

Infrared-Emitter (850 nm) and Si-Phototransistor

Version 1.3

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
- The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.

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 ^{1) page 16}	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 surge current ($\tau < 10 \mu s$)	I_{CS}	75	mA
Collector-emitter voltage	V_{CE}	35	V
Total Power dissipation	P_{tot}	165	mW
Thermal resistance ^{1) page 16}	R_{thJA}	450	K / W

The stated maximum ratings refer to one chip.

Characteristics

Parameter	Symbol	Values	Unit
Emitter 1 ($T_A = 25 \text{ }^\circ\text{C}$)			
Peak wavelength ($I_F = 70 \text{ mA}, t_p = 20 \text{ ms}$)	(typ) λ_{peak}	860	nm
Centroid wavelength ($I_F = 70 \text{ mA}, t_p = 20 \text{ ms}$)	(typ) $\lambda_{centroid}$	850	nm

Parameter		Symbol	Values	Unit
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)	φ	± 60	$^\circ$
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 $I_{e \max}$) ($I_F = 70 \text{ mA}$, $R_L = 50 \Omega$)	(typ)	t_r, t_f	12	ns
Forward voltage ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)	(typ (max))	V_F	1.6 (≤ 2)	V
Forward voltage ($I_F = 500 \text{ mA}$, $t_p = 100 \mu\text{s}$)	(typ (max))	V_F	2.4 (≤ 3)	V
Reverse current ($V_R = 5 \text{ V}$)	(typ (max))	I_R	not designed for reverse operation	μA
Total radiant flux ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)	(typ)	Φ_e	40	mW
Min Radiant Intensity ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)		$I_{e, \min}$	6.3	mW / sr
Radiant intensity ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)		$I_{e, \text{typ}}$	10	mW/sr
Typ Radiant Intensity ($I_F = 500 \text{ mA}$, $t_p = 100 \mu\text{s}$)		$I_{e, \text{typ}}$	60	mW / sr
Temperature coefficient of I_e or Φ_e ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)	(typ)	TC_I	-0.5	% / K
Temperature coefficient of V_F ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)	(typ)	TC_V	-0.7	mV / K
Temperature coefficient of wavelength ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$)	(typ)	TC_λ	0.3	nm / K

Phototransistor $(T_A = 25 \text{ }^\circ\text{C}$, $\lambda = 880 \text{ nm})$

Wavelength of max. sensitivity	(typ)	$\lambda_{S \max}$	990	nm
Spectral range of sensitivity ($S = 10\%$ of S_{\max})	(typ)	λ	440 ... 1150	nm
Radiant sensitive area ($\varnothing = 240 \mu\text{m}$)	(typ)	A	0.038	mm^2
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

Parameter		Symbol	Values	Unit
Half angle	(typ)	φ	± 60	$^{\circ}$
Capacitance ($V_{CE} = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$)	(typ)	C_{CE}	5	pF
Dark current ($V_{CE} = 25\text{ V}$, $E = 0$)	(typ (max))	I_{CE0}	1 (≤ 200)	nA
Photocurrent ($\lambda = 880\text{ nm}$, $E_e = 0.1\text{ mW/cm}^2$, $V_{CE} = 5\text{ V}$)		I_{PCE}	≥ 16	μA
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	μs
Collector-emitter saturation voltage ($I_C = 5\text{ }\mu\text{A}$, $E_e = 0.1\text{ mW/cm}^2$)	(typ)	V_{CEsat}	150	mV

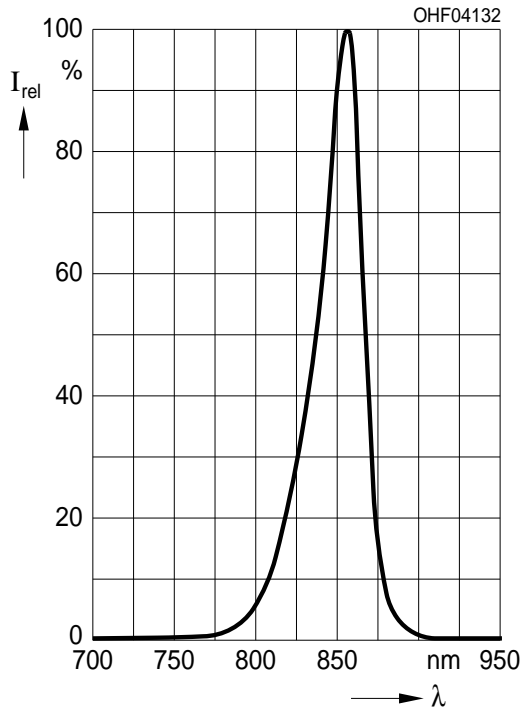
Grouping ($T_A = 25\text{ }^{\circ}\text{C}$)

