

# Infrared-Emitter (850 nm) and Si-Phototransistor Version 1.3

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## SFH 7250



### Features:

- 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

### Applications

- Data transmission
- Lock bar
- Infrared interface

### Ordering Information

Type:	Package:	Ordering Code
SFH 7250	SMT Multi TOPLED®	Q65111A3188

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Operating and storage temperature range	$T_{op}; T_{stg}$	-40 ... 100	°C
Junction temperature	$T_j$	100	°C
Electrostatic discharge (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2000	V

**Emitter 1**

Forward current	$I_F$	70	mA
Surge current ( $t_p \leq 10 \mu s$ , $D = 0$ )	$I_{FSM}$	0.7	A
Reverse voltage	$V_R$	5	V
Power consumption	$P_{tot}$	140	mW
Thermal resistance junction - ambient <sup>1) page 15</sup>	$R_{thJA}$	500	K / W
Thermal resistance junction - solder point	$R_{thJS}$	400	K / W

**Phototransistor**

Collector current	$I_C$	15	mA
Surge current ( $t_p \leq 10 \mu s$ , $D = 0$ )	$I_{FSM}$	0.075	A
Collector-emitter voltage	$V_{CE}$	35	V
Total Power dissipation	$P_{tot}$	165	mW
Thermal resistance <sup>1) page 15</sup>	$R_{thJA}$	450	K / W

The stated maximum ratings refer to one chip.

**Characteristics**

Parameter	Symbol	Values	Unit
<b>Emitter 1</b> ( $T_A = 25 \text{ }^\circ\text{C}$ )			
Peak wavelength ( $I_F = 70 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ) $\lambda_{peak}$	860	nm
Centroid wavelength ( $I_F = 70 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ) $\lambda_{centroid}$	850	nm
Spectral bandwidth at 50% of $I_{max}$ ( $I_F = 70 \text{ mA}$ , $t_p = 20 \text{ ms}$ )	(typ) $\Delta\lambda$	30	nm
Half angle	(typ) $\varphi$	$\pm 60$	°

Parameter		Symbol	Values	Unit
Dimensions of active chip area	(typ)	L x W	0.2 x 0.2	mm x mm
Rise and fall time of $I_e$ ( 10% and 90% of $I_{e\ max}$ ) ( $I_F = 70\ mA$ , $R_L = 50\ \Omega$ )	(typ)	$t_r, t_f$	12	ns
Forward voltage ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )	(typ (max))	$V_F$	1.6 ( $\leq 2$ )	V
Forward voltage ( $I_F = 500\ mA$ , $t_p = 100\ \mu s$ )	(typ (max))	$V_F$	2.4 ( $\leq 3$ )	V
Reverse current ( $V_R = 5\ V$ )	(typ (max))	$I_R$	not designed for reverse operation	$\mu A$
Total radiant flux ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )	(typ)	$\Phi_e$	40	mW
Min Radiant Intensity ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )		$I_{e, min}$	6.3	mW / sr
Radiant intensity ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )		$I_{e, typ}$	10	mW/sr
Typ Radiant Intensity ( $I_F = 500\ mA$ , $t_p = 100\ \mu s$ )		$I_{e, typ}$	60	mW / sr
Temperature coefficient of $I_e$ or $\Phi_e$ ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )	(typ)	$TC_I$	-0.5	% / K
Temperature coefficient of $V_F$ ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )	(typ)	$TC_V$	-0.7	mV / K
Temperature coefficient of wavelength ( $I_F = 70\ mA$ , $t_p = 20\ ms$ )	(typ)	$TC_\lambda$	0.3	nm / K

**Phototransistor** $(T_A = 25\ ^\circ C, \lambda = 880\ nm)$ 

Wavelength of max. sensitivity	(typ)	$\lambda_{S\ max}$	990	nm
Spectral range of sensitivity ( $S = 10\%$ of $S_{max}$ )	(typ)	$\lambda$	440 ... 1150	nm
Radiant sensitive area ( $\varnothing = 240\ \mu m$ )	(typ)	A	0.038	mm <sup>2</sup>
Dimensions of chip area	(typ)	L x W	(typ) 0.45 x 0.45	mm x mm
Distance chip front to case surface	(typ)	H	(typ) 0.5 ... 0.7	mm
Half angle	(typ)	$\varphi$	$\pm 60$	$^\circ$
Capacitance ( $V_{CE} = 0\ V, f = 1\ MHz, E = 0$ )	(typ)	$C_{CE}$	5	pF

Parameter		Symbol	Values	Unit
Dark current ( $V_{CE} = 25 \text{ V}$ , $E = 0$ )	(typ (max))	$I_{CE0}$	1 ( $\leq 200$ )	nA
Photocurrent ( $\lambda = 880 \text{ nm}$ , $E_e = 0.1 \text{ mW/cm}^2$ , $V_{CE} = 5 \text{ V}$ )		$I_{PCE}$	$\geq 16$	$\mu\text{A}$
Rise and fall time ( $I_C = 1 \text{ mA}$ , $V_{CC} = 5 \text{ V}$ , $R_L = 1 \text{ k}\Omega$ )	(typ)	$t_r$ , $t_f$	7	$\mu\text{s}$
Collector-emitter saturation voltage ( $I_C = 5 \mu\text{A}$ , $E_e = 0.1 \text{ mW/cm}^2$ )	(typ)	$V_{CEsat}$	150	mV

