

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 | <i>ESD</i> | 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 ($T_{\text{A}} = 25 \text{ °C}$, $V_{\text{DD}} = 5 \text{ V}$, $R_{\text{L}} = 10 \text{ k}\Omega$)

Characteristics

| Bezeichnung Parameter | Symbol Symbol | Wert Value | | | Einheit Unit |
|---|------------------|---------------|------|------|-----------------|
| | | min. | typ. | max. | |
| Stromaufnahme, $E_{\text{e}} \neq 0$ 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 ($T_A = 25\text{ °C}$, $V_{DD} = 5\text{ V}$, $R_L = 10\text{ k}\Omega$)

Characteristics

| Bezeichnung Parameter | Symbol Symbol | Wert Value | | | Einheit Unit |
|--|--------------------------|---------------|---------|-------|--|
| | | min. | typ. | max. | |
| Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. photosensitivity | $\lambda_{s\text{ max}}$ | – | 770 | – | nm |
| Durchmesser der aktiven Fläche Diameter of active area | D | – | 0.75 | – | mm |
| Empfindlichkeit ¹⁾ , $\lambda = 428\text{ nm}$ Irradiance responsivity | N_e | – | 1180 | – | mV/ $\mu\text{W}/\text{cm}^2$ |
| Ausgangsspannung ¹⁾ Output Voltage, $E_e = 1.69\text{ }\mu\text{W}/\text{cm}^2$, $\lambda = 428\text{ nm}$ | V_O | 1.0 | – | 3.2 | V |
| Sättigungsspannung, $V_{DD} = 4.5\text{ V}$, $E_e \geq 7\text{ }\mu\text{W}/\text{cm}^2$ Maximum output voltage swing | V_{sat} | 4 | 4.47 | – | V |
| Anstiegszeit ²⁾ , $E_e = 0$ to $E_e = 1.69\text{ }\mu\text{W}/\text{cm}^2$ Rise time | t_r | – | 50 | 250 | μs |
| Abfallzeit, $E_e = 1.69$ to $0\text{ }\mu\text{W}/\text{cm}^2$ 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 | $\mu\text{V}/\text{K}$ |
| Temperaturkoeffizient der Ausgangsspannung Temperature coefficient of output voltage $E_e = 1.69\text{ }\mu\text{W}/\text{cm}^2$, $\lambda = 428\text{ nm}$, $T = 5$ to 45 °C | α_{vo} | – 3 | ± 1 | + 3 | mV/K |
| Power supply rejection ratio ³⁾ $f_{\text{ac}} = 100\text{ Hz}$ $f_{\text{ac}} = 1\text{ kHz}$ | PSRR PSRR | – | 45 | – | dB dB |
| Output noise voltage $f = 0$ to 1 kHz $f = 10\text{ Hz}$ $f = 100\text{ Hz}$ $f = 1\text{ kHz}$ | | | | | $\mu\text{V RMS}$ $\mu\text{V}/\text{Hz}^{(1/2)}$ $\mu\text{V}/\text{Hz}^{(1/2)}$ $\mu\text{V}/\text{Hz}^{(1/2)}$ |

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

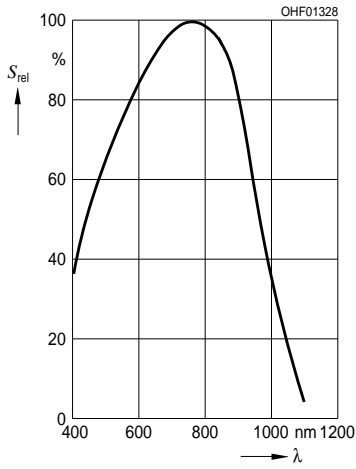
- 2) The light source used is a 428 nm LED with following characteristics: $t_r > 1 \mu\text{s}$, $t_f < 1 \mu\text{s}$. The output waveform is monitored on an oscilloscope with $t_r > 100 \text{ ns}$, $Z_i = 1 \text{ M}\Omega$, $C_i < 20 \text{ pF}$. The rise time is defined as the time from the 10% 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 $V_{DD}(0 \text{ Hz}) = 4.5 \text{ V}$ and $V_O(0 \text{ Hz}) = 2 \text{ V}$

