

# NPN-Silizium-Fototransistor Silicon NPN Phototransistor

## SFH 309 SFH 309 FA



SFH 309



SFH 309 FA

### Wesentliche Merkmale

- Speziell geeignet für Anwendungen im Bereich von 380 nm bis 1180 nm (SFH 309) und bei 880 nm (SFH 309 FA)
- Hohe Linearität
- 3 mm-Plastikbauform im LED-Gehäuse
- Gruppierbar lieferbar

### Anwendungen

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

### Features

- Especially suitable for applications from 380 nm to 1180 nm (SFH 309) and of 880 nm (SFH 309 FA)
- High linearity
- 3 mm LED plastic package
- Available in groups

### Applications

- Photointerrupters
- Industrial electronics
- For control and drive circuits

Typ Type	Bestellnummer Ordering Code	Typ Type	Bestellnummer Ordering Codes
SFH 309	Q62702-P859	SFH 309 FA	Q62702-P941
SFH 309-3/4	Q62702-P3592	SFH 309 FA-3/4	Q62702-P3590
SFH 309-4	Q62702-P998	SFH 309 FA-4	Q62702-P178
SFH 309-4/5	Q62702-P3593	SFH 309 FA-4/5	Q62702-P3591
SFH 309-5	Q62702-P999	SFH 309 FA-5	Q62702-P180
SFH 309-5/6	Q62702-P3594	SFH 309 FA-5/6	Q62702-P5199

**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 bei Tauchlötung Lötstelle $\geq 2$ mm vom Gehäuse, Lötzeit $t \leq 5$ s Dip soldering temperature $\geq 2$ mm distance from case bottom, soldering time $t \leq 5$ s	$T_S$	260	°C
Löttemperatur bei Kolbenlötung Lötstelle $\geq 2$ mm vom Gehäuse, Lötzeit $t \leq 3$ s Iron soldering temperature $\geq 2$ mm distance from case bottom, soldering time $t \leq 3$ s	$T_S$	300	°C
Kollektor-Emitterspannung Collector-emitter voltage	$V_{CE}$	35	V
Kollektorstrom Collector current	$I_C$	15	mA
Kollektorspitzenstrom, $\tau < 10 \mu s$ Collector surge current	$I_{CS}$	75	mA
Verlustleistung, $T_A = 25 \text{ °C}$ Total power dissipation	$P_{tot}$	165	mW
Wärmewiderstand Thermal resistance	$R_{thJA}$	450	K/W

Kennwerte ( $T_A = 25\text{ °C}$ ,  $\lambda = 950\text{ nm}$ )

## Characteristics

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 309	SFH 309 FA	
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 ... 1150	730 ... 1120	nm
Bestrahlungsempfindliche Fläche ( $\varnothing 220\text{ }\mu\text{m}$ ) Radiant sensitive area	$A$	0.038	0.038	$\text{mm}^2$
Abmessungen der Chipfläche Dimensions of chip area	$L \times B$ $L \times W$	$0.45 \times 0.45$	$0.45 \times 0.45$	$\text{mm} \times \text{mm}$
Abstand Chipoberfläche zu Gehäuseoberfläche Distance chip front to case surface	$H$	2.4 ... 2.8	2.4 ... 2.8	mm
Halbwinkel Half angle	$\varphi$	$\pm 12$	$\pm 12$	Grad deg.
Kapazität, $V_{\text{CE}} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ Capacitance	$C_{\text{CE}}$	5.0	5.0	pF
Dunkelstrom Dark current $V_{\text{CE}} = 25\text{ V}$ , $E = 0$	$I_{\text{CEO}}$	1 ( $\leq 200$ )	1 ( $\leq 200$ )	nA

Die Fototransistoren werden nach ihrer Fotoempfindlichkeit gruppiert und mit arabischen Ziffern gekennzeichnet.

