

# Silizium-PIN-Fotodiode mit sehr kurzer Schaltzeit

## Silicon PIN Photodiode with Very Short Switching Time

### Lead (Pb) Free Product - RoHS Compliant

#### SFH 229 SFH 229 FA



SFH 229



SFH 229 FA

#### Wesentliche Merkmale

- Speziell geeignet für Anwendungen im Bereich von 380 nm bis 1100 nm (SFH 229) und bei 880 nm (SFH 229 FA)
- Kurze Schaltzeit (typ. 10 ns)
- 3 mm-Plastikbauform im LED-Gehäuse
- Auch gegurtet lieferbar

#### Anwendungen

- Lichtschranken für Gleich- und Wechselbetrieb
- Industrieelektronik
- „Messen/Steuern/Regeln“

#### Features

- Especially suitable for applications from 380 nm to 1100 nm (SFH 229) and of 880 nm (SFH 229 FA)
- Short switching time (typ. 10 ns)
- 3 mm LED plastic package
- Also available on tape and reel

#### Applications

- Photointerrupters
- Industrial electronics
- For control and drive circuits

Typ Type	Bestellnummer Ordering Code
SFH 229	Q62702P0215
SFH 229 FA	Q62702P0216

**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
Sperrspannung Reverse voltage	$V_R$	20	V
Verlustleistung Total power dissipation	$P_{tot}$	150	mW

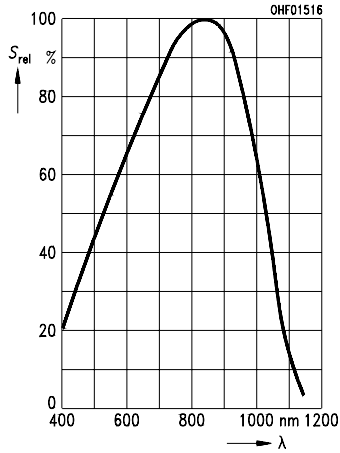
**Kennwerte ( $T_A = 25\text{ °C}$ )**  
**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 229	SFH 229 FA	
Fotostrom Photocurrent $V_R = 5\text{ V}$ , Normlicht/standard light A, $T = 2856\text{ K}$ , $E_V = 1000\text{ lx}$ $V_R = 5\text{ V}$ , $\lambda = 950\text{ nm}$ , $E_e = 1\text{ mW/cm}^2$	$I_P$	28 ( $\geq 18$ )	–	$\mu\text{A}$
	$I_P$	–	20 ( $\geq 10.8$ )	$\mu\text{A}$
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$	860	900	nm
Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von $S_{\text{max}}$ Spectral range of sensitivity $S = 10\%$ of $S_{\text{max}}$	$\lambda$	380 ... 1100	730 ... 1100	nm
Bestrahlungsempfindliche Fläche Radiant sensitive area	$A$	0.3	0.3	$\text{mm}^2$
Abmessung der bestrahlungsempfindlichen Fläche Dimensions of radiant sensitive area	$L \times B$ $L \times W$	$0.56 \times 0.56$	$0.56 \times 0.56$	mm × mm
Halbwinkel Half angle	$\varphi$	$\pm 17$	$\pm 17$	Grad deg.
Dunkelstrom, $V_R = 10\text{ V}$ Dark current	$I_R$	50 ( $\leq 5000$ )	50 ( $\leq 5000$ )	$\mu\text{A}$
Spektrale Fotoempfindlichkeit, $\lambda = 850\text{ nm}$ Spectral sensitivity	$S_\lambda$	0.62	0.60	A/W
Quantenausbeute, $\lambda = 850\text{ nm}$ Quantum yield	$\eta$	0.90	0.88	<u>Electrons</u> Photon

