

# OSRAM SFH 7250

## Datasheet

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Multi TOPLED®

# SFH 7250

Infrared-Emitter (850 nm) and Si-Phototransistor



## Applications

- Appliances & Tools
- Factory Automation
- Home & Building Automation

## Features

- Package: clear epoxy
- 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)
- Available on tape and reel
- SMT package with IR emitter (850 nm) and Si-phototransistor
- Suitable for SMT assembly
- Emitter and detector can be controlled separately

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## Ordering Information

Type	Radiant intensity <sup>1)</sup> typ. $I_F = 70 \text{ mA}; t_p = 20 \text{ ms}$ $I_e$	Ordering Code
SFH 7250	10 mW/sr	Q65111A3188

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## Maximum Ratings

 $T_A = 25\text{ °C}$ 

Parameter	Symbol		Values
Operating temperature range	$T_{op}$	min.	-40 °C
		max.	100 °C
Storage temperature range	$T_{stg}$	min.	-40 °C
		max.	100 °C
Junction temperature	$T_j$	max.	100 °C
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 - HBM	$V_{ESD}$	max.	2 kV

### Emitter

Reverse voltage	$V_R$	max.	5 V
Forward current	$I_F$	max.	70 mA
Forward current pulsed $t_p \leq 10\ \mu\text{s}$ ; $D = 0.005$	$I_{pulse}$	max.	0.7 A
Power consumption	$P_{tot}$	max.	140 mW

### Phototransistor

Collector current	$I_C$	max.	15 mA
Surge current $t_p \leq 10\ \mu\text{s}$ ; $D = 0$	$I_{CS}$	max.	75 mA
Collector-emitter voltage	$V_{CE}$	max.	35 V

The stated maximum ratings refer to one chip.

## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol	Values	
<b>Emitter</b>			
Peak wavelength $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$\lambda_{\text{peak}}$	typ.	860 nm
Centroid wavelength $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$\lambda_{\text{centroid}}$	typ.	850 nm
Spectral bandwidth at 50% $I_{\text{rel,max}}$ (FWHM) $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$\Delta \lambda$	typ.	30 nm
Half angle	$\phi$	typ.	$\pm 60\text{ °}$
Dimensions of chip area	L x W	typ.	0.2 x 0.2 mm x mm
Rise time (10% / 90%) $I_F = 70\text{ mA}$ , $R_L = 50\ \Omega$	$t_r$	typ.	12 ns
Fall time (10% / 90%) $I_F = 70\text{ mA}$ , $R_L = 50\ \Omega$	$t_f$	typ.	12 ns
Forward voltage 8) $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$V_F$	typ. max.	1.6 V 1.9 V
Forward voltage 8) $I_F = 500\text{ mA}$ , $t_p = 100\ \mu\text{s}$	$V_F$	typ. max.	2.4 V 2.9 V
Reverse current $V_R = 5\text{ V}$	$I_R$	typ. max.	not designed for reverse operation
Total radiant flux $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$\Phi_e$	typ.	40 mW
Radiant intensity 1) $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$I_e$	min. typ.	6.3 mW / sr 10 mW / sr
Radiant intensity $I_F = 500\text{ mA}$ , $t_p = 100\ \mu\text{s}$	$I_e$	typ.	60 mW / sr
Temperature coefficient of brightness $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_I$	typ.	-0.5 % / K
Temperature coefficient of voltage $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_V$	typ.	-0.7 mV / K
Temperature coefficient of wavelength $I_F = 70\text{ mA}$ , $t_p = 20\text{ ms}$	$TC_\lambda$	typ.	0.3 nm / K
Thermal resistance junction – ambient 9)	$R_{thJA}$	max.	500 K / W
Thermal resistance junction – solder point	$R_{thJS}$	max.	400 K / W

The stated characteristics refer to one chip.

## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
<b>Phototransistor</b>			
Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$	typ.	990 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	440 ... 1150 nm
Radiant sensitive area $\phi = 240\text{ }\mu\text{m}$	A	typ.	0.038 mm <sup>2</sup>
Dimensions of chip area	L x W	typ.	0.45 x 0.45 mm x mm
Half angle	$\phi$	typ.	$\pm 60\text{ °}$
Capacitance $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_{CE}$	typ.	5 pF
Dark current $V_{CE} = 20\text{ V}$ , $E = 0$	$I_{CE0}$	typ. max.	1 nA 200 nA
Photocurrent <sup>10)</sup> $\lambda = 950\text{ nm}$ , $E_e = 0.1\text{ mW/cm}^2$ , $R_L = 1\text{ k}\Omega$	$I_{PCE}$	min.	16 $\mu\text{A}$
Rise time $I_C = 1\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_L = 1\text{ k}\Omega$	$t_r$	typ.	7 $\mu\text{s}$
Fall time $I_C = 1\text{ mA}$ , $V_{CE} = 5\text{ V}$ , $R_L = 1\text{ k}\Omega$	$t_f$	typ.	7 $\mu\text{s}$
Collector-emitter saturation voltage $I_C = 5\text{ }\mu\text{A}$ , $E_e = 0.1\text{ mW/cm}^2$	$V_{CEsat}$	typ.	150 mV
Thermal resistance junction – ambient <sup>9)</sup>	$R_{thJA}$	max.	450 K/ W