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

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

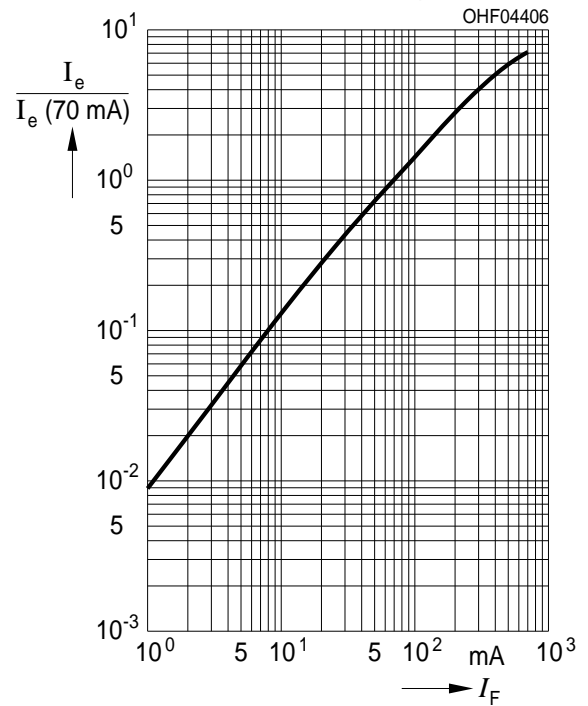
Relative Spectral Emission ^{2) page 16}

