OSRAM SFH 331

Datasheet

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OSRAM

Multi TOPLED®

SFH 331

SMT Multi TOPLED

Applications

- Electronic Equipment
- Industrial Automation (Machine Controls, Light Barriers, Vision Controls)
- White Goods

Features

- Package: clear epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- SMT package with red emitter (635 nm) and Si-phototransistor
- Suitable for SMT assembly
- Available on tape and reel
- Emitter and detector can be controlled separately

Ordering Information

Type	Ordering Code
SFH 331-JK	Q65110A2821

Maximum Ratings

T_A = 25 °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 [7]	V_R	max.	5 V
Forward current	I_F	max.	30 mA
Forward current pulsed $t_p \leq 10$ µs, D = 0.005	$I_{F\ pulse}$	max.	0.5 A
Power consumption	P_{tot}	max.	100 mW
Thermal resistance junction – ambient [5]	R_{thJA}	max.	450 K/W
Thermal resistance junction – solder point	R_{thJS}	max.	350 K/W
Phototransistor			
Collector current	I_C	max.	15 mA
Collector surge current τ < 10 µs	I_{CS}	max.	75 mA
Collector-emitter voltage	V_{CE}	max.	35 V
Total Power dissipation	P_{tot}	max.	165 mW
Thermal resistance [5]	R_{thJA}	max.	450 K/W

The stated maximum ratings refer to the specified chip regardless of the operating status of the other one.

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Emitter			
Peak wavelength I_F = 10 mA	λ_{peak}	typ.	635 nm
Dominant wavelength	λ_{dom}	typ.	628 nm
Spectral bandwidth at 50% $I_{rel,max}$ (FWHM) I_F = 10 mA	$\Delta\lambda$	typ.	45 nm
Half angle	ϕ	typ.	± 60 °
Rise time (10% / 90%) I_F = 100 mA, t_p = 10 µs, R_L = 50 Ω	t_r	typ.	300 ns
Fall time (10% / 90%) I_F = 100 mA, t_p = 10 µs, R_L = 50 Ω	t_f	typ.	150 ns
Forward voltage [6] I_F = 10 mA	V_F	typ. max.	2 V 2.5 V
Reverse current [7] V_R = 5 V	I_R	typ. max.	0.01 µA 10 µA
Luminous intensity [8] I_F = 10mA	I_V	min. typ. max.	4.5 mcd 6 mcd 11.2 mcd

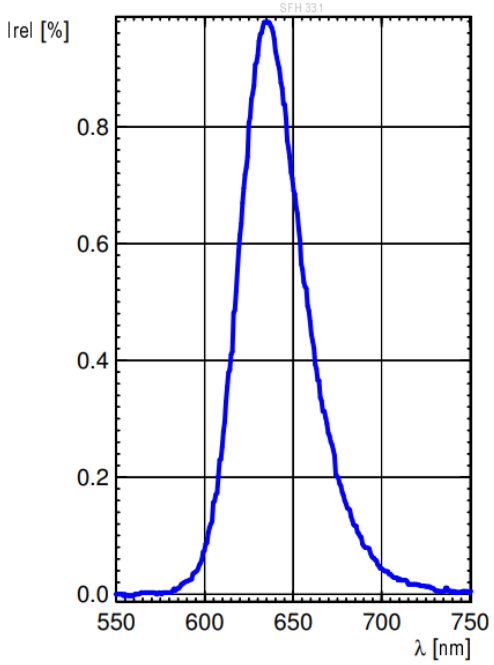
Characteristics (continued)

T_A = 25 °C

Parameter	Symbol		Values
Phototransistor			
Wavelength of max. sensitivity	$\lambda_{S\,max}$	typ.	990 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	440 … 1150 nm
Radiant sensitive area Ø = 240 µm	A	typ.	0.038 mm²
Dimensions of chip area	L x W	typ.	0.45 x 0.45 mm x mm
Half angle	ϕ	typ.	± 60 °
Capacitance V_{CE} = 0 V, f = 1 MHz, E = 0	C_{CE}	typ.	5 pF
Dark current V_{CE} = 20 V, E = 0	I_{CE0}	typ. max.	1 nA 50 nA
Photocurrent [9] λ = 950 nm, E_e = 0.1 mW/cm², R_L = 1 kΩ	I_{PCE}	min.	18 µA
Rise time I_C = 1 mA, V_{CE} = 5 V, R_L = 1 kΩ	t_r	typ.	7 µs
Fall time I_C = 1 mA, V_{CE} = 5 V, R_L = 1 kΩ	t_f	typ.	7 µs
Collector-emitter saturation voltage I_C = 5 µA, E_e = 0.1 mW/cm²	V_{CEsat}	typ.	150 mV

