

BP 103

Metal Can® TO18

Silicon NPN Phototransistor



Applications

- Electronic Equipment
- Industrial Automation (Machine Controls, Light Barriers, Vision Controls)
- Measurement Levelling

Features:

- Package: clear epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Spectral range of sensitivity: (typ) 450 ... 1100 nm
- Base connection
- High linearity

Ordering Information

Type	Photocurrent ¹⁾ $V_{CE} = 5 \text{ V}; \lambda = 950 \text{ nm}; E_e = 0.5 \text{ mW/cm}^2$ I_{PCE}	Photocurrent ²⁾ typ. $V_{CE} = 5 \text{ V}; \lambda = 950 \text{ nm}; E_e = 0.5 \text{ mW/cm}^2$ I_{PCE}	Ordering Code
BP 103	140 ... 580 μA	200 μA	Q62702P0075
BP 103-3/4	140 ... 355 μA	200 μA	Q62702P3577
BP 103-4/5	224 ... 580 μA	200 μA	Q65113A2116

Only one bin within one packing unit (variation less than 2:1)

Maximum Ratings

$T_A = 25\text{ °C}$

Parameter	Symbol	Values
Operating temperature	T_{op}	min. -40 °C max. 80 °C
Storage temperature	T_{stg}	min. -40 °C max. 80 °C
Collector-emitter voltage	V_{CE}	max. 35 V
Collector current	I_C	max. 100 mA
Collector surge current $\tau \leq 10\text{ }\mu\text{s}$	I_{CS}	max. 200 mA
Emitter-basis voltage	V_{EB}	max. 7 V
Emitter-collector voltage	V_{EC}	max. 7 V
Total power dissipation	P_{tot}	max. 150 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}	max. 2 kV

Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Wavelength of max sensitivity	$\lambda_{S\text{ max}}$	typ.	850 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	450 ... 1100 nm
Dimensions of chip area	L x W	typ.	0.55 x 0.55 mm x mm
Radiant sensitive area	A	typ.	0.11 mm ²
Half angle	φ	typ.	55 °
Photocurrent $V_{CE} = 5\text{ V}$; Std. Light A; $E_v = 1000\text{ lx}$	I_{PCE}	typ.	775 μA
Photocurrent of collector-base photodiode $V_{CE} = 5\text{ V}$; $\lambda = 950\text{ nm}$; $E_e = 0.5\text{ mW/cm}^2$	I_{PCB}	typ.	1 μA
Photocurrent of collector-base photodiode $V_{CE} = 5\text{ V}$; Std. Light A; $E_v = 1000\text{ lx}$	I_{PCB}	typ.	3 μA
Dark current $V_{CE} = 5\text{ V}$	I_{CE0}	typ. max.	1 nA 50 nA
Rise time $I_C = 1\text{ mA}$; $\lambda = 950\text{ nm}$; $V_{CE} = 5\text{ V}$; $R_L = 1\text{ k}\Omega$	t_r	typ.	8 μs
Fall time $I_C = 1\text{ mA}$; $\lambda = 950\text{ nm}$; $V_{CE} = 5\text{ V}$; $R_L = 1\text{ k}\Omega$	t_f	typ.	8 μs
Collector-emitter saturation voltage ³⁾ $I_C = I_{PCE, \text{min}} \times 0.3$; $E_e = 0.5\text{ mW/cm}^2$; $\lambda = 950\text{ nm}$	$V_{CE\text{sat}}$	typ.	150 mV
Capacitance $V_{CE} = 0\text{ V}$; $f = 1\text{ MHz}$; $E = 0$	C_{CE}	typ.	7.5 pF
Capacitance $V_{CB} = 0\text{ V}$; $f = 1\text{ MHz}$; $E = 0$	C_{CB}	typ.	13 pF
Capacitance $V_{EB} = 0\text{ V}$; $f = 1\text{ MHz}$; $E = 0$	C_{EB}	typ.	19 pF
Thermal resistance junction ambient real	R_{thJA}	max.	500 K / W