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



Radiant Intensity ^{2) page 16}

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



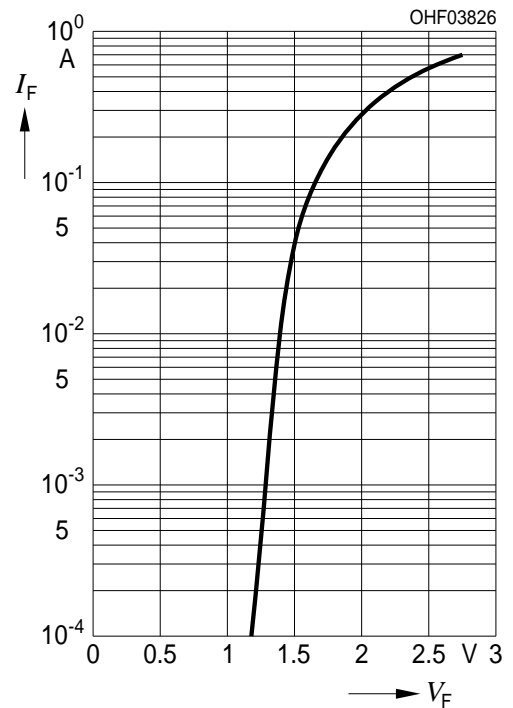
Max. Permissible Forward Current

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



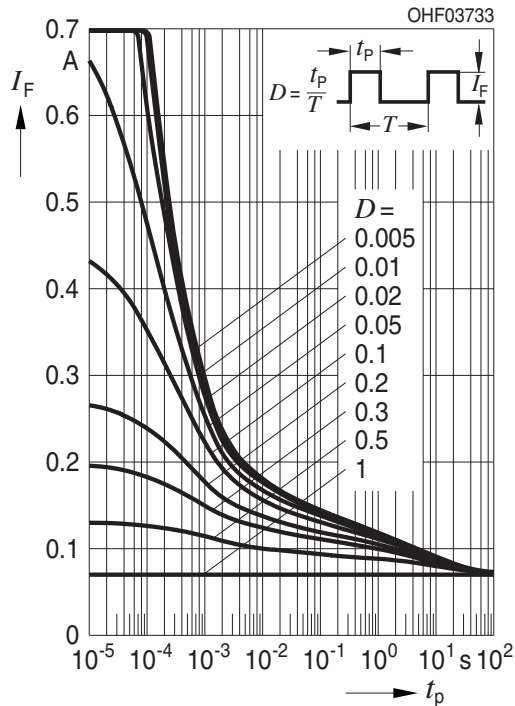
Forward Current ^{2) page 16}

$I_F = f(V_F)$, $T_A = 25^\circ\text{C}$



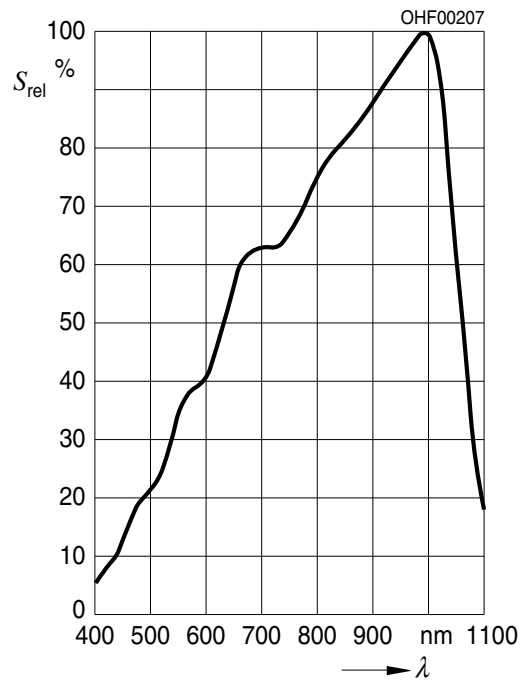
Permissible Pulse Handling Capability

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



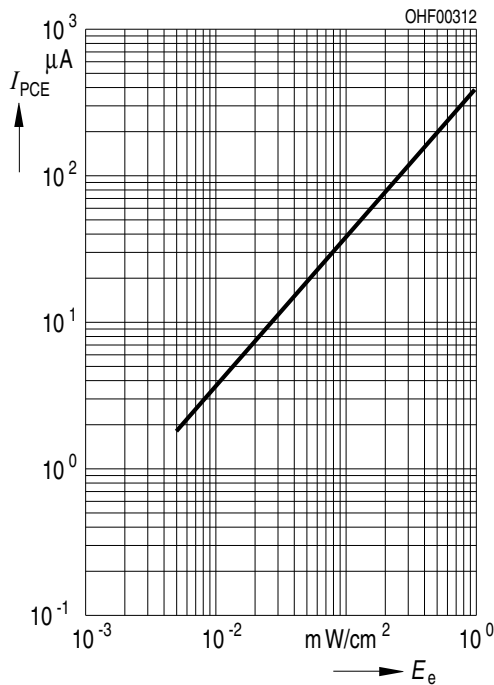
Relative Spectral Sensitivity ^{2) page 16}

