

# Silicon PIN Photodiode

## Version 1.3

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### SFH 213 FA



#### Features:

- Wavelength range ( $S_{10\%}$ ) 750 nm to 1100 nm
- Short switching time (typ. 5 ns)
- 5 mm LED plastic package

#### Applications

- High speed photointerrupters
- Industrial electronics
- For control and drive circuits

#### Ordering Information

Type:	Photocurrent $I_P$ [ $\mu A$ ] $V_R = 5 V, \lambda = 870 nm, E_e = 1 mW/cm^2$	Ordering Code
SFH 213 FA	90 ( $\geq 65$ )	Q62702P1671

**Maximum Ratings** ( $T_A = 25\text{ °C}$ )

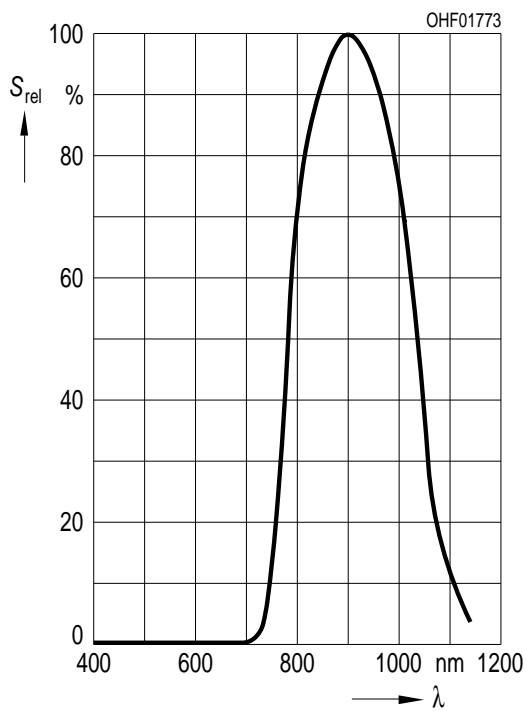
Parameter	Symbol	Values	Unit
Operating and storage temperature range	$T_{op}; T_{stg}$	-40 ... 100	°C
Reverse voltage	$V_R$	20	V
Reverse voltage ( $t < 2\text{ min}$ )	$V_R$	50	V
Total Power dissipation	$P_{tot}$	150	mW
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2000	V

**Characteristics** ( $T_A = 25\text{ °C}$ )

Parameter	Symbol	Values	Unit
Photocurrent ( $V_R = 5\text{ V}$ , $\lambda = 870\text{ nm}$ , $E_e = 1\text{ mW/cm}^2$ )	$I_P$ (typ (min))	90 ( $\geq 65$ )	$\mu\text{A}$
Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$ (typ)	900	nm
Spectral range of sensitivity	$\lambda_{10\%}$ (typ)	(typ) 750 ... 1100	nm
Radiant sensitive area	A (typ)	1.00	$\text{mm}^2$
Dimensions of radiant sensitive area	L x W (typ)	1 x 1	mm x mm
Half angle	$\varphi$ (typ)	$\pm 10$	°
Dark current ( $V_R = 20\text{ V}$ )	$I_R$ (typ (max))	1 ( $\leq 5$ )	nA
Spectral sensitivity of the chip ( $\lambda = 870\text{ nm}$ )	$S_{\lambda\text{ typ}}$ (typ)	0.65	A / W
Quantum yield of the chip ( $\lambda = 870\text{ nm}$ )	$\eta$ (typ)	0.93	Electrons / Photon
Open-circuit voltage ( $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$ )	$V_O$ (typ (min))	380 ( $\geq 300$ )	mV
Short-circuit current ( $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$ )	$I_{SC}$ (typ)	42	$\mu\text{A}$
Rise and fall time ( $V_R = 20\text{ V}$ , $R_L = 50\ \Omega$ , $\lambda = 850\text{ nm}$ )	$t_r, t_f$ (typ)	0.005	$\mu\text{s}$
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 $V_O$	$TC_V$ (typ)	-2.6	mV / K