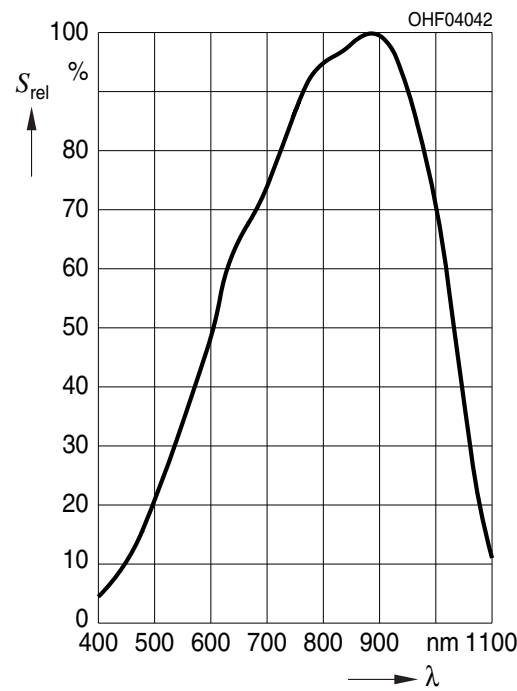
Photocurrent Groups

T_A = 25 °C

Group	Photocurrent ¹⁾ V _{CE} = 5 V; λ = 950 nm; E _e = 0.5 mW/cm ² min. I _{PCE}	Photocurrent ¹⁾ V _{CE} = 5 V; λ = 950 nm; E _e = 0.5 mW/cm ² max. I _{PCE}
3	140 μA	224 μA
4	224 μA	355 μA
5	355 μA	580 μA

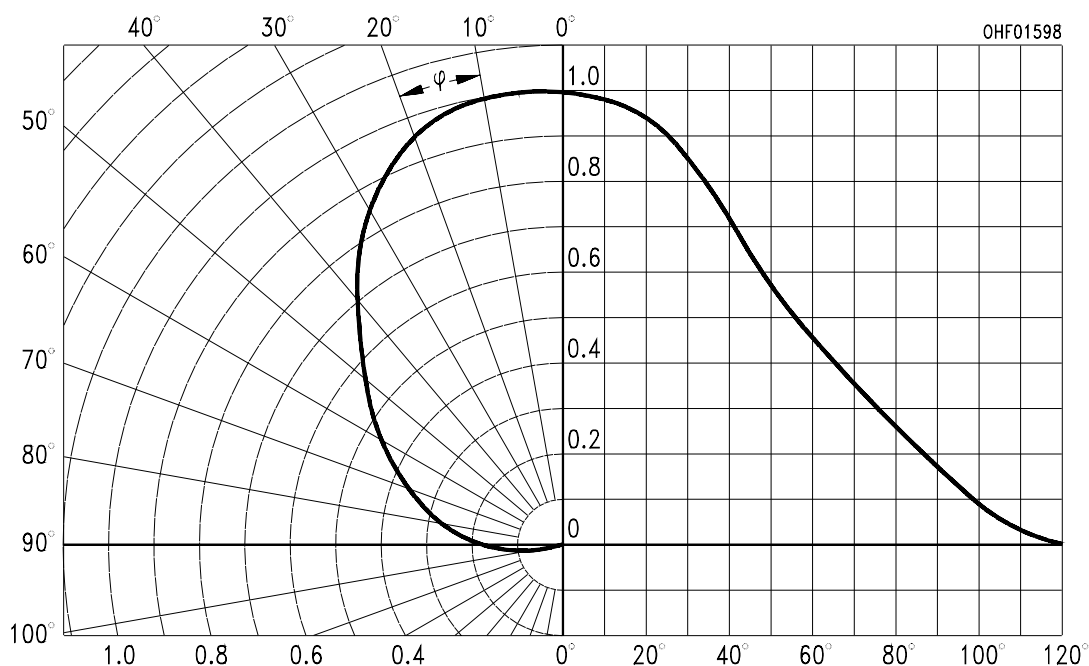
Relative Spectral Sensitivity ^{4), 5)}

S_{rel} = f (λ)