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 |

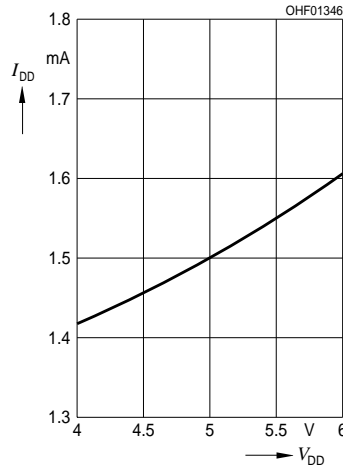
Spectral Sensitivity

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



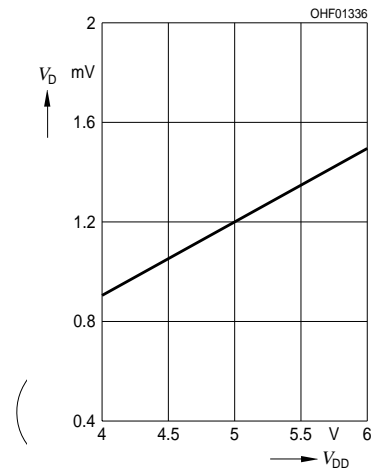
Current Consumption

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

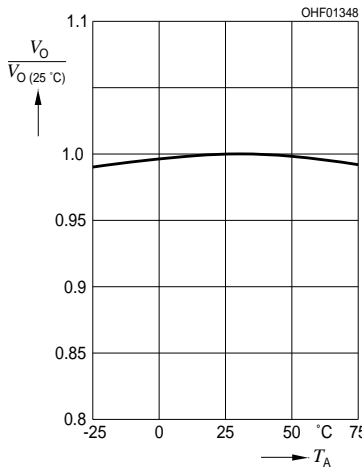


Dark Voltage

$V_D = f(V_{DD})$

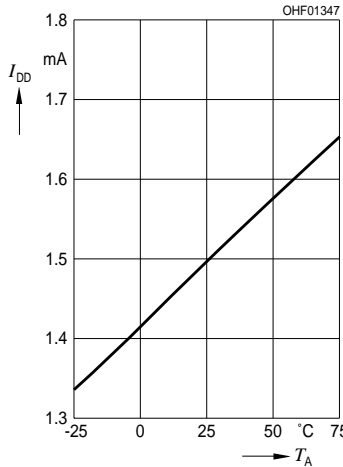


**Output Voltage, $V_O = f(T_A)$,
 $E_e = 1.69 \mu W/cm^2, \lambda = 428 nm$**



