

# Silizium-PIN-Fotodiode mit sehr kurzer Schaltzeit

## Silicon PIN Photodiode with Very Short Switching Time

### 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	Q62702-P215
SFH 229 FA	Q62702-P216

**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)	$T_S$	230	°C
Sperrspannung Reverse voltage	$V_R$	20	V
Verlustleistung Total power dissipation	$P_{tot}$	150	mW

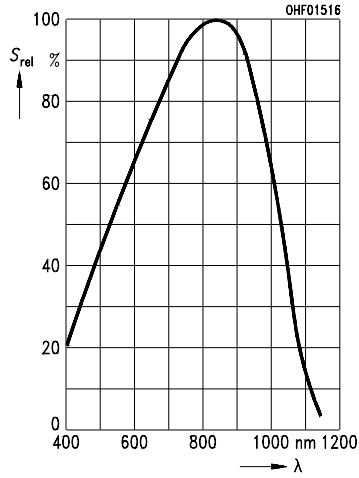
**Kennwerte ( $T_A = 25$  °C)**  
**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 229	SFH 229 FA	
Fotostrom Photocurrent $V_R = 5$ V, Normlicht/standard light A, $T = 2856$ K, $E_V = 1000$ lx $V_R = 5$ V, $\lambda = 950$ nm, $E_e = 1$ mW/cm <sup>2</sup>	$I_P$	28 ( $\geq 18$ )	–	$\mu$ A
	$I_P$	–	20 ( $\geq 10.8$ )	$\mu$ A
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S\ max}$	860	900	nm
Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von $S_{max}$ Spectral range of sensitivity $S = 10\%$ of $S_{max}$	$\lambda$	380 ... 1100	730 ... 1100	nm
Bestrahlungsempfindliche Fläche Radiant sensitive area	$A$	0.3	0.3	mm <sup>2</sup>
Abmessung der bestrahlungsempfindlichen Fläche Dimensions of radiant sensitive area	$L \times B$ $L \times W$	0.56 × 0.56	0.56 × 0.56	mm × mm
Abstand Chipoberfläche zu Gehäuseoberfläche Distance chip front to case surface	$H$	2.4 ... 2.8	2.4 ... 2.8	mm
Halbwinkel Half angle	$\varphi$	$\pm 17$	$\pm 17$	Grad deg.

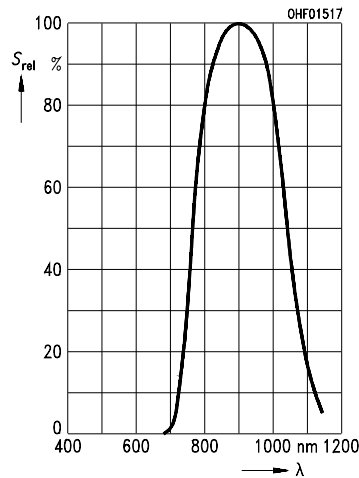
**Kennwerte** ( $T_A = 25\text{ °C}$ )  
**Characteristics** (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 229	SFH 229 FA	
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
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	$D^*$	$8.4 \times 10^{12}$	$8.4 \times 10^{12}$	$\frac{\text{cm} \times \sqrt{\text{Hz}}}{\text{W}}$

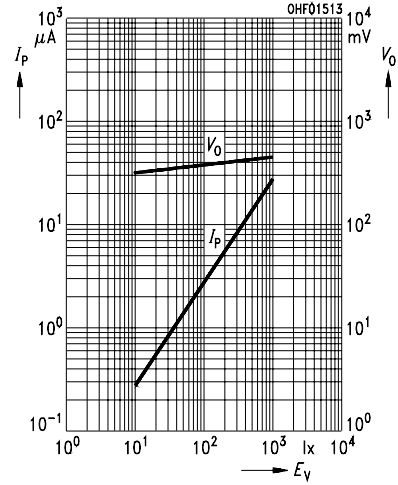
**Relative Spectral Sensitivity**  
 $S_{rel} = f(\lambda)$   
**SFH 229**



