Photodetektor mit Spannungsausgang
Light to Voltage Converter

SFH 5130

Wesentliche Merkmale

- Integrierter Fotodetektor mit linearem Spannungsausgang
- Transparentes Plastikgehäuse mit 3 Pins
- Hohe Empfindlichkeit von 350 nm bis 1100 nm
- Runde Fotodiode

Anwendungen

- Lichtschranken

Features

- Integrated photodiode with linear voltage output
- Transparent sidelooker package with 3 pins
- High sensitivity from 350 nm to 1100 nm
- Circular photodiode

Applications

- Photointerrupter

Typ Type	Bestellnummer Ordering Code	Gehäuse Package
SFH 5130	on request	Sidelooker Gehäuse Sidelooker Package

Grenzwerte
Maximum Ratings

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Lagertemperatur Storage temperature range	T_{stg}	– 40 … + 85	°C
Versorgungsspannung Supply Voltage	V_{DD}	6	V
Ausgangsspannung Output voltage	V_{OUT}	< V_{DD}	V
Elektrostatische Entladung Electrostatic Discharge Human Body Model according to EOS/ESD-5.1-1993	ESD	2	kV

Empfohlener Arbeitsbereich
Recommended Operating Conditions

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Funktionstemperatur Operating Temperature	T_{op}	- 40	+ 25	+ 75	°C
Betriebsspannung Supply Voltage	V_{DD}	4.5	5	5.5	V
Kapazitive Ausgangslast Output load capacitance	C_L			30	nF

Kennwerte (T_A = 25 °C, V_{DD} = 5 V, R_L = 10 kΩ)
Characteristics

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Stromaufnahme, E_e = 0 Current consumption	I_{DD}	–	1.5	4.5	mA
Dunkelspannung Dark Voltage	V_D	–	1.2	15	mV
Spektraler Bereich der Fotoempfindlichkeit Spectral range of sensitivity	λ	350	–	1100	nm

Kennwerte (T_A = 25 °C, V_{DD} = 5 V, R_L = 10 kΩ)
Characteristics

Bezeichnung **Parameter**	**Symbol** **Symbol**	**Wert** **Value**			**Einheit** **Unit**
		min.	**typ.**	**max.**	
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. photosensitivity	$\lambda_{s\,max}$	–	770	–	nm
Durchmesser der aktiven Fläche Diameter of active area	D	–	0.75	–	mm
Empfindlichkeit[1], λ = 428 nm Irradiance responsivity	N_e	–	1180	–	mV/µW/cm²
Ausgangsspannung[1] Output Voltage, E_e=1.69 µW/cm², λ = 428 nm	V_O	1.0	–	3.2	V
Sättigungsspannung, V_{DD} = 4.5V, $E_e \geq$ 7 µW/cm² Maximum output voltage swing	V_{sat}	4	4.47	–	V
Anstiegszeit[2], E_e = 0 to E_e = 1.69 µW/cm² Rise time	t_r	–	50	250	µs
Abfallzeit, E_e =1.69 to 0 µW/cm² Fall time	t_f	–	70	250	µs
Einschwingzeit, to 99% of nominal Settling time	t_s	–	90	–	µs
Temperaturkoeffizient der Dunkelspannung, T = 5 to 45 °C Temperature coefficient of dark voltage	α_{vd}	– 100	± 8	+ 100	µV/K
Temperaturkoeffizient der Ausgangsspannung Temperature coefficient of output voltage	α_{vo}	– 3	± 1	+ 3	mV/K
E_e = 1.69 µW/cm², λ = 428 nm, T = 5 to 45 °C		– 0.15		+ 0.15	%/K
Power supply rejection ratio[3] f_{ac} = 100 Hz	PSRR	–	45	–	dB
f_{ac} = 1 kHz	PSRR	–	45	–	dB
Output noise voltage f = 0 to 1 kHz					µV RMS
f = 10 Hz		–	< 1	–	µV/Hz$^{(1/2)}$
f = 100 Hz		–	< 1	–	µV/Hz$^{(1/2)}$
f = 1 kHz		–	< 1	–	µV/Hz$^{(1/2)}$

[1] The sensitivity is characterized using 428 nm LEDs as light source. A constant irradiance over the whole lens area is created.

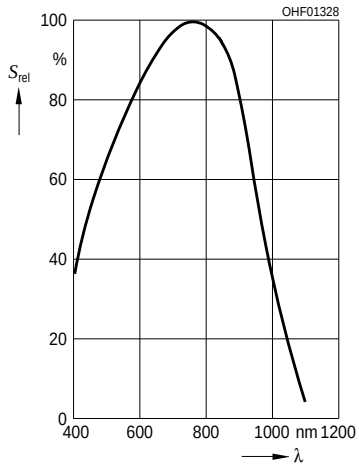
[2] The light source used is a 428 nm LED with following characteristics: t_r > 1 µs, t_f < 1 µs. The output waveform is monitored on an osciloscope with t_r > 100 ns, Z_i = 1 MΩ, C_i < 20 pF. The rise time is defined as the time from the 10% to the 90% value, the fall time is defined as the time from the 90% to the 10% value.