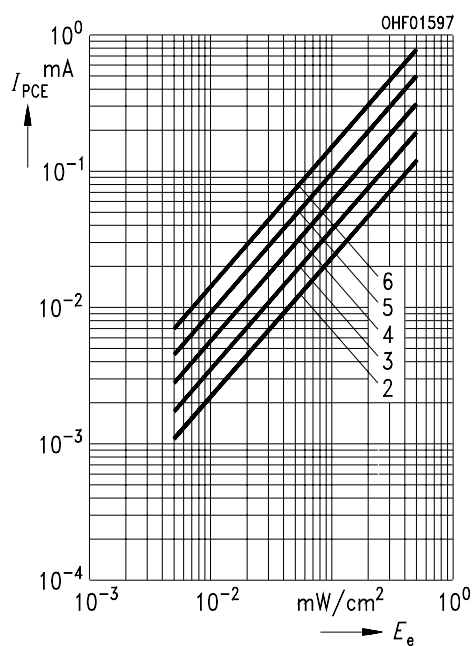
Directional Characteristics ^{4), 5)}

$$S_{\text{rel}} = f(\varphi)$$



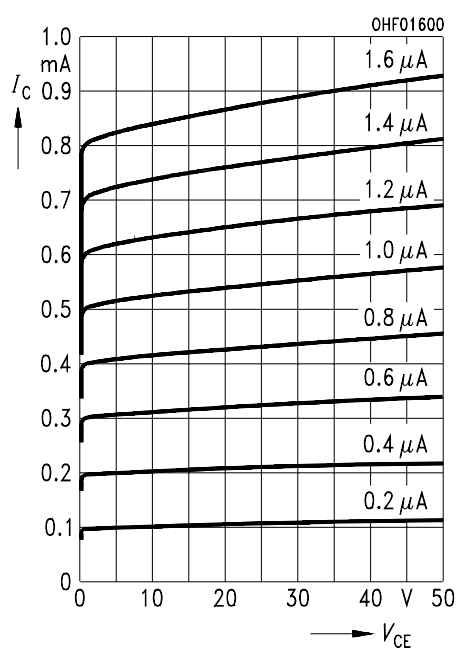
Photocurrent ^{4), 5)}

$$I_{\text{PCE}} = f(E_e); V_{\text{CE}} = 5 \text{ V}$$



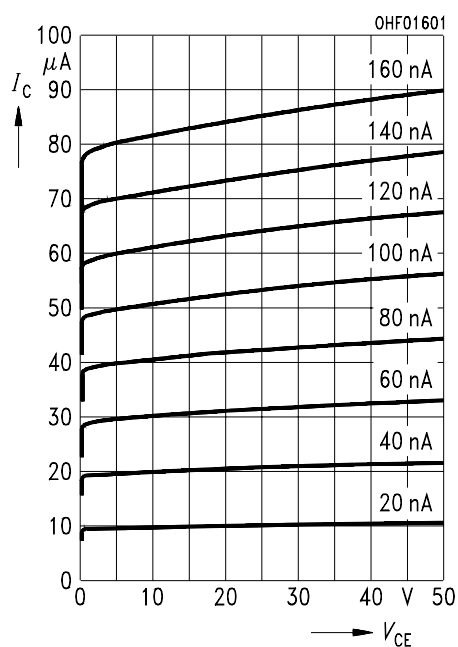
Collector Current ^{4), 5)}

$$I_{\text{CE}} = f(V_{\text{CE}}); I_{\text{B}} = \text{Parameter}$$

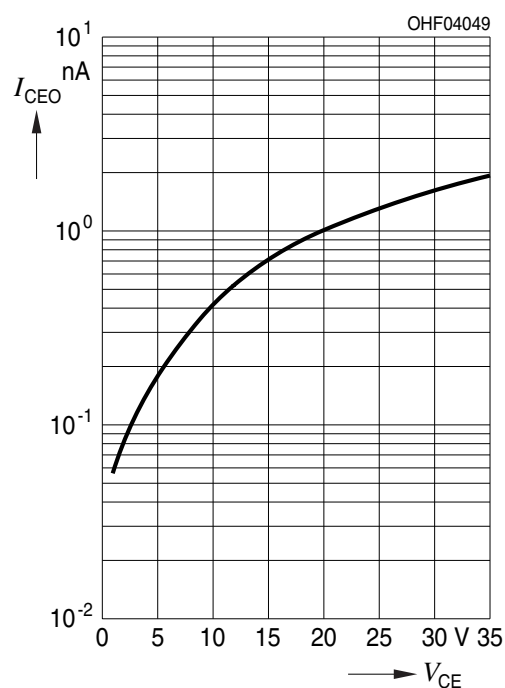


Collector Current 4), 5)