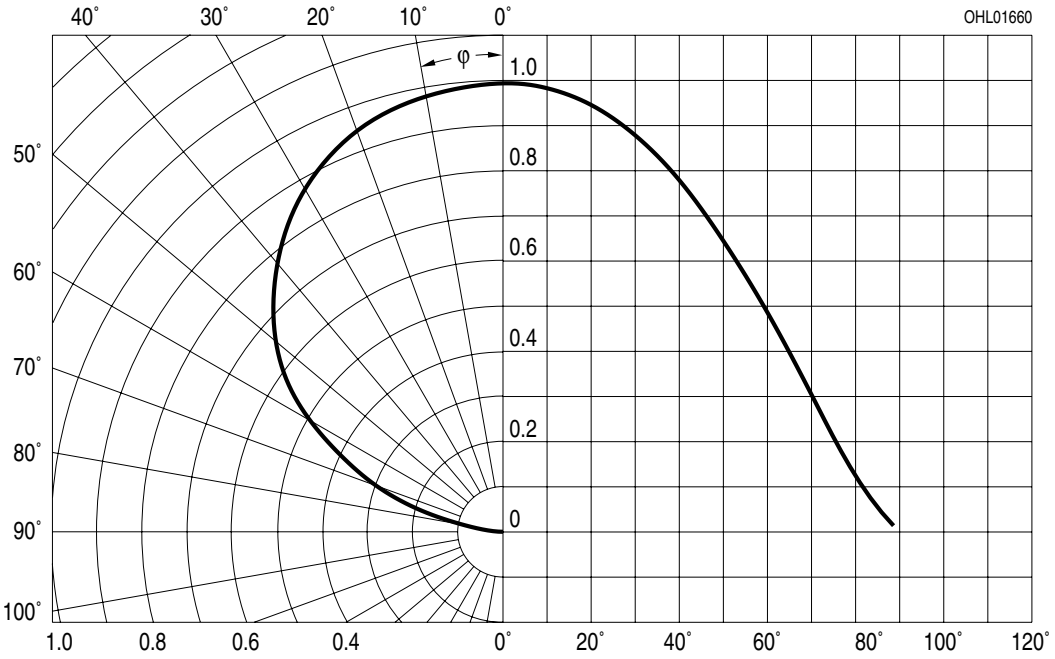
Relative Spectral Emission [1), 2)]

- super red: $I_{e,rel} = f(\lambda)$; $I_F = 10$ mA



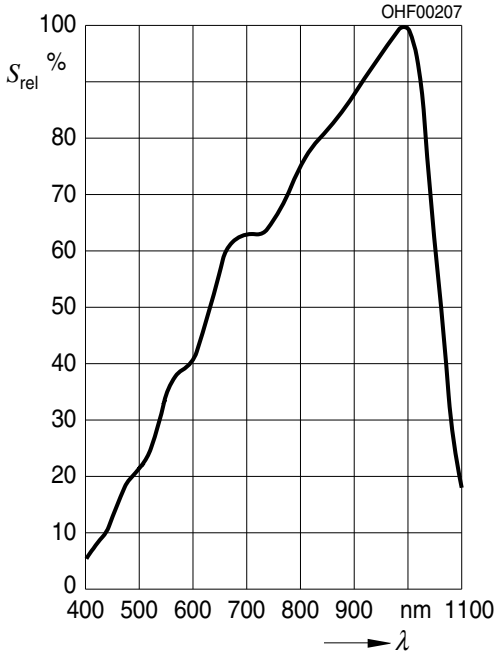
Radiation Characteristics [1), 2)]

$I_{rel} = f(\phi)$; $T_A = 25$ °C



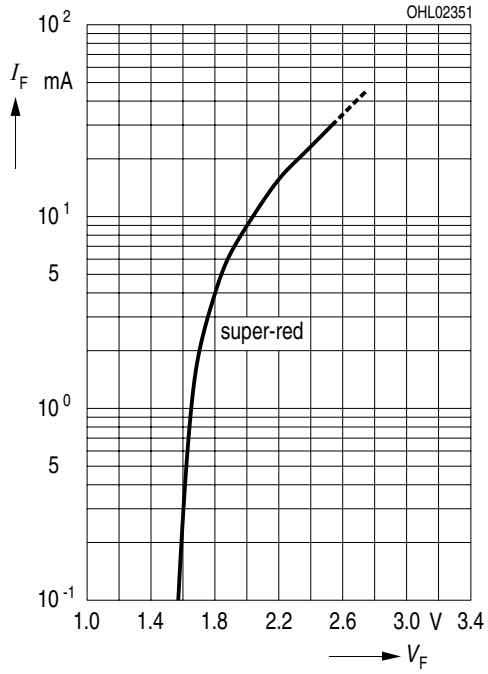
Relative Spectral Sensitivity [1), 2)]

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



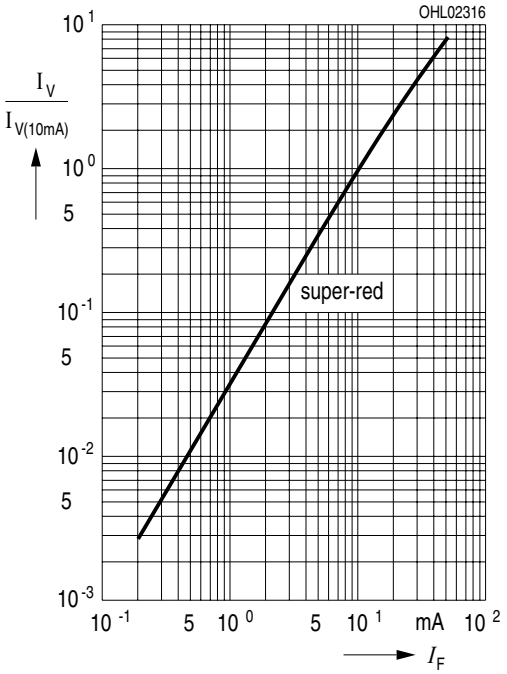
Forward current [1), 2)]

