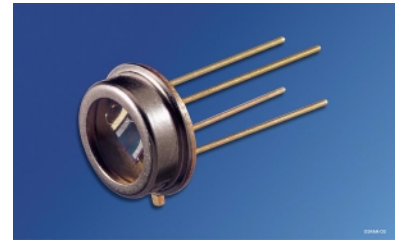


# Silizium-Differential-Fotodiode Silicon Differential Photodiode

## SFH 221



### Wesentliche Merkmale

- Speziell geeignet für Anwendungen im Bereich von 400 nm bis 1100 nm
- Hohe Fotoempfindlichkeit
- Hermetisch dichte Metallbauform (ähnlich TO-5), geeignet bis 125 °C
- Doppeldiode von extrem hoher Gleichmäßigkeit

### Anwendungen

- Nachlaufsteuerungen
- Kantenführung
- Industrieelektronik
- „Messen/Steuern/Regeln“

### Features

- Especially suitable for applications from 400 nm to 1100 nm
- High photosensitivity
- Hermetically sealed metal package (similar to TO-5), suitable up to 125 °C
- Double diode with extremely high homogeneousness

### Applications

- Follow-up controls
- Edge drives
- Industrial electronics
- For control and drive circuits

| Typ<br>Type | Bestellnummer<br>Ordering Code | Gehäuse<br>Package                                                                                        |
|-------------|--------------------------------|-----------------------------------------------------------------------------------------------------------|
| SFH 221     | Q62702-P270                    | Lötspieße im 5.08-mm-Raster ( <sup>2</sup> /10")<br>solder tabs 5.08 mm ( <sup>2</sup> /10") lead spacing |

**Grenzwerte**  
**Maximum Ratings**

| Bezeichnung<br>Parameter                                                                                                                                      | Symbol<br>Symbol  | Wert<br>Value  | Einheit<br>Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------|-----------------|
| Betriebs- und Lagertemperatur<br>Operating and storage temperature range                                                                                      | $T_{op}; T_{stg}$ | - 40 ... + 125 | °C              |
| Löttemperatur (Lötstelle 2 mm vom Gehäuse<br>entfernt bei Lötzeit $t \leq 3$ s)<br>Soldering temperature in 2 mm distance from case<br>bottom ( $t \leq 3$ s) | $T_S$             | 230            | °C              |
| Sperrspannung<br>Reverse voltage                                                                                                                              | $V_R$             | 10             | V               |
| Isolationsspannung gegen Gehäuse<br>Insulation voltage vs. package                                                                                            | $V_{IS}$          | 100            | V               |
| Verlustleistung, $T_A = 25$ °C<br>Total power dissipation                                                                                                     | $P_{tot}$         | 50             | mW              |

**Kennwerte** ( $T_A = 25$  °C, Normlicht A,  $T = 2856$  K) für jede Einzeldiode

**Characteristics** ( $T_A = 25$  °C, standard light A,  $T = 2856$  K) per single diode

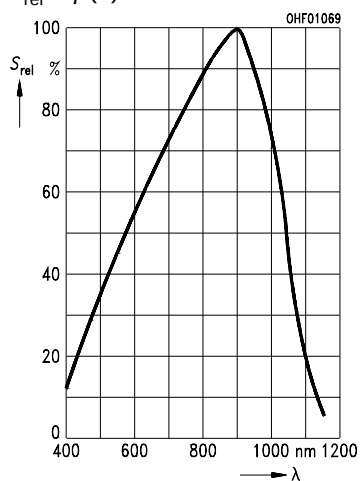
| Bezeichnung<br>Parameter                                                                                                             | Symbol<br>Symbol             | Wert<br>Value    | Einheit<br>Unit |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------|-----------------|
| Fotoempfindlichkeit, $V_R = 5$ V<br>Spectral sensitivity                                                                             | $S$                          | 24 ( $\geq 15$ ) | nA/lx           |
| Wellenlänge der max. Fotoempfindlichkeit<br>Wavelength of max. sensitivity                                                           | $\lambda_{S \max}$           | 900              | nm              |
| Spektraler Bereich der Fotoempfindlichkeit<br>$S = 10\%$ von $S_{\max}$<br>Spectral range of sensitivity<br>$S = 10\%$ of $S_{\max}$ | $\lambda$                    | 400 ... 1100     | nm              |
| Bestrahlungsempfindliche Fläche<br>Radiant sensitive area                                                                            | $A$                          | 1.54             | mm <sup>2</sup> |
| Abmessung der bestrahlungsempfindlichen Fläche<br>Dimensions of radiant sensitive area                                               | $L \times B$<br>$L \times W$ | $0.7 \times 2.2$ | mm              |
| Abstand Chipoberfläche zu Gehäuseoberfläche<br>Distance chip front to case surface                                                   | $H$                          | 1.1 ... 1.6      | mm              |
| Halbwinkel<br>Half angle                                                                                                             | $\varphi$                    | $\pm 55$         | Grad<br>deg.    |