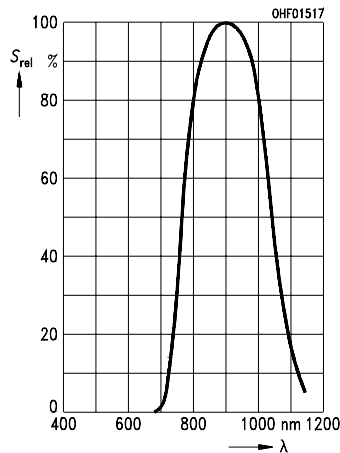
**Kennwerte** ( $T_A = 25\text{ °C}$ )  
**Characteristics** (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 229	SFH 229 FA	
Leerlaufspannung Open-circuit voltage $E_V = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$V_O$	450 ( $\geq 400$ )	–	mV
	$V_O$	–	420 ( $\geq 370$ )	mV
Kurzschlußstrom Short-circuit current $E_V = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 0.5\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$I_{SC}$	27	–	$\mu\text{A}$
	$I_{SC}$	–	9	$\mu\text{A}$
Anstiegs- und Abfallzeit des Fotostromes Rise and fall time of the photocurrent $R_L = 50\ \Omega$ ; $V_R = 10\text{ V}$ ; $\lambda = 850\text{ nm}$ ; $I_p = 800\ \mu\text{A}$	$t_r, t_f$	10	10	ns
Durchlaßspannung, $I_F = 100\text{ mA}$ , $E = 0$ Forward voltage	$V_F$	1.3	1.3	V
Kapazität, $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ Capacitance	$C_0$	13	13	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 $\lambda = 950\text{ nm}$	$TC_I$	0.18 –	– 0.2	%/K
Rauschäquivalente Strahlungsleistung Noise equivalent power $V_R = 10\text{ V}$ , $\lambda = 850\text{ nm}$	$NEP$	$6.5 \times 10^{-15}$	$6.5 \times 10^{-15}$	$\frac{\text{W}}{\sqrt{\text{Hz}}}$
Nachweisgrenze, $V_R = 10\text{ V}$ , $\lambda = 850\text{ nm}$ Detection limit	$D^*$	$8.4 \times 10^{12}$	$8.4 \times 10^{12}$	$\frac{\text{cm} \times \sqrt{\text{Hz}}}{\text{W}}$

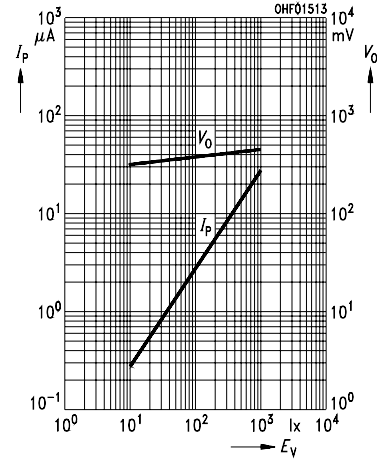
**Relative Spectral Sensitivity**  
 $S_{rel} = f(\lambda)$   
**SFH 229**



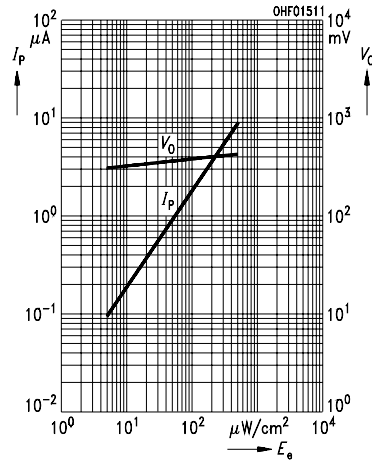
**Relative Spectral Sensitivity**  
 $S_{rel} = f(\lambda)$   
**SFH 229 FA**



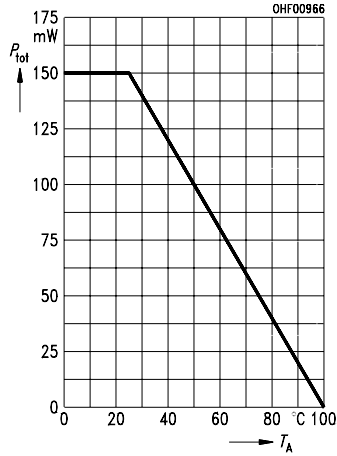
**Photocurrent  $I_P = f(E_v)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_v)$**   
**SFH 229**