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



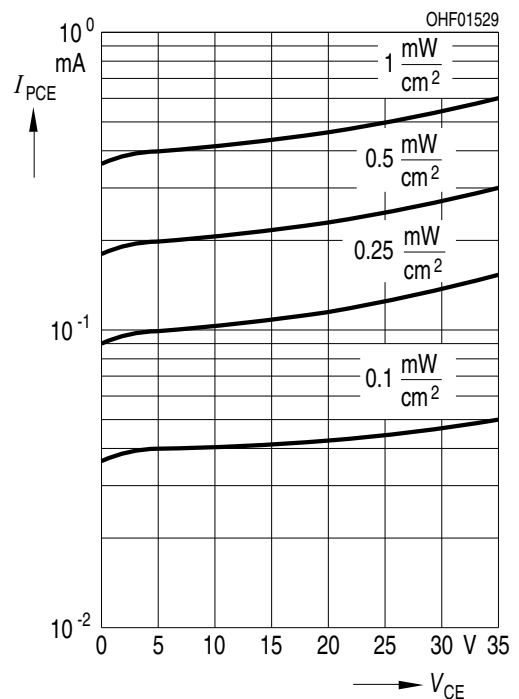
Photocurrent ^{2) page 16}

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



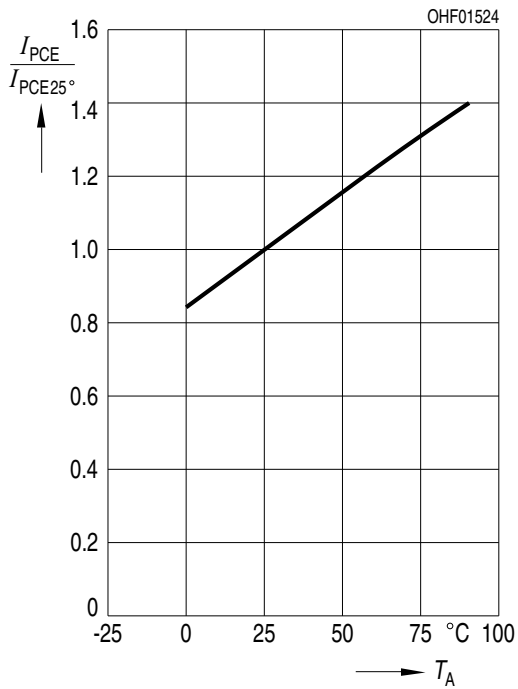
Photocurrent ^{2) page 16}

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



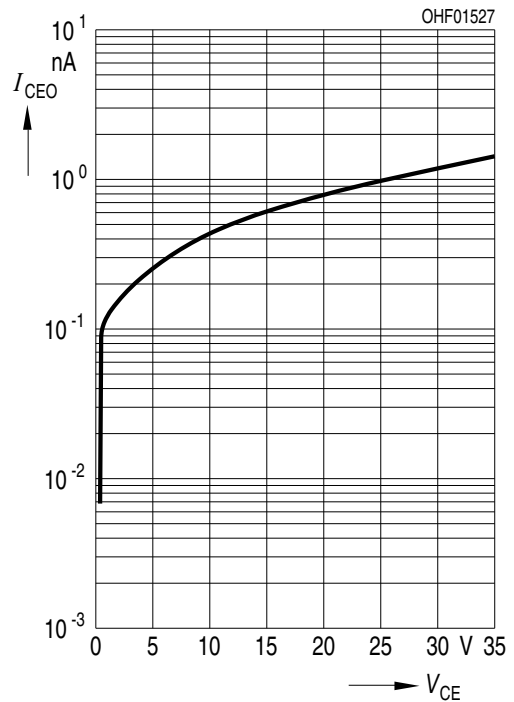
Photocurrent 2) page 16

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



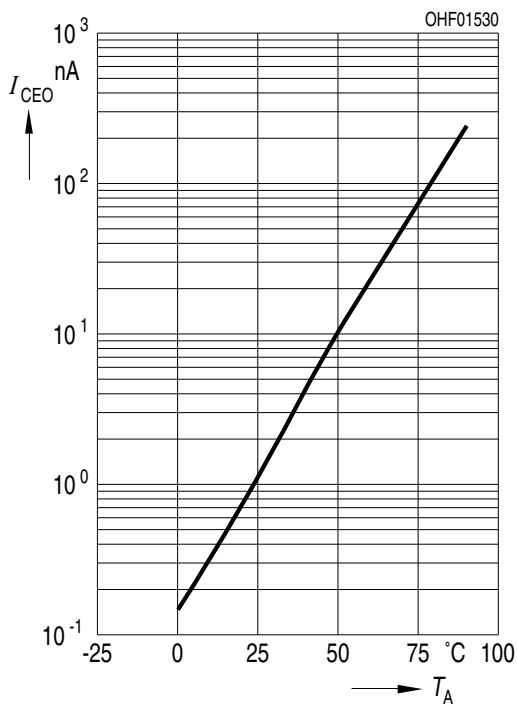
Dark Current 2) page 16

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



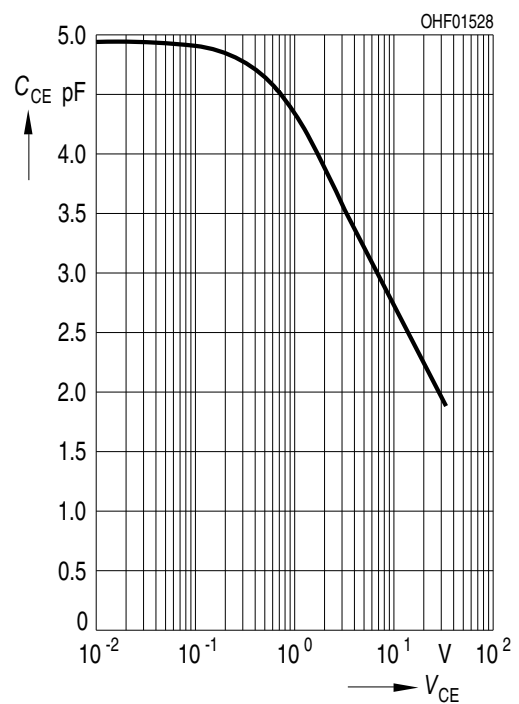
Dark Current 2) page 16

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



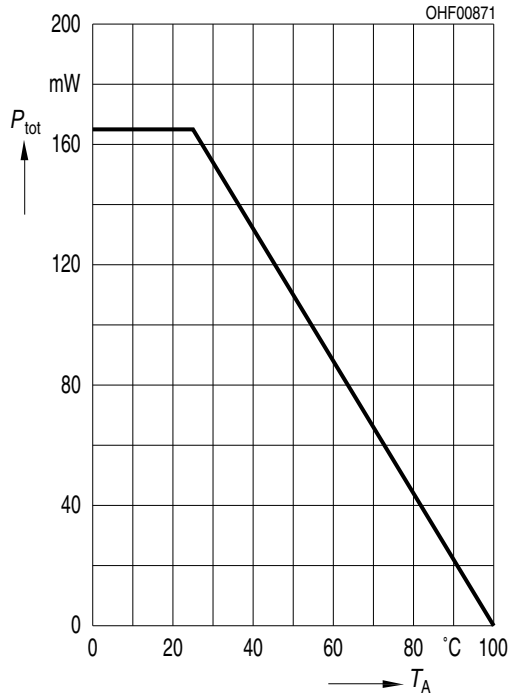
Collector-Emitter Capacitance 2) page 16

