

OSRAM BPW 21

Datasheet

Published by ams-OSRAM AG

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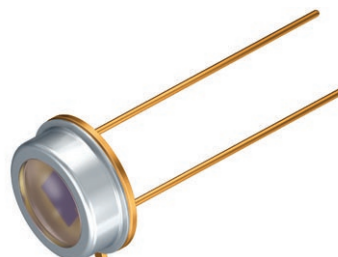
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Metal Can® TO39 Ambient Light Sensor

BPW 21

Silicon Photodiode for the Visible Spectral Range



Applications

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

Features

- Package: hermetically sealed
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Especially suitable for applications from 350 nm to 820 nm
- Adapted to human eye sensitivity (V_{λ})
- Package similar to TO-5

Ordering Information

Type	Photocurrent ¹⁾ $E_v = 1000 \text{ lx; Std. Light A; } V_R = 5 \text{ V}$ I_P	Photocurrent typ. $E_v = 1000 \text{ lx; Std. Light A; } V_R = 5 \text{ V}$ I_P	Ordering Code
BPW 21	$\geq 5.5 \text{ }\mu\text{A}$	$18 \text{ }\mu\text{A}$	Q62702P0885

Maximum Ratings

 $T_A = 25\text{ °C}$

Parameter	Symbol	Values	
Operating Temperature	T_{op}	min. max.	-40 °C 80 °C
Storage temperature	T_{stg}	min. max.	-40 °C 80 °C
Reverse voltage	V_R	max.	10 V
Total power dissipation	P_{tot}	max.	250 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM)	V_{ESD}	max.	2 kV

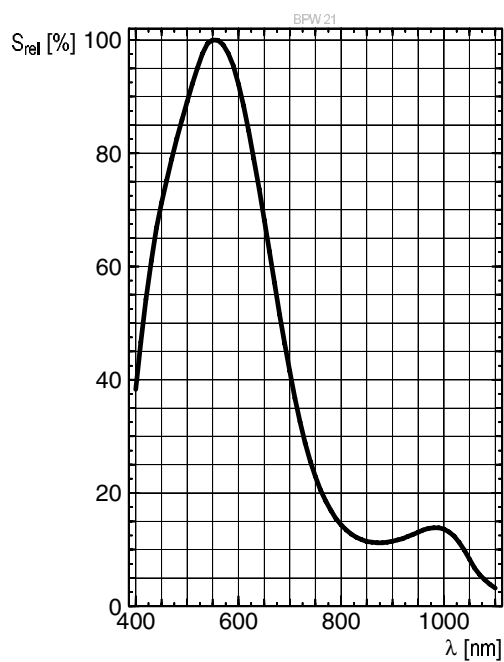
Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Spectral sensitivity $V_R = 5\text{ V}$; Std. Light A; $T=2856\text{ K}$	S	min. typ.	5.5 nA/lx 18 nA/lx
Wavelength of max sensitivity	$\lambda_{S\text{ max}}$	typ.	550 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	350 ... 820 nm
Radiant sensitive area	A	typ.	7.45 mm ²
Dimensions of active chip area	L x W	typ.	2.73 x 2.73 mm x mm
Half angle	φ	typ.	55 °
Dark current $V_R = 5\text{ V}$	I_R	typ. max.	0.17 nA 30 nA
Dark current $V_R = 10\text{ mV}$	I_R	typ. max.	40 pA 200 pA
Open-circuit voltage $E_v = 1000\text{ lx}$; Std. Light A; $V_R = 0\text{ V}$	V_O	typ.	340 mV
Short-circuit current $E_v = 1000\text{ lx}$; Std. Light A; $V_R = 0\text{ V}$	I_{SC}	typ.	17.5 µA
Rise time $V_R = 5\text{ V}$; $R_L = 1\text{ k}\Omega$; $\lambda = 550\text{ nm}$	t_r	typ.	1.5 µs
Fall time $V_R = 5\text{ V}$; $R_L = 1\text{ k}\Omega$; $\lambda = 550\text{ nm}$	t_f	typ.	1.5 µs
Forward voltage $I_F = 100\text{ mA}$; $E = 0$	V_F	typ.	1.2 V
Capacitance $V_R = 0\text{ V}$; $f = 1\text{ MHz}$; $E = 0$	C_0	typ.	48 pF
Temperature coefficient of voltage	TC_V	typ.	-2.6 mV / K
Temperature coefficient of short-circuit current $\lambda = 550\text{ nm}$	TC_I	typ.	-0.05 % / K
Noise equivalent power $V_R = 5\text{ V}$; $\lambda = 550\text{ nm}$	NEP	typ.	0.074 pW / Hz ^{1/2}
Detection limit $V_R = 5\text{ V}$; $\lambda = 850\text{ nm}$	D^*	typ.	3.7e12 cm x Hz ^{1/2} / W