● super red: $I_F = f(V_F)$; single pulse; $t_p = 100\ \mu s$



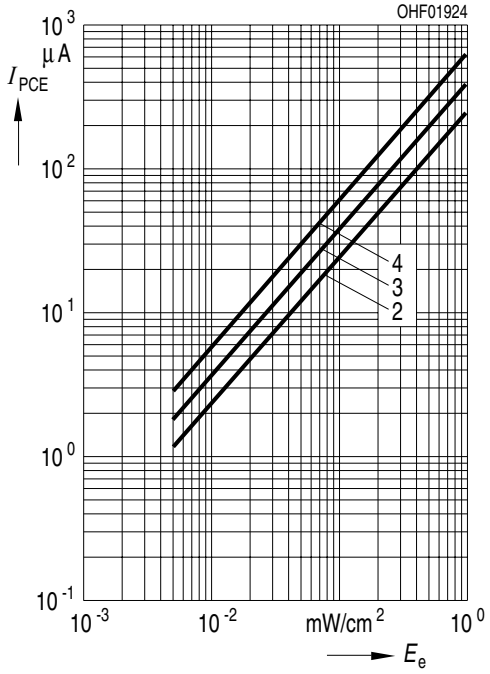
Relative Luminous Intensity [1), 2)]

● super red: $I_v / I_{v\,(10\ mA)} = f(I_F)$



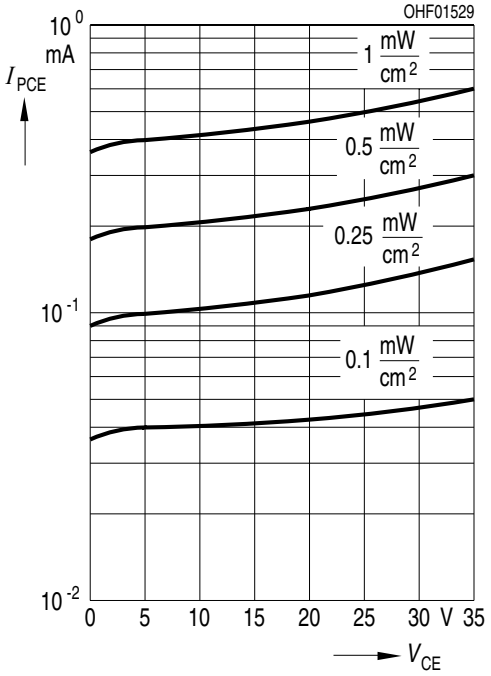
Photocurrent 1), 2)

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



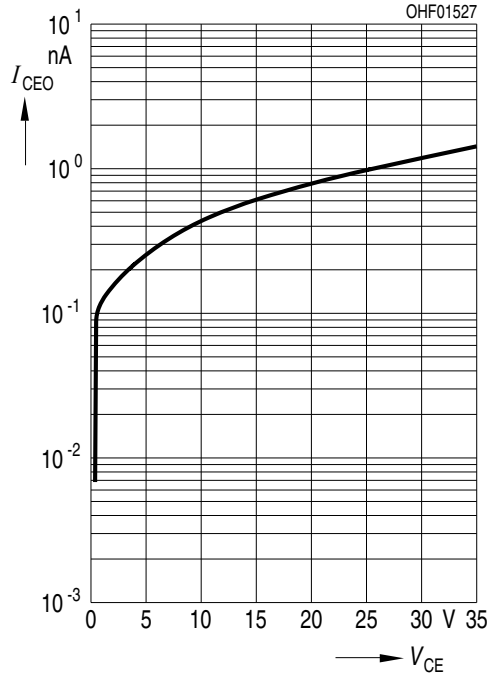
Photocurrent 1), 2)

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



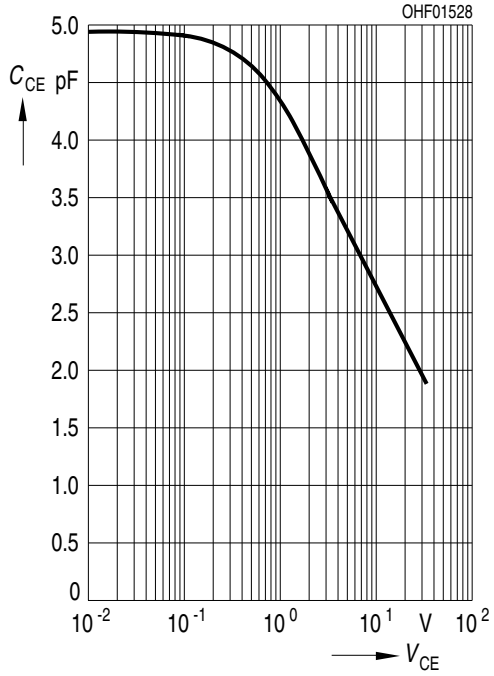
Dark Current 1), 2)

■ phototransistor: $I_{CE0} = f(V_{CE})$; E = 0



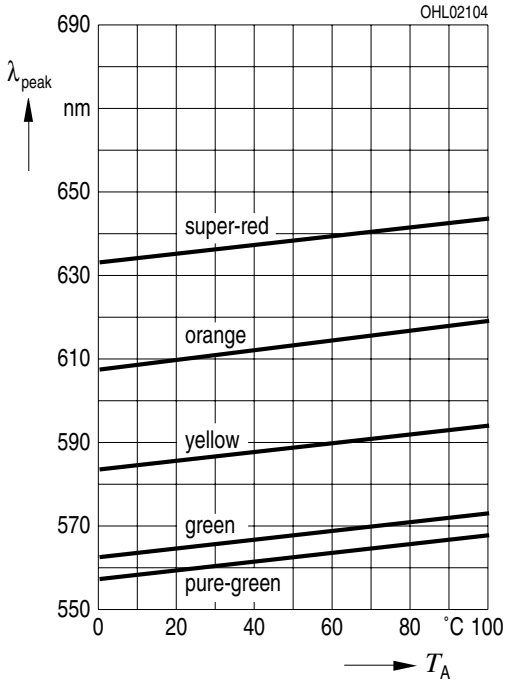
Collector-Emitter Capacitance [1), 2)]