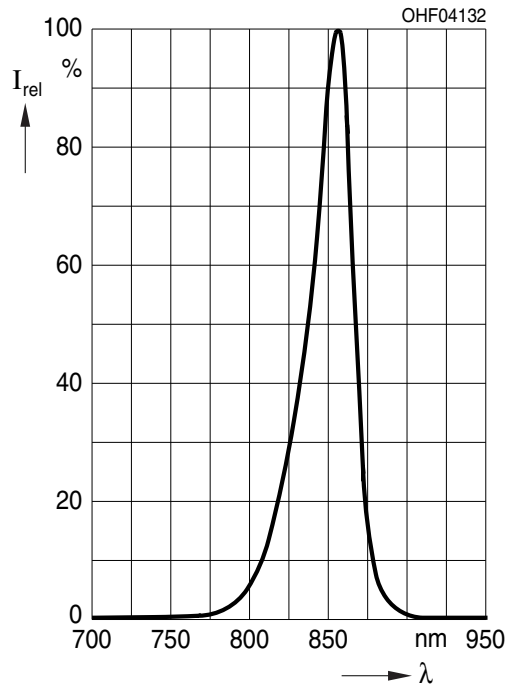
The stated characteristics refer to one chip.

## Brightness Groups

Group	Radiant intensity <sup>1)2)</sup> $I_F = 70 \text{ mA}; t_p = 20 \text{ ms}$ min. $I_e$	Radiant intensity <sup>1)2)</sup> $I_F = 70 \text{ mA}; t_p = 20 \text{ ms}$ max. $I_e$
Q	7.1 mW/sr	11.2 mW/sr
R	11.2 mW/sr	18.0 mW/sr

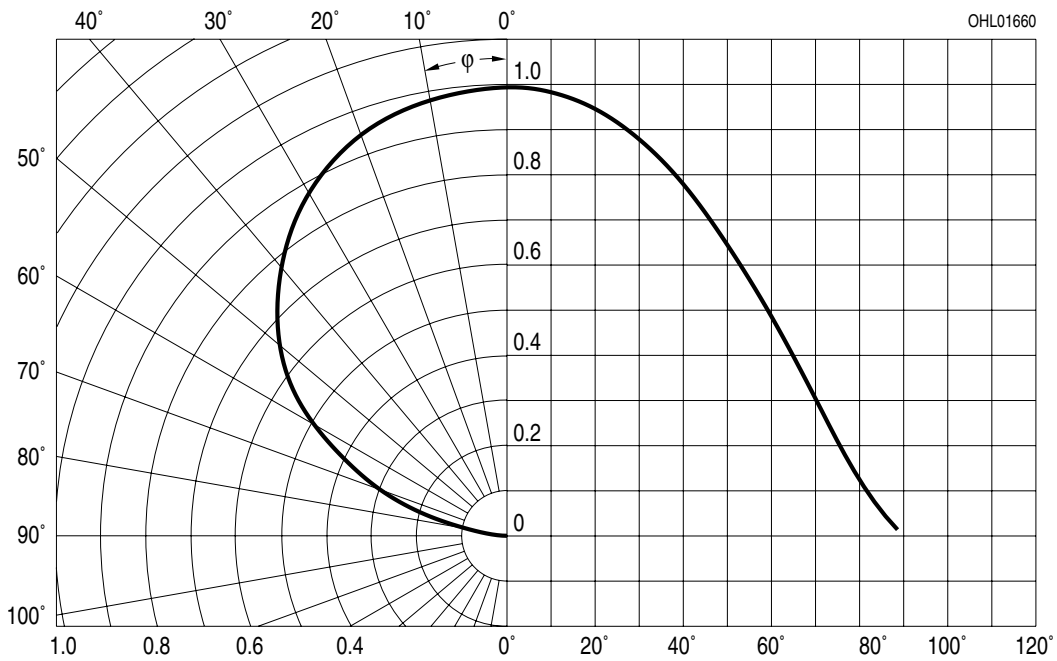
### Relative Spectral Emission <sup>3)</sup>