[3] PSRR is defined as 20 log (V_{DD}(f) / V_O(f)) with V_{DD}(0 Hz) = 4.5 V and V_O(0 Hz) = 2 V

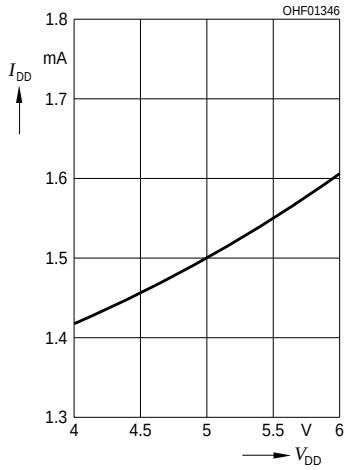
Lötbedingungen
Soldering Conditions

Type	Dip, wave and drag soldering		
	Temperature of soldering bath	**Max permissible soldering time**	**Distance between solder joint and package**
SFH5130	260 s	10 s	1.5 mm

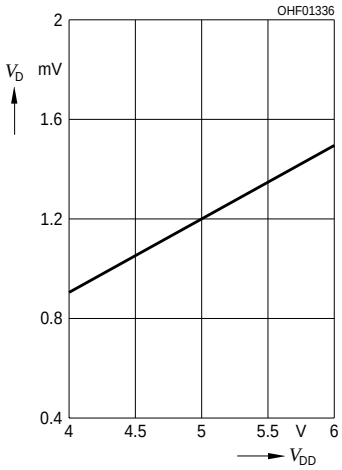
Spectral Sensitivity
$S_{rel} = f(\lambda)$



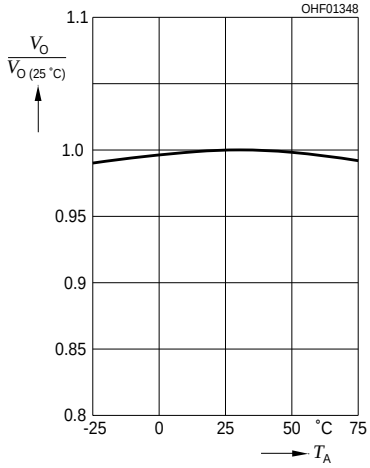
Current Consumption
$I_{DD} = f(V_{DD})$



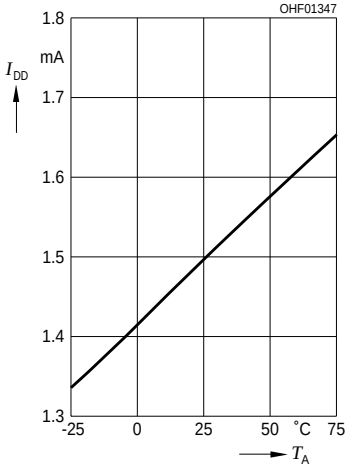
Dark Voltage
$V_D = f(V_{DD})$



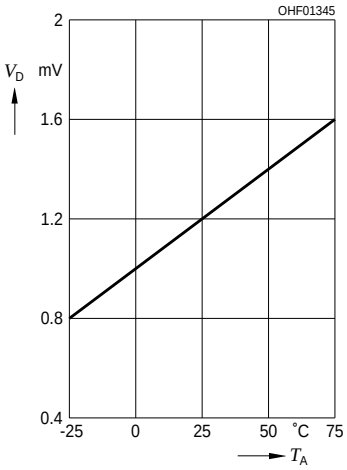
Output Voltage, $V_O = f(T_A)$,
E_e = 1.69 µW/cm², λ=428nm