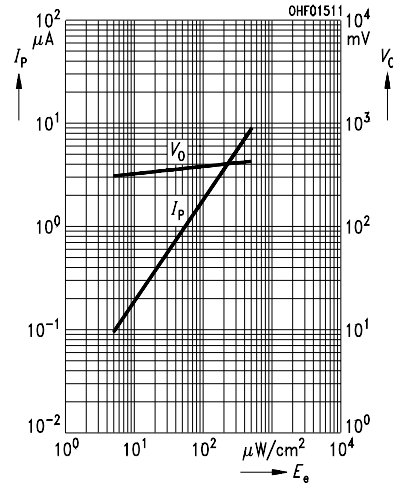
**Relative Spectral Sensitivity**  
 $S_{rel} = f(\lambda)$   
**SFH 229 FA**



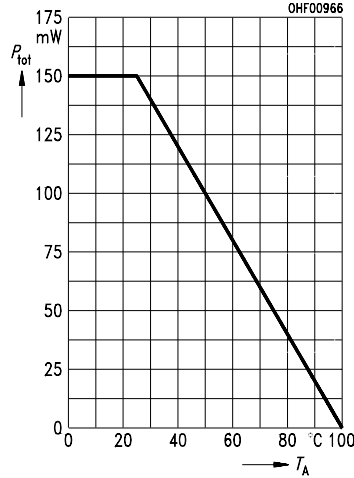
**Photocurrent  $I_P = f(E_v)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_v)$**   
**SFH 229**



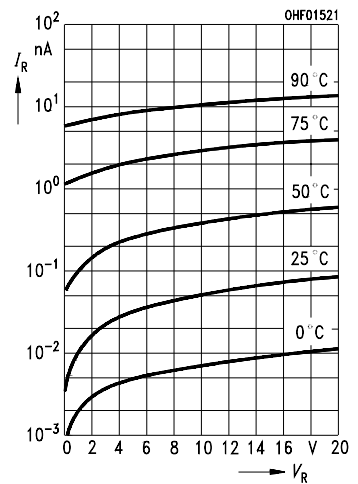
**Photocurrent  $I_P = f(E_e)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_e)$**   
**SFH 229 FA**