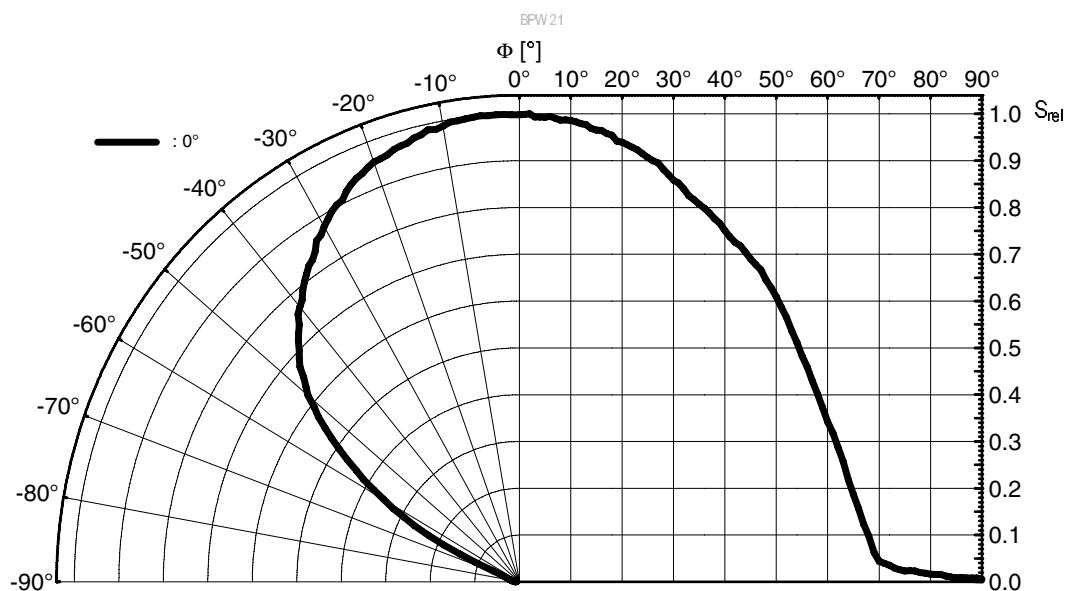
Relative Spectral Sensitivity ^{2), 3)}

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



Directional Characteristics ^{2), 3)}

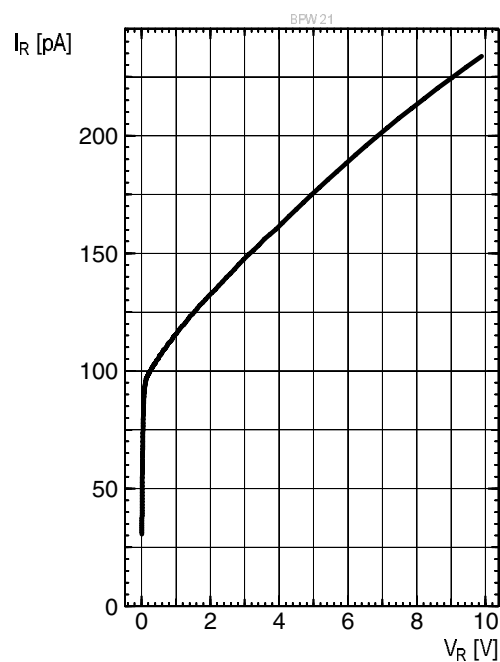
