Silicon NPN Phototransistor
Version 1.3

SFH 309 FA

Features:

- **Spectral range of sensitivity:** (typ) 730 ... 1120 nm
- **Package:** 3mm Radial (T 1), Epoxy
- **Special:** High photosensitivity
- High linearity
- Available in groups

Applications

- Photointerrupters
- Industrial electronics
- For control and drive circuits

Ordering Information

Type:	Photocurrent I_{PCE} [µA] **λ = 950 nm, E_e = 0.5 mW/cm², V_{CE} = 5 V**	Ordering Code
SFH 309 FA	400 ... 5000	Q62702P0941
SFH 309 FA-3/4	630 ... 2000	Q62702P3590
SFH 309 FA-4	1000 ... 2000	Q62702P0178
SFH 309 FA-4/5	1000 ... 3200	Q62702P3591
SFH 309 FA-5	1600 ... 3200	Q62702P0180
SFH 309 FA-5/6	1600 ... 5000	Q62702P5199

Note: Only one bin within one packing unit (variation less than 2:1)

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Maximum Ratings (T_A = 25 °C)

Parameter	Symbol	Values	Unit
Operating and storage temperature range	T_{op}; T_{stg}	-40 ... 100	°C
Collector-emitter voltage	V_{CE}	35	V
Collector current	I_C	15	mA
Collector surge current (τ < 10 µs)	I_{CS}	75	mA
Total Power dissipation	P_{tot}	165	mW
Thermal resistance	R_{thJA}	450	K / W
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	V_{ESD}	2000	V

Characteristics (T_A = 25 °C)

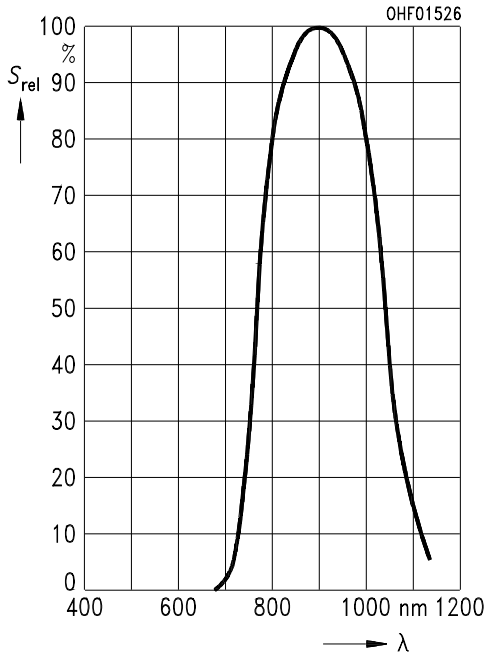
Parameter		Symbol	Values	Unit
Wavelength of max. sensitivity	(typ)	$\lambda_{S\ max}$	900	nm
Spectral range of sensitivity	(typ)	$\lambda_{10\%}$	(typ) 730 ... 1120	nm
Radiant sensitive area (Ø 220 µm)	(typ)	A	0.038	mm^2
Dimensions of chip area	(typ)	L x W	(typ) 0.45 x 0.45	mm x mm
Distance chip front to case surface	(min ... max)	H	(min ... max) 2.4 ... 2.8	mm
Half angle	(typ)	φ	± 12	°
Capacitance (V_{CE} = 0 V, f = 1 MHz, E = 0)	(typ)	C_{CE}	5	pF
Dark current (V_{CE} = 20 V, E = 0)	(typ (max))	I_{CE0}	1 (≤ 50)	nA

Grouping (T_A = 25 °C, λ = 950 nm)

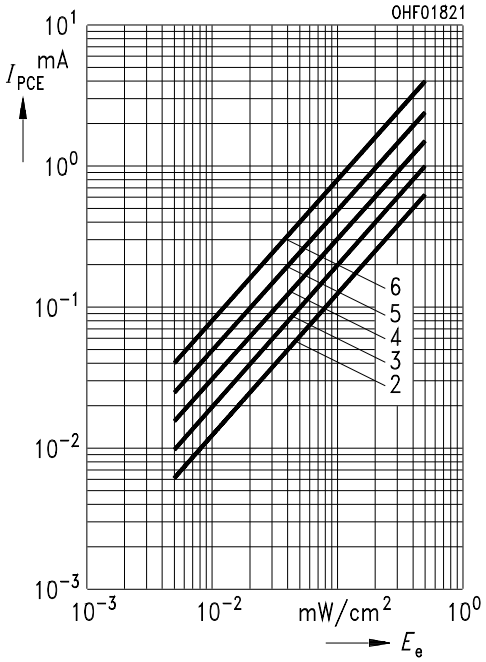
Group	Min Photocurrent E_e = 0.5 mW/cm², V_{CE} = 5 V $I_{PCE, min}$ [µA]	Max Photocurrent E_e = 0.5 mW/cm², V_{CE} = 5 V $I_{PCE, max}$ [µA]	Rise and fall time I_C = 1 mA, V_{CC} = 5 V, R_L = 1 kΩ t_r, t_f [µs]	Collector-emitter saturation voltage $I_C = I_{PCEmin}$ x 0.3, E_e = 0.5 mW/cm² V_{CEsat} [mV]
-2	400	800	5	200
-3	630	1250	6	200
-4	1000	2000	7	200
-5	1600	3200	8	200
-6	2500	5000	9	200

