

# SFH 213 FA

## Radial T1 3/4

Silicon PIN Photodiode



### Applications

- Electronic Equipment
- Highbay Industrial
- Industrial Automation (Machine controls, Light barriers, Vision controls)
- Smoke Detectors
- White Goods

### Features:

- Package: black epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Wavelength range ( $S_{10\%}$ ) 750 nm to 1100 nm
- Short switching time (typ. 5 ns)
- 5 mm LED plastic package

### Ordering Information

Type	Photocurrent $E_e = 1 \text{ mW/cm}^2; \lambda = 870 \text{ nm}; V_R = 5 \text{ V}$ $I_P$	Photocurrent typ. $E_e = 1 \text{ mW/cm}^2; \lambda = 870 \text{ nm}; V_R = 5 \text{ V}$ $I_P$	Ordering Code
SFH 213 FA	$\geq 65 \mu\text{A}$	$90 \mu\text{A}$	Q62702P1671

## Maximum Ratings

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min. max.	-40 °C 100 °C
Storage temperature	$T_{stg}$	min. max.	-40 °C 100 °C
Reverse voltage	$V_R$	max.	20 V
Reverse voltage $t \leq 2\text{ min}$	$V_R$	max.	50 V
Total power dissipation	$P_{tot}$	max.	150 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	$V_{ESD}$		2 kV

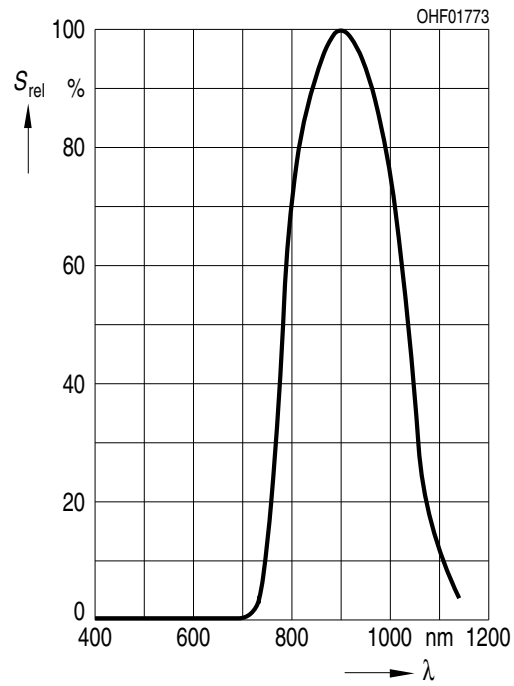
## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Wavelength of max sensitivity	$\lambda_{S\text{ max}}$	typ.	900 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	750 ... 1100 nm
Radiant sensitive area	A	typ.	1.00 mm <sup>2</sup>
Dimensions of active chip area	L x W	typ.	1 x 1 mm x mm
Half angle	$\varphi$	typ.	10 °
Dark current	$I_R$	typ.	1 nA
$V_R = 20\text{ V}$		max.	5 nA
Spectral sensitivity of the chip $\lambda = 870\text{ nm}$	$S_\lambda$	typ.	0.65 A / W
Quantum yield of the chip $\lambda = 870\text{ nm}$	$\eta$	typ.	0.93 Electrons / Photon
Open-circuit voltage $E_e = 0.5\text{ mW/cm}^2; \lambda = 870\text{ nm}$	$V_O$	min. typ.	300 mV 380 mV
Short-circuit current $E_e = 0.5\text{ mW/cm}^2; \lambda = 870\text{ nm}$	$I_{sc}$	typ.	42 $\mu$ A
Rise time $V_R = 20\text{ V}; R_L = 50\ \Omega; \lambda = 850\text{ nm}$	$t_r$	typ.	0.005 $\mu$ s
Fall time $V_R = 20\text{ V}; R_L = 50\ \Omega; \lambda = 850\text{ nm}$	$t_f$	typ.	0.005 $\mu$ s
Forward voltage $I_F = 100\text{ mA}; E = 0$	$V_F$	typ.	1.3 V
Capacitance $V_R = 0\text{ V}; f = 1\text{ MHz}; E = 0$	$C_0$	typ.	11 pF
Temperature coefficient of voltage	$TC_V$	typ.	-2.6 mV / K
Temperature coefficient of short-circuit current $\lambda = 870\text{ nm}$	$TC_I$	typ.	0.1 % / K
Noise equivalent power $V_R = 20\text{ V}; \lambda = 870\text{ nm}$	NEP	typ.	0.028 pW / Hz <sup>1/2</sup>
Detection limit $V_R = 20\text{ V}; \lambda = 870\text{ nm}$	$D^*$	typ.	3.6e12 cm x Hz <sup>1/2</sup> / W