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



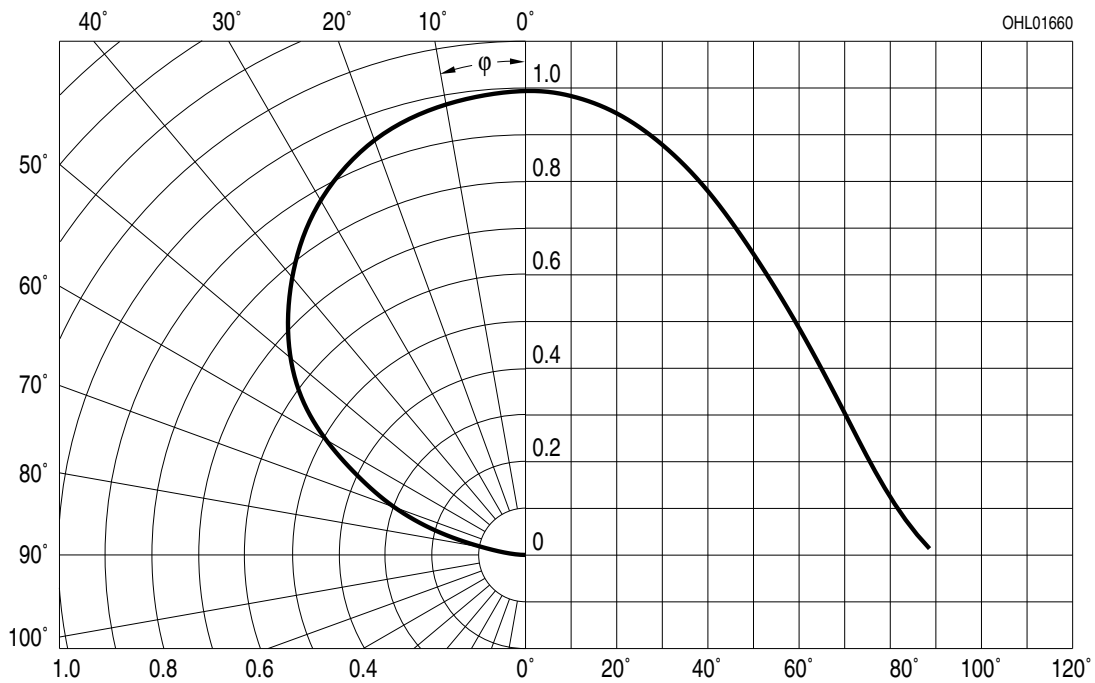
Power Consumption

$P_{\text{tot}} = f(T_A)$

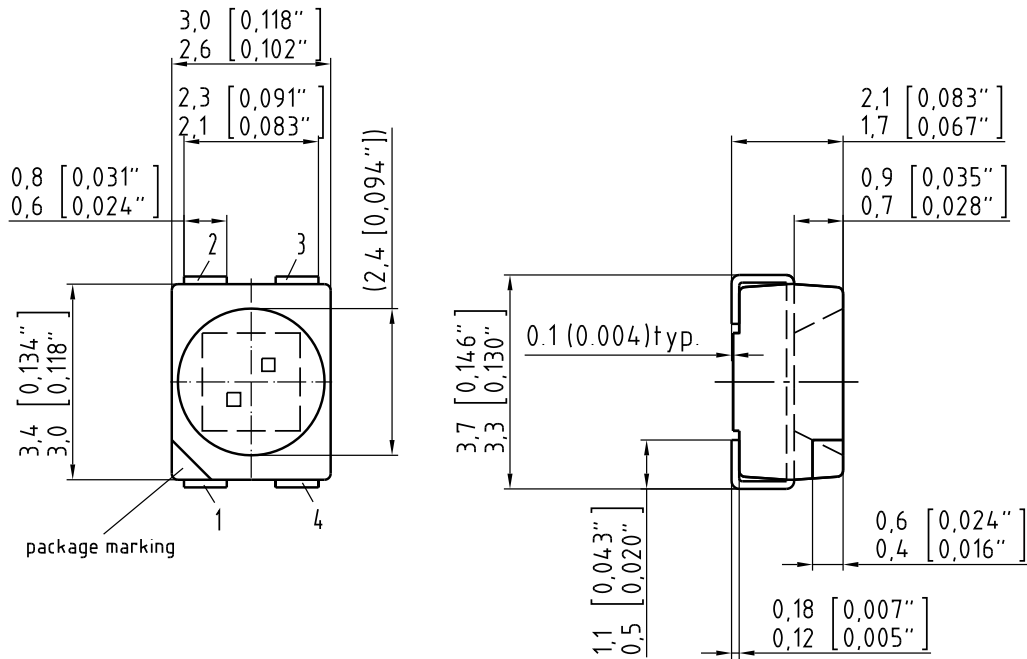


Emitter Radiation Characteristics / Phototransistor Directional Characteristics ^{2) page 16}