Note.: I_{PCEmin} *is the min. photocurrent of the specified group.*

Relative Spectral Sensitivity [1] *page 9*
$S_{rel} = f(\lambda)$



Photocurrent [1] *page 9*
$I_{PCE} = f(E_e)$, V_{CE} = 5 V



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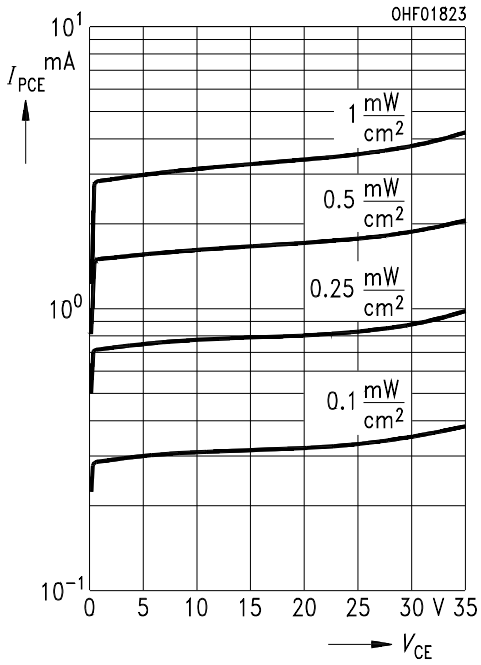
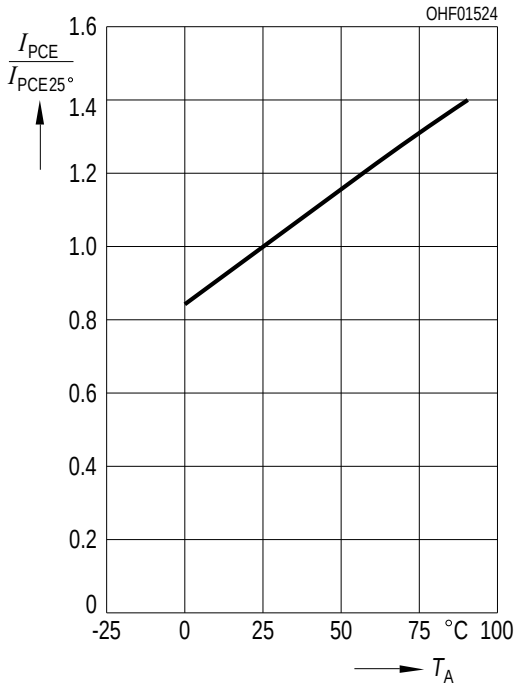
Photocurrent [1] *page 9*