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



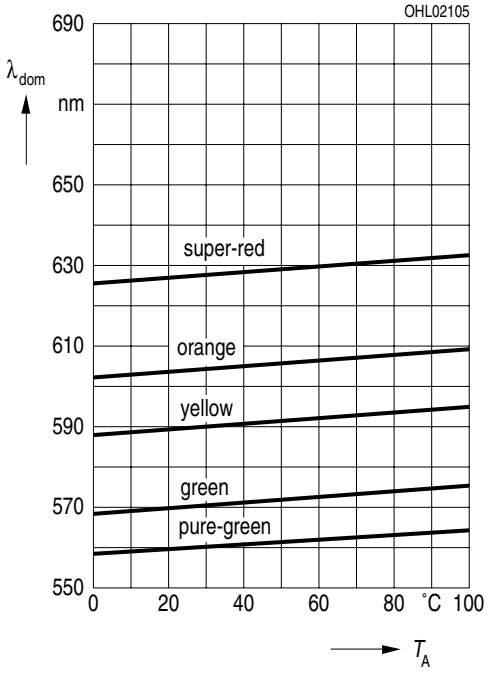
Peak Wavelength [1)]

● super red: $\lambda_{peak} = f(T_A)$; I_F = 20 mA



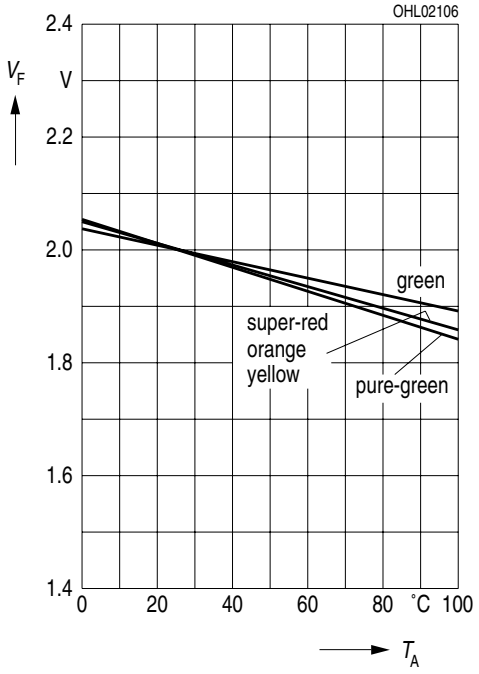
Dominant Wavelength [1)]

● super red: $\lambda_{dom} = f(T_A)$; I_F = 20 mA



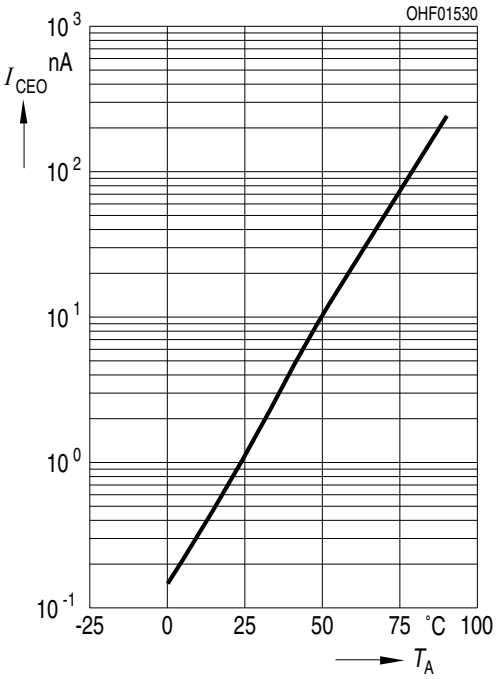
Forward Voltage [1)]

- super red: $V_F = f(T_A)$; I_F = 10 mA



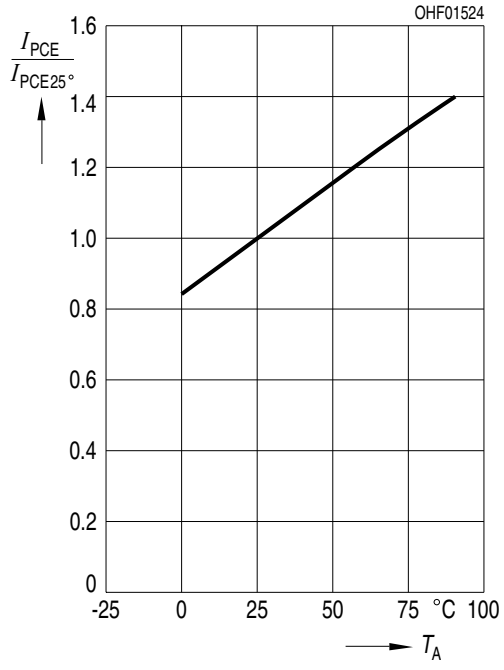
Dark Current [1)]