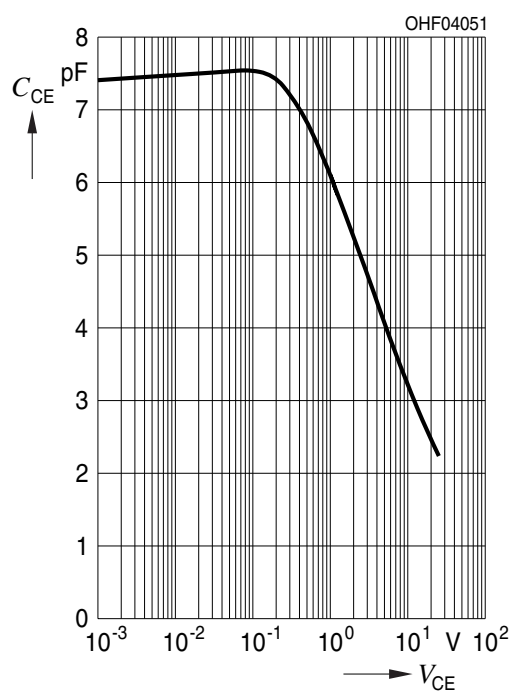
$$I_{CE} = f(V_{CE}); I_B = \text{Parameter}$$

**Dark Current** 4), 5)

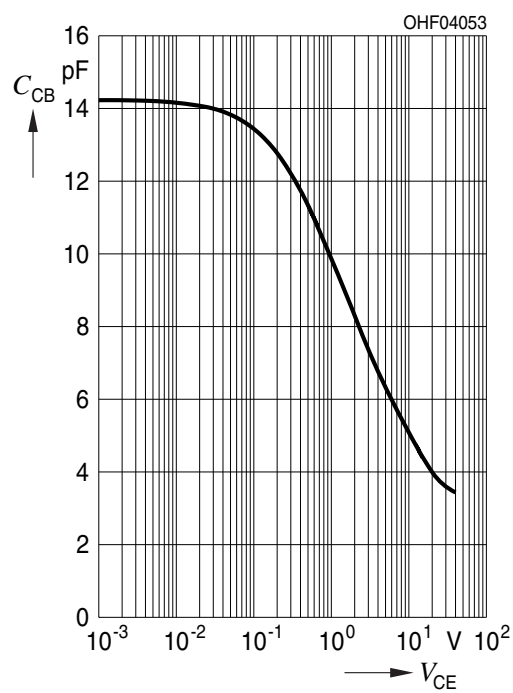
$$I_{CEO} = f(V_{CE}); E = 0$$

**Collector-Emitter Capacitance** 4), 5)

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

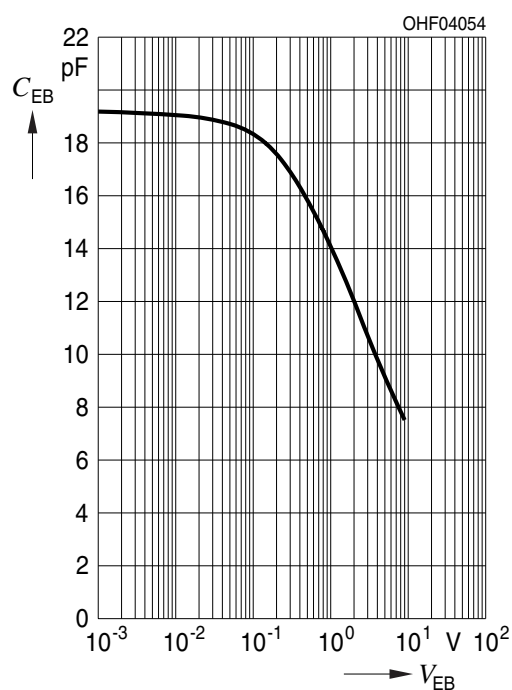
**Collector-Base Capacitance** 4), 5)

