

# Schnelle IR-Lumineszenzdiode (950 nm) im 5 mm Radial-Gehäuse High-Speed Infrared Emitter (950 nm) in 5 mm Radial Package

SFH 4501, SFH 4502, SFH 4503



SFH 4501



SFH 4502



SFH 4503

## Wesentliche Merkmale

- GaAs-LED mit sehr hohem Wirkungsgrad
- Hohe Zuverlässigkeit
- Gute spektrale Anpassung an Si-Fotoempfänger

## Features

- Very highly efficient GaAs-LED
- High reliability
- Spectral match with silicon photodetectors

## Anwendungen

- IR-Fernsteuerung von Fernseh- und Rundfunkgeräten, Videorecordern, Lichtdimmern
- Gerätefernsteuerungen für Gleich- und Wechsellichtbetrieb
- Sensorik
- Diskrete Lichtschranken

## Applications

- IR remote control of hi-fi and TV-sets, video tape recorders, dimmers
- Remote control for steady and varying intensity
- Sensor technology
- Discrete interrupters

| Typ<br>Type | Bestellnummer<br>Ordering Code | Gehäuse<br>Package                                                                                                                                                                   |
|-------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SFH 4501    | Q62702-P5061                   | 5-mm-LED-Gehäuse (T 1 <sup>3</sup> / <sub>4</sub> ), schwarz eingefärbt, Anschluß im 2.54-mm-Raster (1 <sup>1</sup> / <sub>10</sub> " ),<br>Anodenkennzeichnung: kürzerer Anschluß   |
| SFH 4502    | Q62702-P5062                   |                                                                                                                                                                                      |
| SFH 4503    | Q62702-P5305                   | 5 mm LED package (T 1 <sup>3</sup> / <sub>4</sub> ), black-colored epoxy resin lens, solder tabs lead spacing 2.54 mm (1 <sup>1</sup> / <sub>10</sub> " ), anode marking: short lead |

**Grenzwerte** ( $T_A = 25\text{ °C}$ )**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 ... + 100 | °C              |
| Sperrspannung<br>Reverse voltage                                                                                                                                                 | $V_R$             | 3              | V               |
| Durchlaßstrom<br>Forward current                                                                                                                                                 | $I_F$ (DC)        | 100            | mA              |
| Stoßstrom, $t_p = 10\text{ }\mu\text{s}$ , $D = 0$<br>Surge current                                                                                                              | $I_{FSM}$         | 2.2            | A               |
| Verlustleistung<br>Power dissipation                                                                                                                                             | $P_{tot}$         | 180            | mW              |
| Wärmewiderstand Sperrschicht - Umgebung,<br>freie Beinchenlänge max. 10 mm<br>Thermal resistance junction - ambient,<br>lead length between package bottom and PCB<br>max. 10 mm | $R_{thJA}$        | 375            | K/W             |

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

| Bezeichnung<br>Parameter                                                                                                             | Symbol<br>Symbol             | Wert<br>Value                  | Einheit<br>Unit |
|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------|-----------------|
| Wellenlänge der Strahlung<br>Wavelength at peak emission<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$                             | $\lambda_{peak}$             | 950                            | nm              |
| Spektrale Bandbreite bei 50% von $I_{max}$<br>Spectral bandwidth at 50% of $I_{max}$<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ | $\Delta\lambda$              | 40                             | nm              |
| Abstrahlwinkel<br>Half angle<br>SFH 4501<br>SFH 4502<br>SFH 4503                                                                     | $\varphi$                    | $\pm 7$<br>$\pm 18$<br>$\pm 4$ | Grad<br>deg.    |
| Aktive Chipfläche<br>Active chip area                                                                                                | $A$                          | 0.09                           | mm <sup>2</sup> |
| Abmessungen der aktiven Chipfläche<br>Dimension of the active chip area                                                              | $L \times B$<br>$L \times W$ | $0.3 \times 0.3$               | mm              |