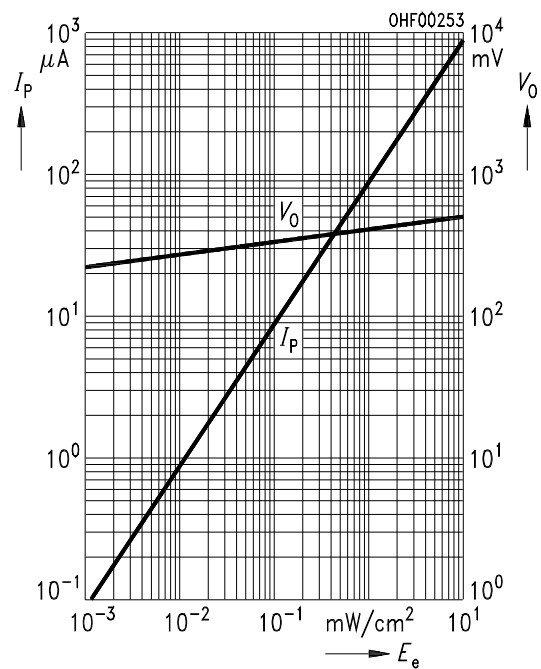
Parameter		Symbol	Values	Unit
Temperature coefficient of $I_{SC}$ ( $\lambda = 870 \text{ nm}$ )	(typ)	$TC_1$	0.1	% / K
Noise equivalent power ( $V_R = 20 \text{ V}$ , $\lambda = 870 \text{ nm}$ )	(typ)	NEP	0.028	$\mu\text{W} / \text{Hz}^{1/2}$
Detection limit ( $V_R = 20 \text{ V}$ , $\lambda = 870 \text{ nm}$ )	(typ)	$D^*$	$3.6 \times 10^{12}$	$\text{cm} \times \text{Hz}^{1/2} / \text{W}$