- infrared (850 nm):  $I_{e,rel} = f(\lambda)$ ;  $I_F = 70 \text{ mA}$ ;  $t_p = 20 \text{ ms}$



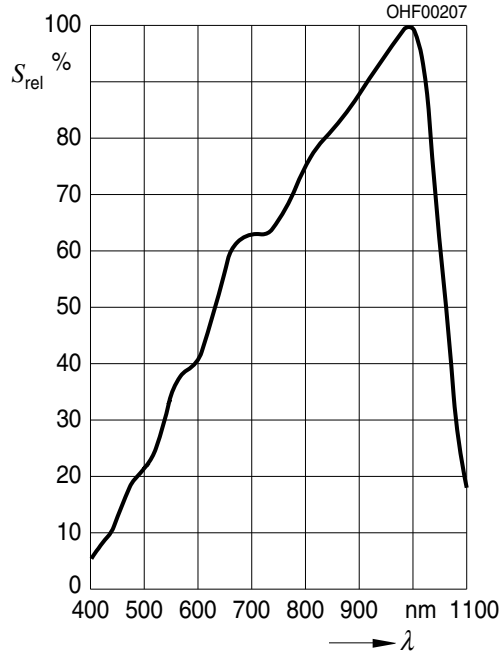
### Radiation Characteristics <sup>3)</sup>

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



### Relative Spectral Sensitivity <sup>3)</sup>

■ phototransistor:  $S_{rel} = f(\lambda)$

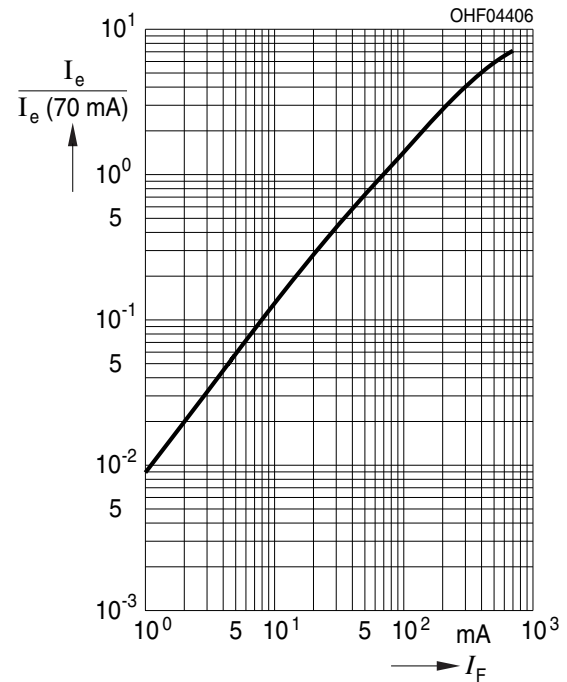
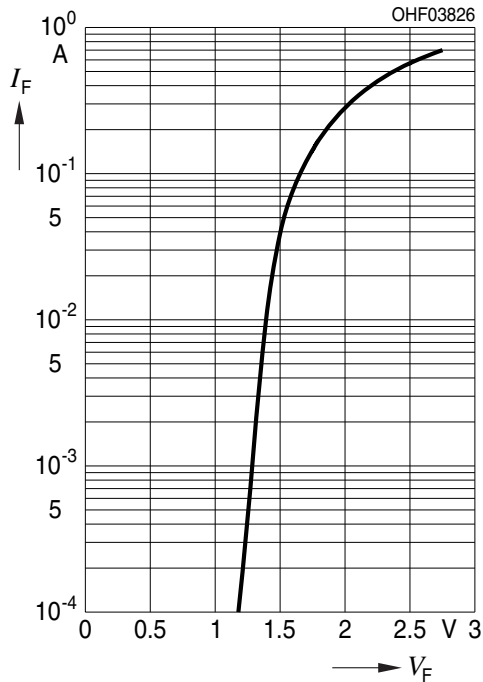