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



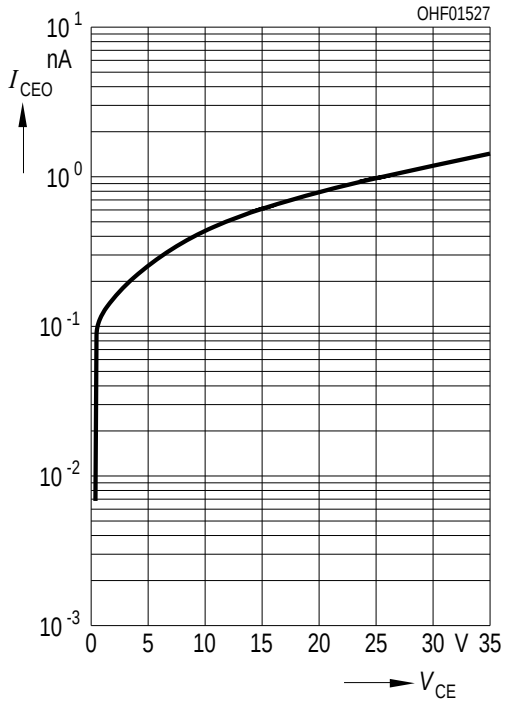
Photocurrent [1] *page 9*

$I_{PCE} / I_{PCE}(25°C) = f(T_A)$, V_{CE} = 5 V



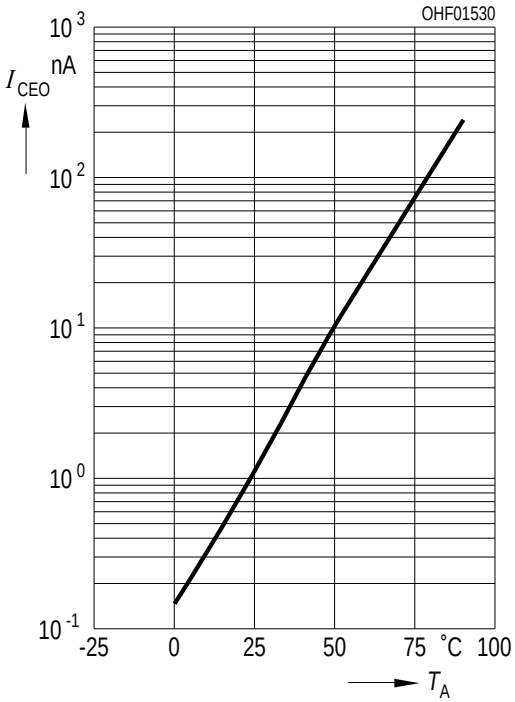
Dark Current [1] *page 9*

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



Dark Current [1] *page 9*

$I_{CEO} = f(T_A)$, V_{CE} = 20 V, E = 0



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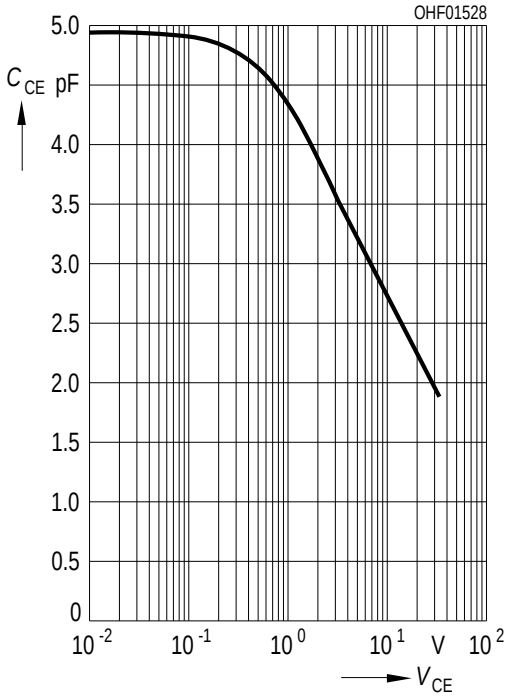
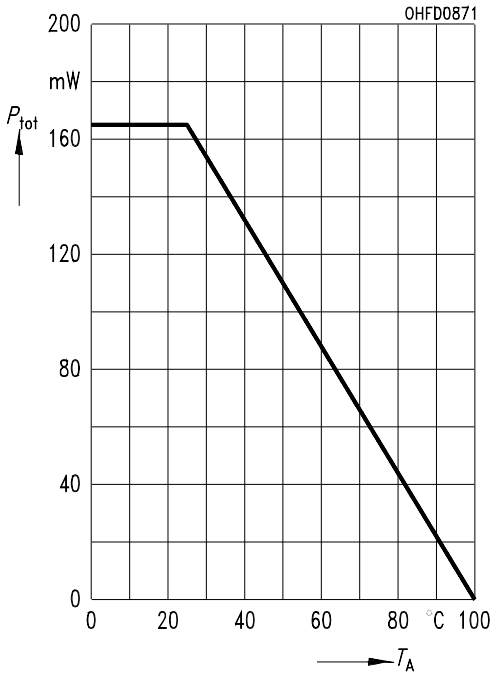
Collector-Emitter Capacitance [1] *page 9*

