

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

## SFH 2400, SFH 2400FA, SFH 2400FAR



SFH 2400



SFH 2400FA



SFH 2400FAR

### Wesentliche Merkmale

- Speziell geeignet für Anwendungen im Bereich von 380 nm bis 1100 nm (SFH 2400) und von 750 nm bis 1100 nm (SFH 2400FA und SFH 2400FAR)
- Kurze Schaltzeit (typ. 5 ns)

### Anwendungen

- Industrieelektronik
- Automobilbereich (z.B. Regensensor)
- Schnelle Lichtschranken

### Features

- Especially suitable for applications from 380 nm to 1100 nm (SFH 2400) and from 750 nm to 1100 nm (SFH 2400FA and SFH 2400FAR)
- Short switching time (typ. 5 ns)

### Applications

- Industrial electronics
- Automotive (e.g. rainsensor)
- Photointerrupters

Typ Type	Bestellnummer Ordering Code	Fotostrom, $V_R = 5\text{ V}$ , standard light A, $E_V = 1000\text{ lx}$ (SFH 2400) $E_e = 1\text{ mW/cm}^2$ , $V_R = 5\text{ V}$ , $\lambda = 870\text{ nm}$ (SFH 2400FA, SFH 2400FAR) Photocurrent $I_p$ ( $\mu\text{A}$ )
SFH 2400	Q65110A2628	10 (> 6)
SFH 2400FA	Q65110A2638	6.2 (> 3.6)
SFH 2400FAR	Q65110A9563	6.2 (> 3.6)

**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
Sperrspannung $t < 2$ min Reverse voltage $t < 2$ min	$V_R$	50	V
Verlustleistung Total power dissipation	$P_{tot}$	120	mW
Wärmewiderstand für Montage auf PC-Board Thermal resistance for mounting on pcb	$R_{thJA}$	450	K/W

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

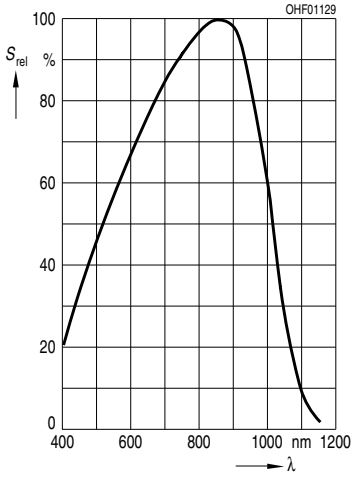
Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 2400	SFH 2400FA SFH 2400FAR	
Fotostrom Photocurrent $V_R = 5$ V, Normlicht/standard light A, $T = 2856$ K, $E_V = 1000$ lx $V_R = 5$ V, $\lambda = 870$ nm, $E_e = 1$ mW/cm <sup>2</sup>	$I_P$	10 (> 6)	–	µA
	$I_P$	6.5	6.2 (> 3.6)	µA
Wellenlänge 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 $S_{max}$	$\lambda$	380 ... 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
Halbwinkel Half angle	$\varphi$	± 60	± 60	Grad deg.

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

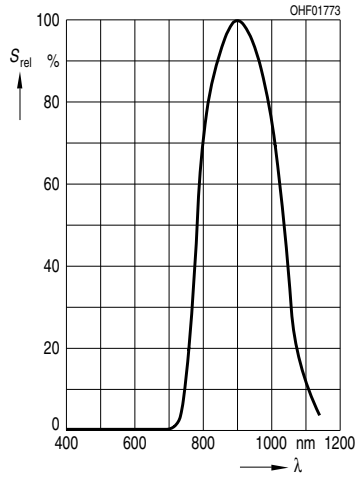
**Characteristics** (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		SFH 2400	SFH 2400FA SFH 2400FAR	
Dunkelstrom, $V_R = 20\text{ V}$ Dark current	$I_R$	1 (< 5)	1 (< 5)	nA
Leerlaufspannung Open-circuit voltage $E_V = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 1\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$	$V_O$	320	–	mV
	$V_O$	–	320	mV
Kurzschlußstrom Short-circuit current $E_V = 1000\text{ lx}$ , Normlicht/standard light A, $T = 2856\text{ K}$ $E_e = 1\text{ mW/cm}^2$ , $\lambda = 870\text{ nm}$	$I_{SC}$	10	–	$\mu\text{A}$
	$I_{SC}$	–	6.0	$\mu\text{A}$
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	–	%K
		–	0.1	
Rauschäquivalente Strahlungsleistung Noise equivalent power $V_R = 20\text{ V}$ , $\lambda = 870\text{ nm}$	$NEP$	$2.9 \times 10^{-14}$	$2.9 \times 10^{-14}$	$\frac{\text{W}}{\sqrt{\text{Hz}}}$
Nachweisgrenze, $V_R = 20\text{ V}$ , $\lambda = 870\text{ nm}$ Detection limit	$D^*$	$3.5 \times 10^{12}$	$3.5 \times 10^{12}$	$\frac{\text{cm} \times \sqrt{\text{Hz}}}{\text{W}}$

