

# Silizium-PIN-Fotodiode mit sehr kurzer Schaltzeit Silicon PIN Photodiode with Very Short Switching Time

**SFH 213**  
**SFH 213 FA**



SFH 213



SFH 213 FA

## Wesentliche Merkmale

- Speziell geeignet für Anwendungen im Bereich von 400 nm bis 1100 nm (SFH 213) und bei 880 nm (SFH 213 FA)
- Kurze Schaltzeit (typ. 5 ns)
- 5 mm-Plastikbauform im LED-Gehäuse
- Auch gegurtet lieferbar

## Anwendungen

- Industrieelektronik
- „Messen/Steuern/Regeln“
- Schnelle Lichtschranken für Gleich- und Wechsellichtbetrieb
- LWL

## Features

- Especially suitable for applications from 400 nm to 1100 nm (SFH 213) and of 880 nm (SFH 213 FA)
- Short switching time (typ. 5 ns)
- 5 mm LED plastic package
- Also available on tape and reel

## Applications

- Industrial electronics
- For control and drive circuits
- Photointerrupters
- Fiber optic transmission systems

Typ Type	Bestellnummer Ordering Code
SFH 213	Q62702-P930
SFH 213 FA	Q62702-P1671

**Grenzwerte**  
**Maximum Ratings**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebs- und Lagertemperatur Operating and storage temperature range	$T_{op}; T_{stg}$	- 40 ... + 100	°C
Löttemperatur (Lötstelle 2 mm vom Gehäuse entfernt bei Lötzeit $t \leq 3$ s) Soldering temperature in 2 mm distance from case bottom ( $t \leq 3$ s)	$T_S$	300	°C
Sperrspannung Reverse voltage	$V_R$	50	V
Verlustleistung Total power dissipation	$P_{tot}$	100	mW

**Kennwerte ( $T_A = 25$  °C)**  
**Characteristics**

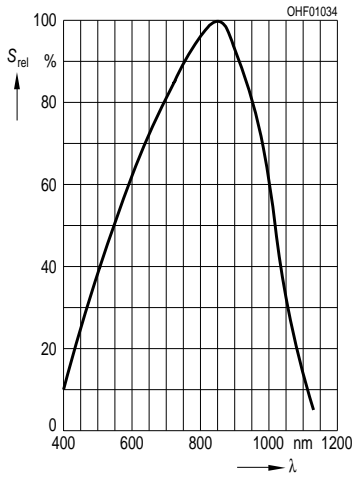
Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 213	SFH 213 FA	
Fotostrom Photocurrent $V_R = 5$ V, Normlicht/standard light A, $T = 2856$ K, $E_V = 1000$ lx $V_R = 5$ V, $\lambda = 870$ nm, $E_e = 1$ mW/cm <sup>2</sup>	$I_P$  $I_P$	135 ( $\geq 100$ ) –	– 90 ( $\geq 65$ )	$\mu$ A  $\mu$ A
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S\ max}$	850	900	nm
Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von $S_{max}$ Spectral range of sensitivity $S = 10\%$ of $S_{max}$	$\lambda$	400 ... 1100	750 ... 1100	nm
Bestrahlungsempfindliche Fläche Radiant sensitive area	$A$	1	1	mm <sup>2</sup>
Abmessung der bestrahlungsempfindlichen Fläche Dimensions of radiant sensitive area	$L \times B$ $L \times W$	1 × 1	1 × 1	mm × mm
Abstand Chipoberfläche zu Gehäuseoberfläche Distance chip front to case surface	$H$	5.1 ... 5.7	5.1 ... 5.7	mm
Halbwinkel Half angle	$\varphi$	$\pm 10$	$\pm 10$	Grad deg.

Kennwerte ( $T_A = 25\text{ °C}$ )