### Relative Spectral Sensitivity <sup>1) page 8</sup>



### Photocurrent / Open-Circuit Voltage <sup>1) page 8</sup>

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



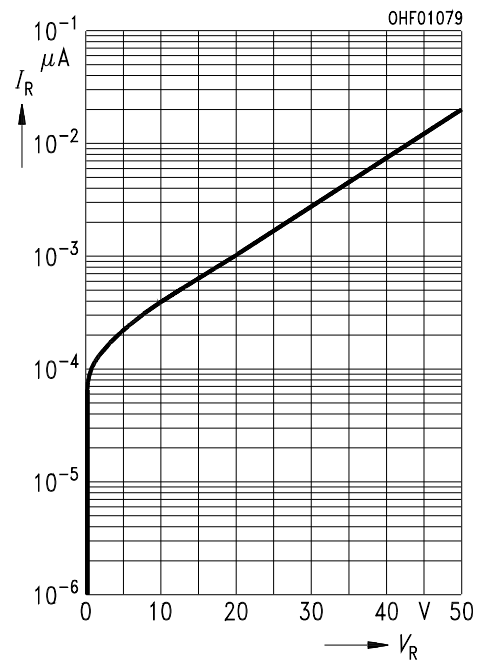
**Power Consumption**

$P_{tot} = f(T_A)$



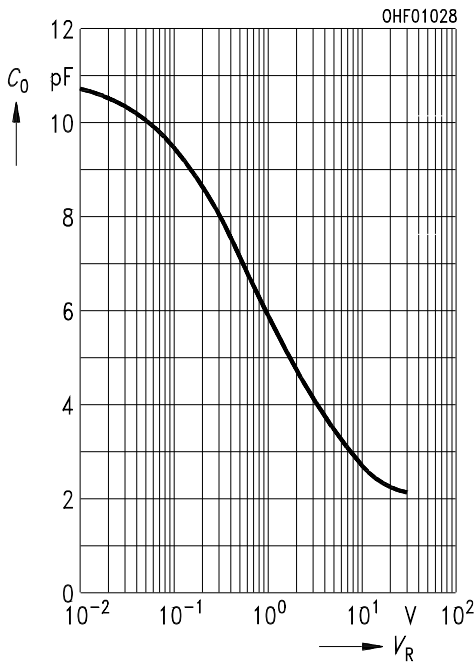
**Dark Current** <sup>1) page 8</sup>

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



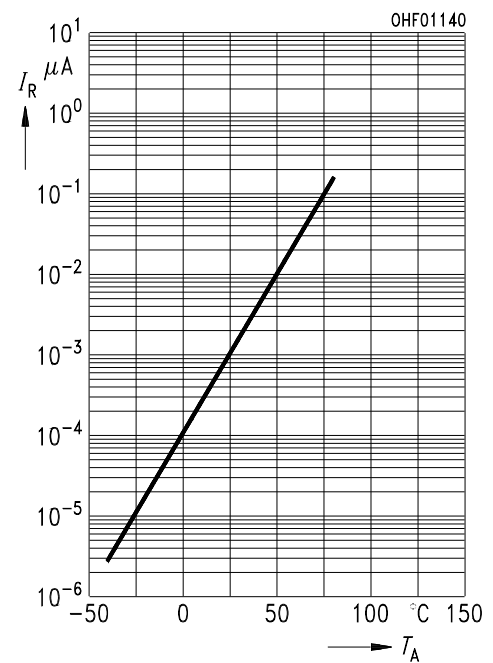
**Capacitance** <sup>1) page 8</sup>

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



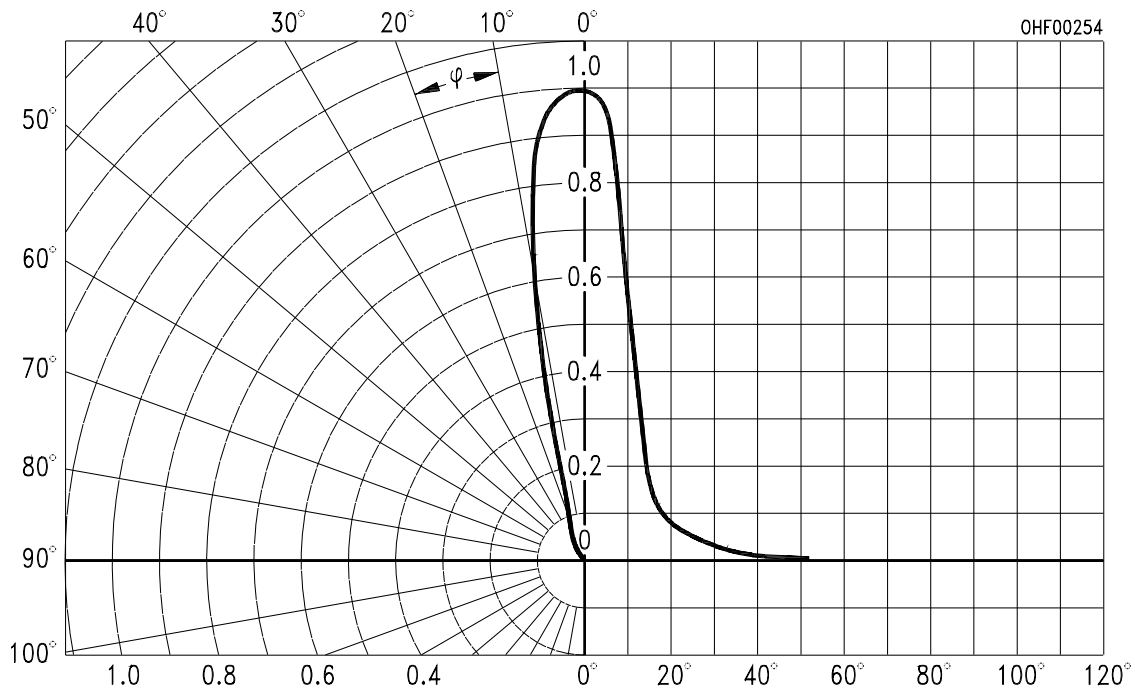
**Dark Current** <sup>1) page 8</sup>

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

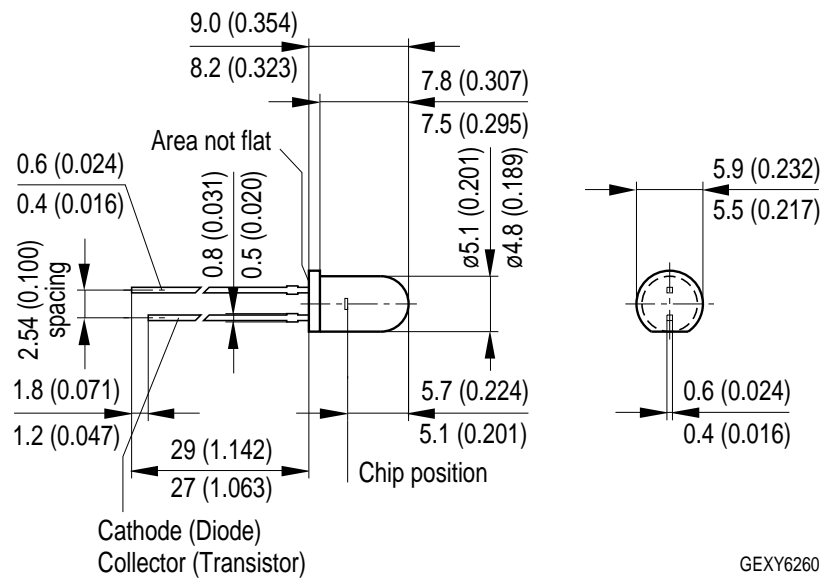


**Directional Characteristics** <sup>1) page 8</sup>

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