**Kennwerte** ( $T_A = 25\text{ °C}$ , Normlicht A,  $T = 2856\text{ K}$ ) für jede Einzeldiode

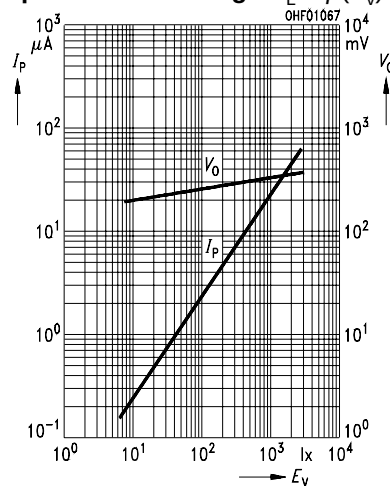
**Characteristics** ( $T_A = 25\text{ °C}$ , standard light A,  $T = 2856\text{ K}$ ) per single diode (cont'd)

| Bezeichnung<br>Parameter                                                                                                                                                                        | Symbol<br>Symbol | Wert<br>Value         | Einheit<br>Unit                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|------------------------------------------------------|
| Dunkelstrom, $V_R = 10\text{ V}$<br>Dark current                                                                                                                                                | $I_R$            | 10 ( $\leq 100$ )     | nA                                                   |
| Spektrale Fotoempfindlichkeit, $\lambda = 850\text{ nm}$<br>Spectral sensitivity                                                                                                                | $S_\lambda$      | 0.55                  | A/W                                                  |
| Maximale Abweichung der Fotoempfindlichkeit<br>vom Mittelwert<br>Max. deviation of the system spectral sensitivity<br>from the average                                                          | $\Delta S$       | $\pm 5$               | %                                                    |
| Quantenausbeute, $\lambda = 850\text{ nm}$<br>Quantum yield                                                                                                                                     | $\eta$           | 0.80                  | <u>Electrons</u><br>Photon                           |
| Leerlaufspannung, $E_v = 1000\text{ lx}$<br>Open-circuit voltage                                                                                                                                | $V_L$            | 330 ( $\geq 280$ )    | mV                                                   |
| Kurzschlußstrom, $E_v = 1000\text{ lx}$<br>Short-circuit current                                                                                                                                | $I_K$            | 24                    | $\mu\text{A}$                                        |
| Isolationsstrom, $V_{IS} = 100\text{ V}$<br>Insulation current                                                                                                                                  | $I_{IS}$         | 0.1 ( $\leq 1$ )      | nA                                                   |
| Anstiegs- und Abfallzeit des Fotostromes<br>Rise and fall time of the photocurrent<br>$R_L = 1\text{ k}\Omega$ ; $V_R = 5\text{ V}$ ; $\lambda = 850\text{ nm}$ ; $I_p = 25\text{ }\mu\text{A}$ | $t_r, t_f$       | 500                   | ns                                                   |
| Durchlaßspannung, $I_F = 40\text{ mA}$ , $E = 0$<br>Forward voltage                                                                                                                             | $V_F$            | 1.0                   | V                                                    |
| Kapazität, $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$<br>Capacitance                                                                                                                     | $C_0$            | 25                    | pF                                                   |
| Temperaturkoeffizient für $V_L$<br>Temperature coefficient of $V_L$                                                                                                                             | $TC_V$           | - 2.6                 | mV/K                                                 |
| Temperaturkoeffizient für $I_K$<br>Temperature coefficient of $I_K$                                                                                                                             | $TC_I$           | 0.18                  | %/K                                                  |
| Rauschäquivalente Strahlungsleistung<br>Noise equivalent power<br>$V_R = 10\text{ V}$ , $\lambda = 850\text{ nm}$                                                                               | $NEP$            | $1.0 \times 10^{-13}$ | $\frac{\text{W}}{\sqrt{\text{Hz}}}$                  |
| Nachweisgrenze, $V_R = 10\text{ V}$ , $\lambda = 850\text{ nm}$<br>Detection limit                                                                                                              | $D^*$            | $1.2 \times 10^{12}$  | $\frac{\text{cm} \times \sqrt{\text{Hz}}}{\text{W}}$ |