### Forward current <sup>3)</sup>

• infrared (850 nm):  $I_F = f(V_F)$ ; single pulse;  $t_p = 100 \mu s$

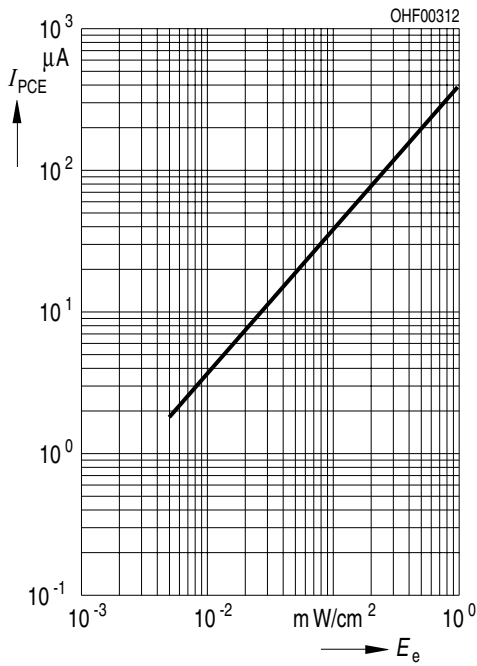
### Relative Radiant Intensity <sup>3), 4)</sup>