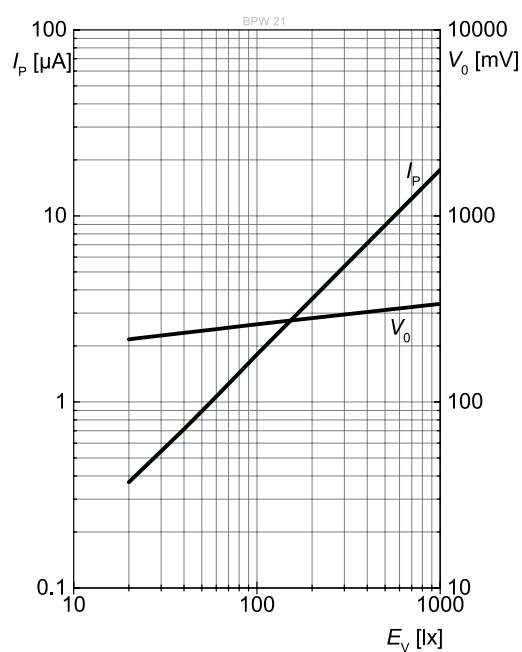
$$S_{\text{rel}} = f(\varphi)$$



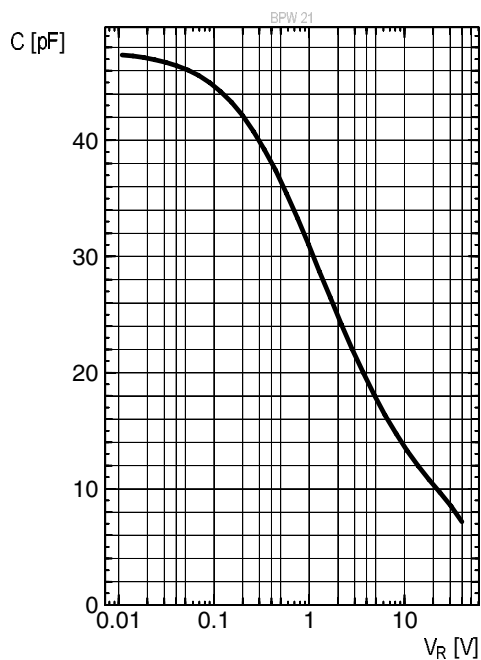
Photocurrent/Open-Circuit Voltage 2), 3) **Dark Current** 2), 3)