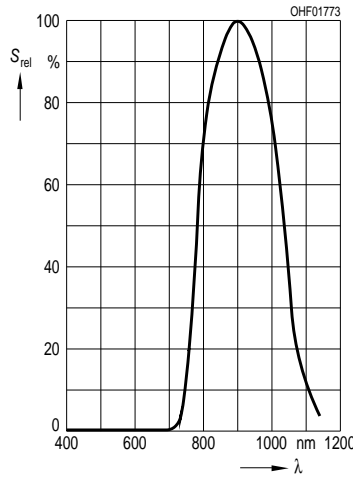
## Characteristics (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 213	SFH 213 FA	
Dunkelstrom, $V_R = 20\text{ V}$ Dark current	$I_R$	1 ( $\leq 5$ )	1 ( $\leq 5$ )	nA
Spektrale Fotoempfindlichkeit, $\lambda = 870\text{ nm}$ Spectral sensitivity	$S_\lambda$	0.62	0.59	A/W
Quantenausbeute, $\lambda = 870\text{ nm}$ Quantum yield	$\eta$	0.89	0.86	<u>Electrons</u> Photon
Leerlaufspannung Open-circuit voltage $E_v = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$	$V_O$ $V_O$	430 ( $\geq 350$ ) –	– 380 ( $\geq 300$ )	mV mV
Kurzschlußstrom Short-circuit current $E_v = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$	$I_{SC}$ $I_{SC}$	125 –	– 42	$\mu\text{A}$ $\mu\text{A}$
Anstiegs- und Abfallzeit des Fotostromes Rise and fall time of the photocurrent $R_L = 50\ \Omega$ ; $V_R = 20\text{ V}$ ; $\lambda = 850\text{ nm}$ ; $I_p = 800\ \mu\text{A}$	$t_r, t_f$	5	5	ns
Durchlaßspannung, $I_F = 80\text{ mA}$ , $E = 0$ Forward voltage	$V_F$	1.3	1.3	V
Kapazität, $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ Capacitance	$C_0$	11	11	pF
Temperaturkoeffizient von $V_O$ Temperature coefficient of $V_O$	$TC_V$	– 2.6	– 2.6	mV/K
Temperaturkoeffizient von $I_{SC}$ Temperature coefficient of $I_{SC}$ Normlicht/standard light A $\lambda = 870\text{ nm}$	$TC_I$	0.18 –	– 0.2	%/K
Rauschäquivalente Strahlungsleistung Noise equivalent power $V_R = 10\text{ V}$ , $\lambda = 870\text{ nm}$	$NEP$	$2.9 \times 10^{-14}$	$2.9 \times 10^{-14}$	$\frac{\text{W}}{\sqrt{\text{Hz}}}$
Nachweisgrenze, $V_R = 20\text{ V}$ , $\lambda = 870\text{ nm}$ Detection limit	$D^*$	$3.5 \times 10^{12}$	$3.5 \times 10^{12}$	$\frac{\text{cm} \times \sqrt{\text{Hz}}}{\text{W}}$

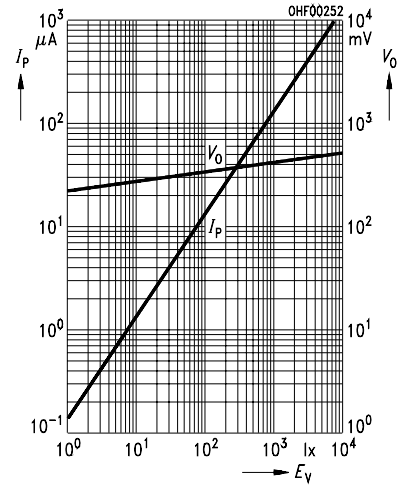
**Relative Spectral Sensitivity**  
SFH 213,  $S_{rel} = f(\lambda)$



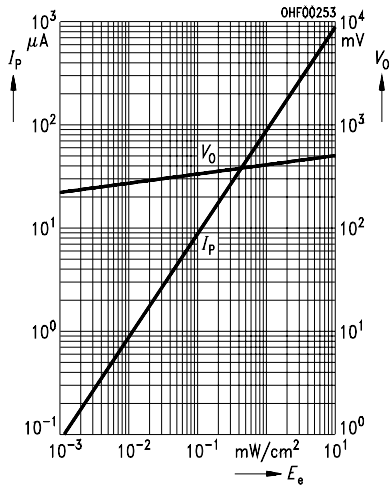
**Relative Spectral Sensitivity**  
SFH 213 FA,  $S_{rel} = f(\lambda)$



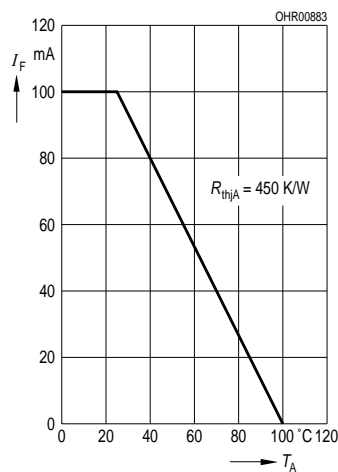
**Photocurrent  $I_P = f(E_V)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_V)$**   
SFH 213



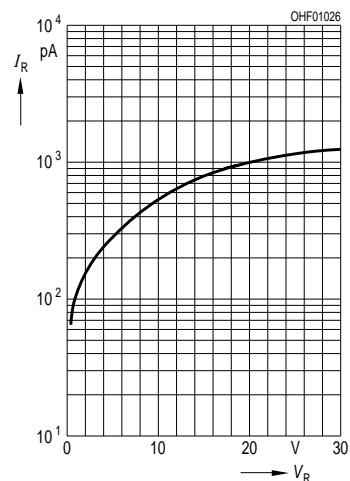
**Photocurrent  $I_P = f(E_e)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_e)$**   
SFH 213 FA