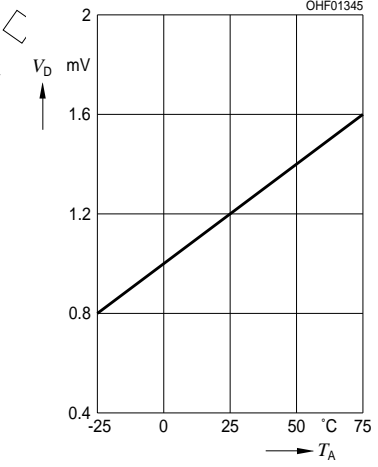
Current Consumption

$I_{DD} = f(T_A)$



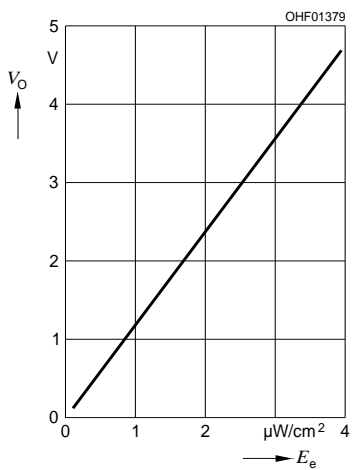
Dark Voltage

$V_D = f(T_A)$



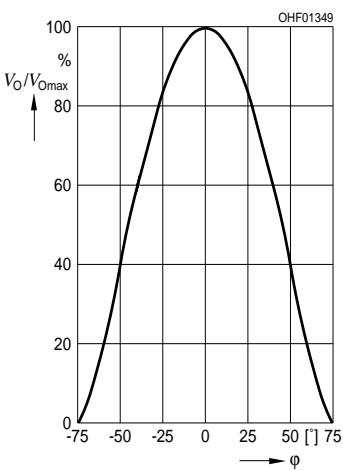
Linearity

$V_O = f(E_e)$

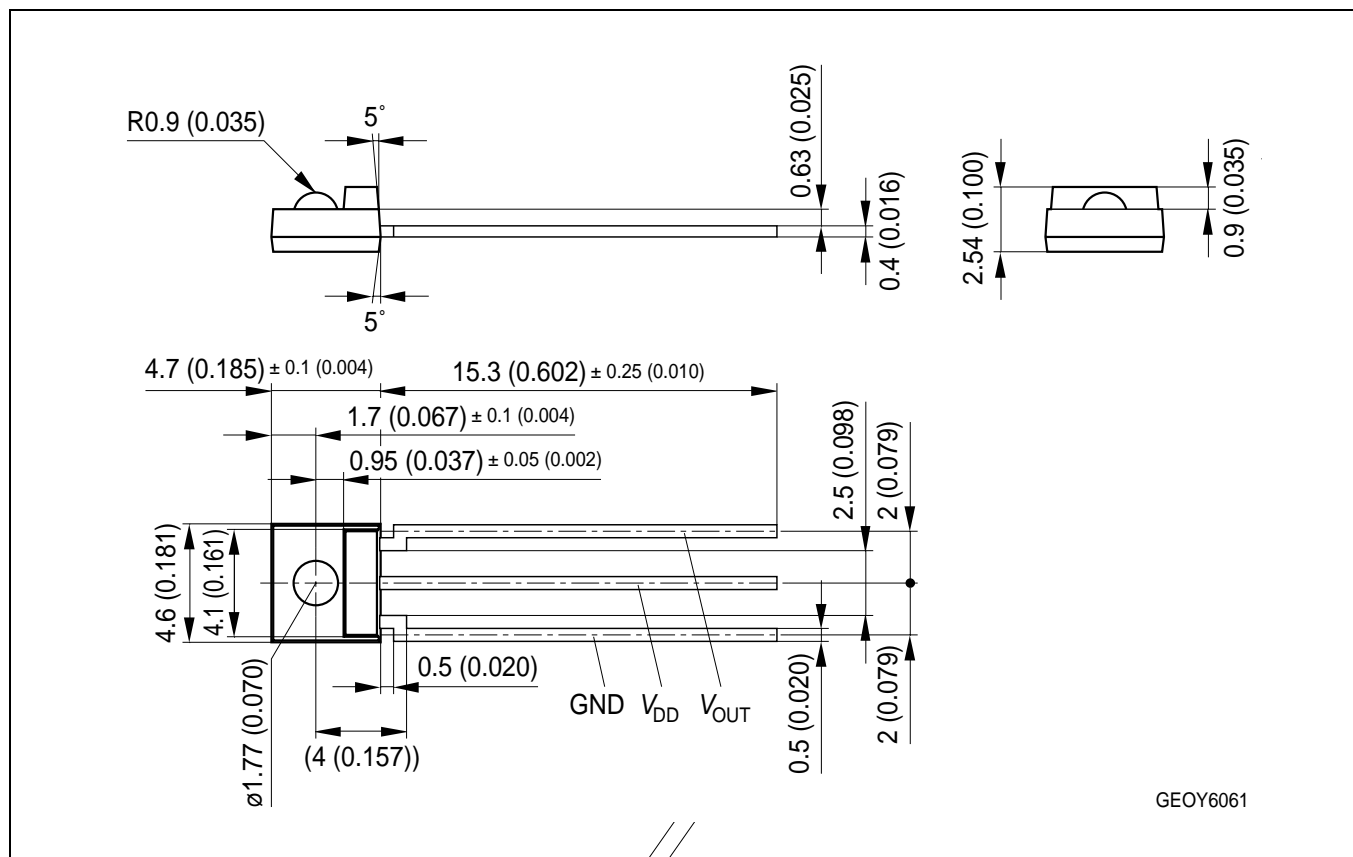


Directional Characteristics

$V_O = f(\phi)$



Maßzeichnung Package Outlines



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

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