• infrared (850 nm):  $I_e/I_e(70mA) = f(I_F)$ ; single pulse;  $t_p = 25 \mu s$



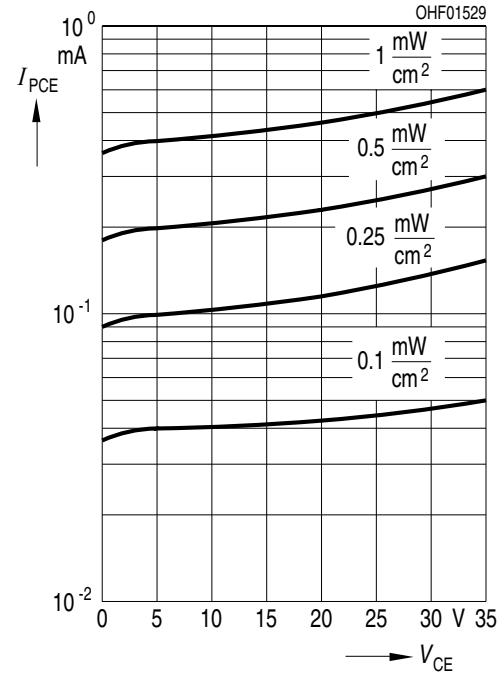
**Photocurrent** <sup>3)</sup>

■ phototransistor:  $I_{PCE} = f(E_e); V_{CE} = 5V$



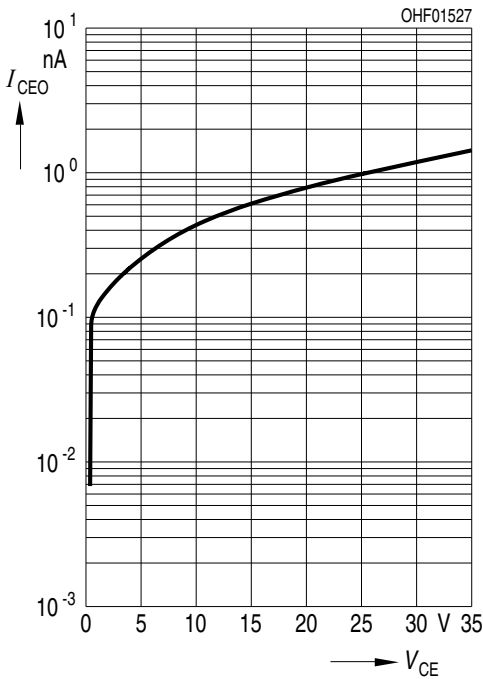
**Photocurrent** <sup>3)</sup>

■ phototransistor:  $I_{PCE} = f(V_{CE}); E_e = \text{Parameter}$



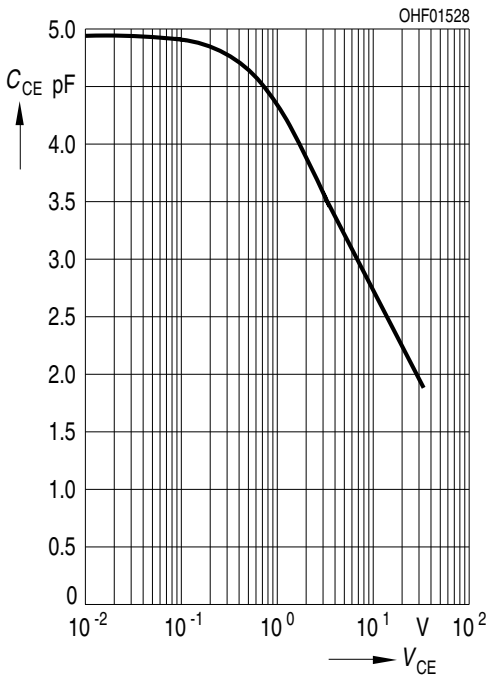
**Dark Current** <sup>3)</sup>

■ phototransistor:  $I_{CEO} = f(V_{CE}); E = 0$



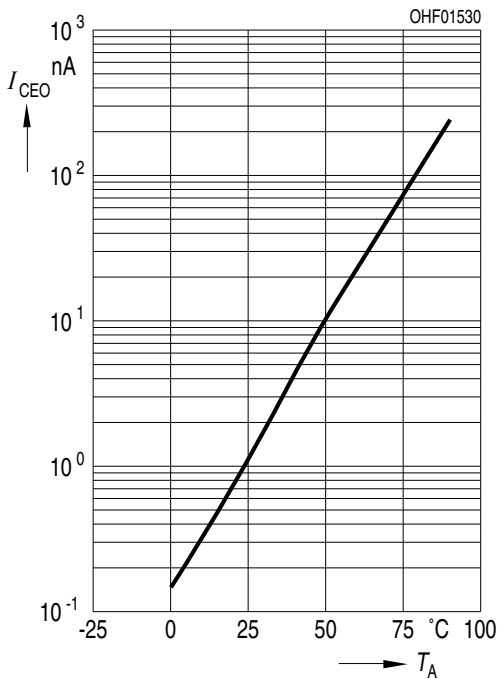
### Collector-Emitter Capacitance <sup>3)</sup>

