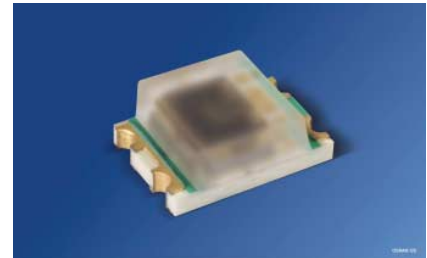


**Hochgenauer Umgebungslichtsensor**  
**High Accuracy Ambient Light Sensor**  
**Lead (Pb) Free Product - RoHS Compliant**

**SFH 5711**



**Wesentliche Merkmale**

- Optohybrid mit logarithmischem Stromausgang
- Perfekt an die Augenempfindlichkeit ( $V\lambda$ ) angepasst
- Niedriger Temperaturkoeffizient der Fotoempfindlichkeit
- Hohe Genauigkeit über weiten Beleuchtungsstärkebereich
- Automotive Freigabe

**Anwendungen**

- Anwendungen im Automobilbereich
- Sonnenlichtsensor / Fahrlichtkontrolle
- Steuerung von Displayhinterleuchtungen
- Mobile Geräte

**Features**

- Opto hybrid with logarithmic current output
- Perfect match to Human Eye Sensitivity ( $V\lambda$ )
- Low temperature coefficient of spectral sensitivity
- High accuracy over wide illumination range
- Automotive qualified

**Applications**

- Automotive applications
- Sunlight sensor / head lamp control
- Control of display backlighting
- Mobile devices

Typ Type	Bestellnummer Ordering code	Ausgangsstrom, $E_v=1000lx$ , (white LED LW 541C) Output current, $I_{OUT} / \mu A$
SFH 5711-2/3 <sup>1)</sup>	Q65110A4513	27 - 32
SFH 5711-1/2 <sup>1)</sup>	on request	25 - 30
SFH 5711-3/4 <sup>1)</sup>	on request	29 - 34

<sup>1)</sup> Nur eine Gruppe innerhalb einer Verpackungseinheit, siehe Kenndaten.  
 Only one bin within one packing unit, see characteristics

**Grenzwerte**  
**Maximum Ratings**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebs- und Lagertemperatur Operating and storage temperature range	$T_{stg}$	- 40 ... + 100 <sup>1)</sup>	°C
Versorgungsspannung Supply voltage	$V_{CC}$	6	V
Ausgangsspannung Output voltage	$V_{OUT}$	< $V_{CC}$	V
Elektrostatische Entladung Electrostatic discharge Human Body Model according to EOS/ESD-5.1-1993	$ESD$	2	kV

<sup>1)</sup> Maximum operation temperature of 100°C is only valid after soldering with JEDEC level 4 preconditioning. With JEDEC level 3 max. preconditioning operating temperature is 85°C.

**Empfohlener Arbeitsbereich**  
**Recommended Operating Conditions**

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Betriebsspannung Supply voltage	$V_{CC}$	2.3		5.5	V
Beleuchtungsstärke Illuminance $T_A = - 30 \text{ °C} \dots + 70 \text{ °C}$ $T_A = - 40 \text{ °C} \dots + 100 \text{ °C}$	$E_V$		3 ... 80k 10...80k		lx

Kennwerte ( $T_A = 25\text{ °C}$ )