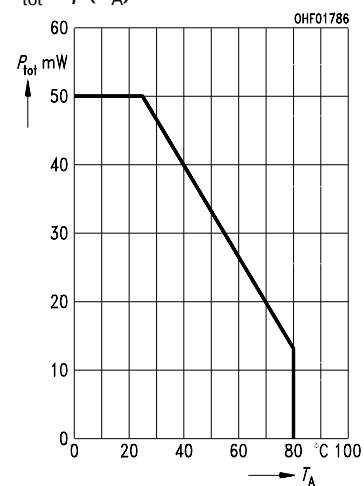
**Relative Spectral Sensitivity**  
 $S_{\text{rel}} = f(\lambda)$



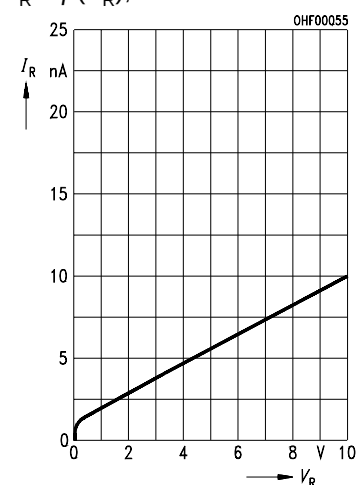
**Photocurrent  $I_P = f(E_V)$ ,  $V_R = 5 \text{ V}$**   
**Open-Circuit-Voltage  $V_0 = f(E_V)$**



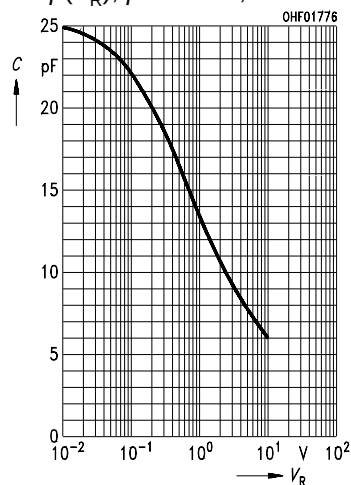
**Total Power Dissipation**  
 $P_{\text{tot}} = f(T_A)$



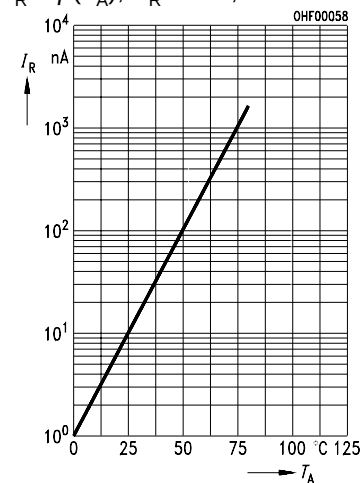
**Dark Current**  
 $I_R = f(V_R), E = 0$



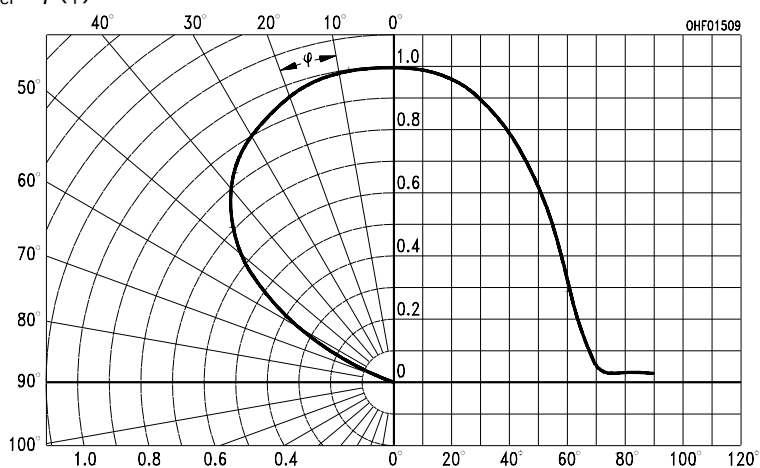
**Capacitance**  
 $C = f(V_R), f = 1 \text{ MHz}, E = 0$