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

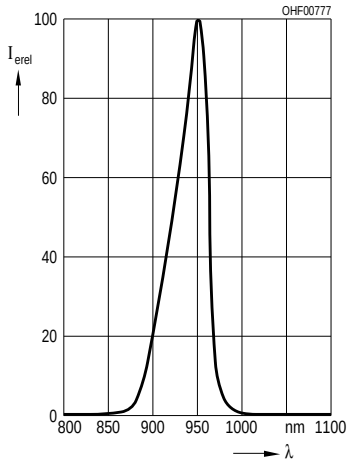
| <b>Bezeichnung<br/>Parameter</b>                                                                                                                                                                                                                                            | <b>Symbol<br/>Symbol</b> | <b>Wert<br/>Value</b>                    | <b>Einheit<br/>Unit</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------|-------------------------|
| Schaltzeiten, $I_e$ von 10% auf 90% und von 90% auf 10%, bei $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ , $R_L = 50\text{ }\Omega$<br>Switching times, $I_e$ from 10% to 90% and from 90% to 10%, $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ , $R_L = 50\text{ }\Omega$ | $t_r$ , $t_f$            | 10                                       | ns                      |
| Kapazität<br>Capacitance<br>$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                                                                                                                                                         | $C_o$                    | 35                                       | pF                      |
| Durchlaßspannung,<br>Forward voltage<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$<br>$I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$                                                                                                                                 | $V_F$<br>$V_F$           | 1.5 ( $\leq 1.8$ )<br>3.2 ( $\leq 4.0$ ) | V<br>V                  |
| Sperrstrom,<br>Reverse current<br>$V_R = 3\text{ V}$                                                                                                                                                                                                                        | $I_R$                    | 0.01 ( $\leq 10$ )                       | $\mu\text{A}$           |
| Gesamtstrahlungsfluß,<br>Total radiant flux<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$                                                                                                                                                                                 | $\Phi_e$                 | 32                                       | mW                      |
| Temperaturkoeffizient von $I_e$ bzw. $\Phi_e$ ,<br>$I_F = 100\text{ mA}$<br>Temperature coefficient of $I_e$ or $\Phi_e$ ,<br>$I_F = 100\text{ mA}$                                                                                                                         | $TC_I$                   | - 0.44                                   | %/K                     |
| Temperaturkoeffizient von $V_F$ , $I_F = 100\text{ mA}$<br>Temperature coefficient of $V_F$ , $I_F = 100\text{ mA}$                                                                                                                                                         | $TC_V$                   | - 1.5                                    | mV/K                    |
| Temperaturkoeffizient von $\lambda$ , $I_F = 100\text{ mA}$<br>Temperature coefficient of $\lambda$ , $I_F = 100\text{ mA}$                                                                                                                                                 | $TC_\lambda$             | + 0.2                                    | nm/K                    |

**Strahlstärke  $I_e$  in Achsrichtung**gemessen bei einem Raumwinkel  $\Omega = 0.01$  sr**Radiant Intensity  $I_e$  in Axial Direction**at a solid angle of  $\Omega = 0.01$  sr

| Bezeichnung<br>Description                                            | Symbol                                     | Werte<br>Values |          |           | Einheit<br>Unit |
|-----------------------------------------------------------------------|--------------------------------------------|-----------------|----------|-----------|-----------------|
|                                                                       |                                            | SFH 4501        | SFH 4502 | SFH 4503  |                 |
| Strahlstärke<br>Radiant intensity<br>$I_F = 100$ mA, $t_p = 20$ ms    | $I_{e \text{ min}}$<br>$I_{e \text{ typ}}$ | 63<br>90        | 25<br>50 | 63<br>200 | mW/sr           |
| Strahlstärke<br>Radiant intensity<br>$I_F = 1$ A, $t_p = 100$ $\mu$ s | $I_{e \text{ typ}}$                        | 550             | 310      | 1200      | mW/sr           |

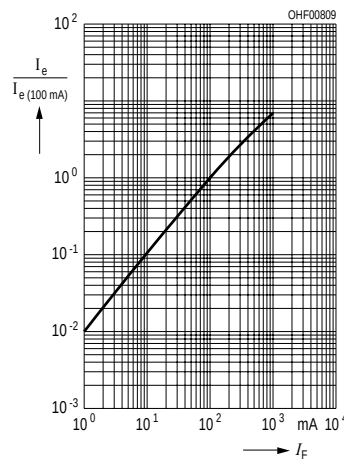
### Relative Spectral Emission

$$I_{\text{rel}} = f(\lambda)$$



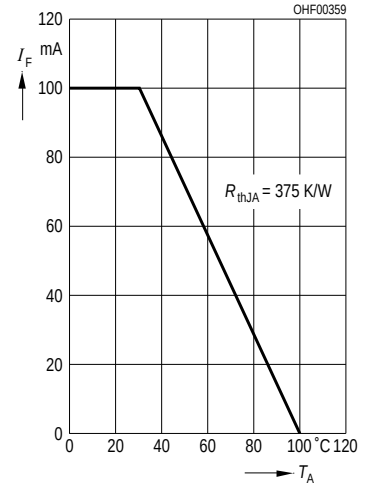
$$\text{Radiant Intensity } \frac{I_e}{I_e(100 \text{ mA})} = f(I_F)$$