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



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

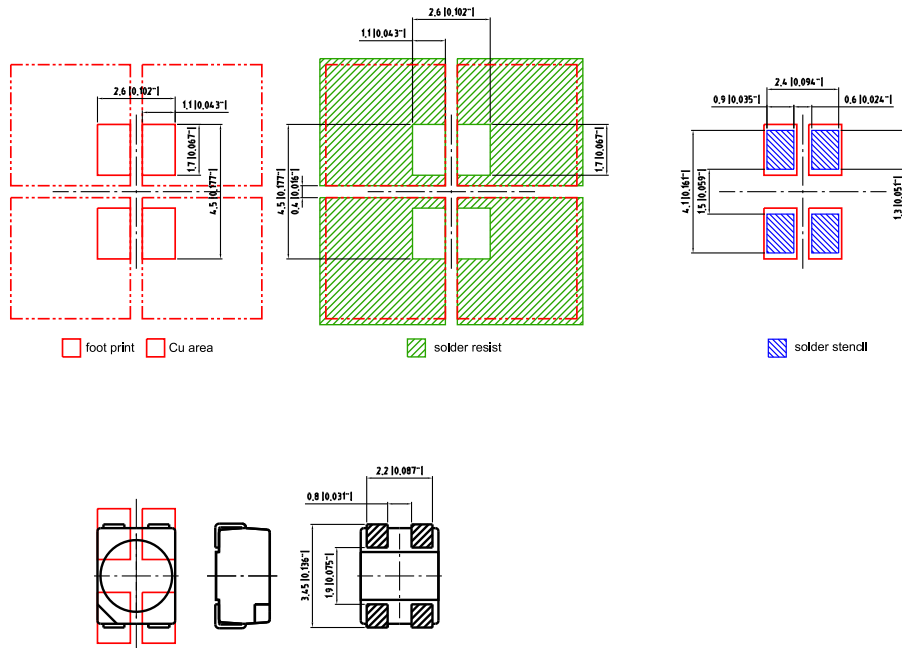
Package

Multi TOPLED

Approximate Weight:

34.0 mg

Recommended Solder Pad

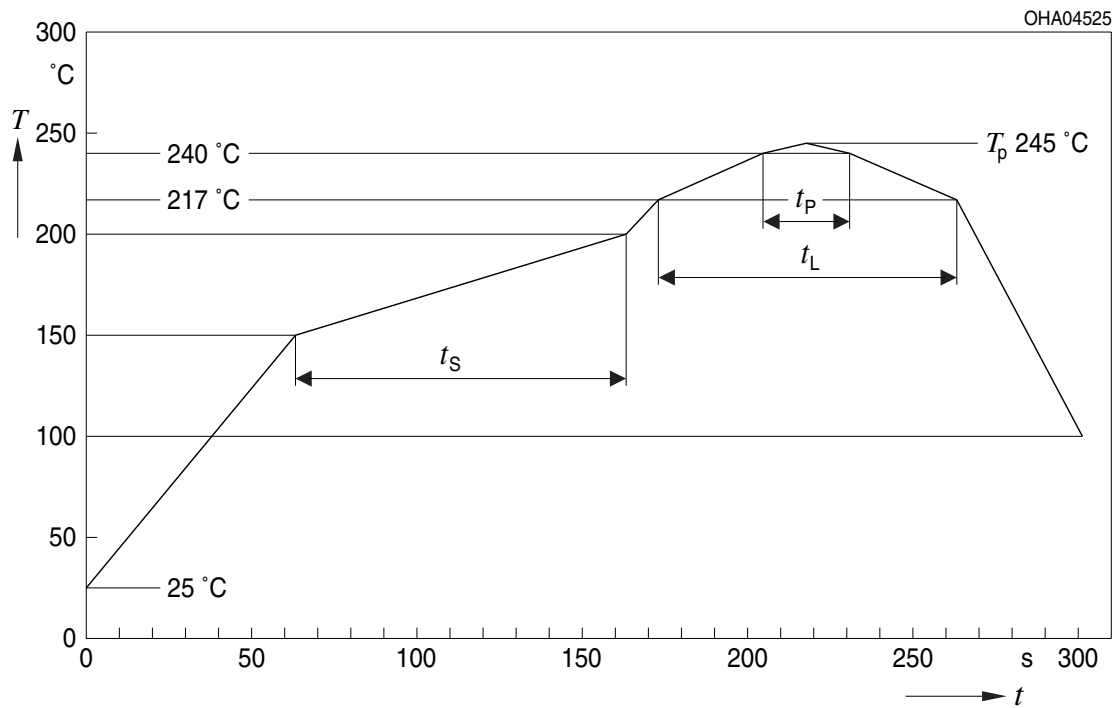


Dimensions in mm (inch).