- phototransistor: $I_{CE0} = f(T_A)$; V_{CE} = 5 V; E = 0



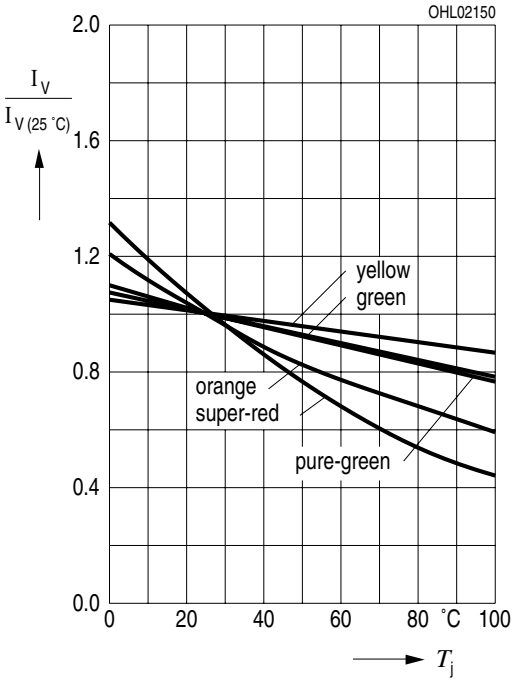
Photocurrent [1)]

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



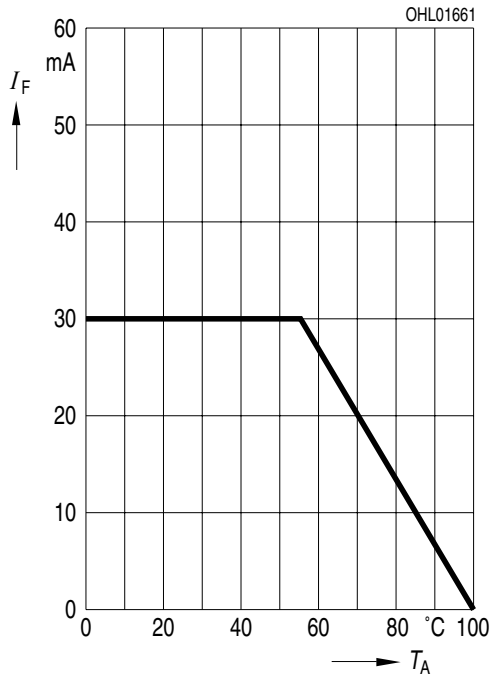
Relative Luminous Intensity [1)]

- super red: $I_{v,rel} = f(T_A)$; I_F = 10 mA



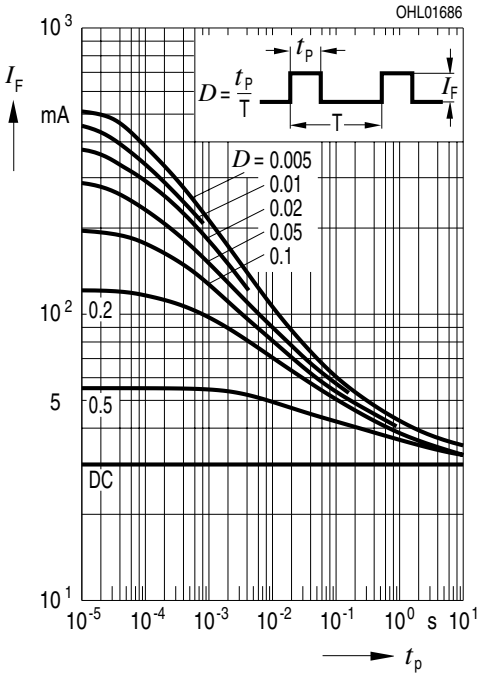
Max. Permissible Forward Current

- super red: $I_{F,max}$ = f (T_A); Rth_{ja} = 450K / W

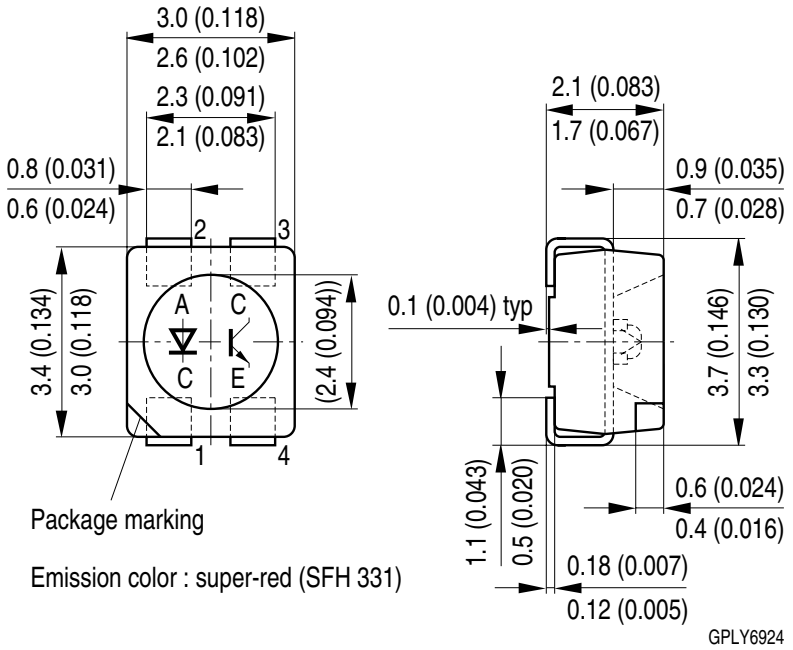


Permissible Pulse Handling Capability

- super red: I_F = f (t_p); D = parameter; T_A = 25°C



Dimensional Drawing [3)]