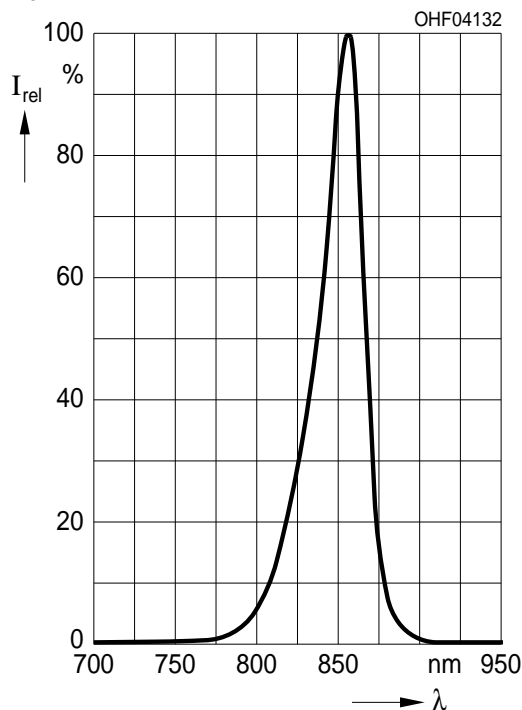
**Grouping** ( $T_A = 25 \text{ }^\circ\text{C}$ )

Group	Min Radiant Intensity $I_F = 70 \text{ mA}$ , $t_p = 20 \text{ ms}$ $I_{e, \text{min}}$	Max Radiant Intensity $I_F = 70 \text{ mA}$ , $t_p = 20 \text{ ms}$ $I_{e, \text{max}}$	Typ Radiant Intensity $I_F = 500 \text{ mA}$ , $t_p = 100 \mu\text{s}$ $I_{e, \text{typ}}$
SFH 7250-Q	6.3	12.5	55
SFH 7250-R	10	20	90

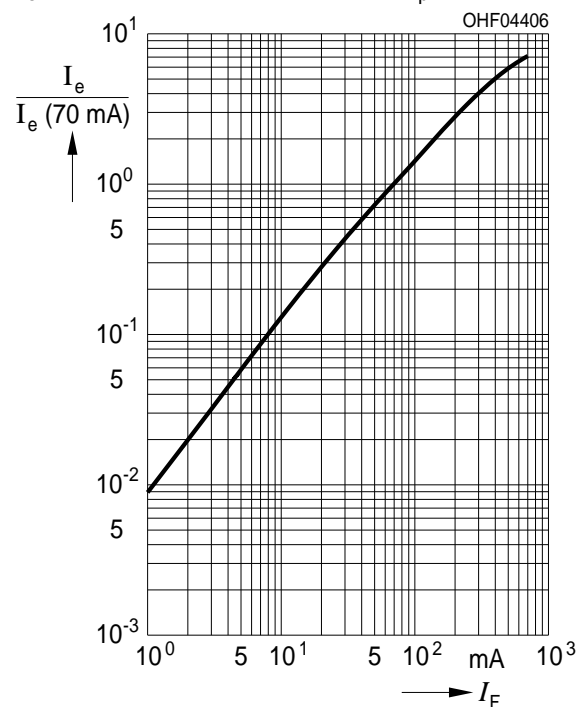
Note: Measured at a solid angle of  $\Omega = 0.01 \text{ sr}$ .