**Package Outline**



*Dimensions in mm (inch).*

**Package**

5mm Radial (T 1 3/4), Epoxy

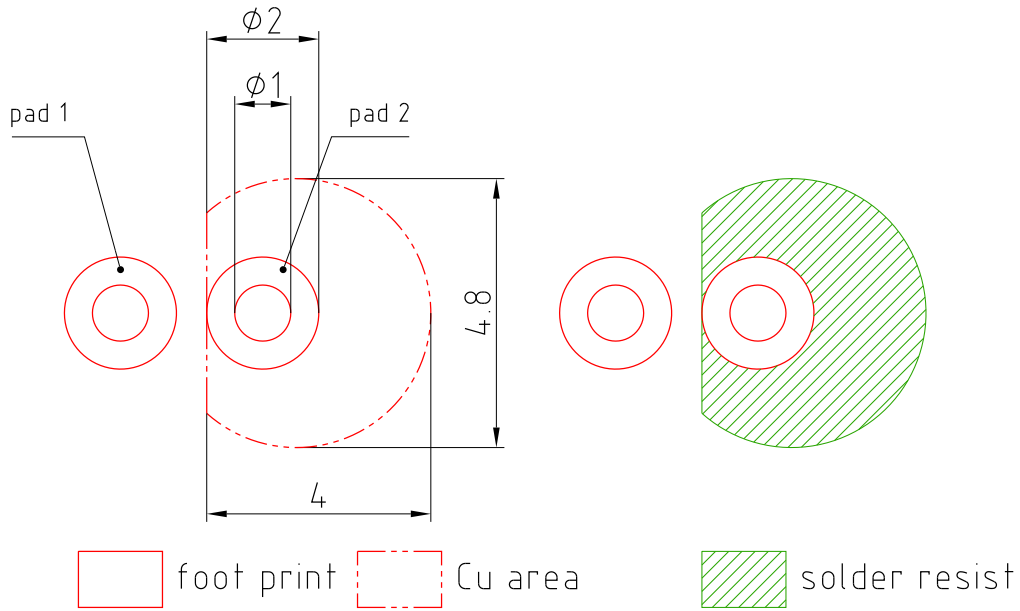
**Approximate Weight:**

0.4 g

**Note**

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

**Recommended Solder Pad**



E062.3010.188-01

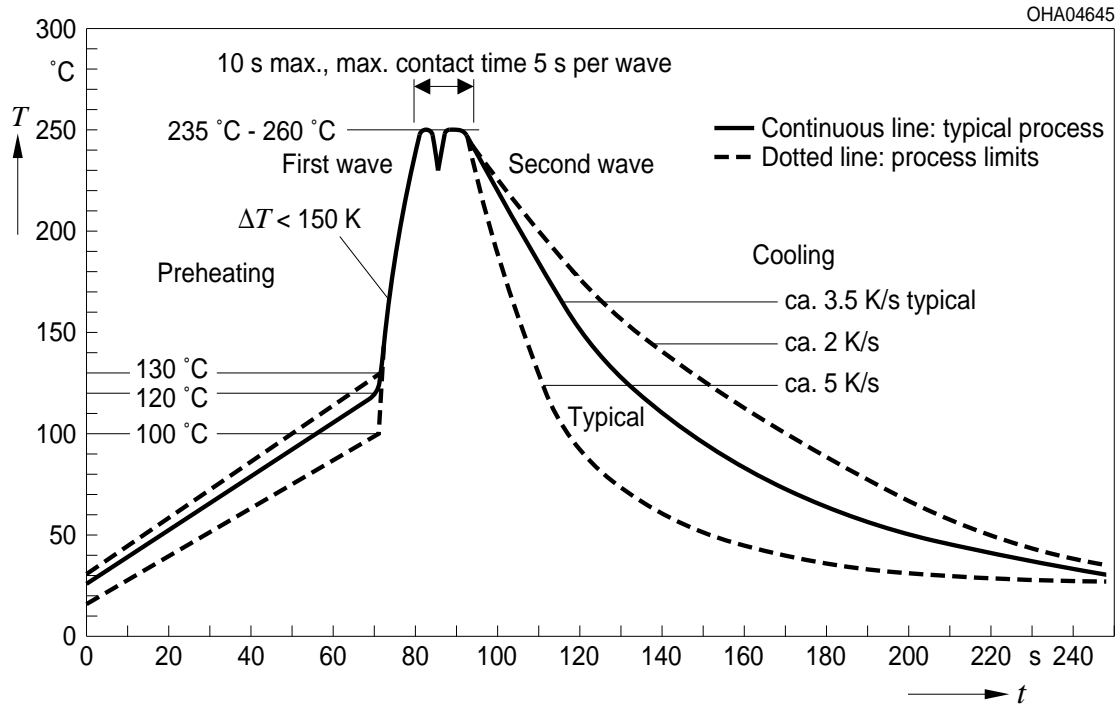
Dimensions in mm.

**Note:**

pad 1: anode

**TTW Soldering**

IEC-61760-1 TTW

**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.

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\*) 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**

- <sup>1)</sup> **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.



**Published by OSRAM Opto Semiconductors GmbH**  
**Leibnizstraße 4, D-93055 Regensburg**  
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