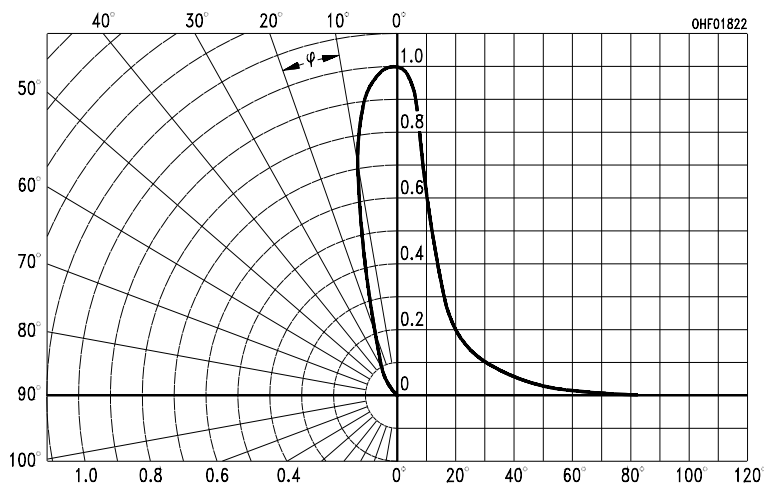
The phototransistors are grouped according to their spectral sensitivity and distinguished by arabian figures.

Bezeichnung Parameter	Symbol Symbol	Wert Value					Einheit Unit
		-2	-3	-4	-5	-6	
Fotostrom, $\lambda = 950 \text{ nm}$ Photocurrent $E_e = 0.5 \text{ mW/cm}^2, V_{CE} = 5 \text{ V}$	$I_{PCE}$	0.4 ...	0.63 ...	1.0 ...	1.6 ...	2.5 ...	mA
<b>SFH 309:</b> $E_v = 1000 \text{ lx}$ , Normlicht/ standard light A, $V_{CE} = 5 \text{ V}$	$I_{PCE}$	0.8	1.25	2.0	3.2	5.0	mA
Anstiegszeit/Abfallzeit Rise and fall time $I_C = 1 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 1 \text{ k}\Omega$	$t_r, t_f$	5	6	7	8	9	$\mu\text{s}$
Kollektor-Emitter- Sättigungsspannung Collector-emitter saturation voltage $I_C = I_{PCEmin}^{1)} \times 0.3,$ $E_e = 0.5 \text{ mW/cm}^2$	$V_{CEsat}$	200	200	200	200	200	mV

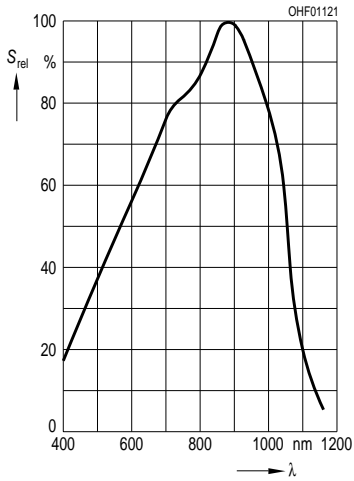
1)  $I_{PCEmin}$  ist der minimale Fotostrom der jeweiligen Gruppe.

1)  $I_{PCEmin}$  is the min. photocurrent of the specified group.

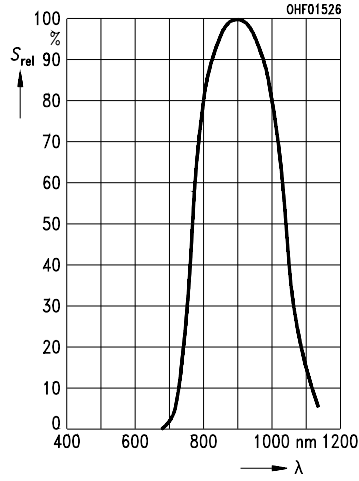
**Directional Characteristics  $S_{rel} = f(\varphi)$**