■ phototransistor:  $C_{CE} = f(V_{CE})$ ;  $f = 1 \text{ MHz}$ ;  $E = 0$



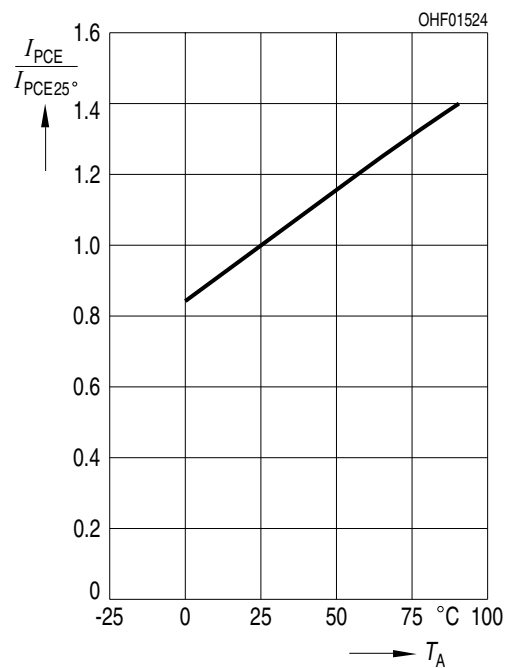
### Dark Current <sup>3)</sup>

■ phototransistor:  $I_{CEO} = f(T_A)$ ;  $V_{CE} = 5 \text{ V}$ ;  $E = 0$



### Photocurrent <sup>3)</sup>

■ phototransistor:  $I_{PCE, rel} = f(T_A)$ ;  $V_{CE} = 5 \text{ V}$



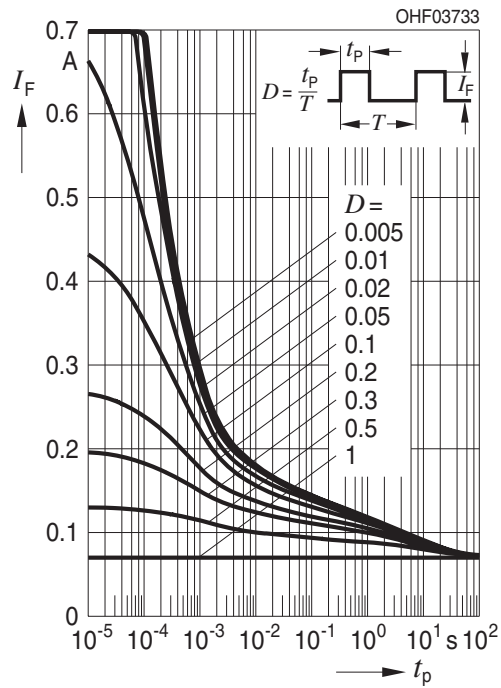
### Max. Permissible Forward Current

- infrared (850 nm):  $I_F = f(T_A)$ ;  $R_{th_{ja}} = 500 \text{ K/W}$

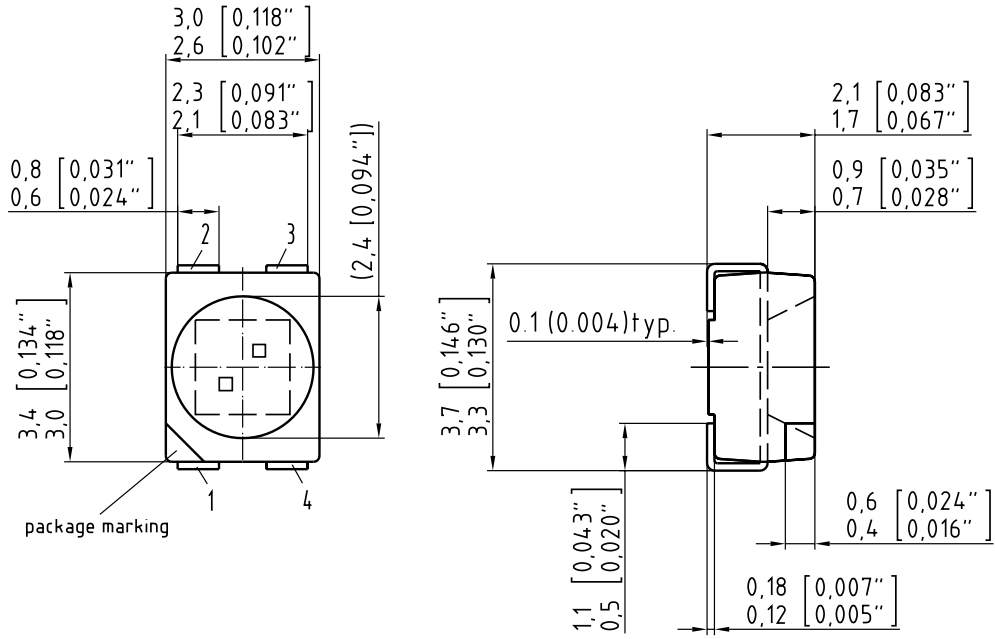


### Permissible Pulse Handling Capability

- infrared (850 nm):  $I_F = f(t_p)$ ;  $D = \text{parameter}$ ;  $T_A = 25 \text{ °C}$



Dimensional Drawing <sup>5)</sup>



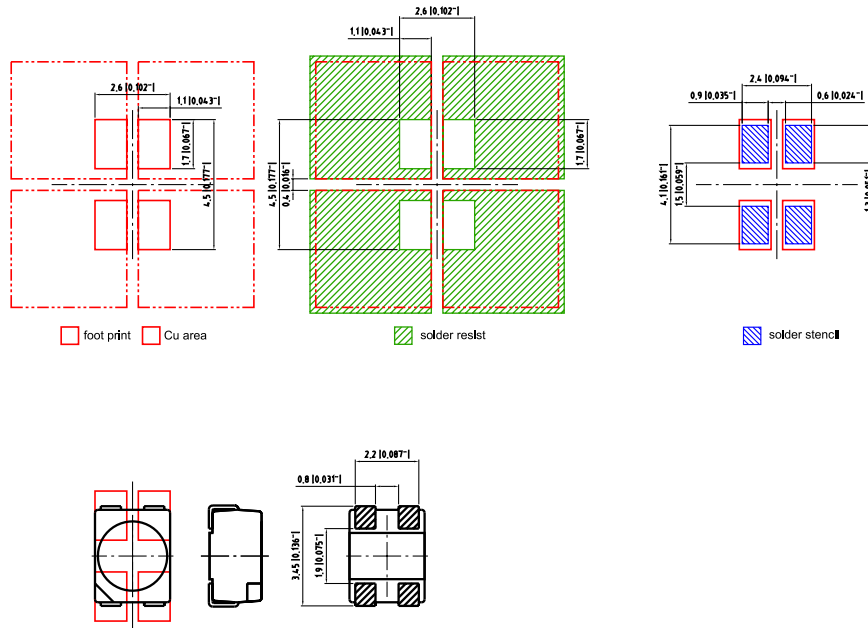
C63062-A4174-A1-02

Further Information:

Approximate Weight: 34.0 mg

Pin	Description
1	Anode Emitter 1
2	Cathode Emitter 1
3	Collector Phototransistor
4	Emitter Phototransistor