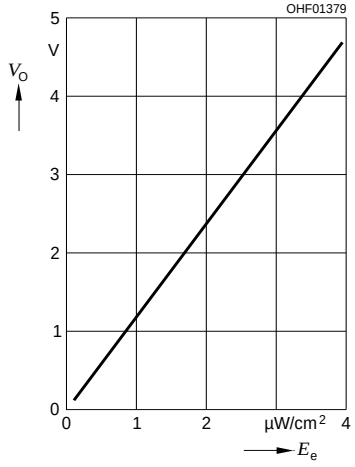
Current Consumption
$I_{DD} = f(T_A)$



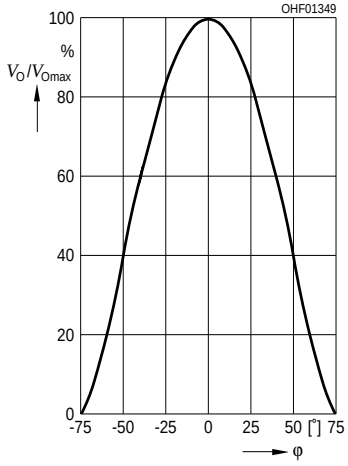
Dark Voltage
$V_D = f(T_A)$



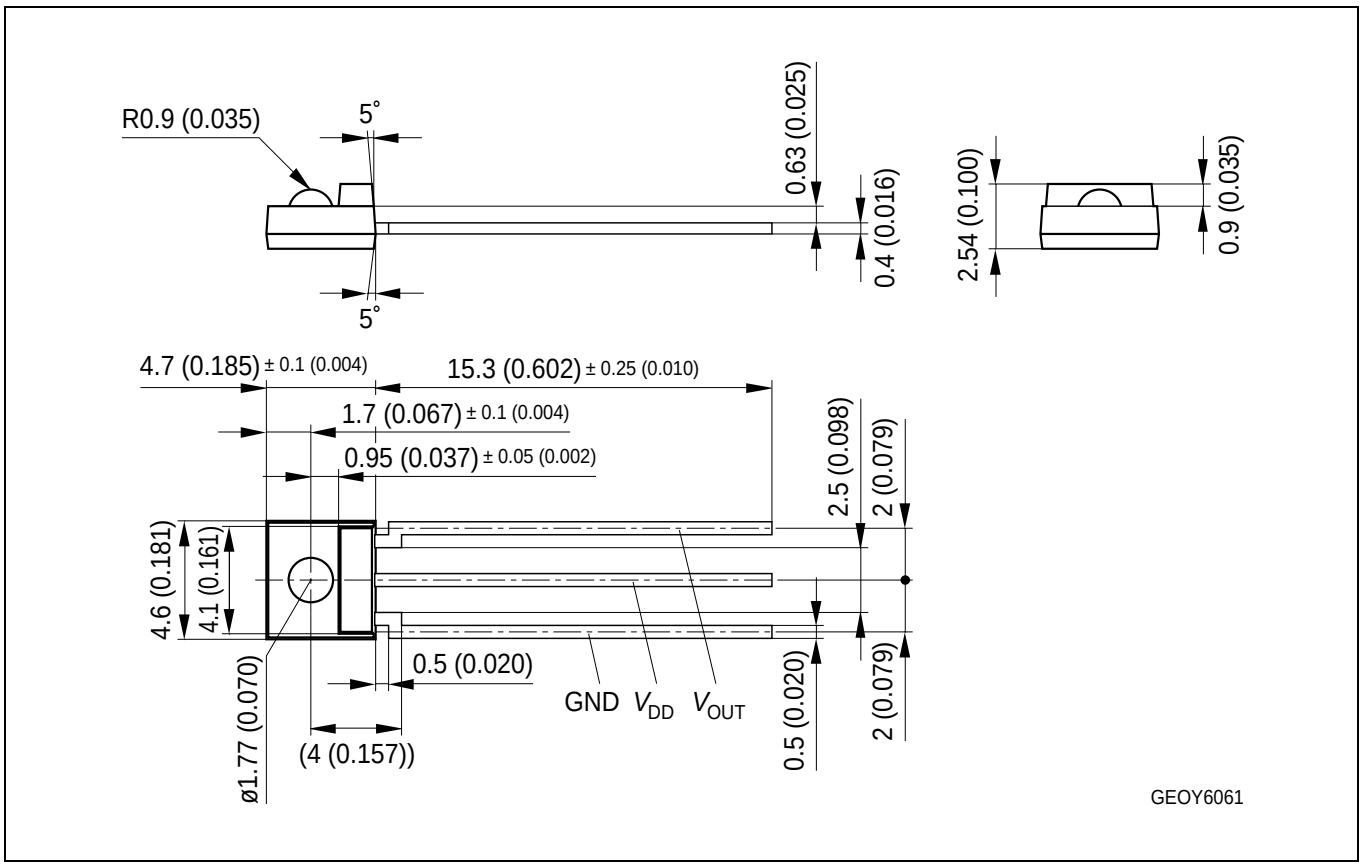
Linearity
$V_O = f(E_e)$



Directional Characteristics
$V_O = f(\phi)$



Maßzeichnung
Package Outlines



Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

Published by OSRAM Opto Semiconductors GmbH & Co. OHG
Wernerwerkstrasse 2, D-93049 Regensburg

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