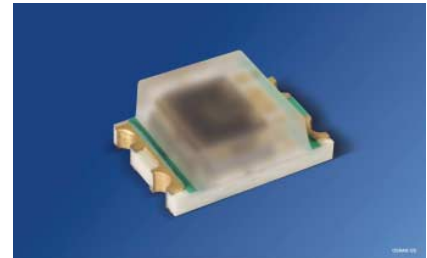


Hochgenauer Umgebungslichtsensor
High Accuracy Ambient Light Sensor
Lead (Pb) Free Product - RoHS Compliant

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 ¹⁾	Q65110A4513	27 - 32
SFH 5711-1/2 ¹⁾	on request	25 - 30
SFH 5711-3/4 ¹⁾	on request	29 - 34

¹⁾ 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 ¹⁾	°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	<i>ESD</i>	2	kV

¹⁾ 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	μA
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	μA
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 ¹⁾ Output accuracy over temperature range ¹⁾ $E_V = 1000\text{ lx}$ $T_A = -40\text{ °C} \dots +100\text{ °C}$ $T_A = -30\text{ °C} \dots +70\text{ °C}$ $T_A = 0\text{ °C} \dots +50\text{ °C}$	ΔI_{OUT}	- 2.0 - 1.5 - 0.7	± 1.0 ± 0.6 ± 0.2	+ 2.0 + 1.5 + 0.7	μA
Ausgangsdunkelstrom, $E_V = 0$ Output dark current	I_{out}		0.1	100	nA

- ¹⁾ 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 ¹⁾ Output current $E_V = 1000\text{ lx}$ (white LED LW 541C)	I_{out}	25 ... 28	27 ... 30	29 ... 32	31 ... 34	μA

- ¹⁾ $3\mu\text{A}$ 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.