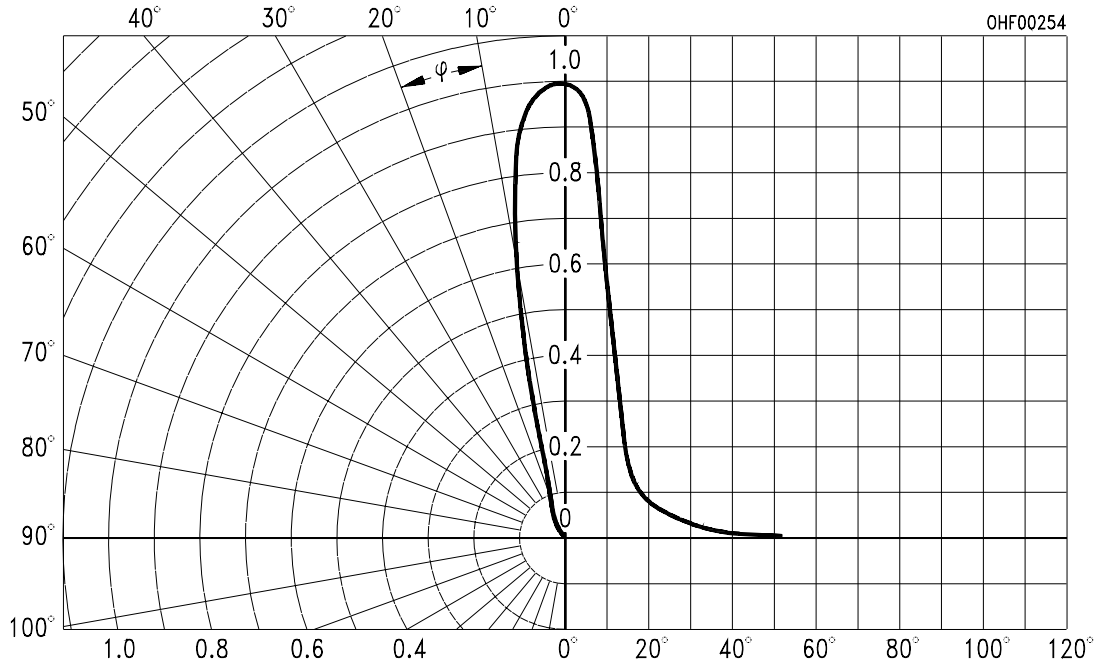
## Relative Spectral Sensitivity <sup>1), 2)</sup>

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



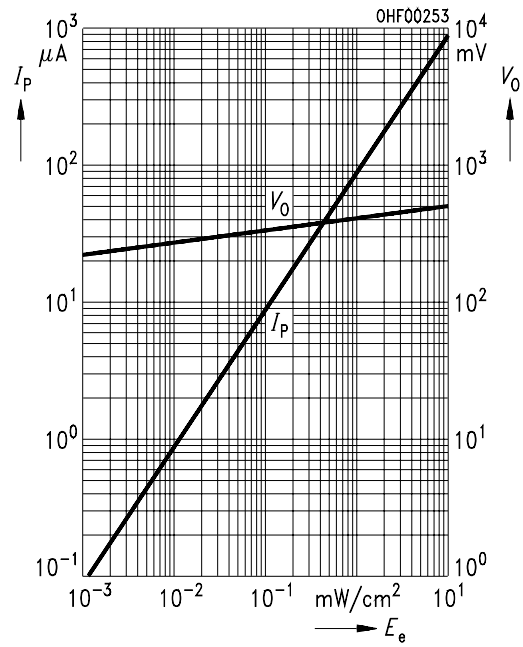
## Directional Characteristics <sup>1), 2)</sup>