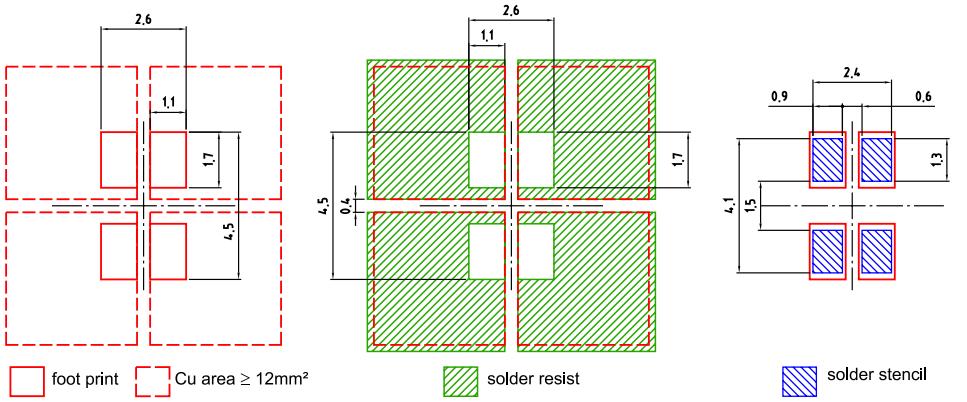
Further Information:

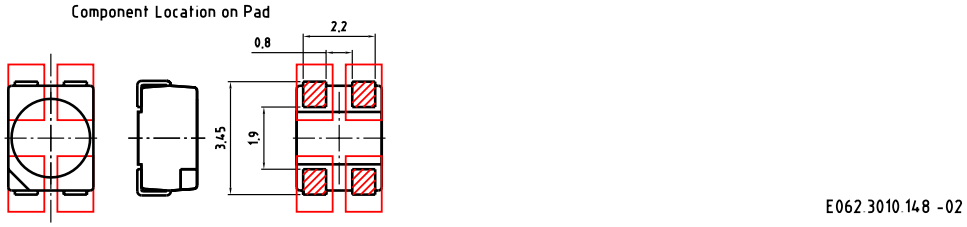
Approximate Weight: 34.0 mg

Package marking: Cathode

Notes: Dimensions in mm (inch).

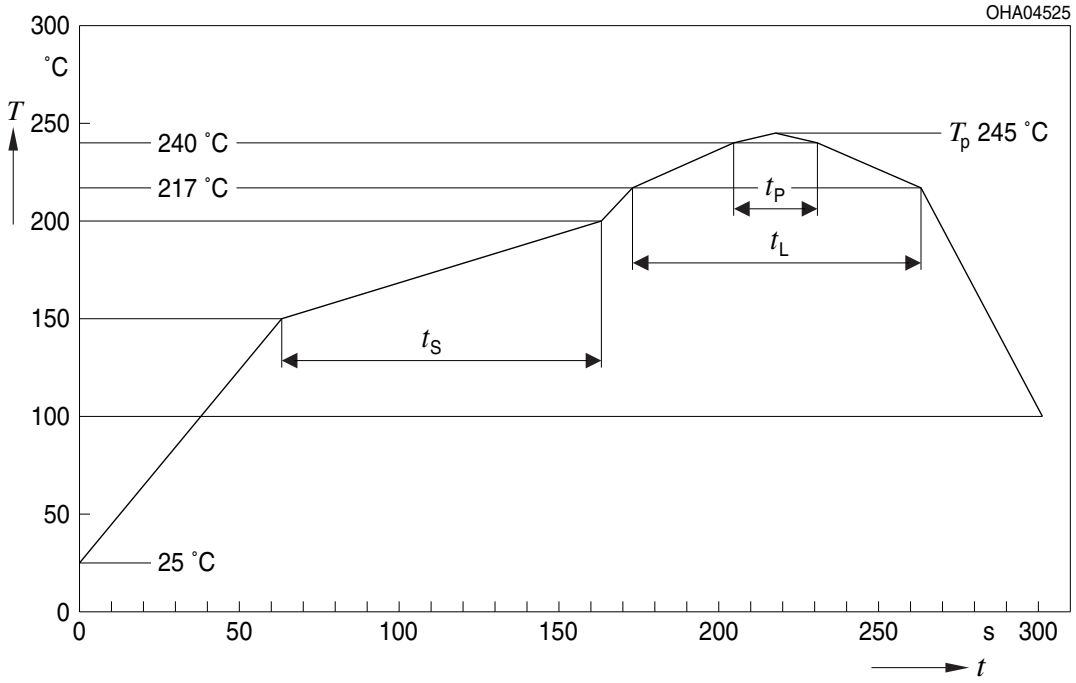
Recommended Solder Pad 3)