Single pulse,  $t_p = 20 \mu\text{s}$



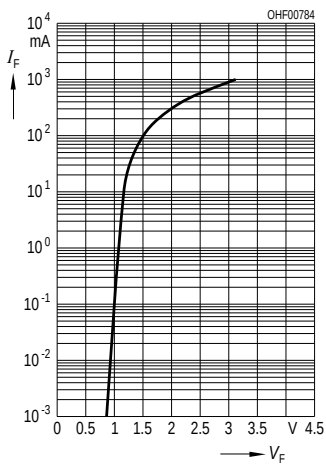
### Max. Permissible Forward Current

$$I_F = f(T_A)$$



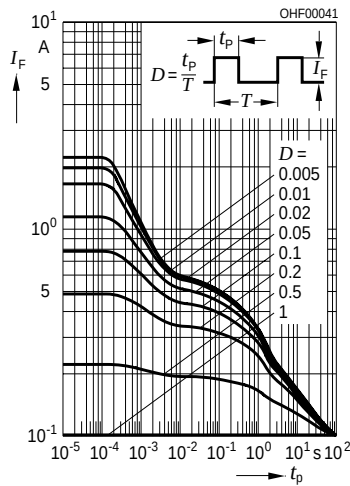
### Forward Current $I_F = f(V_F)$

single pulse,  $t_p = 20 \mu\text{s}$

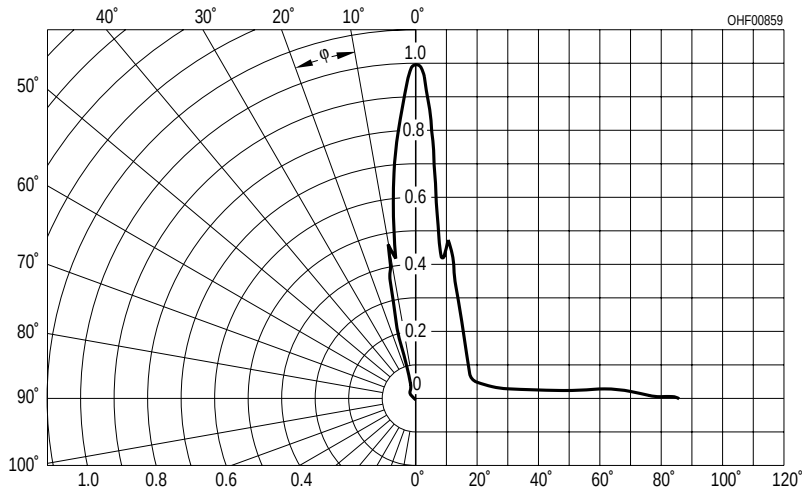


### Permissible Pulse Handling

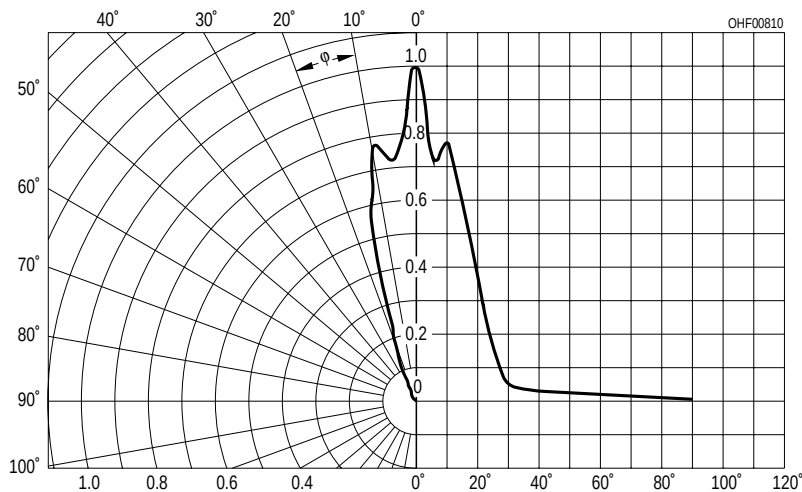
Capability  $I_F = f(\tau)$ ,  $T_A = 25^\circ\text{C}$ ,  
duty cycle  $D = \text{parameter}$



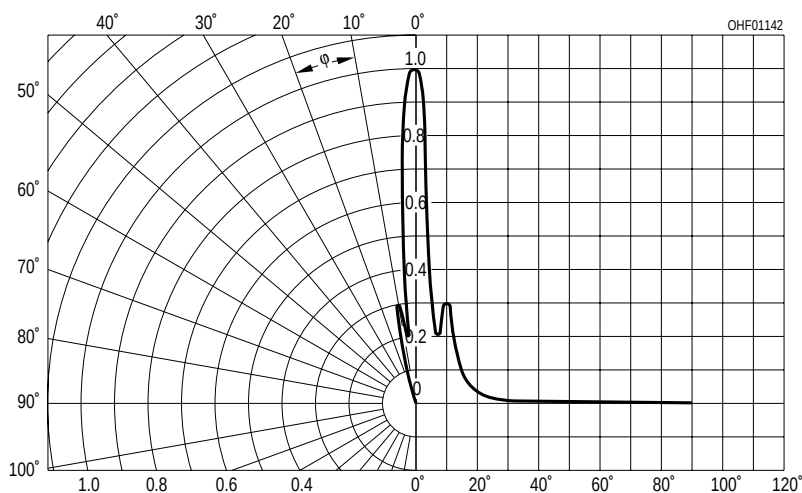
**Radiation Characteristics  $I_{\text{rel}} = f(\varphi)$**   
**SFH 4501**