$$C_{CB} = f(V_{CB}); f = 1 \text{ MHz}; E = 0$$



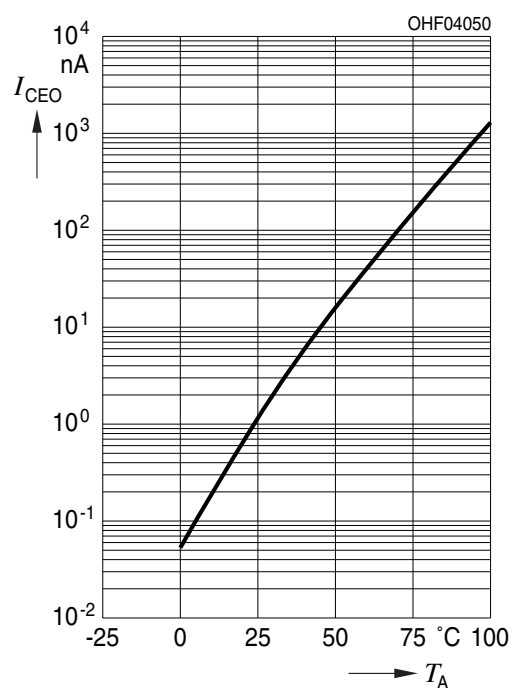
Emitter-Base Capacitance ^{4), 5)}

$$C_{EB} = f(V_{EB}); f = 1 \text{ MHz}; E = 0;$$



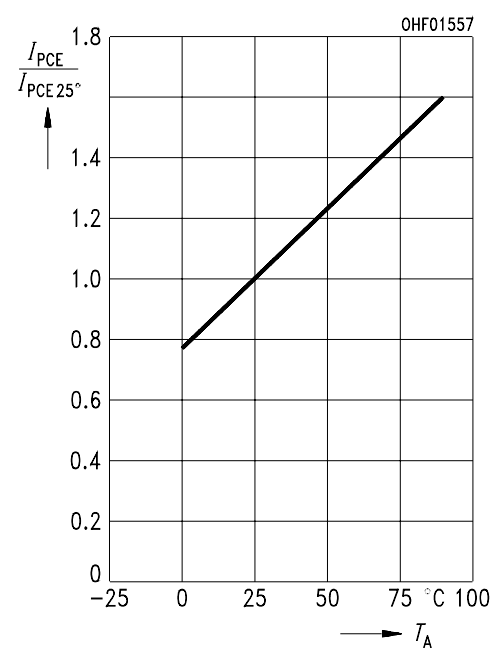
Dark Current ⁴⁾

$$I_{CEO} = f(T_A); V_{CE} = 0 \text{ V}; E = 0; E_e = 0 \text{ mW/cm}^2; 0$$



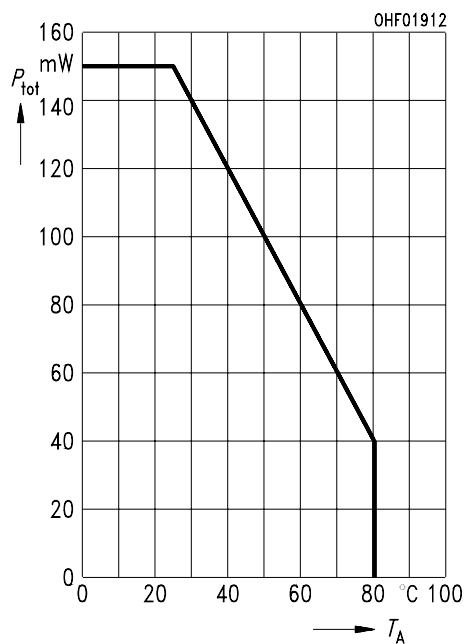
Photocurrent ⁴⁾

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

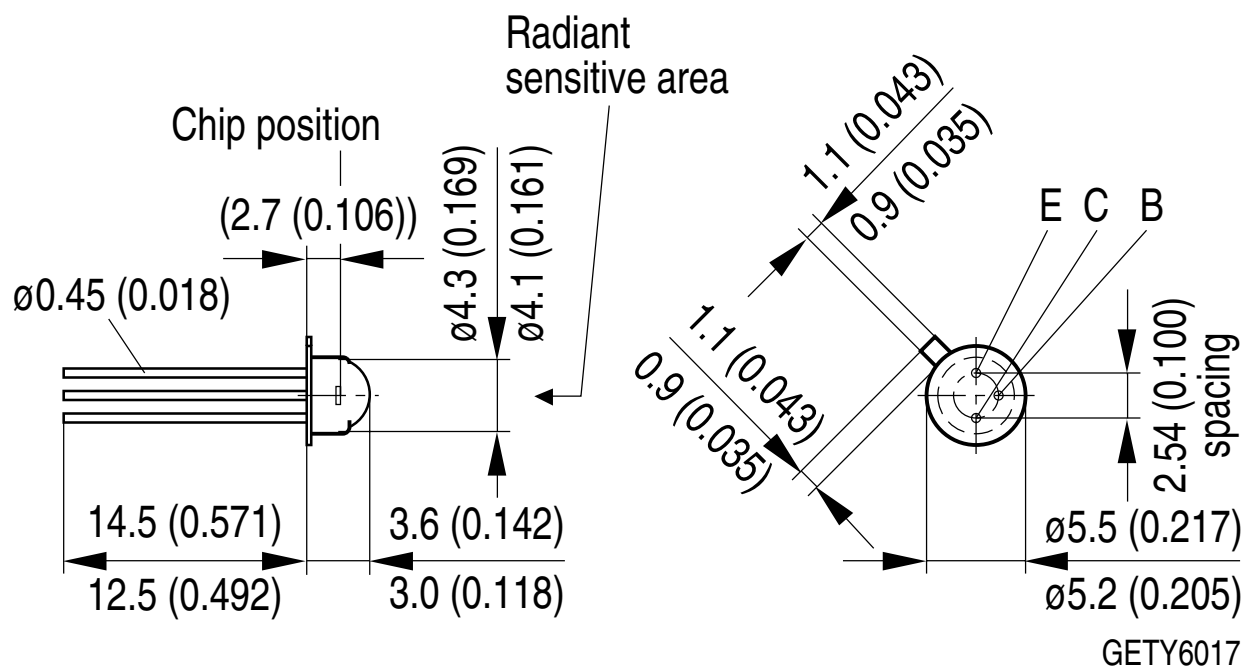


Power Consumption

$$P_{\text{tot}} = f(T_A); R_{\text{thJA}} = 500 \text{ K / W}$$



Dimensional Drawing ⁶⁾



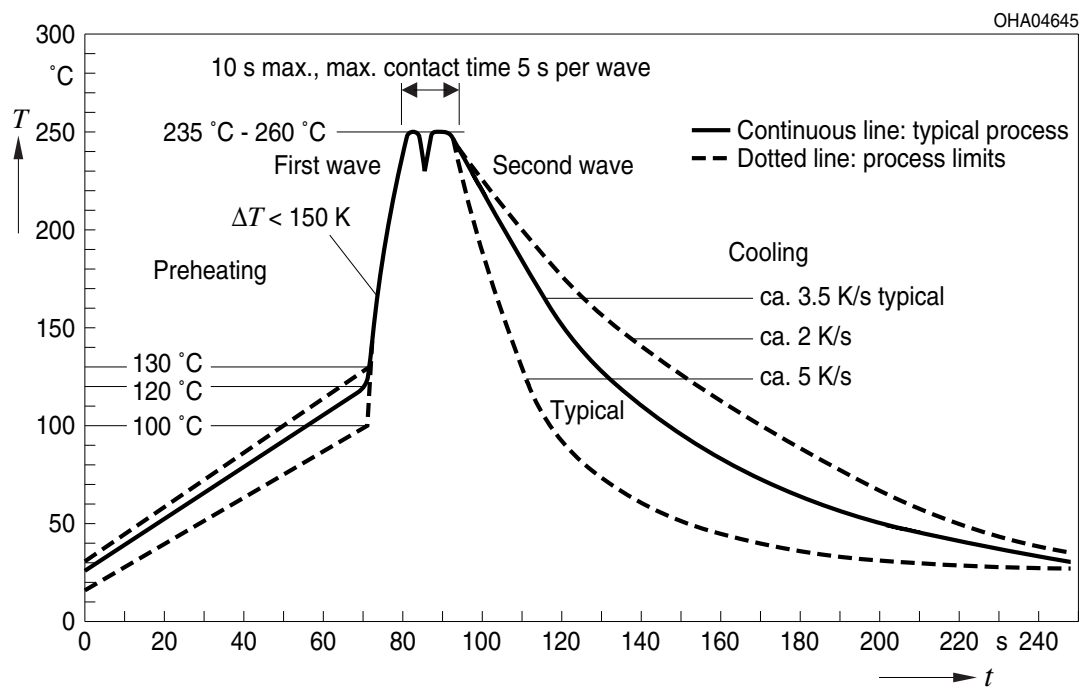
Further Information:

Approximate Weight: 190.0 mg

Package marking: Emitter

TTW Soldering

IEC-61760-1 TTW



Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet falls into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit www.osram-os.com/appnotes

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 the OSRAM OS 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

OSRAM OS components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.

OSRAM OS products are not qualified at module and system level for such application.

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Glossary

- 1) **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 $\pm 11\%$.
- 2) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 3) **IPCEmin:** IPCEmin is the min. photocurrent of the specified group.
- 4) **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.
- 5) **Testing temperature:** $T_A = 25^\circ\text{C}$ (unless otherwise specified)
- 6) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.

Revision History

Version	Date	Change
1.5	2020-11-11	Ordering Information

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