**Relative Spectral Emission** <sup>2) page 15</sup>

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

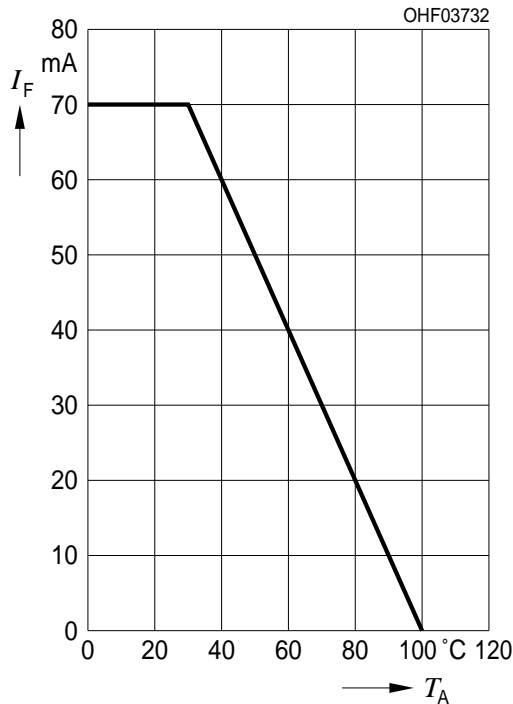

**Radiant Intensity** <sup>2) page 15</sup>

$I_e / I_e(70 \text{ mA}) = f(I_F)$ , single pulse,  $t_p = 25 \mu\text{s}$



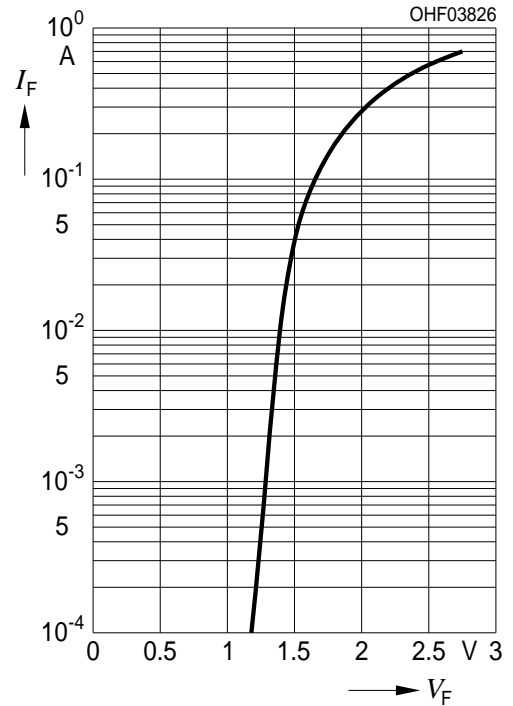
**Max. Permissible Forward Current**

$I_{F,max} = f(T_A)$



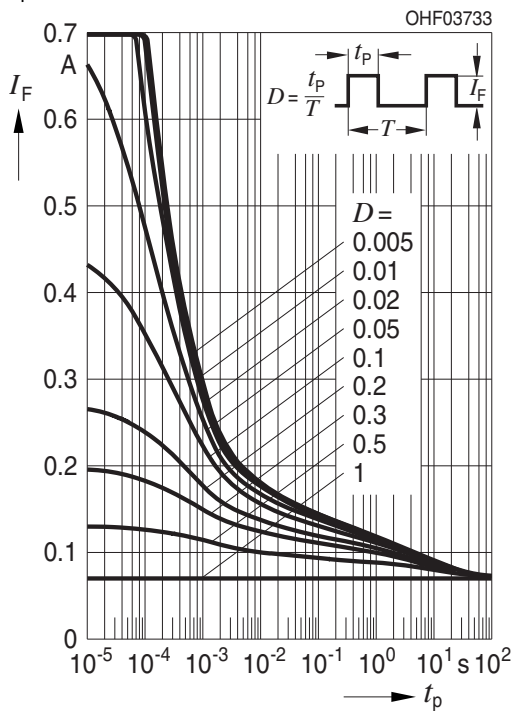
**Forward Current** <sup>2) page 15</sup>

$I_F = f(V_F), T_A = 25\text{ °C}$



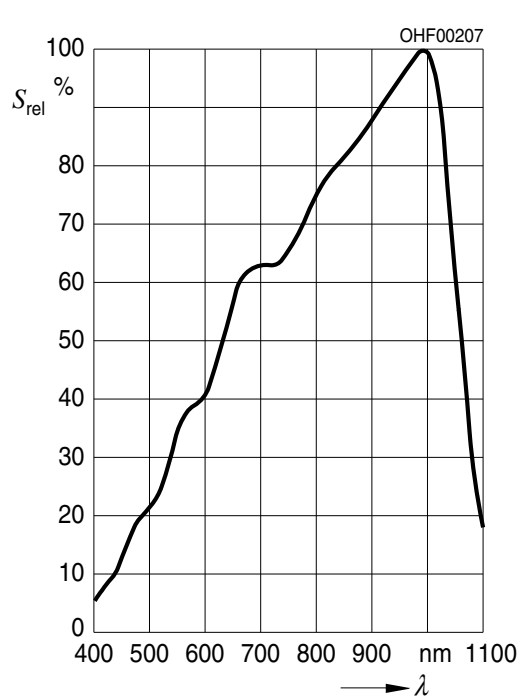
**Permissible Pulse Handling Capability**

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



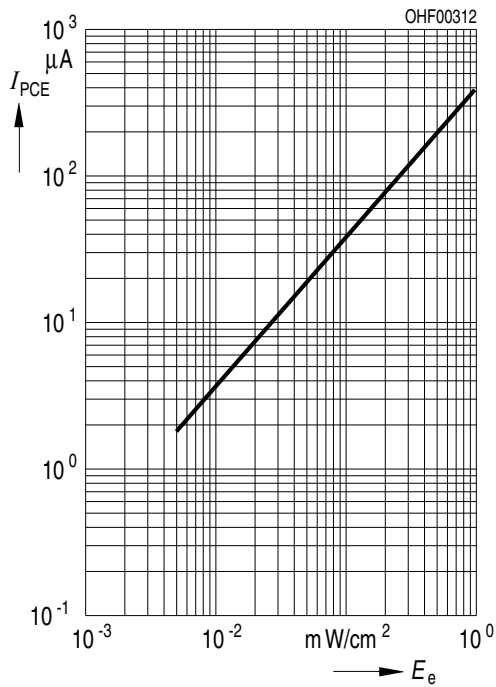
**Relative Spectral Sensitivity** <sup>2) page 15</sup>

