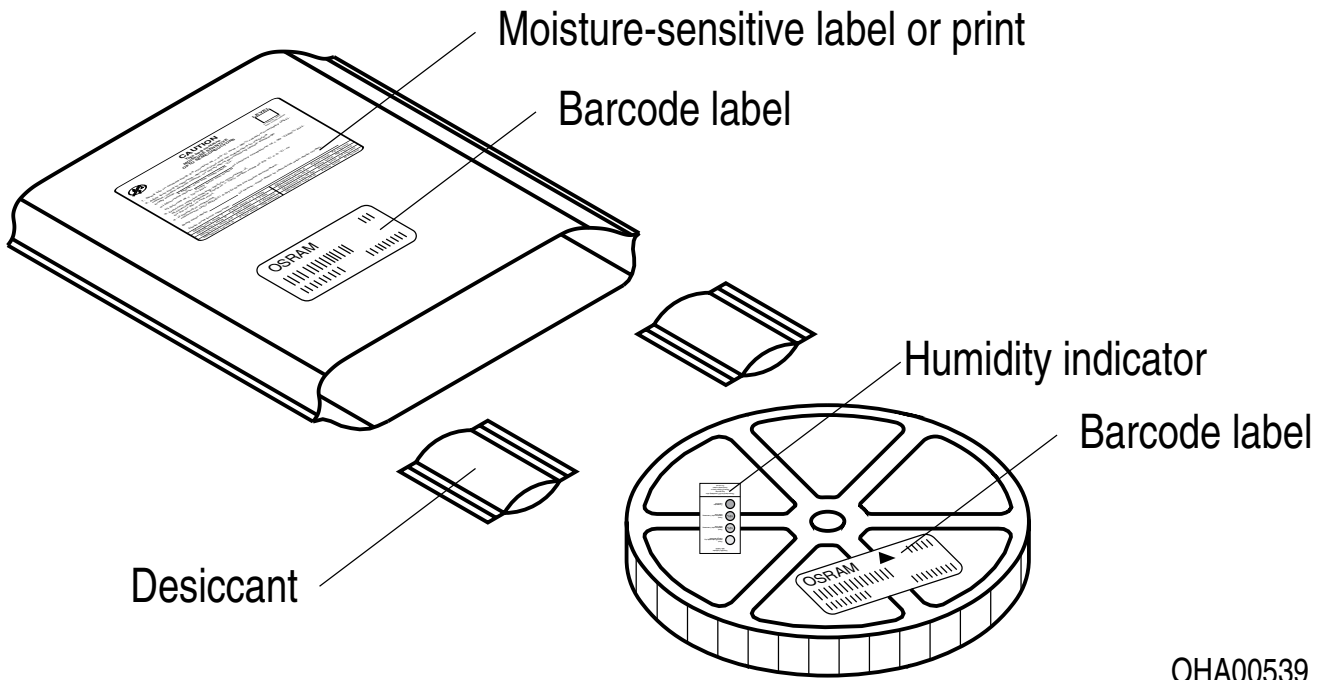
(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X

ML Temp ST  
X XXX °C X

Pack: RXX  
DEMY XXX  
X\_X123\_1234.1234 X

OHA04563

### Dry Packing Process and Materials <sup>3)</sup>



OHA00539

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

## 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.

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## Glossary

- 1) **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.
- 2) **Testing temperature:**  $T_A = 25^\circ\text{C}$  (unless otherwise specified)
- 3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 4) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.
- 5) **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.
- 6) **Wavelength:** The wavelengths are measured with a tolerance of  $\pm 1$  nm.
- 7) **Forward Voltage:** The forward voltages are measured with a tolerance of  $\pm 0.1$  V.

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## Revision History

Version	Date	Change
1.2	2021-04-27	New Layout
1.3	2022-05-10	Characteristics Electro - Optical Characteristics (Diagrams) New Layout

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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。

**Published by ams-OSRAM AG**

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