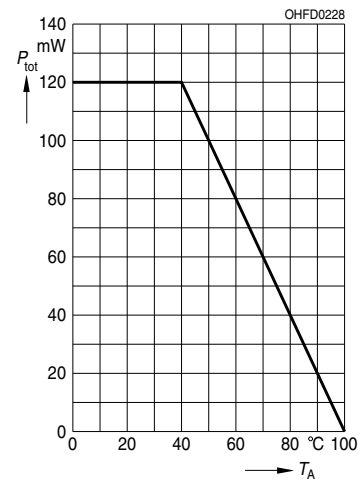
**Relative Spectral Sensitivity**  
SFH 2400,  $S_{rel} = f(\lambda)$



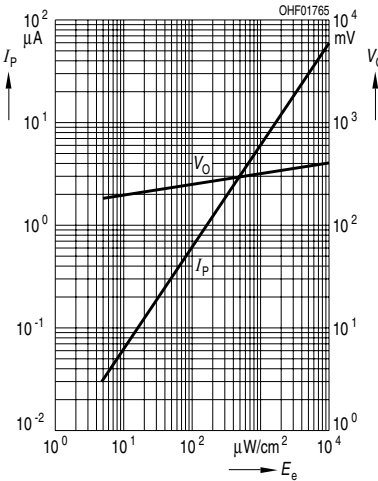
**Relative Spectr. Sensitivity**  
SFH 2400FA, SFH 2400FAR  $S_{rel} = f(\lambda)$



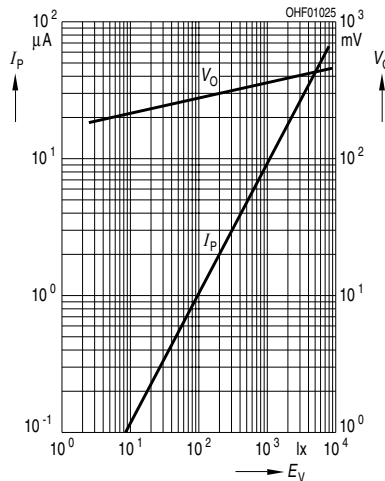
**Total Power Dissipation**  
 $P_{tot} = f(T_A)$



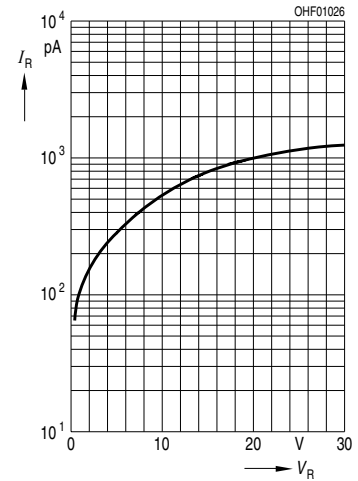
**Photocurrent  $I_P = f(E_e)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_e)$**   
SFH 2400FA, SFH 2400FAR



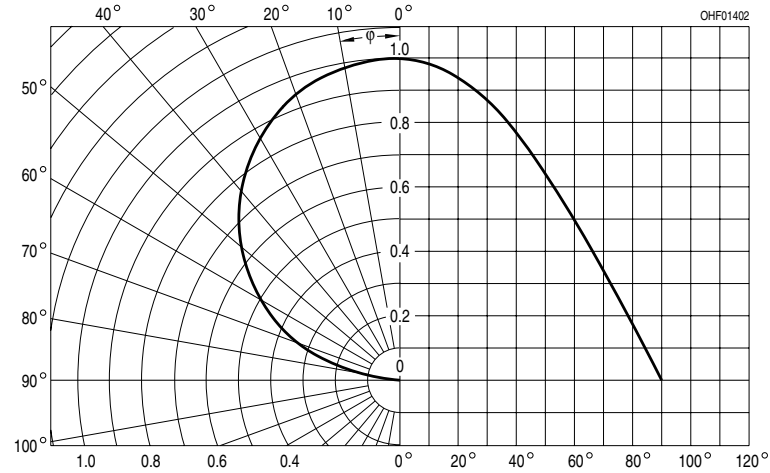
**Photocurrent  $I_P = f(E_v)$ ,  $V_R = 5 V$**   
**Open-Circuit Voltage  $V_O = f(E_v)$**   
SFH 2400