$S_{rel} = f(\lambda), T_A = 25\text{ °C}$



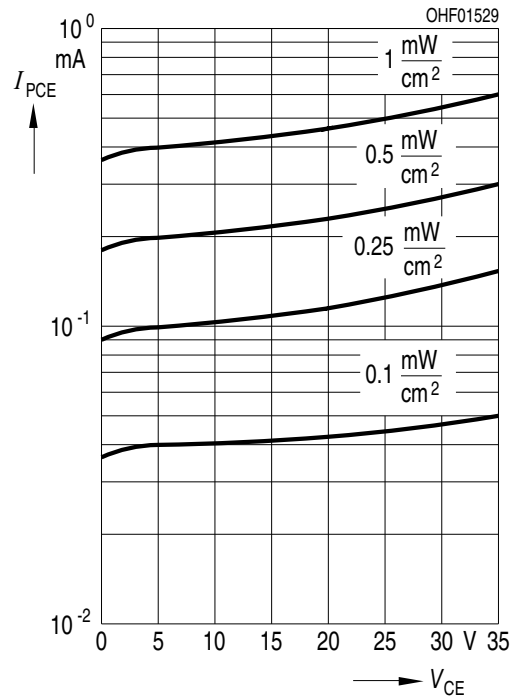
**Photocurrent** <sup>2) page 15</sup>

$I_{PCE} = f(E_e), V_{CE} = 5 \text{ V}, T_A = 25^\circ\text{C}$



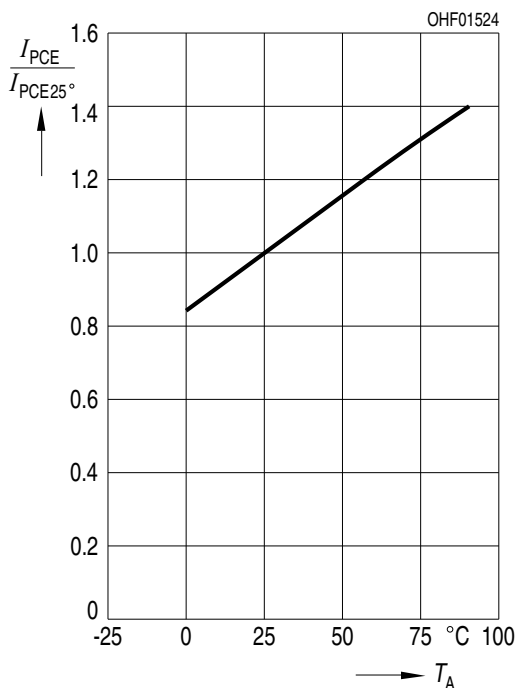
**Photocurrent** <sup>2) page 15</sup>

$I_{PCE} = f(V_{CE}), E_e = \text{Parameter}, T_A = 25^\circ\text{C}$



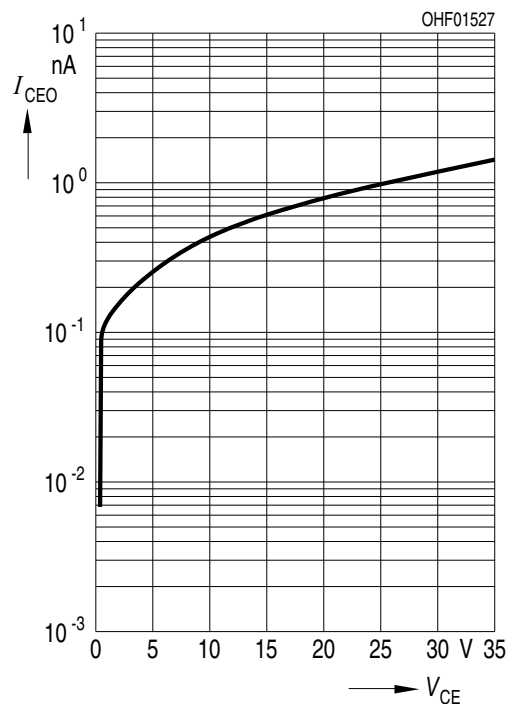
**Photocurrent** <sup>2) page 15</sup>

$I_{PCE} / I_{PCE}(25^\circ\text{C}) = f(T_A), V_{CE} = 5 \text{ V}$



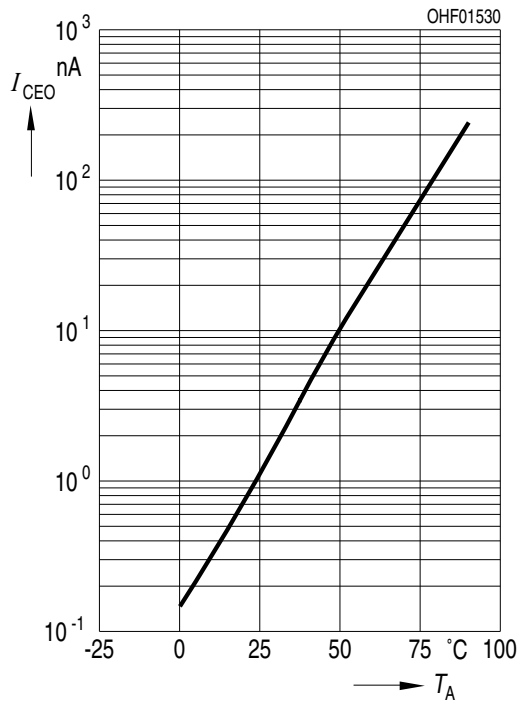
**Dark Current** <sup>2) page 15</sup>

$I_{CEO} = f(V_{CE}), E = 0, T_A = 25^\circ\text{C}$



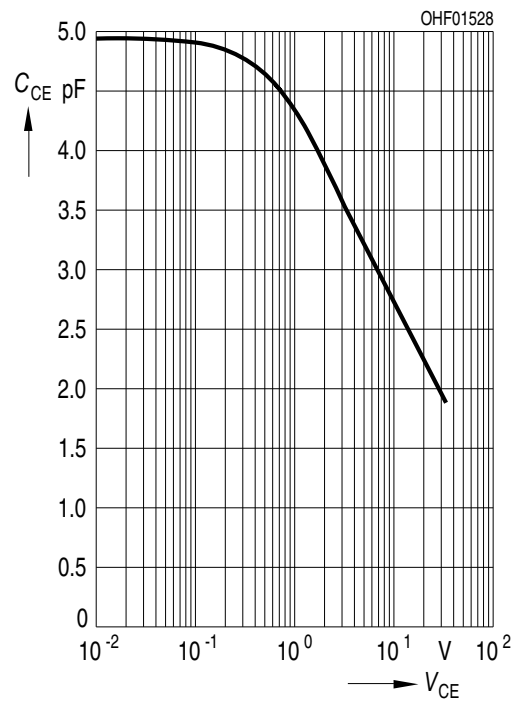
**Dark Current** <sup>2) page 15</sup>

$I_{CEO} = f(T_A), V_{CE} = 5 \text{ V}, E = 0$



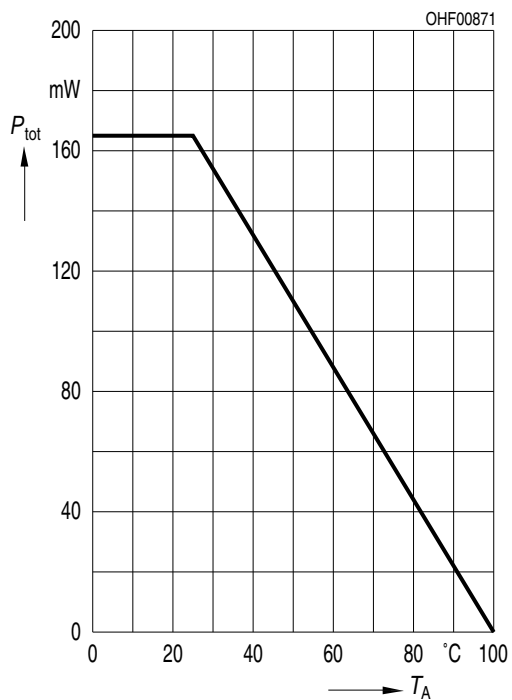
**Collector-Emitter Capacitance** <sup>2) page 15</sup>