Reflow Soldering Profile

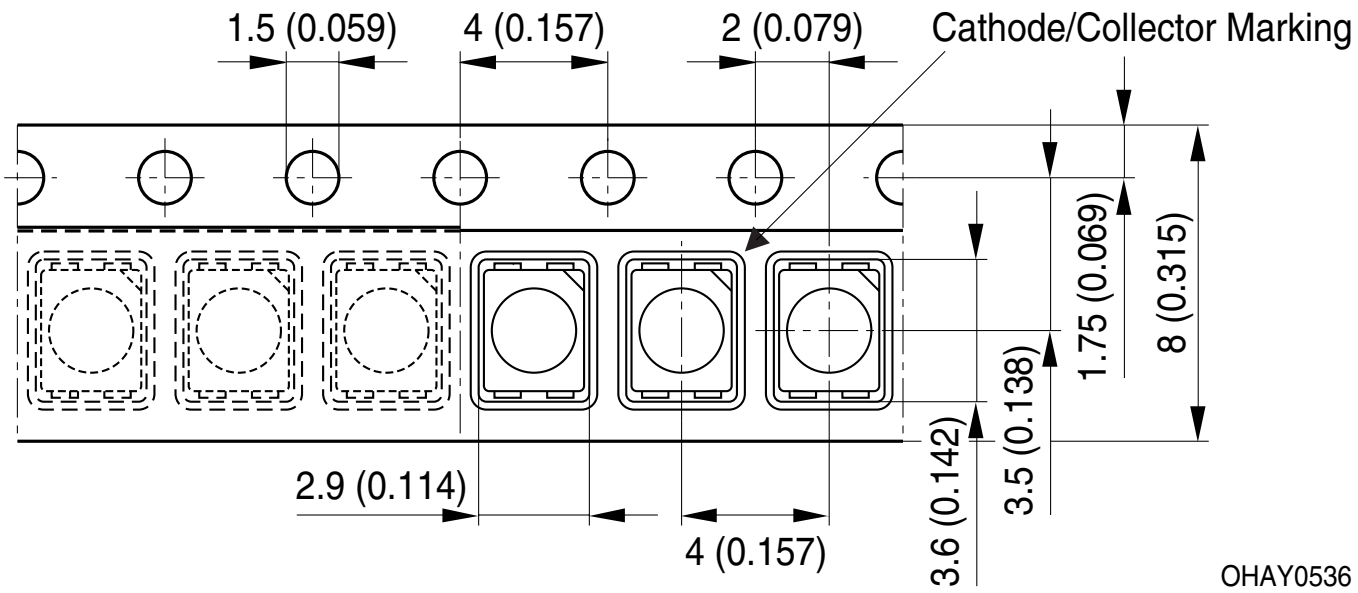
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



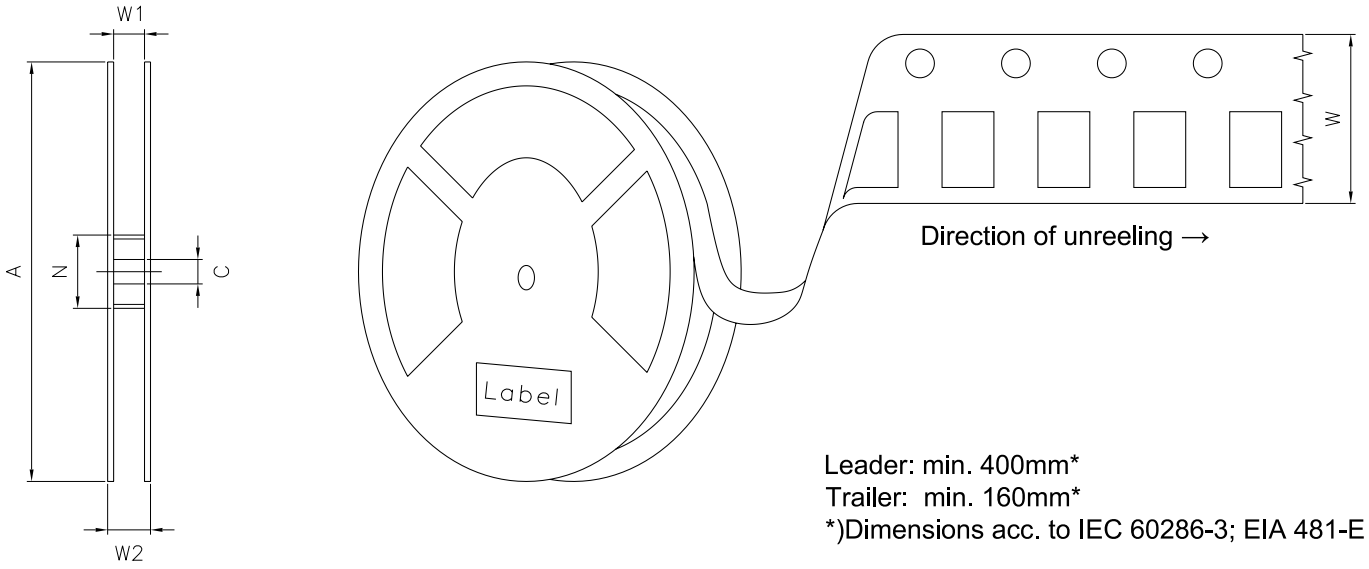
Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time t_S T_{Smin} to T_{Smax}	t_S	60	100	120	s
Ramp-up rate to peak*) T_{Smax} to T_P			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature	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 [3)]


1.5 (0.059)
4 (0.157)
2 (0.079)
Cathode/Collector Marking
1.75 (0.069)
8 (0.315)
3.5 (0.138)
3.6 (0.142)
2.9 (0.114)
4 (0.157)
OHAY0536

Tape and Reel [4)]