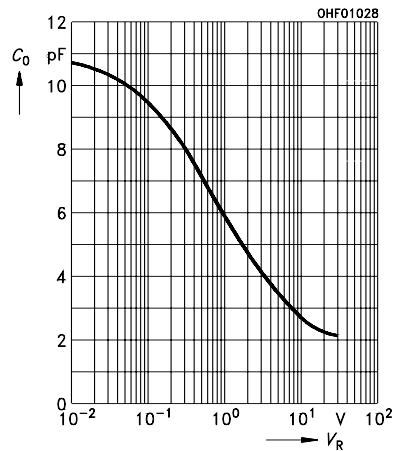
**Dark Current**  
 $I_R = f(V_R), E = 0$



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

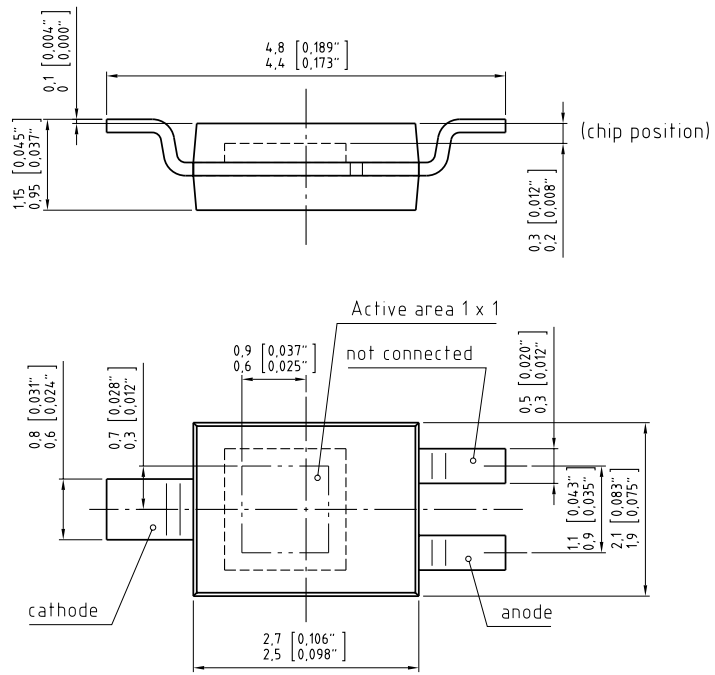


**Capacitance**  
 $C = f(V_R), f = 1 MHz, E = 0$



Maßzeichnung  
Package Outlines

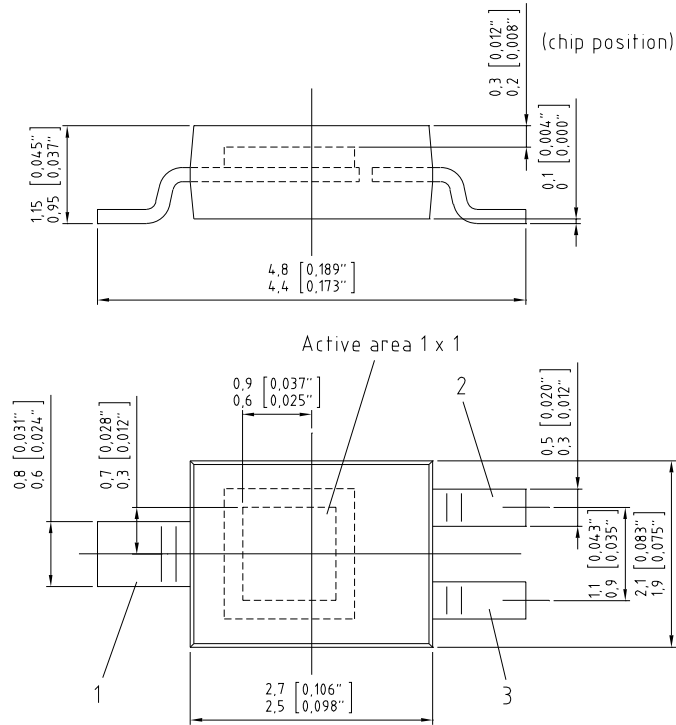
SFH 2400FAR



C63062-A4001-A2...-03

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

SFH 2400  
SFH 2400FA

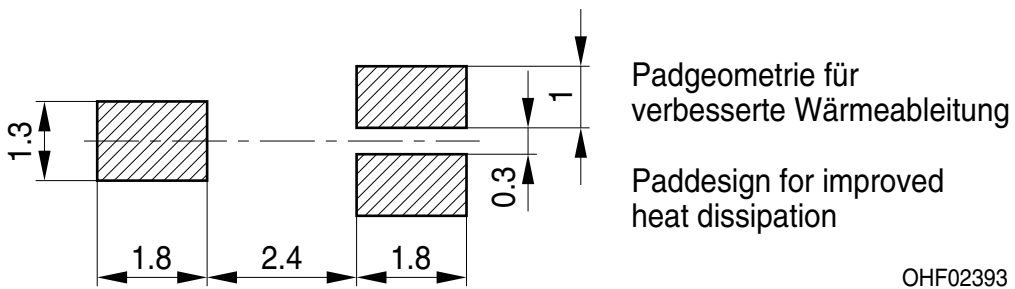


C63062-A4001-A1-03

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

