

# GaAs-IR-Lumineszenzdiode

## GaAs Infrared Emitter

### SFH 409



#### Wesentliche Merkmale

- GaAs-LED mit sehr hohem Wirkungsgrad
- Hohe Zuverlässigkeit
- Hohe Impulsbelastbarkeit
- Gute spektrale Anpassung an Si-Fotoempfänger
- Gehäusegleich mit SFH 309, SFH 487

#### Features

- Very highly efficient GaAs-LED
- High reliability
- High pulse handling capability
- Good spectral match to silicon photodetectors
- Same package as SFH 309, SFH 487

#### Anwendungen

- IR-Fernsteuerungen von Fernseh-, Rundfunk- und Videogeräten, Lichtdimmern
- Lichtschranken bis 500 kHz
- Münzzähler
- Sensorik
- Diskrete Optokoppler

#### Applications

- IR remote control for hifi and TV sets, video tape recorders, dimmers
- Light-reflection switches (max. 500 kHz)
- Coin counters
- Sensor technology
- Discrete optocouplers

| Typ<br>Type | Bestellnummer<br>Ordering Code | Gehäuse<br>Package                                                                                                                                                                                                                                                               |
|-------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SFH 409     | Q62702-P860                    | 3-mm-LED-Gehäuse (T 1), grau eingefärbt, Anschlüsse im 2.54-mm-Raster ( $\frac{1}{10}$ "),<br>Kathodenkennzeichnung: kürzerer Anschluß<br>3 mm LED package (T 1), grey-colored epoxy resin, solder tabs lead spacing 2.54 mm ( $\frac{1}{10}$ "),<br>cathode marking: short lead |
| SFH 409-2   | Q62702-P1002                   |                                                                                                                                                                                                                                                                                  |

**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                                         | $V_R$             | 5              | V               |
| Durchlaßstrom<br>Forward current                                         | $I_F$             | 100            | mA              |
| Stoßstrom, $\tau \leq 10\text{ }\mu\text{s}$ , $D = 0$<br>Surge current  | $I_{FSM}$         | 3              | A               |
| Verlustleistung<br>Power dissipation                                     | $P_{tot}$         | 165            | mW              |
| Wärmewiderstand<br>Thermal resistance                                    | $R_{thJA}$        | 450            | 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>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ | $\Delta\lambda$              | 55               | nm              |
| Abstrahlwinkel<br>Half angle                                                                                                         | $\varphi$                    | $\pm 20$         | Grad<br>deg.    |
| Aktive Chipfläche<br>Active chip area                                                                                                | $A$                          | 0.09             | mm <sup>2</sup> |
| Abmessungen der aktiven Chipfläche<br>Dimensions of the active chip area                                                             | $L \times B$<br>$L \times W$ | $0.3 \times 0.3$ | mm              |
| Abstand Chipoberfläche bis Linsenscheitel<br>Distance chip surface to lens top                                                       | $H$                          | 2.6              | mm              |
| Kapazität, $V_R = 0\text{ V}$<br>Capacitance                                                                                         | $C_o$                        | 25               | pF              |

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

| Bezeichnung<br>Parameter                                                                                                                                                                                                      | Symbol<br>Symbol | Wert<br>Value                             | Einheit<br>Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------|-----------------|
| Schaltzeiten, $I_e$ von 10% auf 90% und von 90% auf 10%, bei $I_F = 100\text{ mA}$ , $R_L = 50\text{ }\Omega$<br>Switching times, $I_e$ from 10% to 90% and from 90% to 10%, $I_F = 100\text{ mA}$ , $R_L = 50\text{ }\Omega$ | $t_r$ , $t_f$    | 0.5                                       | $\mu\text{s}$   |
| 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>$V_F$   | 1.30 ( $\leq 1.5$ )<br>1.9 ( $\leq 2.5$ ) | V<br>V          |
| Sperrstrom,<br>Reverse current, $V_R = 5\text{ V}$                                                                                                                                                                            | $I_R$            | 0.01 ( $\leq 1$ )                         | $\mu\text{A}$   |
| Gesamtstrahlungsfluß,<br>Total radiant flux<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$                                                                                                                                   | $\Phi_e$         | 15                                        | mW              |
| Temperaturkoeffizient von $I_e$ bzw. $\Phi_e$ ,<br>$I_F = 100\text{ mA}$<br>Temperature coefficient of $I_e$ or $\Phi_e$ ,<br>$I_F = 100\text{ mA}$                                                                           | $TC_I$           | - 0.55                                    | %/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 $\lambda_{\text{peak}}$ , $I_F = 100\text{ mA}$<br>Temperature coefficient of $\lambda_{\text{peak}}$ , $I_F = 100\text{ mA}$                                                                       | $TC_\lambda$     | + 0.3                                     | nm/K            |