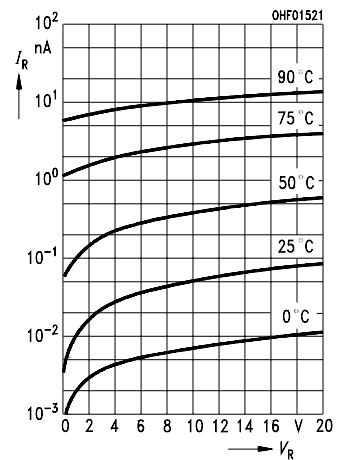
**Photocurrent  $I_P = f(E_e)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_e)$**   
**SFH 229 FA**



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

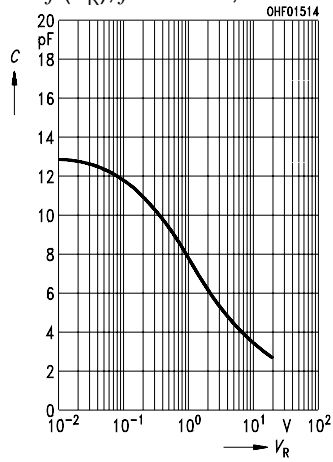


**Dark Current**  
 $I_R = f(V_R), E = 0$



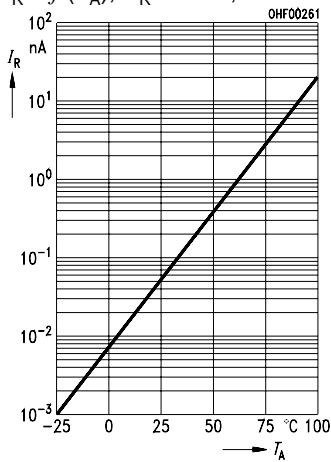
**Capacitance**

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



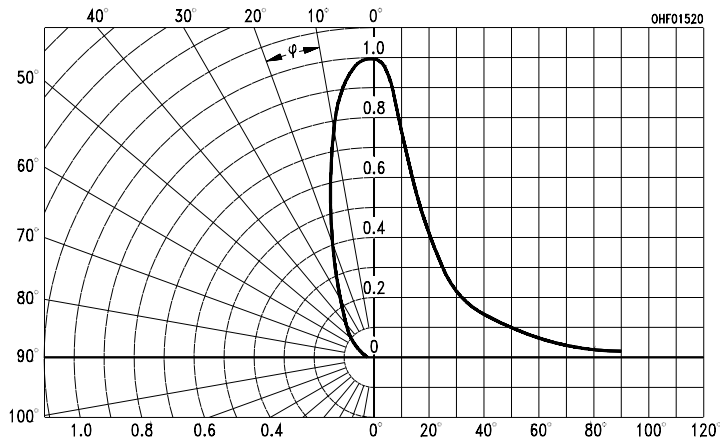
**Dark Current**

$I_R = f(T_A), V_R = 10 \text{ V}, E = 0$