<b>Anschlussbelegung</b>	Pin 1 = Kathode / cathode
<b>Pin configuration</b>	Pin 2 = n.c.
	Pin 3 = Anode / Anode

**Empfohlenes Lötpad Design**  
**Recommended Solderpad Design**



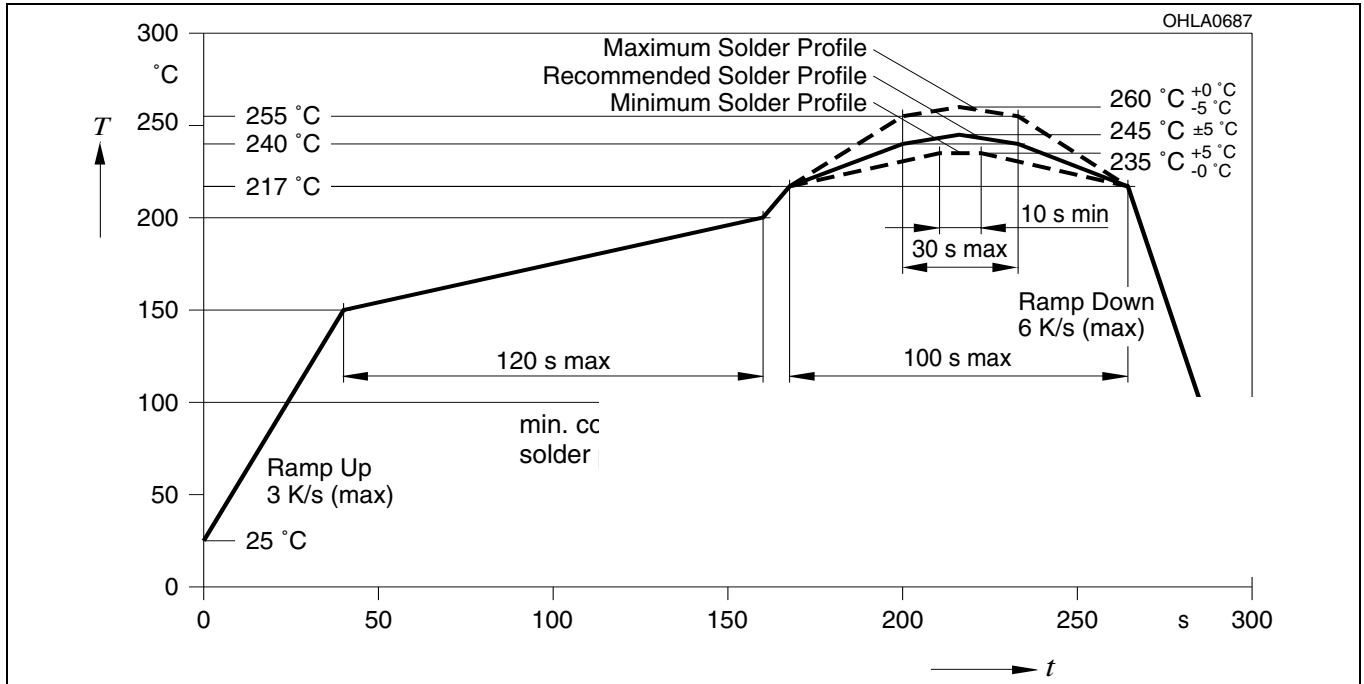
OHF02393

Maße in mm / Dimensions in mm.

**Lötbedingungen**  
**Soldering Conditions**

**Reflow Lötprofil für bleifreies Löt**  
**Reflow Soldering Profile for lead free soldering**

Vorbehandlung nach JEDEC Level 4  
 Preconditioning acc. to JEDEC Level 4  
 (nach J-STD-020C)  
 (acc. to J-STD-020C)



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