**Radiation Characteristics  $I_{\text{rel}} = f(\varphi)$**   
**SFH 4502**

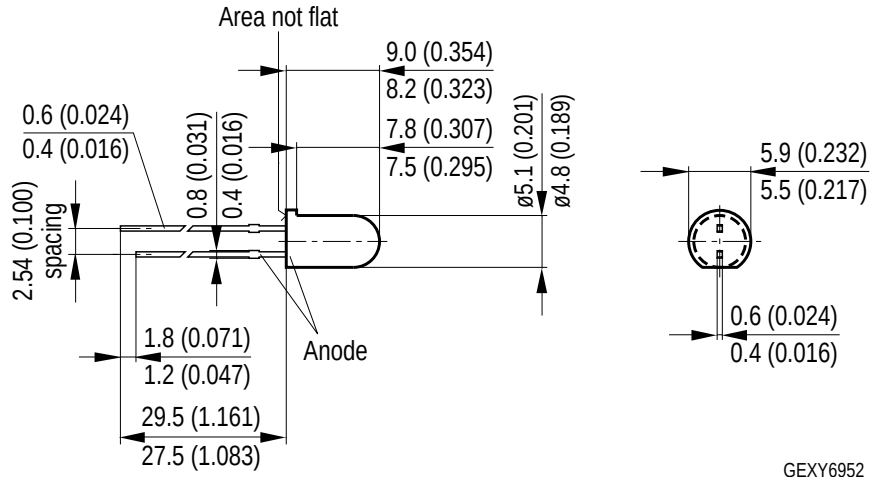


**Radiation Characteristics  $I_{\text{rel}} = f(\varphi)$**   
**SFH 4503**

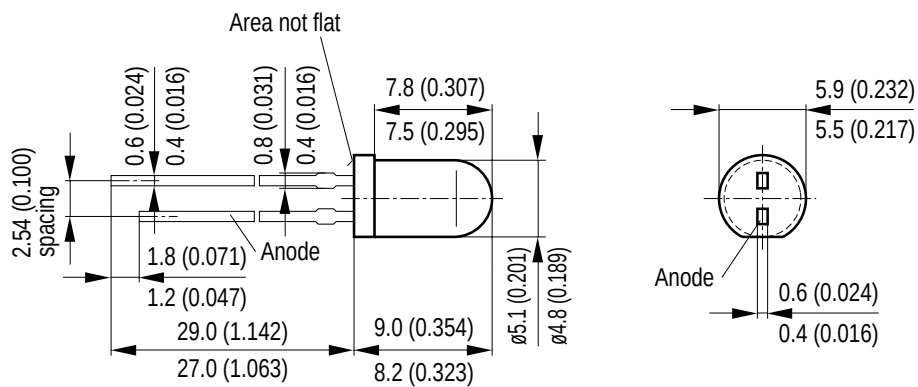


**Maßzeichnung  
Package Outlines**

SFH 4501



SFH 4502



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





**Lötbedingungen**  
**Soldering Conditions**

| Tauch-, Schwall- und Schlepplötlung<br>Dip, Wave and Drag Soldering |                                 |                                                 | Kolbenlötlung (mit 1,5-mm-Kolbenspitze)<br>Iron Soldering (with 1.5-mm-bit) |                                          |                                                 |
|---------------------------------------------------------------------|---------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------|
| Lötbad-<br>temperatur                                               | Maximal<br>zulässige<br>Lötzeit | Abstand<br>Lötstelle –<br>Gehäuse               | Temperatur<br>des Kolbens                                                   | Maximale<br>zulässige<br>Lötzeit         | Abstand<br>Lötstelle –<br>Gehäuse               |
| Temperature<br>of the<br>Soldering<br>Bath                          | Max. Perm.<br>Soldering<br>Time | Distance<br>between<br>Solder Joint<br>and Case | Temperature<br>of the<br>Soldering Iron                                     | Max.<br>Permissible<br>Soldering<br>Time | Distance<br>between<br>Solder Joint<br>and Case |
| 260 °C                                                              | 10 s                            | ≥ 1.5 mm                                        | 300 °C                                                                      | 3 s                                      | ≥ 1.5 mm                                        |

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