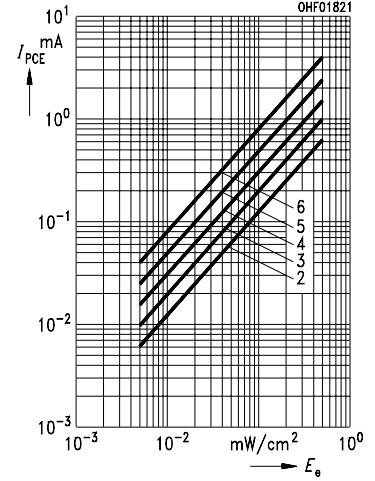
**Relative Spectral Sensitivity, SFH 309**  $S_{rel} = f(\lambda)$



**Relative Spectral Sensitivity, SFH 309 FA**  $S_{rel} = f(\lambda)$

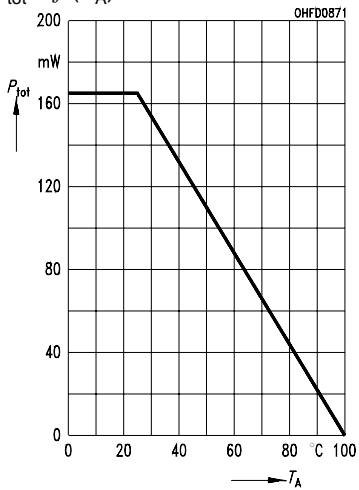


**Photocurrent**  $I_{PCE} = f(E_e), V_{CE} = 5 V$



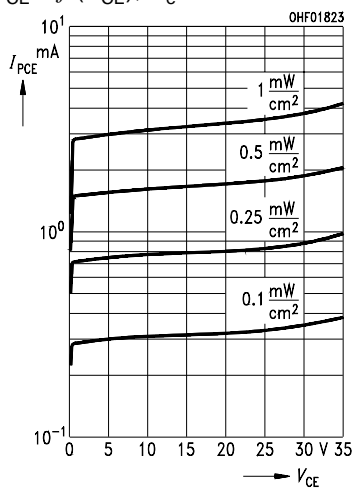
**Total Power Dissipation**

$P_{tot} = f(T_A)$



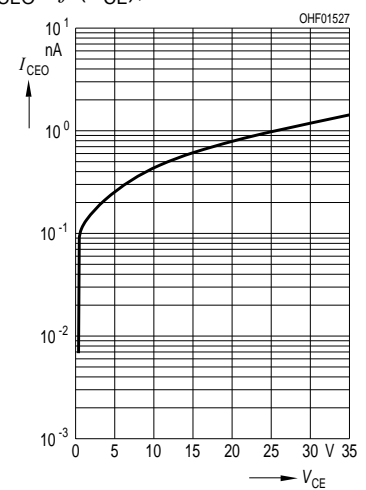
**Photocurrent**

$I_{PCE} = f(V_{CE}), E_e = \text{Parameter}$



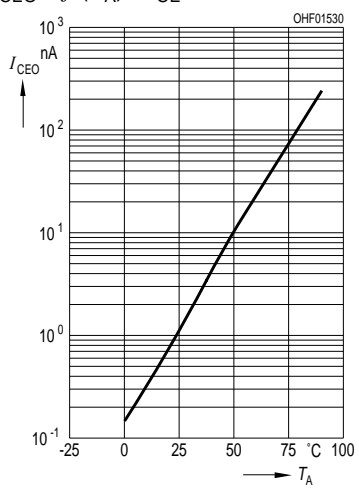
**Dark Current**

$I_{CEO} = f(V_{CE}), E = 0$