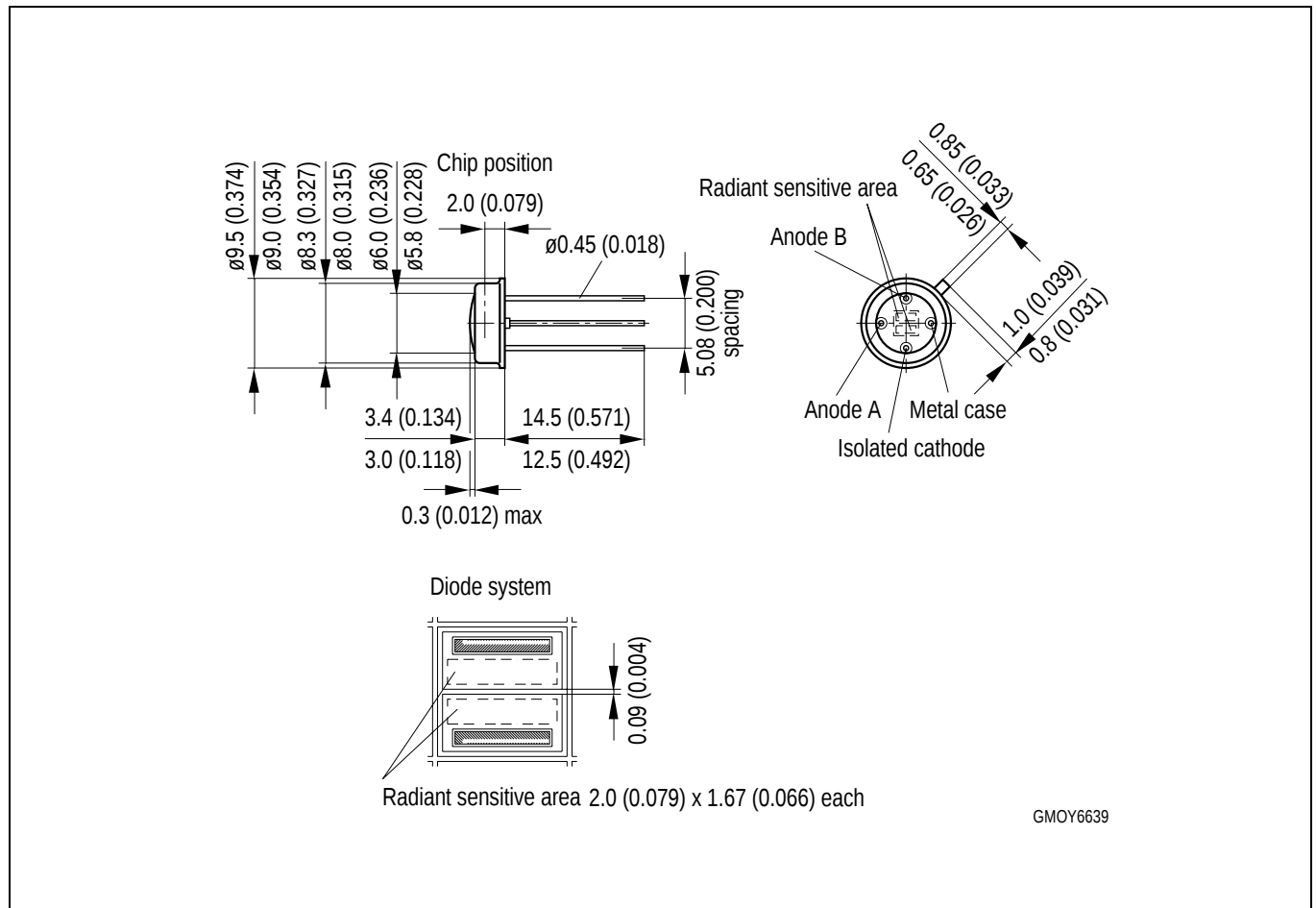
**Dark Current**  
 $I_R = f(T_A), V_R = 1 \text{ V}, E = 0$



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



## Maßzeichnung Package Outlines



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

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