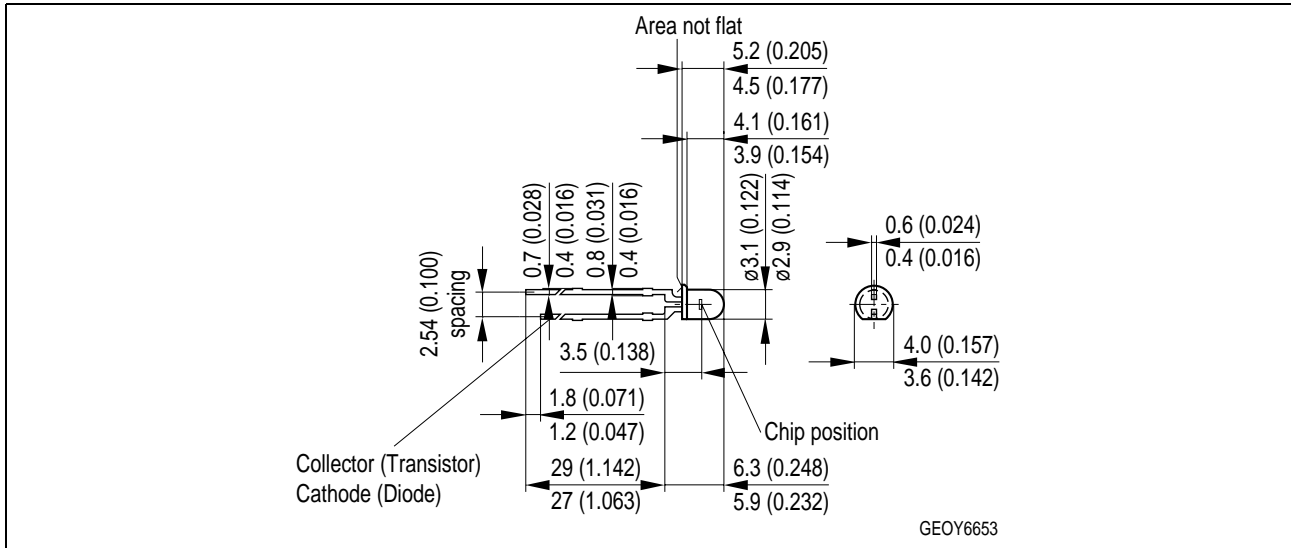


**Directional Characteristics**

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



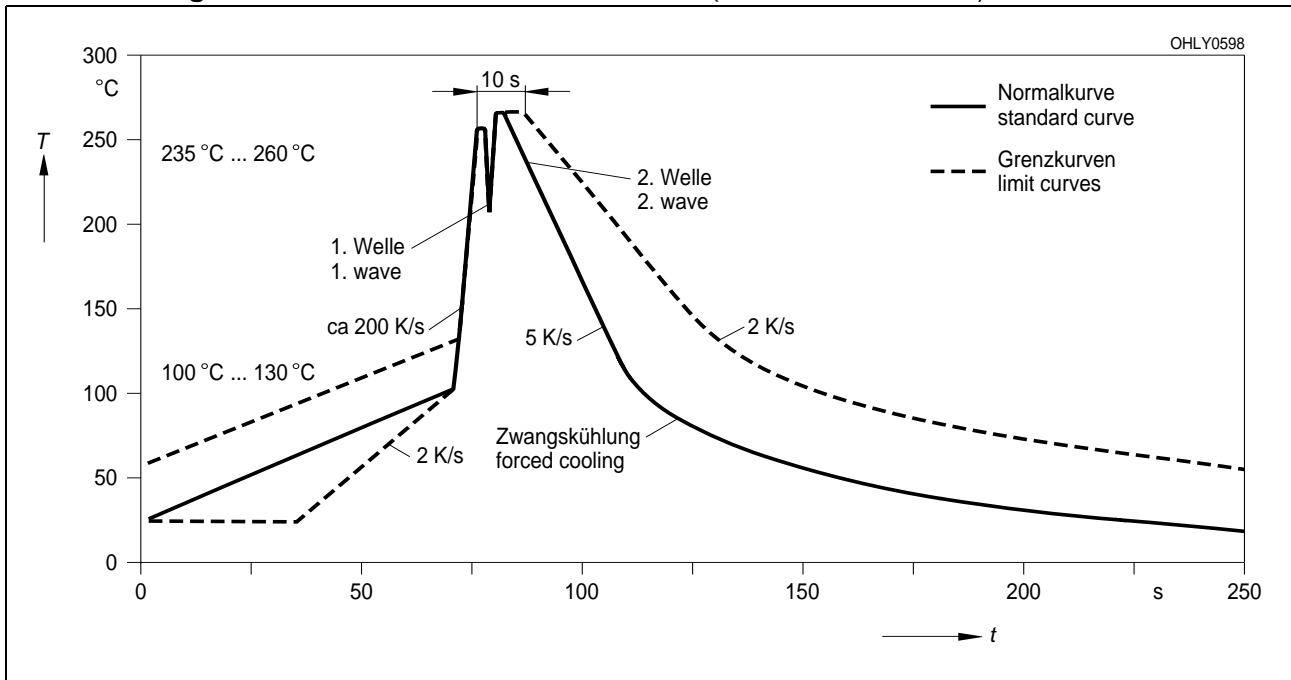
**Maßzeichnung  
Package Outlines**



Maße in mm (inch) / Dimensions in mm (inch).

**Lötbedingungen  
Soldering Conditions  
Wellenlöten (TTW)  
TTW Soldering**

(nach CECC 00802)  
(acc. to CECC 00802)



Published by  
**OSRAM Opto Semiconductors GmbH**  
Wernerwerkstrasse 2, D-93049 Regensburg  
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