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



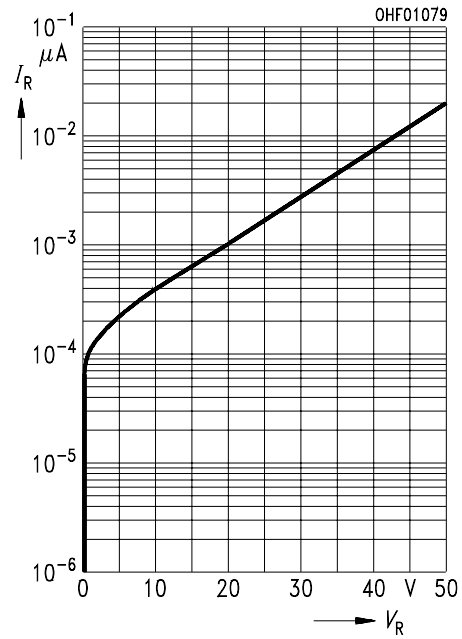
**Photocurrent/Open-Circuit Voltage** <sup>1), 2)</sup>

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



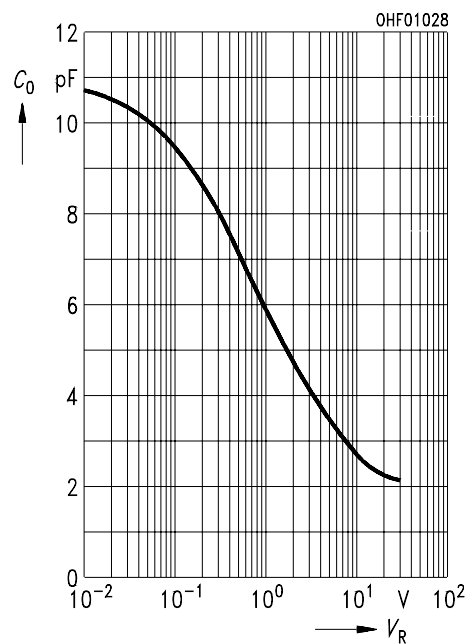
**Dark Current** <sup>1), 2)</sup>

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



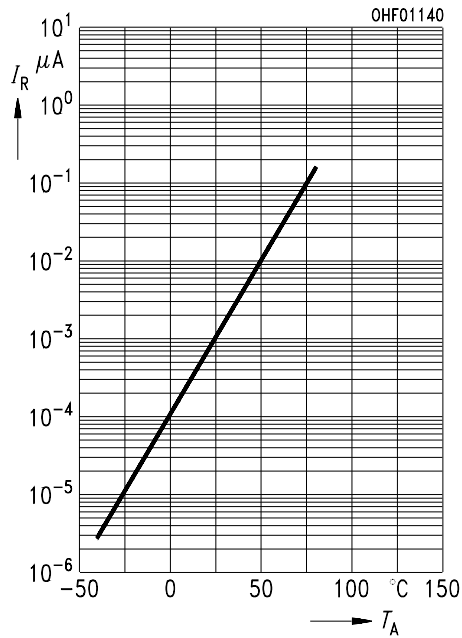
**Capacitance** <sup>1), 2)</sup>

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



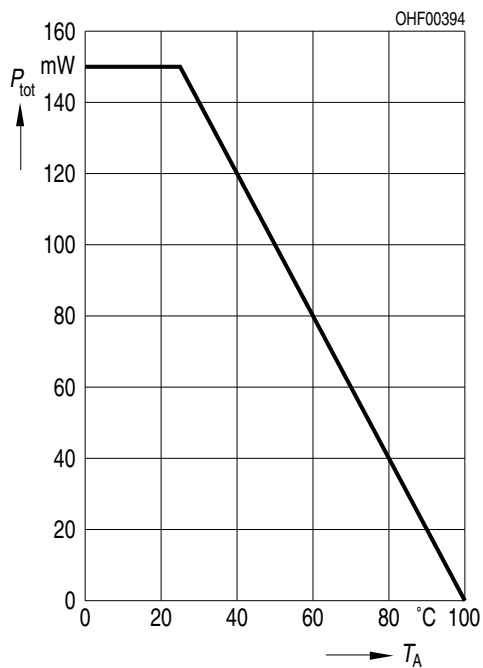
## Dark Current <sup>2)</sup>

$$I_R = f(T_A); E = 0; V_R = 20 \text{ V}$$

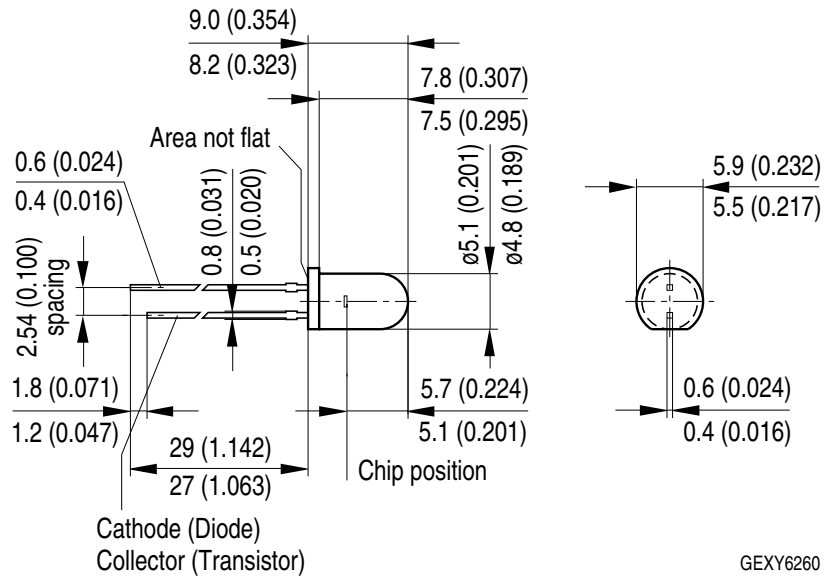