## Characteristics

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Stromaufnahme, $E_V = 0$ Current consumption $V_{CC} = 2.5\text{ V}$ $V_{CC} = 5.0\text{ V}$	$I_{CC}$		410 420	500	$\mu\text{A}$
Stromaufnahme, $E_V = 1000\text{ lx}$ Current consumption, $E_V = 1000\text{ lx}$ $V_{CC} = 2.5\text{ V}$ $V_{CC} = 5.0\text{ V}$	$I_{CC}$		460 470	550	$\mu\text{A}$
Spektraler Bereich der Fotoempfindlichkeit Spectral range of sensitivity	$\lambda_{10\%}$		475 ... 650		nm
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. photosensitivity	$\lambda_{s\text{ max}}$	540	555	570	nm
Abmessung der bestrahlungsempfindlichen Fläche Dimensions of radiant sensitive area	$L \times B$ $L \times W$		0.4 x 0.4		mm x mm
Ausgangskapazität Output capacitance	$C_{OUT}$		3		pF
Transferfunktion Transfer function, s. Fig. 1	$G$	9.5	10	10.5	$\mu\text{A} / \text{dek}$ $\mu\text{A} / \text{dec}$
Abweichung der Ausgangskennlinie von der Logarithmierfunktion Deviation of outputcharacteristic from logarithmic function, s. Fig. 1	$L$	- 3		+ 3	%
Maximale Ausgangsspannung Maximum output voltage	$V_{OUT}$			$V_{CC}$ - 0.5	V
Einschaltzeit, $E_V = 1000\text{ lx}$ Power on time, $E_V = 1000\text{ lx}$ $V_{CC} = 0\text{ V} \rightarrow V_{CC}$	$t_{ON}$		0.1	1.2	ms
Antwortzeit, $R_L = 25\text{ k}\Omega$ , $C = 1\text{ nF}$ Response time, s. Fig. 2 $E_V = 100 \rightarrow 1000\text{ lx}$ $E_V = 1000 \rightarrow 100\text{ lx}$	$t_r / t_f$		0.03 0.1		ms

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

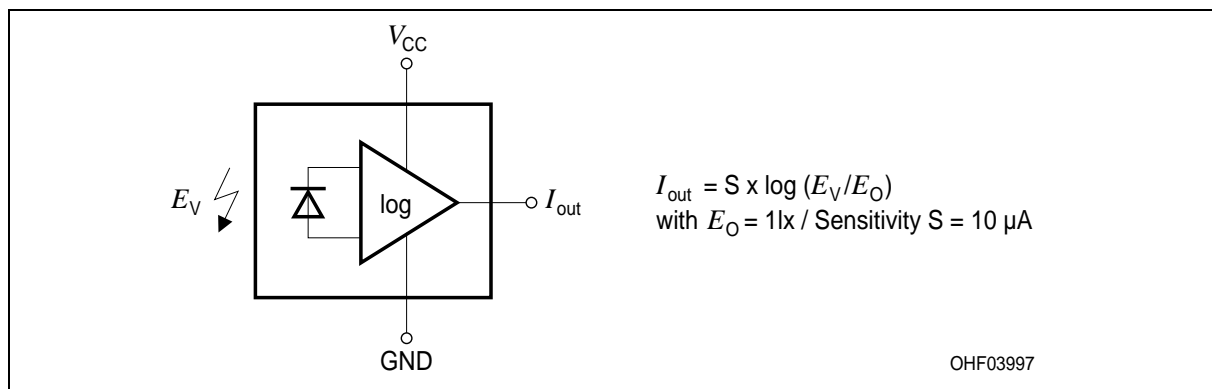
Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Ausgangsgenauigkeit über Temperaturbereich <sup>1)</sup> Output accuracy over temperature range <sup>1)</sup> $E_V = 1000\text{ lx}$ $T_A = -40\text{ °C} \dots +100\text{ °C}$ $T_A = -30\text{ °C} \dots +70\text{ °C}$ $T_A = 0\text{ °C} \dots +50\text{ °C}$	$\Delta I_{OUT}$	- 2.0 - 1.5 - 0.7	$\pm 1.0$ $\pm 0.6$ $\pm 0.2$	+ 2.0 + 1.5 + 0.7	$\mu\text{A}$
Ausgangsdunkelstrom, $E_V = 0$ Output dark current	$I_{out}$		0.1	100	nA

- <sup>1)</sup> Diese Werte entsprechen einer Photodiode mit einem TC von ungefähr 0.3 %/K.  
These values correspond to a photodiode with a TC of approximately 0.3 %/K.