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

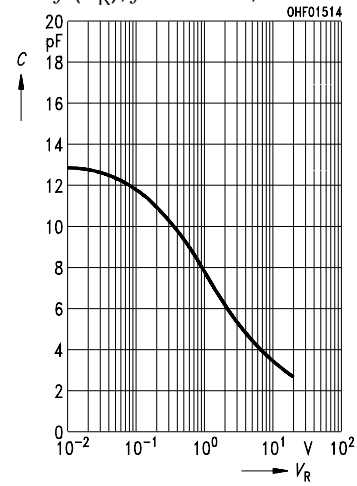


**Dark Current**  
 $I_R = f(V_R), E = 0$



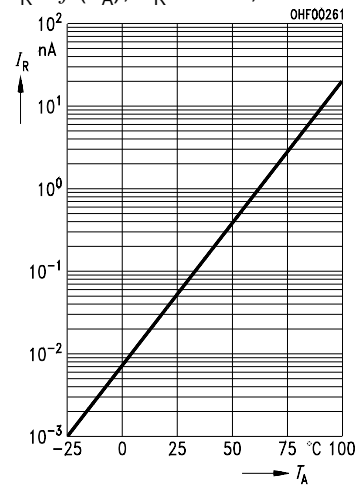
**Capacitance**

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



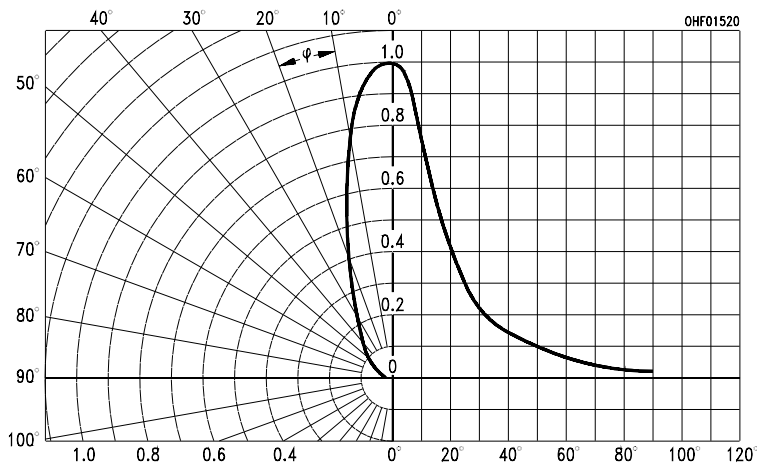
**Dark Current**

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

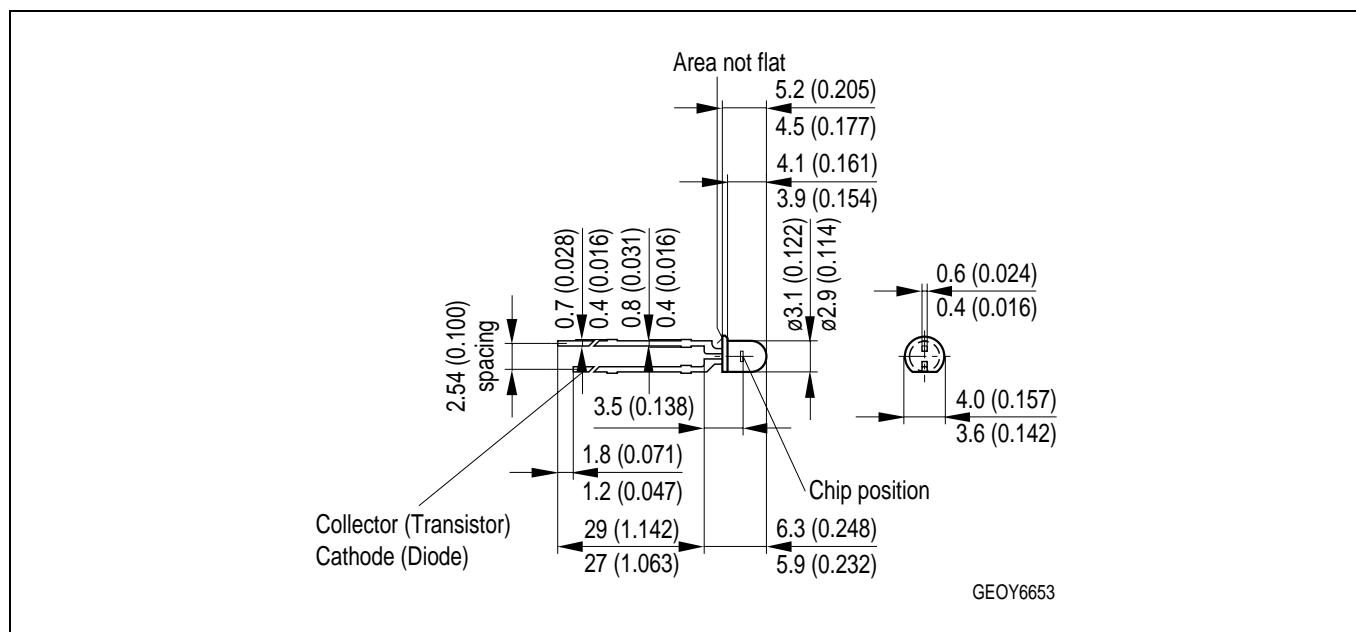


**Directional Characteristics**

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



## Maßzeichnung Package Outlines



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

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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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