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0, T_A = 25^\circ\text{C}$



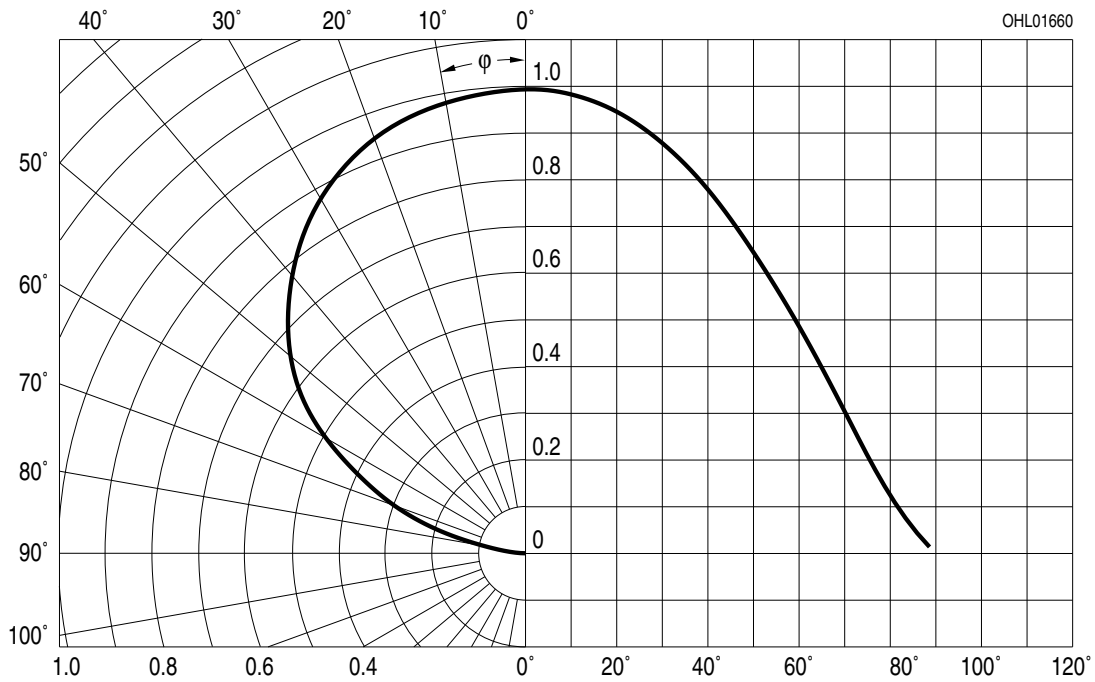
**Power Consumption**

$P_{tot} = f(T_A)$

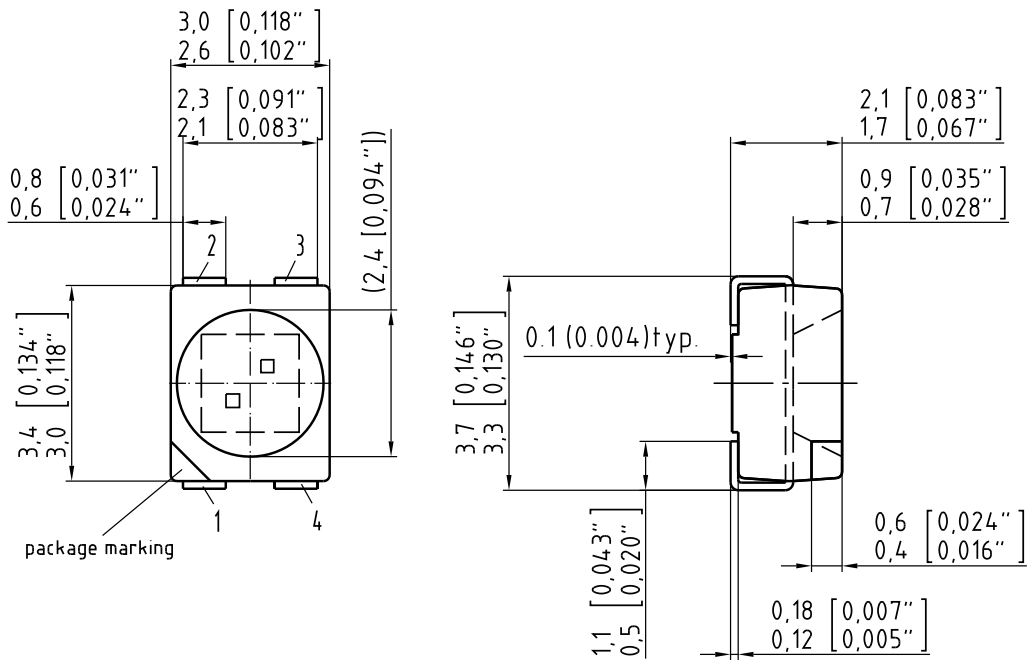


Emitter Radiation Characteristics / Phototransistor Directional Characteristics <sup>2) page 15</sup>

$$I_{rel} = f(\phi) / S_{rel} = f(\phi)$$



Package Outline



C63062-A4174-A1-02

Dimensions in mm (inch).