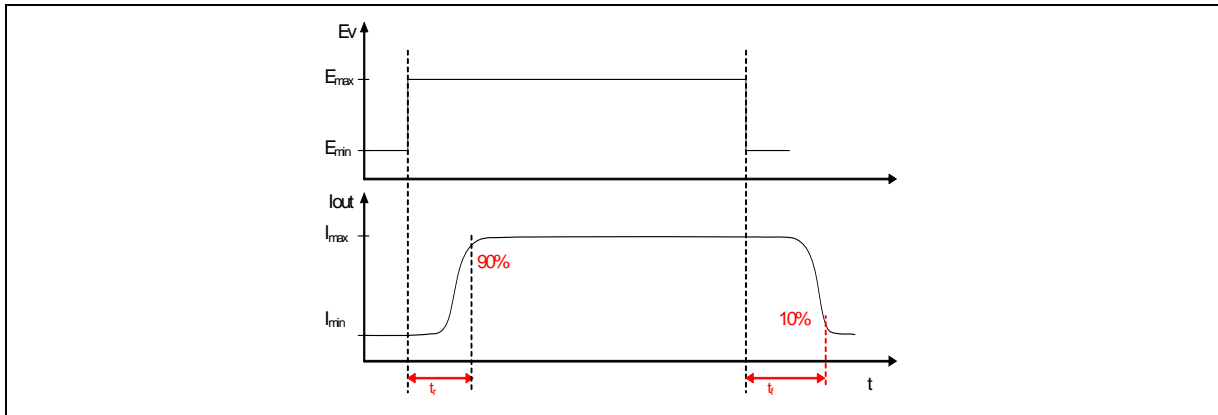
**Gruppierung ( $T_A = 25\text{ °C}$ )****Binning**

Bezeichnung Parameter	Symbol Symbol	Wert Value				Einheit Unit
		-1	-2	-3	-4	
Ausgangsstrom <sup>1)</sup> Output current $E_V = 1000\text{ lx (white LED LW 541C)}$	$I_{out}$	25 ... 28	27 ... 30	29 ... 32	31 ... 34	$\mu\text{A}$

- <sup>1)</sup>  $3\mu\text{A}$  Gruppenbreite entspricht einem Verhältnis von 1:2 in der Bestrahlungsstärke.  
 $3\mu\text{A}$  bin width is equivalent to a spread of 1:2 of the irradiance.



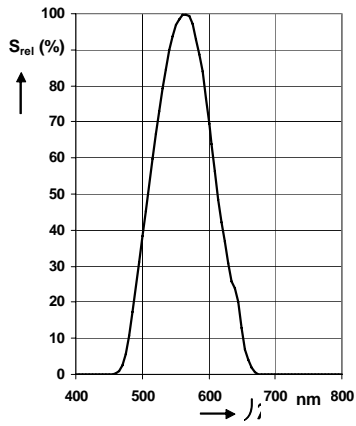
**Figure 1**      **Ersatzschaltbild**  
**Circuitry**



**Figure 2** Definition der Antwortzeit  
Definition of Response Time

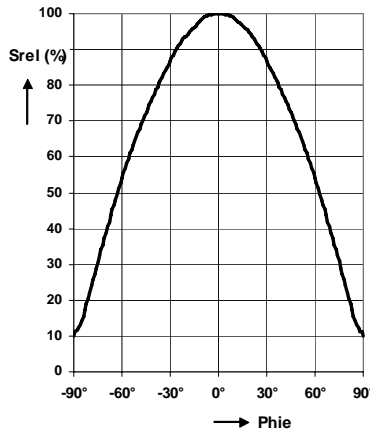
**Relative Spectral Sensitivity of photodiode**

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



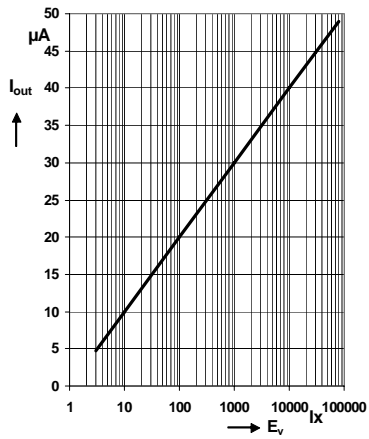
**Directional Characteristics of photodiode**