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



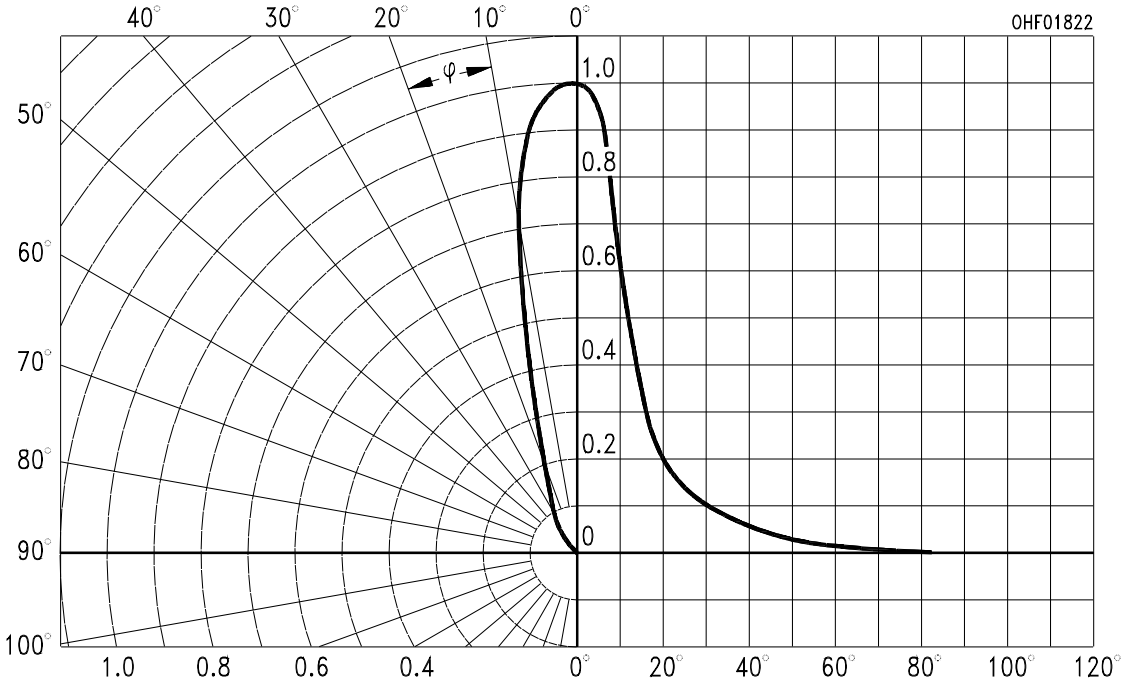
Power Consumption

$P_{tot} = f(T_A)$



Directional Characteristics [1] *page 9*

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



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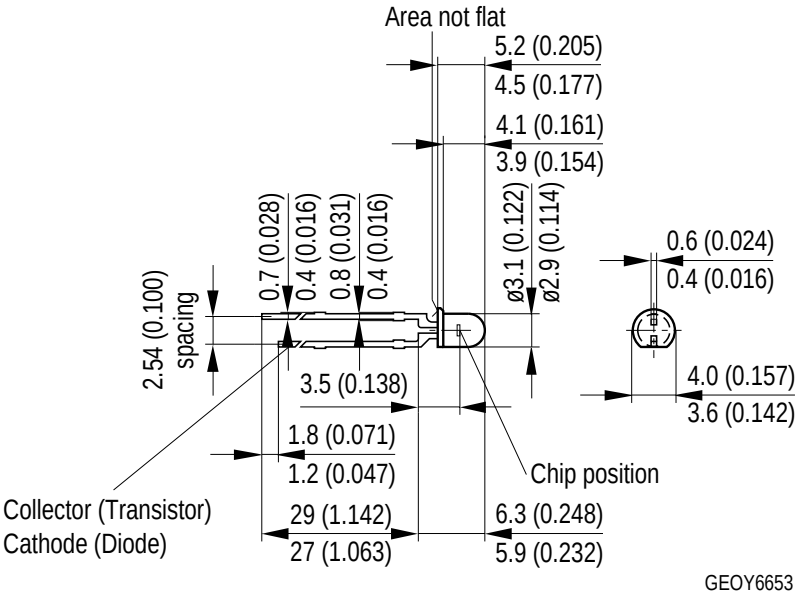
Package Outline



Dimensions in mm (inch).