**Pinning**

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

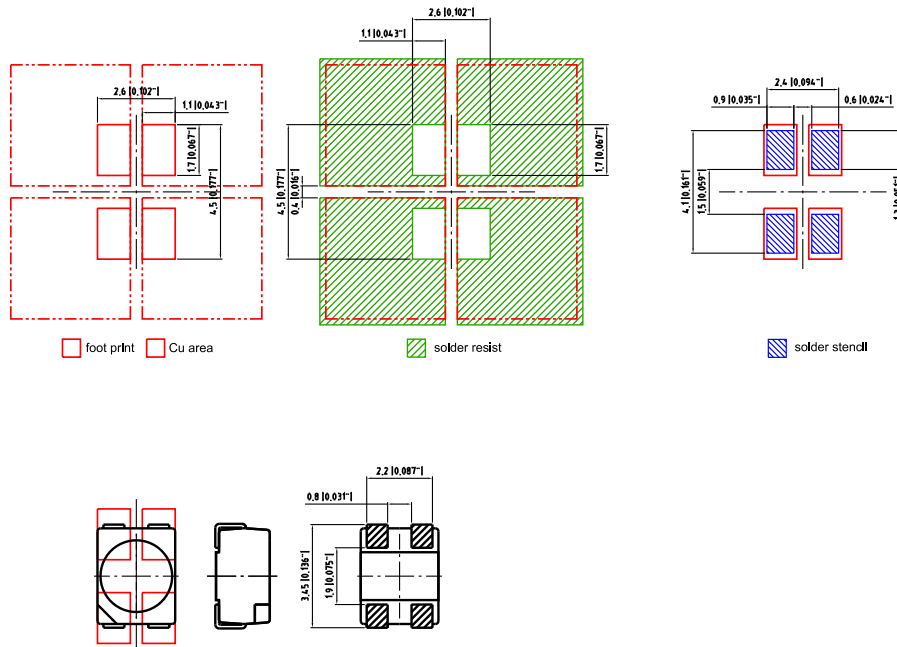
**Package**

Multi TOPLED

**Approximate Weight:**

34.0 mg

**Recommended Solder Pad**

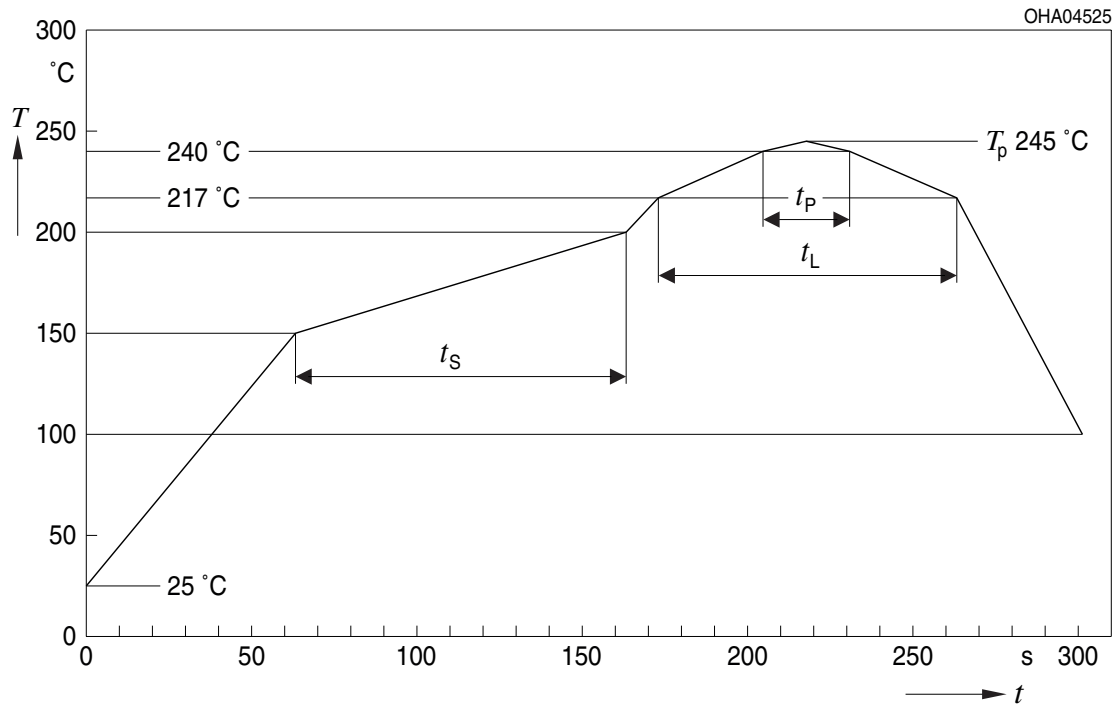


*Dimensions in mm (inch).*

E062.3010.14.8 -01

### Reflow Soldering Profile

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



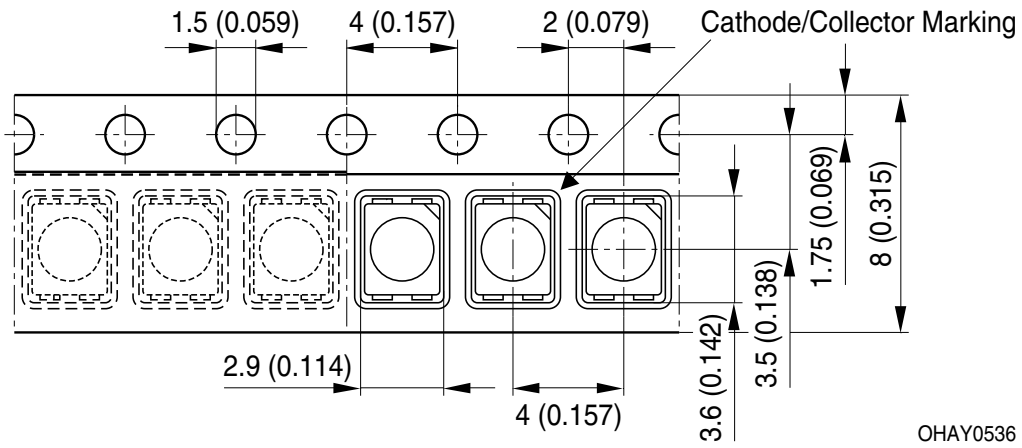