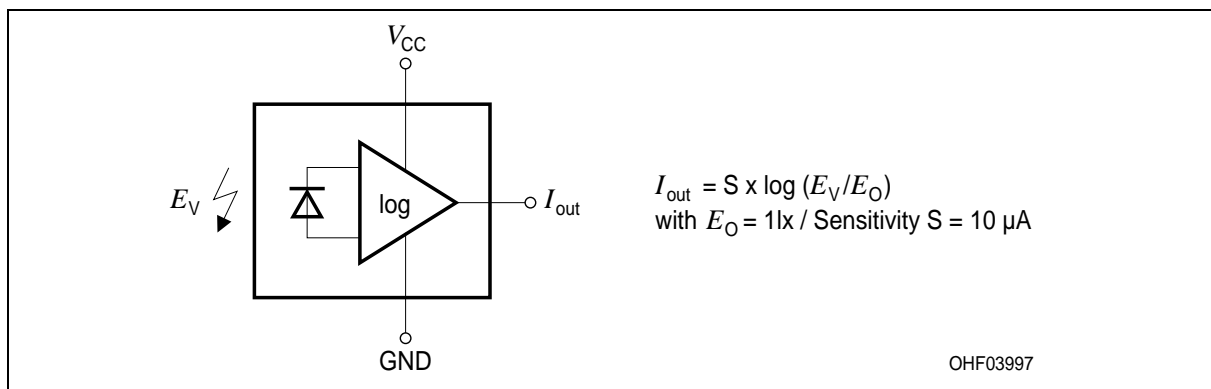


Figure 1 **Ersatzschaltbild**
Circuitry

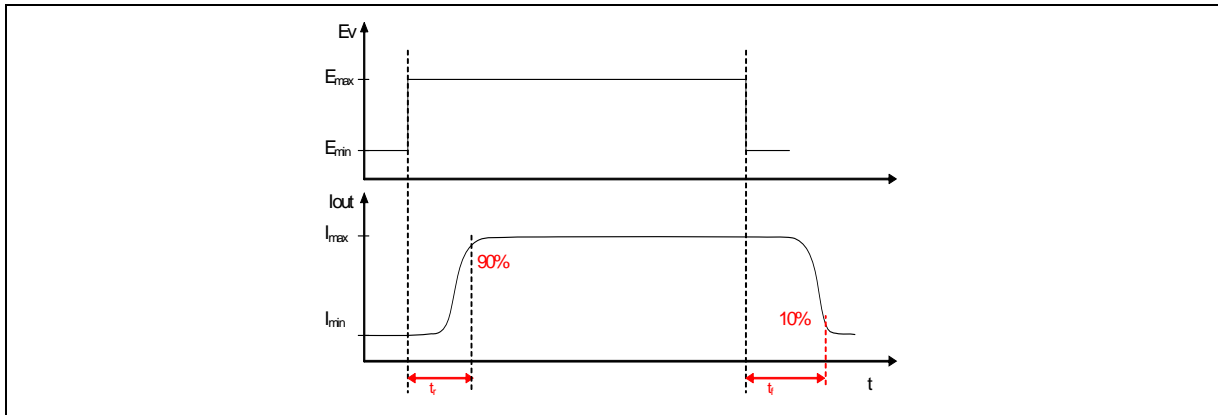
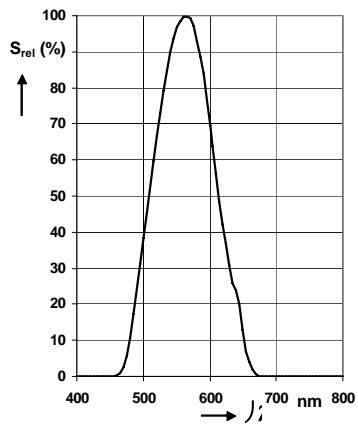


Figure 2 Definition der Antwortzeit
Definition of Response Time

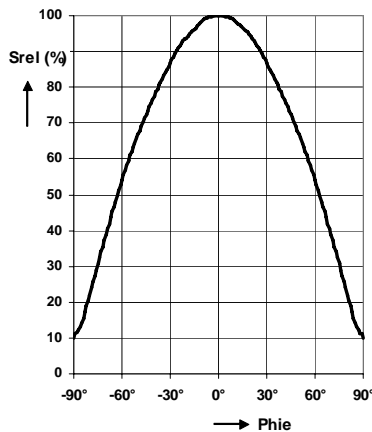
Relative Spectral Sensitivity of photodiode

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



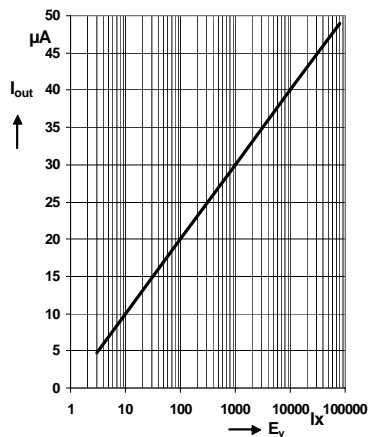
Directional Characteristics of photodiode