## Power Consumption

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



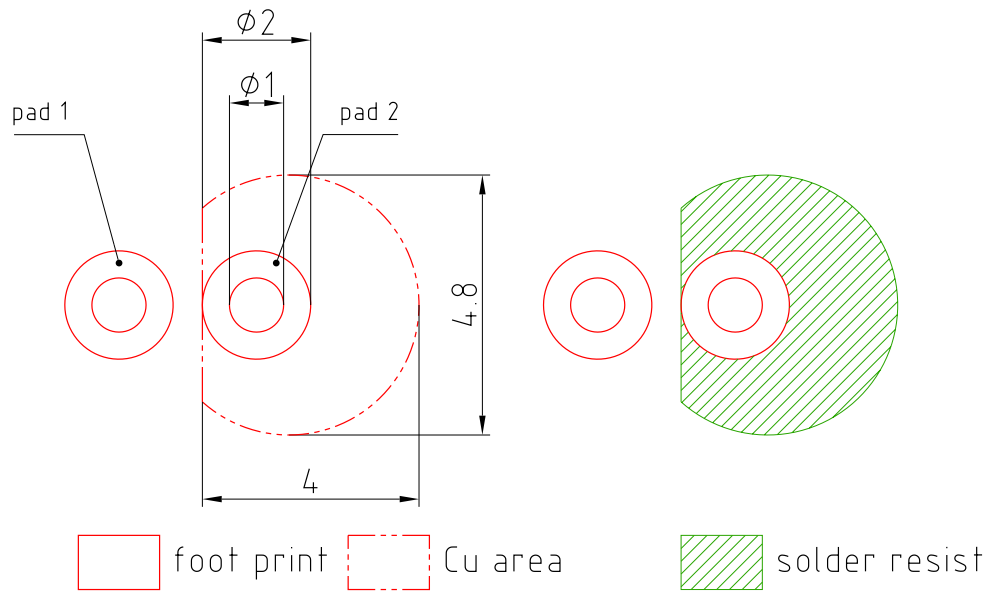
**Dimensional Drawing** <sup>3)</sup>



**Approximate Weight:** 350.0 mg

**Package marking:** Cathode

### Recommended Solder Pad <sup>3)</sup>



E062.3010.188-01

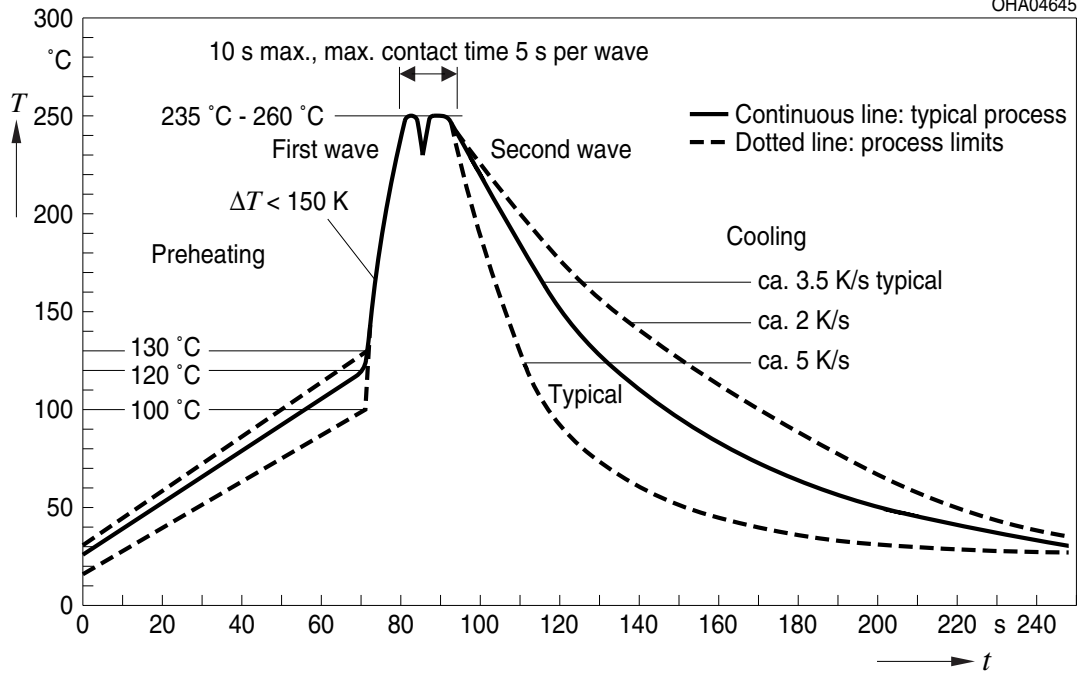
Pad 1: anode



## TTW Soldering

IEC-61760-1 TTW

OHA04645



## 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 LED 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.

Packing information is available on the internet (online product catalog).

For further application related informations please visit [www.osram-os.com/appnotes](http://www.osram-os.com/appnotes)

## Disclaimer

### 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 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.

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## Glossary

- 1) **Testing temperature:**  $T_A = 25^\circ\text{C}$
- 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.
- 3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.

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**Leibnizstraße 4, D-93055 Regensburg**  
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