Package

3mm Radial (T 1), Epoxy

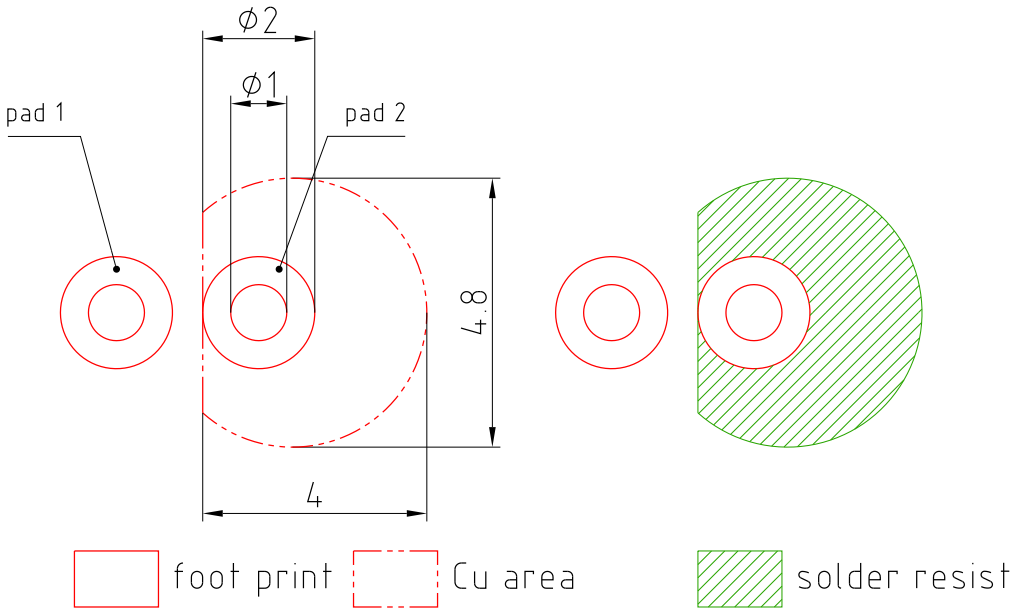
Approximate Weight:

0.2 g

Note

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

Recommended Solder Pad

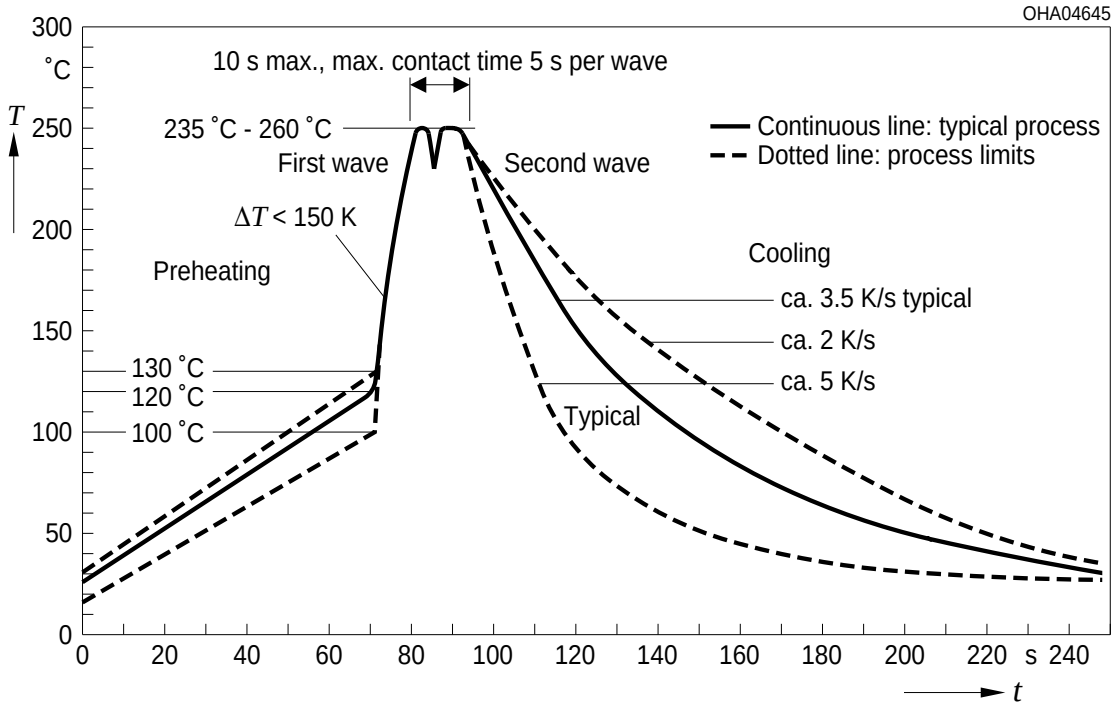


E062.3010.188-01

Dimensions in mm.

Note:
pad 1: emitter

TTW Soldering
IEC-61760-1 TTW



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Language english will prevail in case of any discrepancies or deviations between the two language wordings.

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Glossary

[1] **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.

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