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



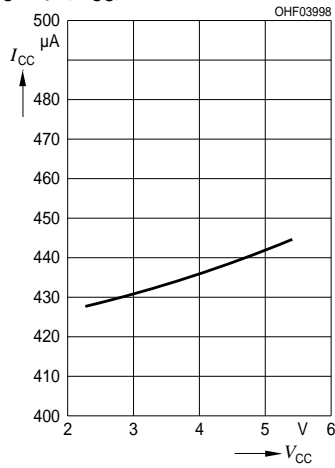
**Output Current**

$I_{OUT} = f(E_V)$

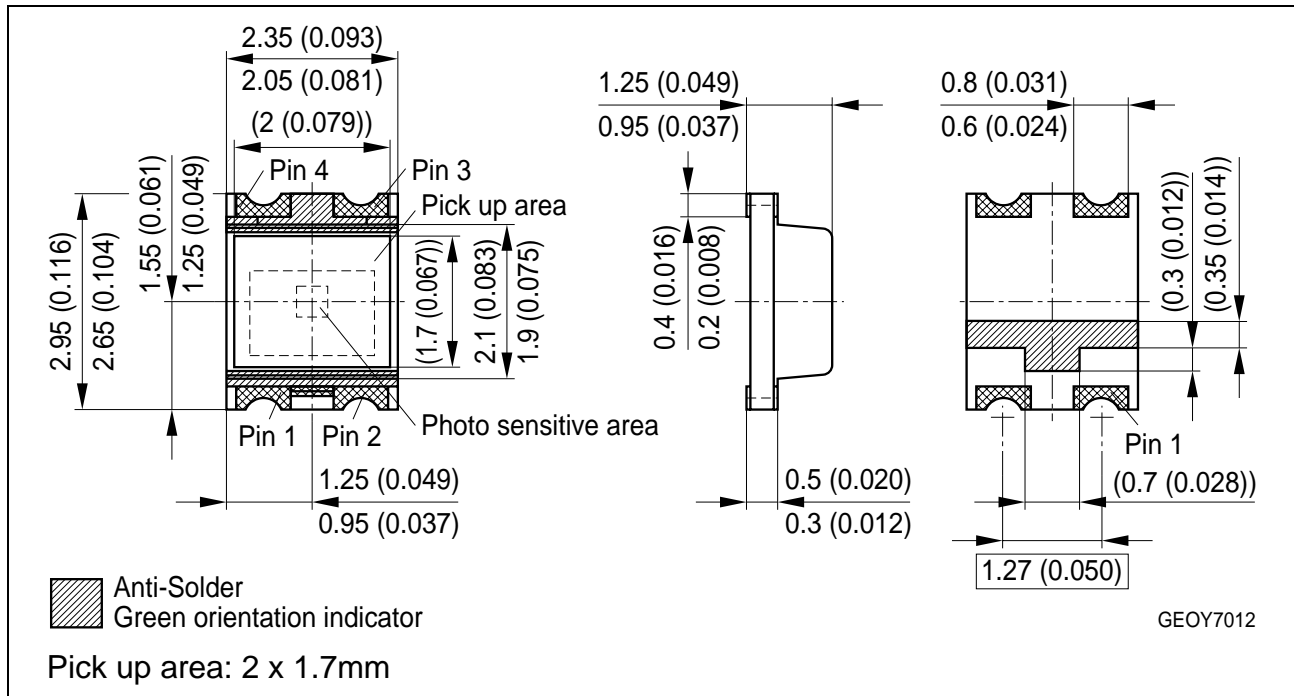


**Current Consumption**

$I_{CC} = f(V_{CC})$



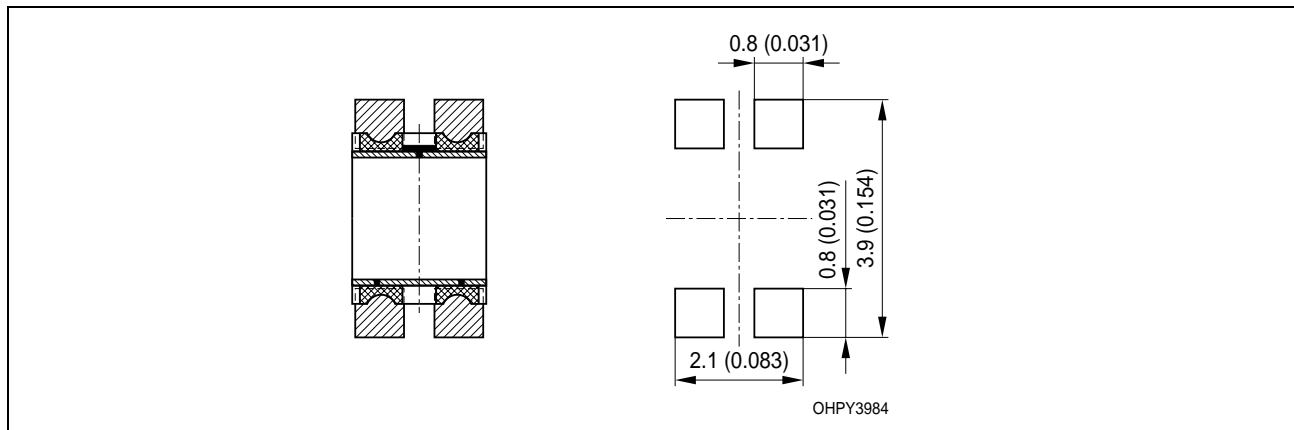
## Maßzeichnung Package Outlines



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

## Anschlußbelegung Pin configuration

Pin #	Description
1	GND
2	GND
3	V <sub>CC</sub>
4	I <sub>OUT</sub>