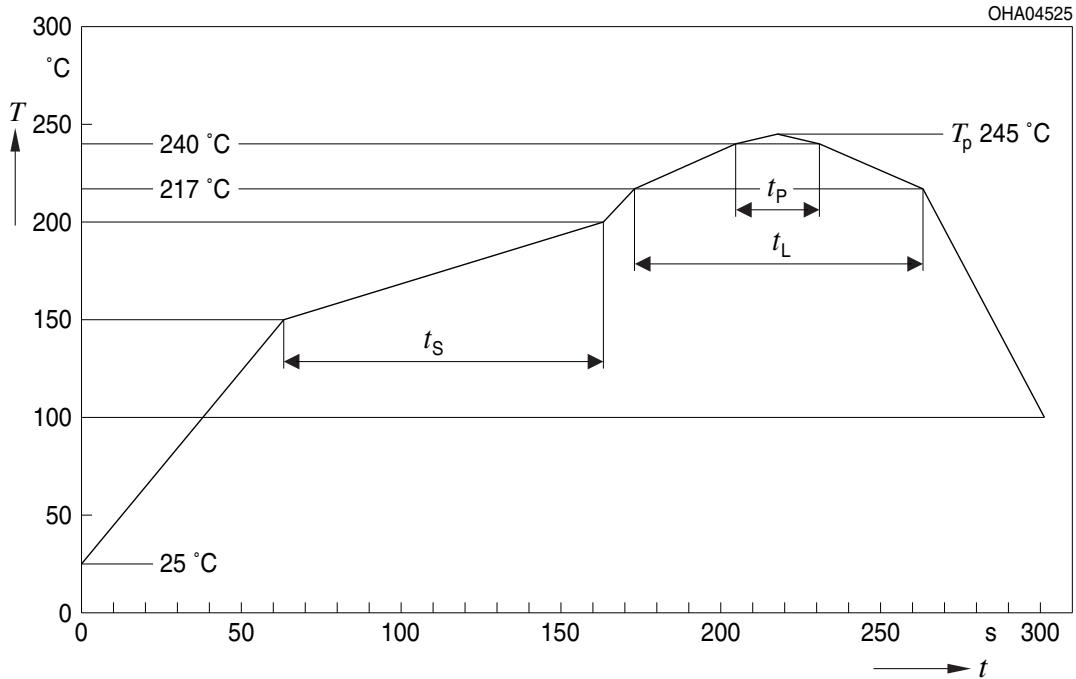
Recommended Solder Pad <sup>5)</sup>



E062.3010.14.8 -01

## Reflow Soldering Profile

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



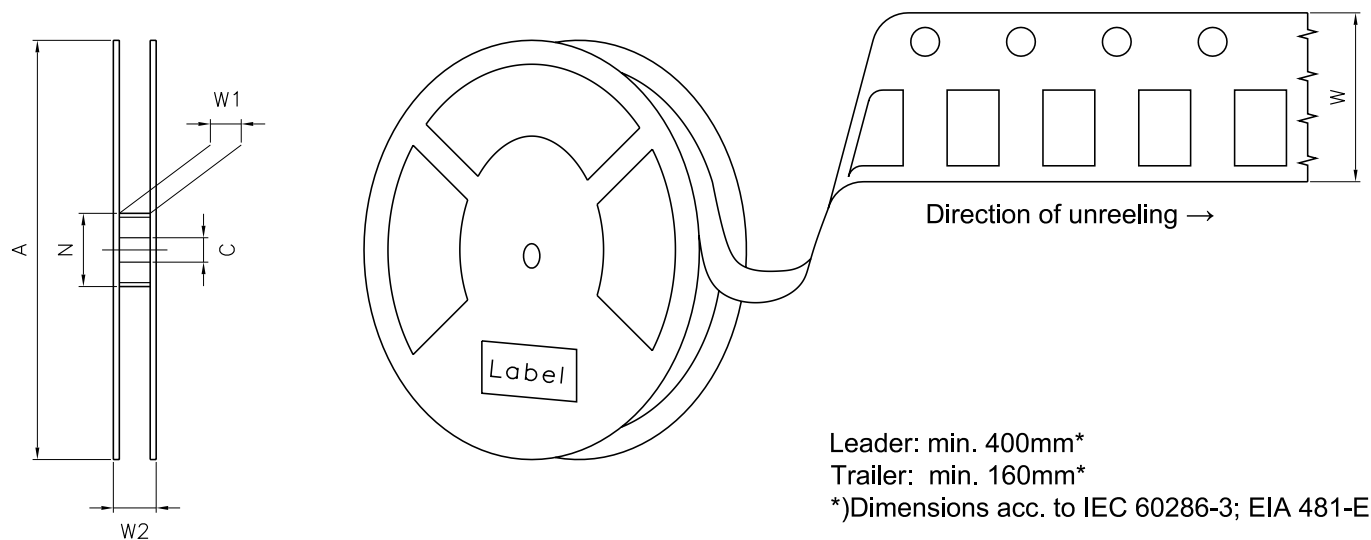
Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$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