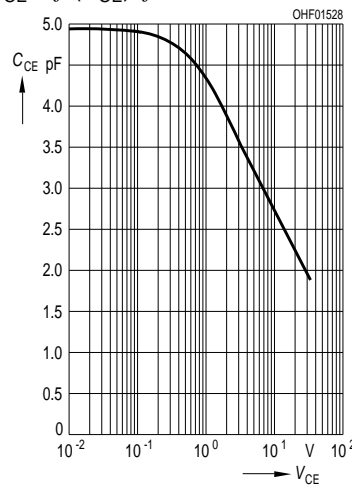
**Dark Current**

$I_{CEO} = f(T_A), V_{CE} = 25 V, E = 0$



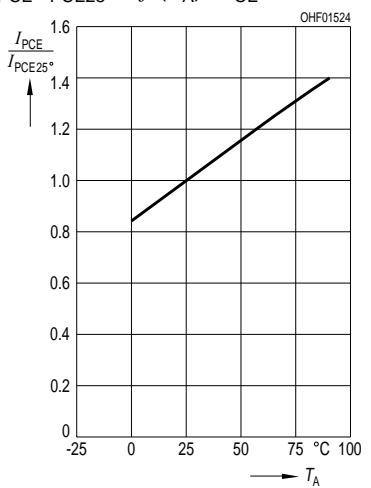
**Capacitance**

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0$

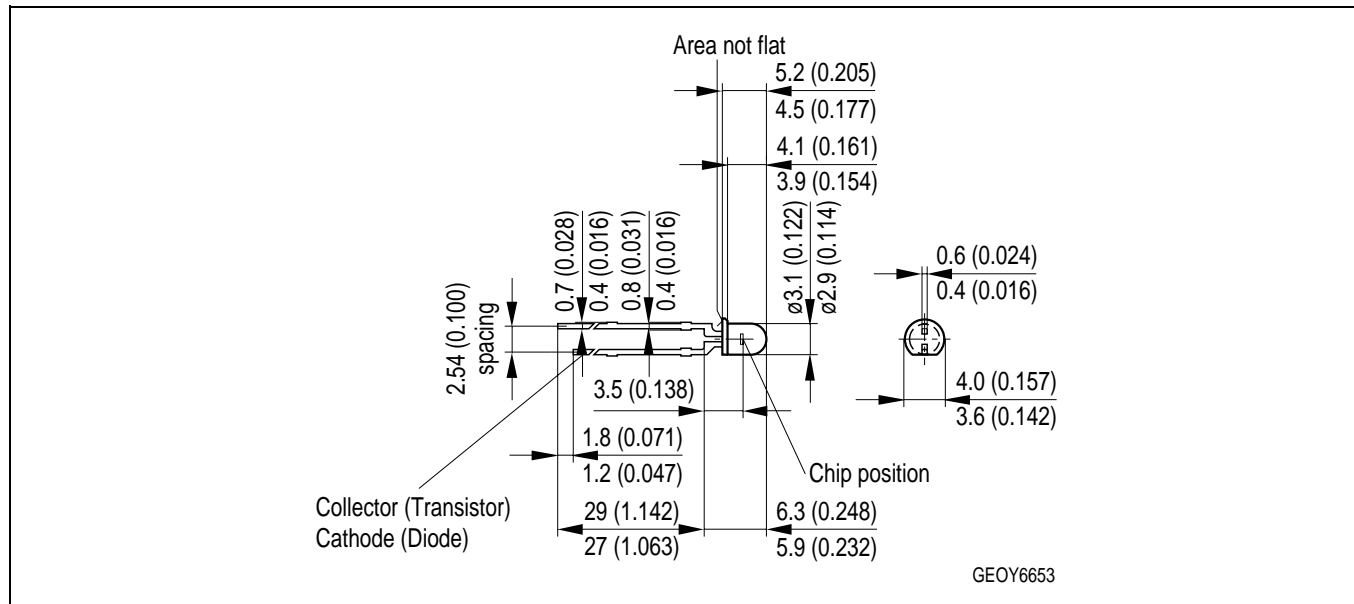


**Photocurrent**

$I_{PCE}/I_{PCE25^\circ} = f(T_A), V_{CE} = 5 V$



## 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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<sup>2</sup> 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 of the user may be endangered.