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

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

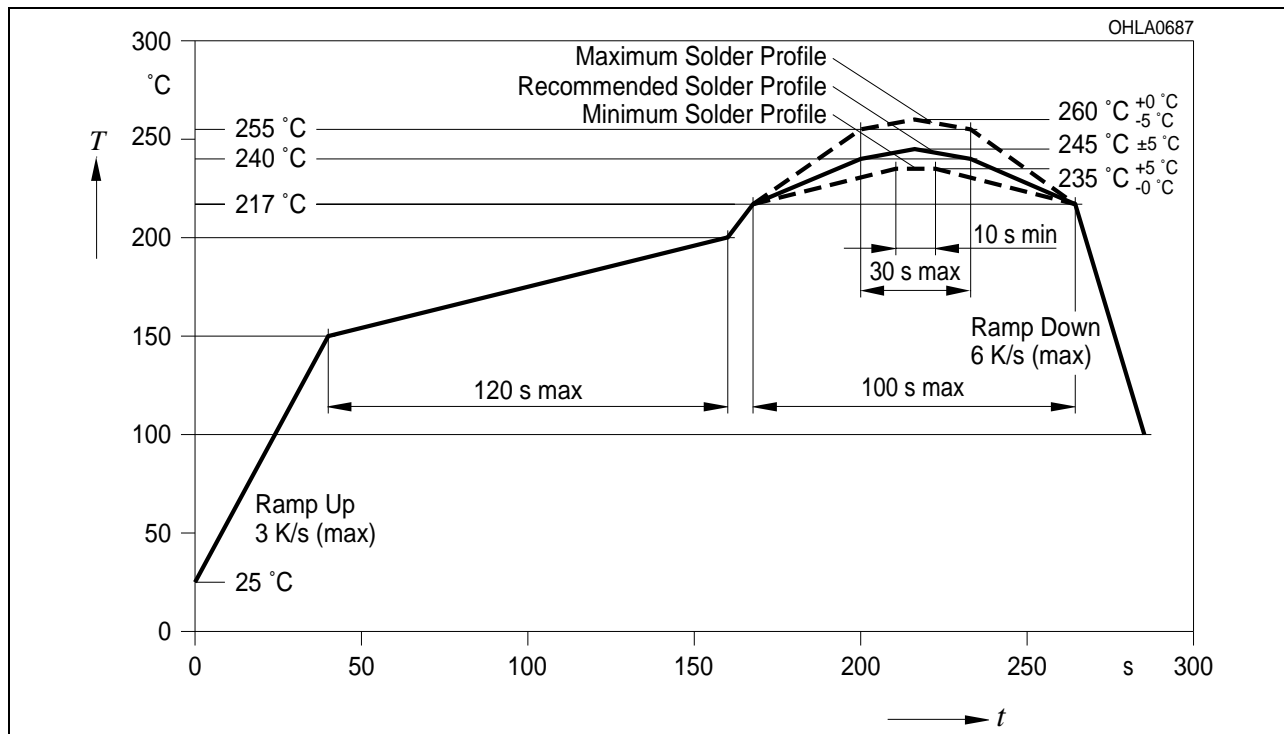


## Lötbedingungen Soldering Conditions

Reflow Lötprofil für bleifreies Löten  
Reflow Soldering Profile for lead free soldering

Vorbehandlung nach JEDEC Level 3  
Preconditioning acc. to JEDEC Level 3

(nach J-STD-020C)  
(acc. to J-STD-020C)



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