OHA04612

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			$^{\circ}\text{C}$
Time above liquidus temperature	$t_L$		80	100	s
Peak temperature	$T_P$		245	260	$^{\circ}\text{C}$
Time within 5 °C of the specified peak temperature $T_P - 5\text{ K}$	$t_p$	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

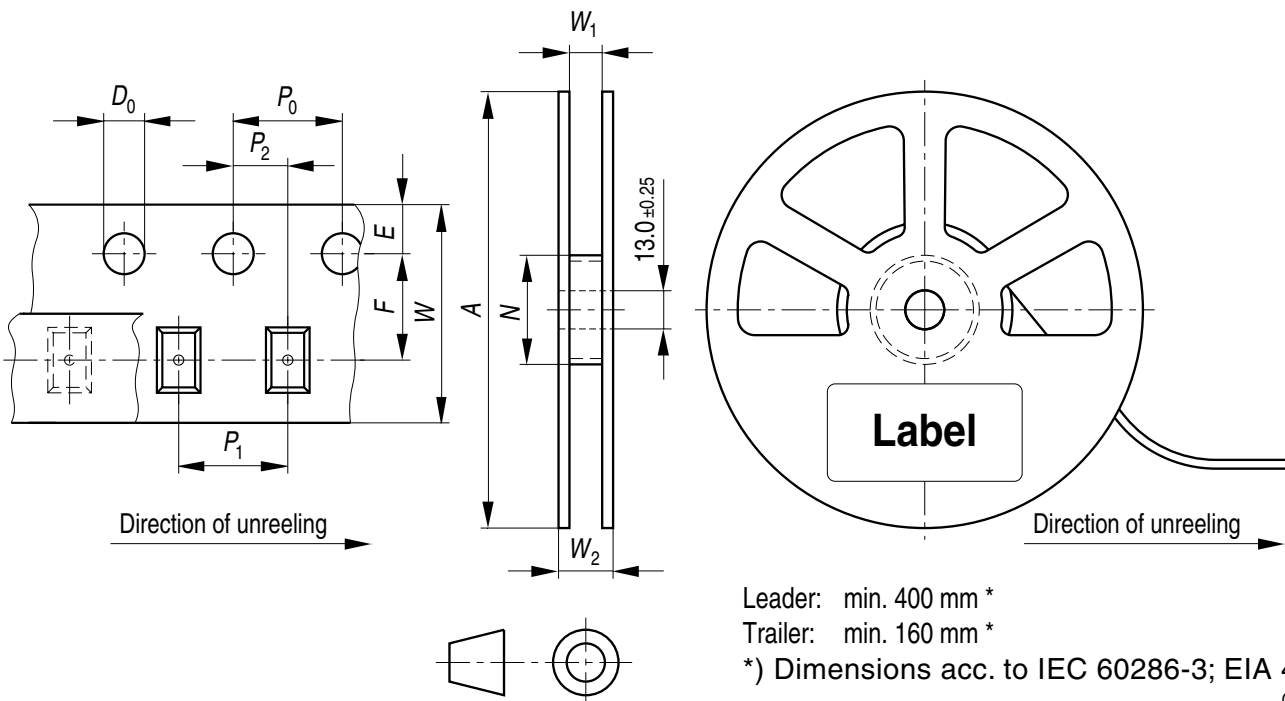
Taping



Dimensions in mm (inch).