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



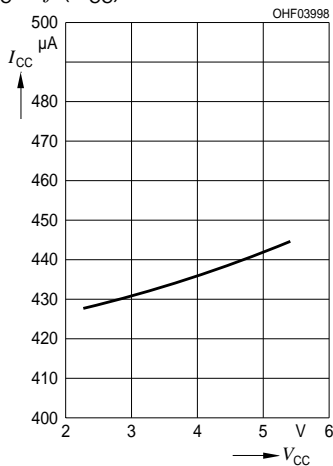
Output Current

$I_{OUT} = f(E_V)$

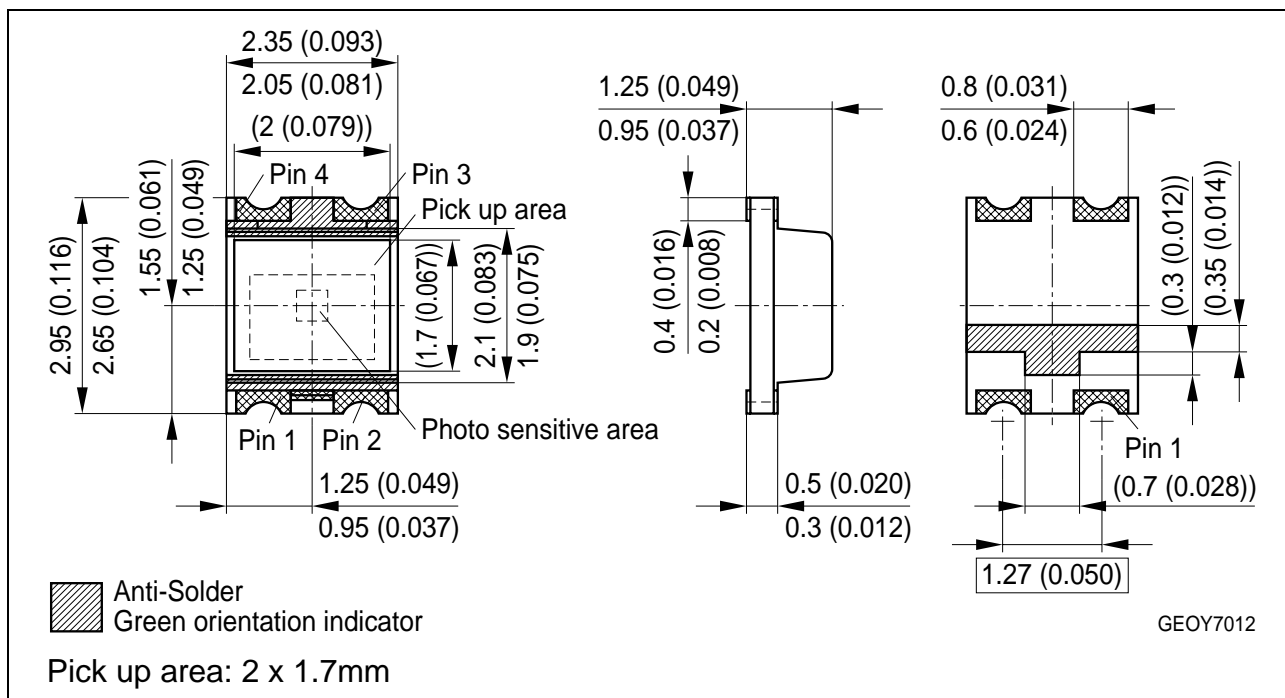


Current Consumption

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



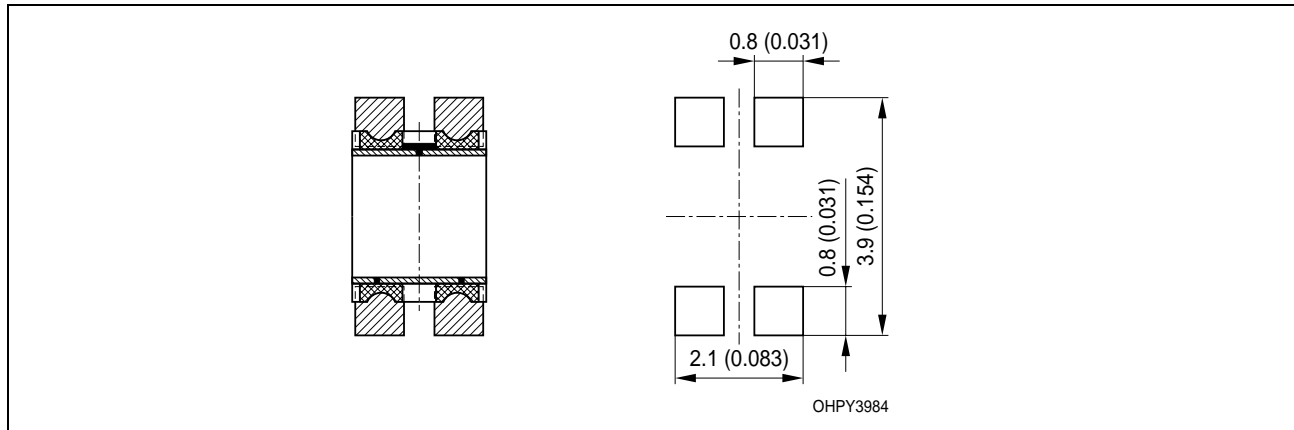
Maßzeichnung Package Outlines



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

Anschlußbelegung Pin configuration