E062.3010.148 -01

Reflow Soldering Profile

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



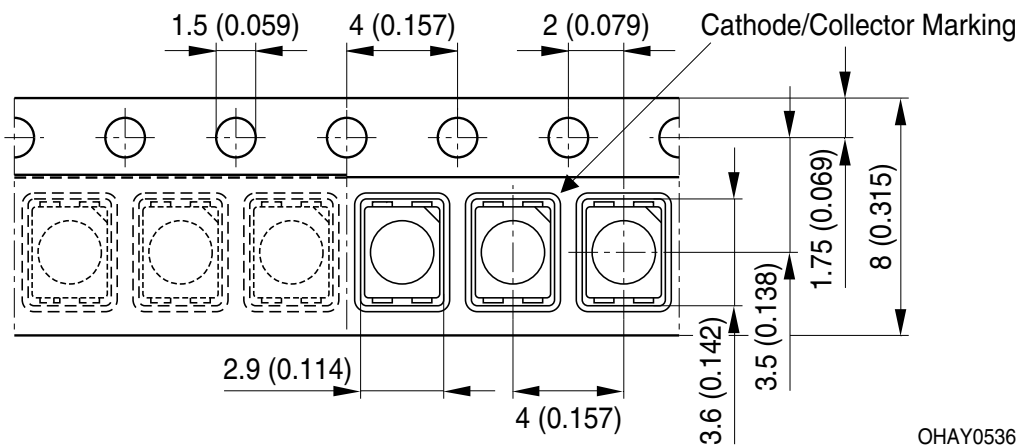
OHA04612

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			°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