Tape and Reel

8 mm tape with 2000 pcs. on  $\varnothing$  180 mm reel, 8000 pcs. on  $\varnothing$  330 mm reel



## Tape dimensions [mm]

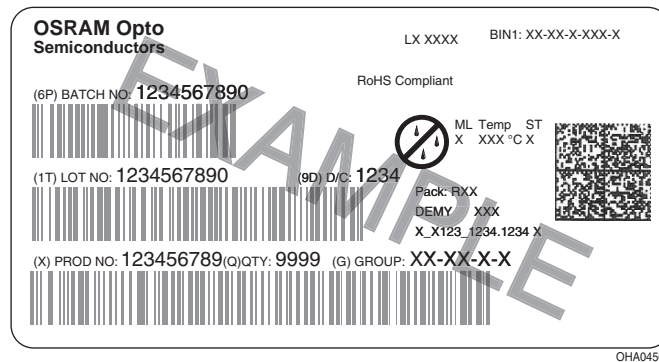
W	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	D <sub>0</sub>	E	F
8 + 0.3 / -0.1	4 ± 0.1	2 ± 0.05 or 4 ± 0.1	2 ± 0.05	1.5 ± 0.1	1.75 ± 0.1	3.5 ± 0.05

## Reel dimensions [mm]

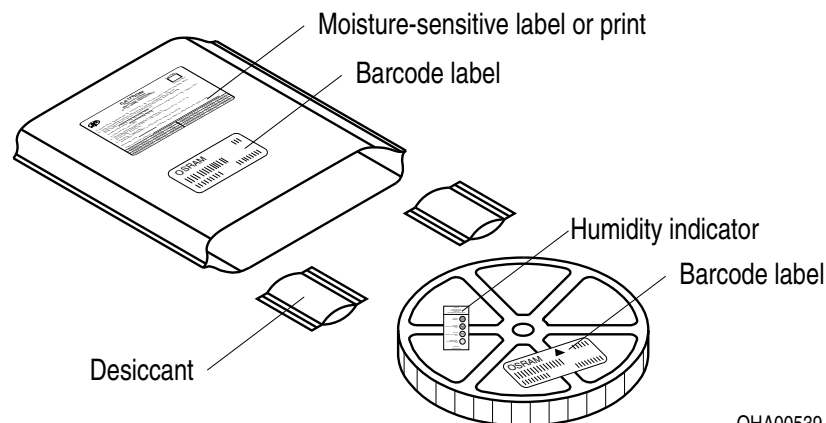
A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2max</sub>
180	8	60	8.4 + 2	14.4

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2max</sub>
330	8	60	8.4 + 2	14.4

## Barcode-Product-Label (BPL)



## Dry Packing Process and Materials

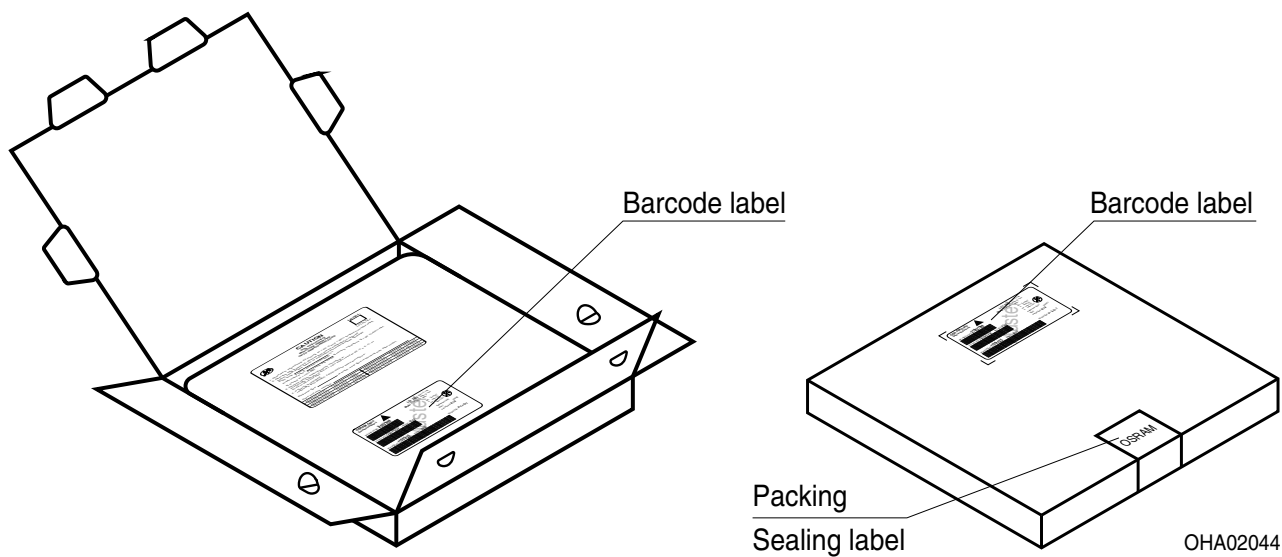


## Note:

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
352 ± 5	352 ± 5	33 ± 5

**Disclaimer**

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.

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 in the Internet.

**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.

**Components used in life-support devices or systems must be expressly authorized for such purpose!**

Critical components\* may only be used in life-support devices\*\* or systems with the express written approval of OSRAM OS.

\*) A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

\*\*) 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) **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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