Pin #	Description
1	GND
2	GND
3	V _{CC}
4	I _{OUT}

Empfohlenes Lötpaddesign
Recommended Solderpad Design

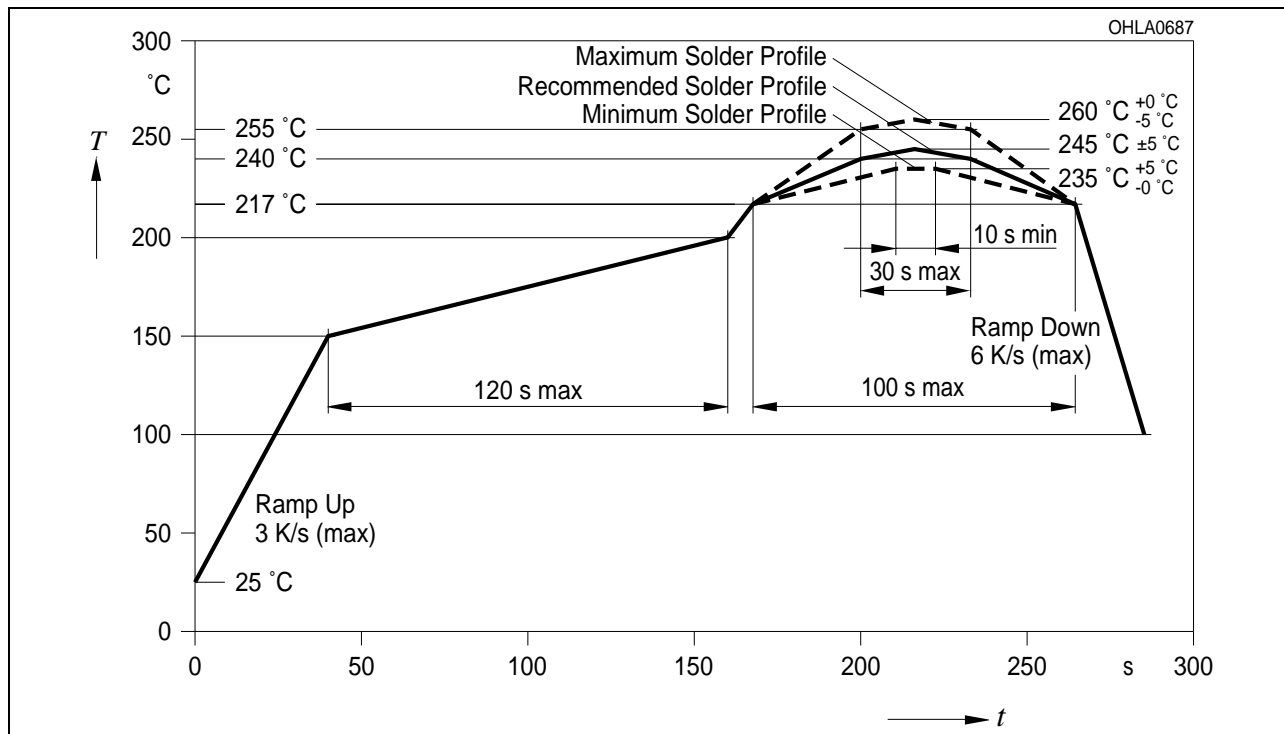
Maße in mm (inch) / Dimensions in mm (inch)

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)



Published by
OSRAM Opto Semiconductors GmbH
Wernerwerkstrasse 2, D-93049 Regensburg
www.osram-os.com

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