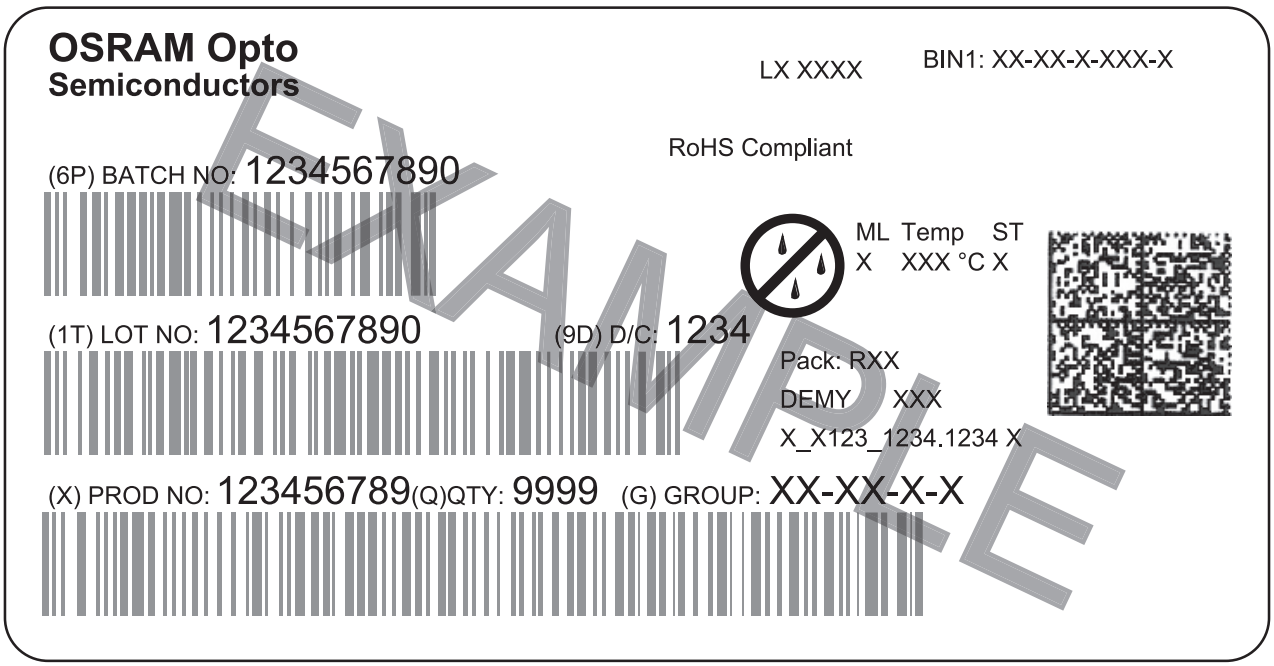


Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

Reel Dimensions

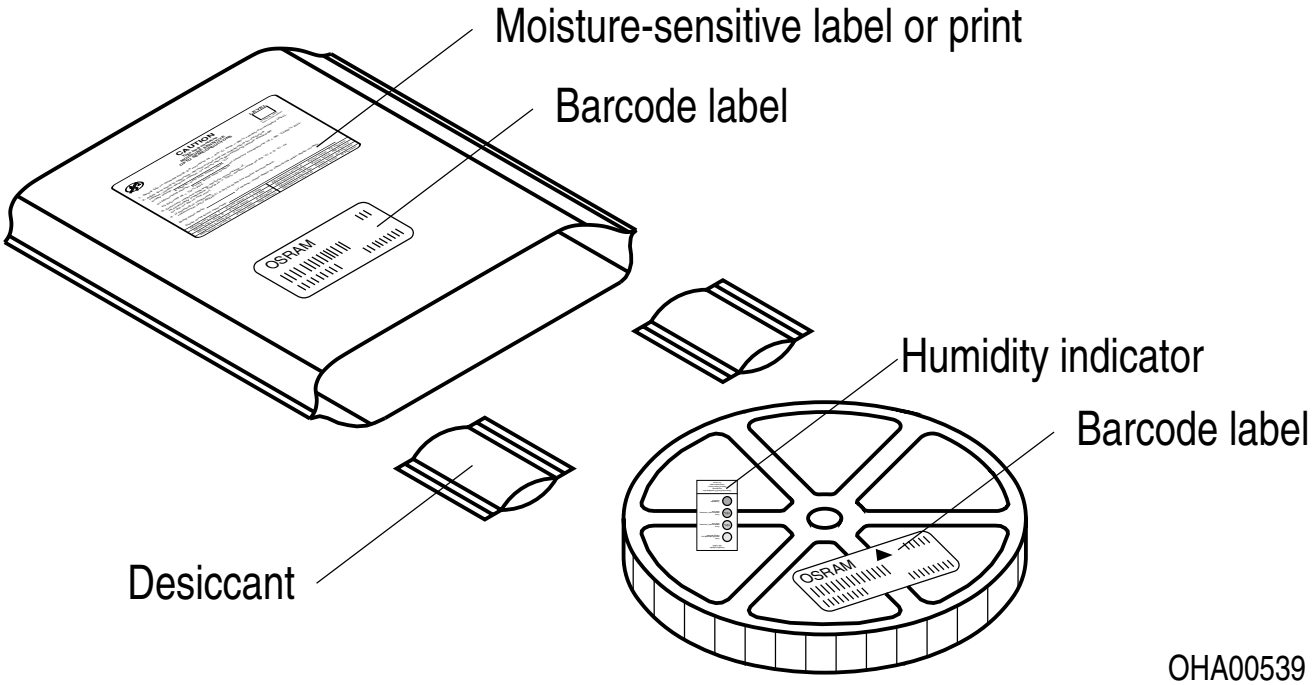
A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	2000
330 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	8000

Barcode-Product-Label (BPL)



OHA04563

Dry Packing Process and Materials [3)]



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.

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:** TA = 25°C (unless otherwise specified)

3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ±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.

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2) **Testing temperature:** T_A = 25°C (unless otherwise specified)
3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ±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) **Thermal resistance:** junction – ambient, mounted on PC-board (FR4), pad size 16mm2 each.
6) **Forward Voltage:** The forward voltages are measured with a tolerance of ±0.1 V.
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) **Brightness:** The brightness values are measured with a tolerance of ±11%.
9) **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 ±11 %.

Revision History

Version	Date	Change
1.4	2021-05-06	New Layout
1.5	2022-03-08	New Layout

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。

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