$$I_P (V_R = 5 \text{ V}) / V_O = f(E_V)$$

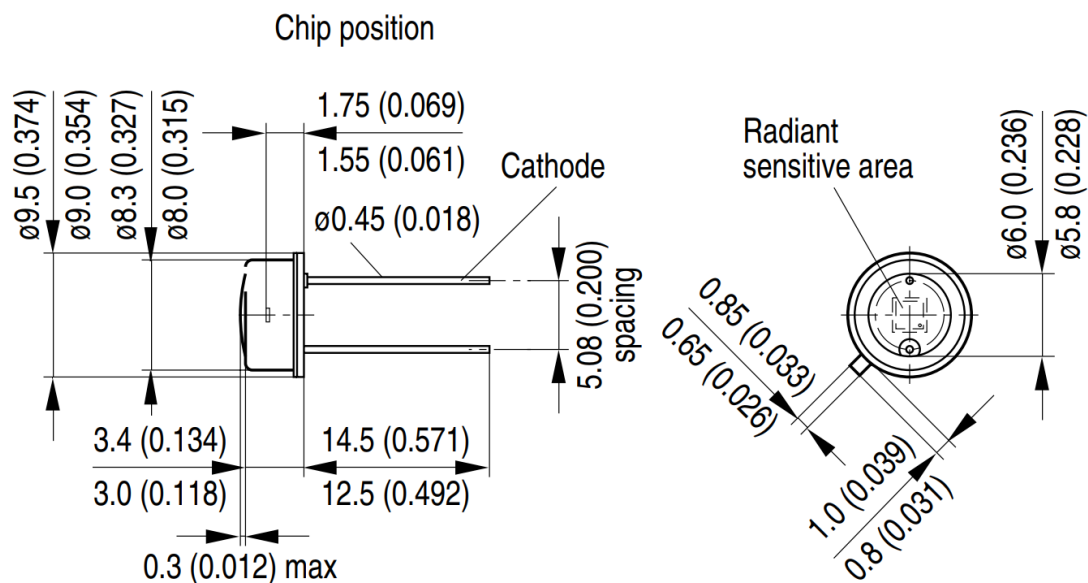
$$I_R = f(V_R); E = 0$$

**Capacitance** 2), 3)

$$C = f(V_R); f = 1 \text{ MHz}; E = 0; T_A = 25^\circ \text{C}$$



Dimensional Drawing ⁴⁾



GMOY6011

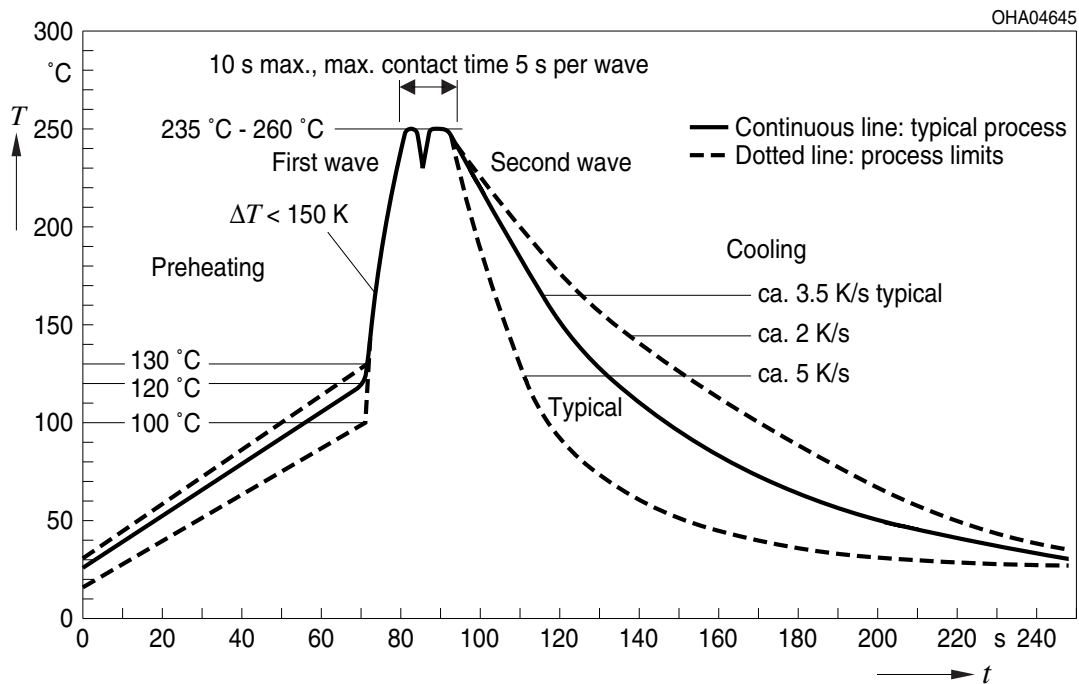
Further Information:

Approximate Weight: 855.0 mg

Package marking: Cathode

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 fall 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 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) **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) **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.
- 3) **Testing temperature:** $T_A = 25^\circ\text{C}$ (unless otherwise specified)
- 4) **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
1.4	2022-06-07	Characteristics Electro - Optical Characteristics (Diagrams) 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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