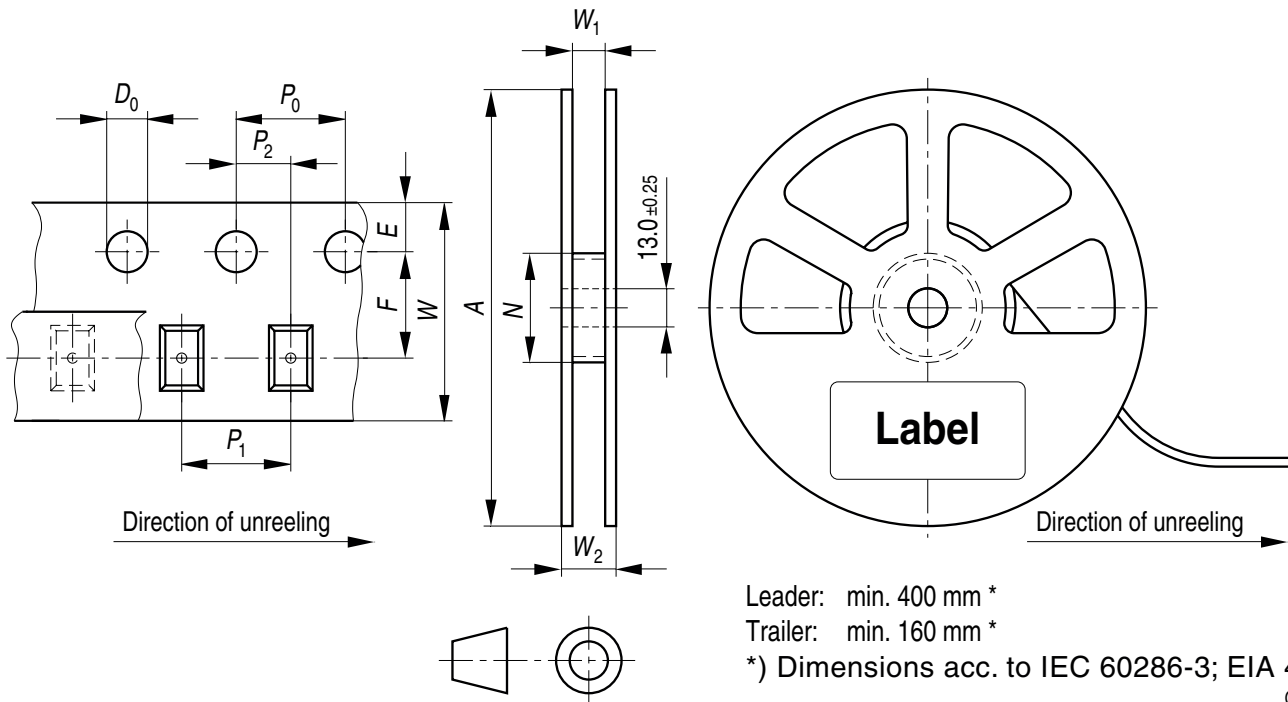


OHAY0536

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



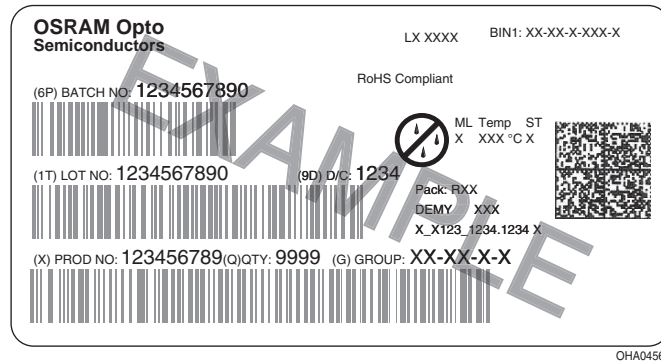
Tape dimensions [mm]

W	P ₀	P ₁	P ₂	D ₀	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

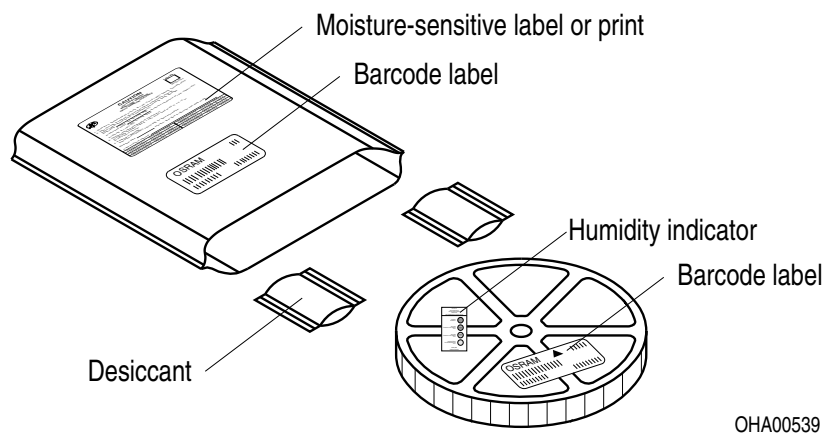
Reel dimensions [mm]

A	W	N _{min}	W ₁	W _{2max}
180	8	60	8.4 + 2	14.4
A	W	N _{min}	W ₁	W _{2max}
330	8	60	8.4 + 2	14.4

Barcode-Product-Label (BPL)



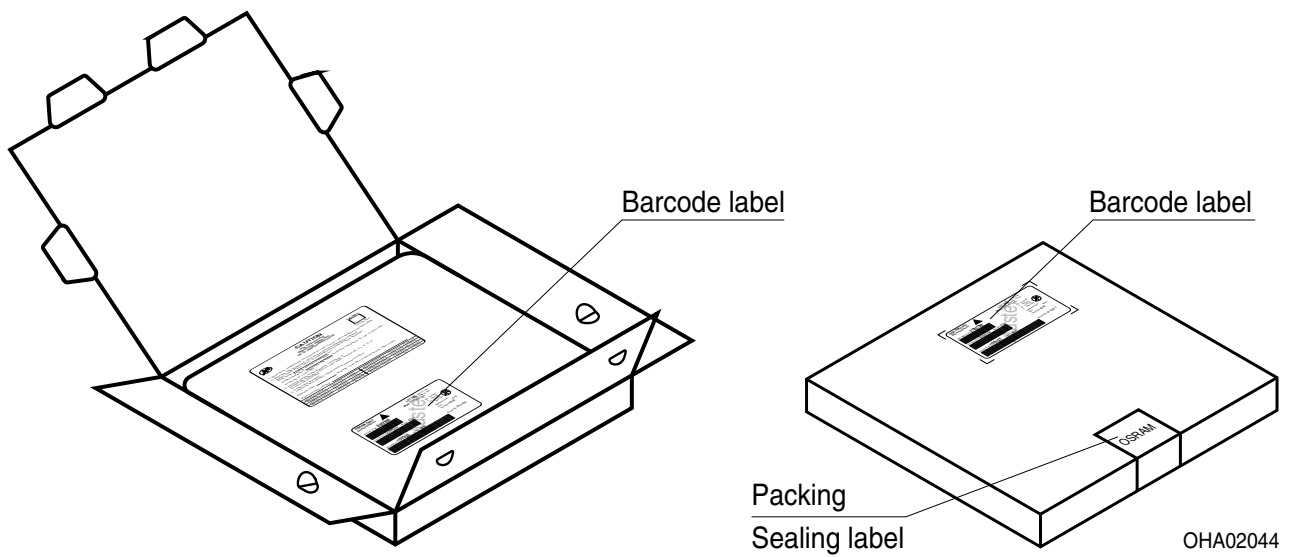
Dry Packing Process and Materials



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 mm² 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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