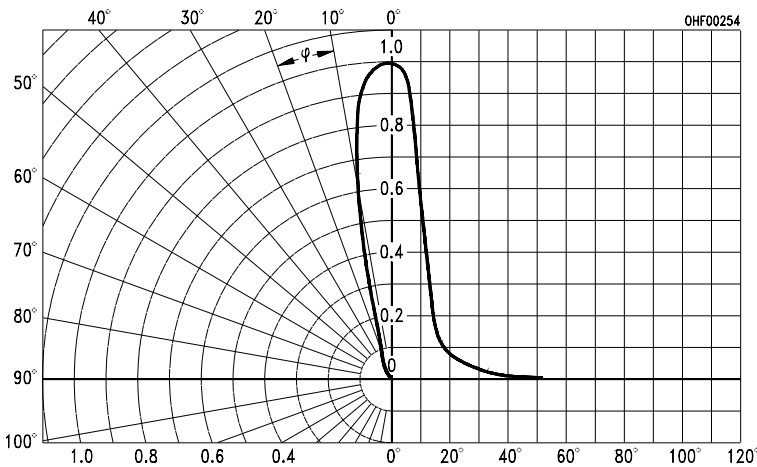
**Total Power Dissipation**  
 $P_{tot} = f(T_A)$



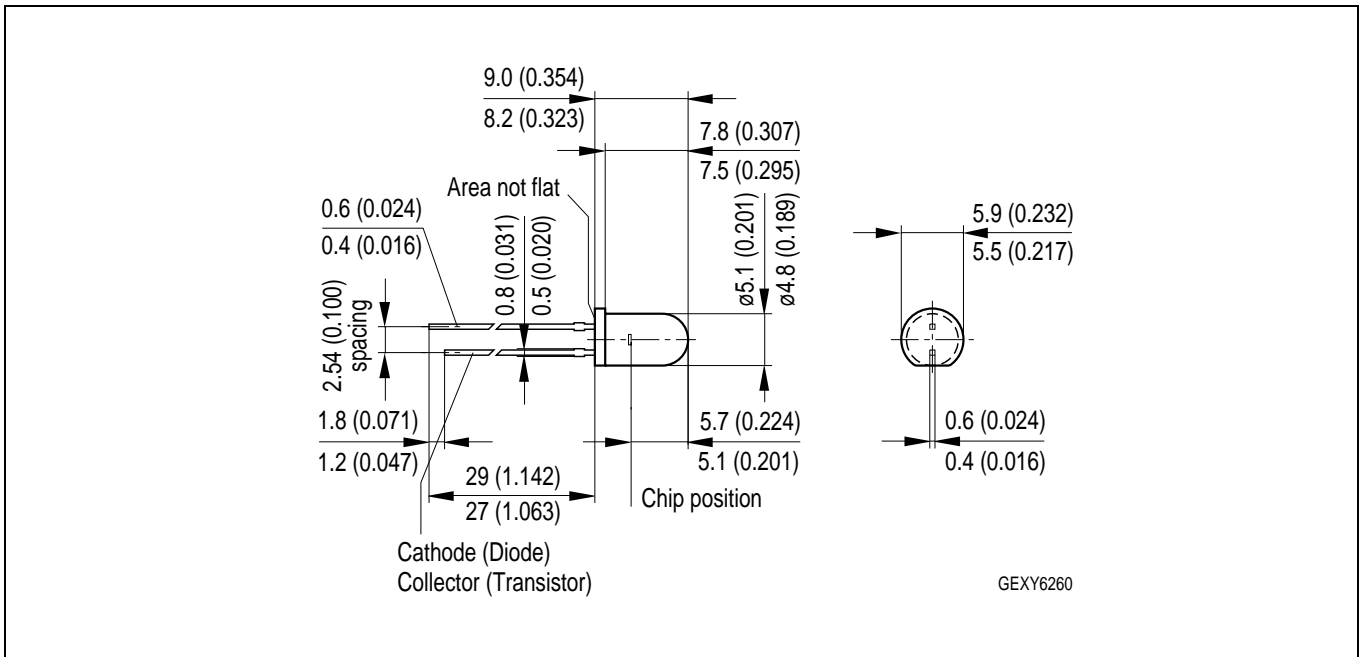
**Dark Current**  
 $I_R = f(V_R), E = 0$



**Directional Characteristics**  
 $S_{rel} = f(\varphi)$



## Maßzeichnung Package Outlines



Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

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