## Tape and Reel <sup>6)</sup>



### 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
330 mm	$8 + 0.3 / - 0.1$ mm	60 mm	$8.4 + 2$ mm	14.4 mm	8000

### Barcode-Product-Label (BPL)

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

RoHS Compliant

(6P) BATCH NO: 1234567890

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

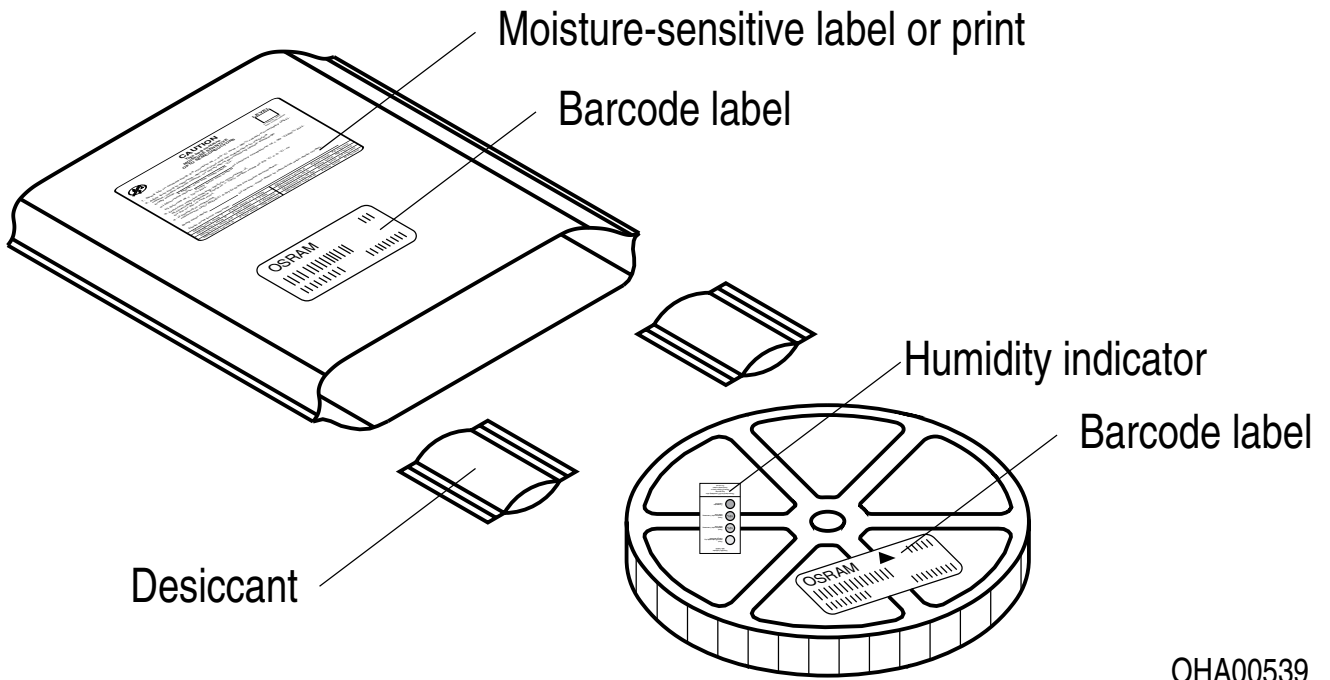
(X) PROD NO: 123456789 (Q) QTY: 9999 (G) GROUP: XX-XX-X-X

ML Temp ST  
X XXX °C X

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

OHA04563

### Dry Packing Process and Materials <sup>5)</sup>



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) **Radiant intensity:** Measured at a solid angle of  $\Omega = 0.01$  sr
- 2) **Brightness:** The brightness values are measured with a tolerance of  $\pm 11\%$ .
- 3) **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.
- 4) **Testing temperature:** TA = 25°C (unless otherwise specified)
- 5) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 6) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

## Glossary (continued)

- 7) **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.
- 8) **Forward Voltage:** The forward voltages are measured with a tolerance of  $\pm 0.1$  V.
- 9) **Thermal resistance:** junction – ambient, mounted on PC-board (FR4), pad size 16mm<sup>2</sup> each.
- 10) **Photocurrent:** The photocurrent values are measured (by irradiating the devices with a homogenous light source and applying a voltage to the device) with a tolerance of  $\pm 11$  %.

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## Revision History

Version	Date	Change
1.4	2021-05-19	New Layout
1.5	2021-09-16	Photocurrent Groups
1.6	2023-08-09	New Layout Applications

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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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