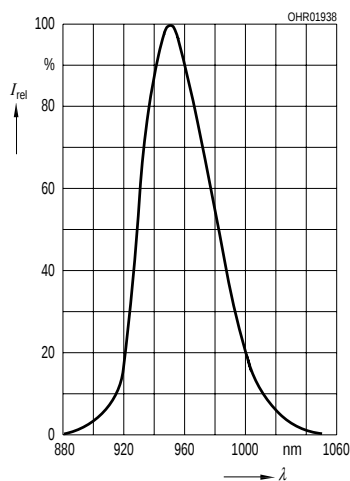
**Gruppierung der Strahlstärke  $I_e$  in Achsrichtung**gemessen bei einem Raumwinkel  $\Omega = 0.01\text{ sr}$ **Grouping of Radiant Intensity  $I_e$  in Axial Direction**at a solid angle of  $\Omega = 0.01\text{ sr}$ 

| Bezeichnung<br>Parameter                                                                                                                 | Symbol                       | Werte<br>Values |                         |             |                         | Einheit<br>Unit |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|-------------------------|-------------|-------------------------|-----------------|
|                                                                                                                                          |                              | SFH 409         | SFH 409-1 <sup>1)</sup> | SFH 409-2   | SFH 409-3 <sup>1)</sup> |                 |
| Strahlstärke<br>Radiant intensity<br>$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$<br>$I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$<br>$I_{e\text{ typ.}}$ | $\geq 6.3$<br>— | 6.3 ... 12.5<br>75      | > 10<br>120 | 16 ... 32<br>—          | mW/sr<br>mW/sr  |

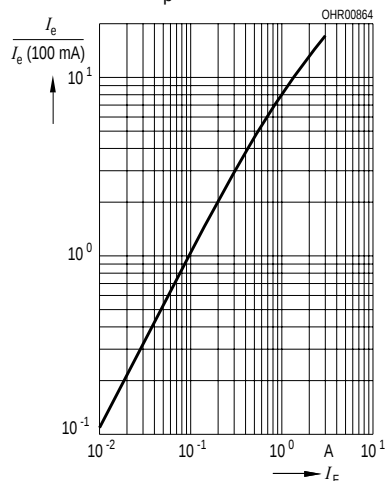
<sup>1)</sup> Nicht bestellbar als Einzelgruppe.<sup>1)</sup> Can not be ordered as single group.

**Relative Spectral Emission**

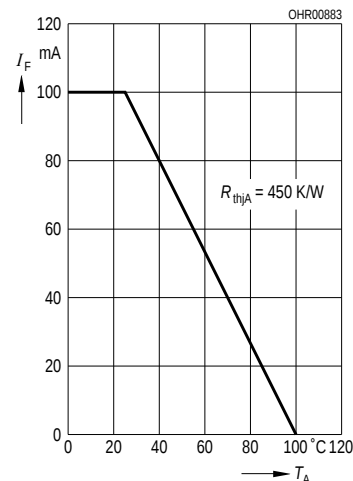
$$I_{\text{rel}} = f(\lambda)$$



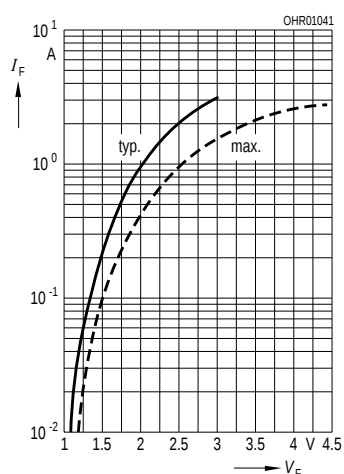
$$\text{Radiant Intensity } \frac{I_e}{I_e 100 \text{ mA}} = f(I_F)$$

Single pulse,  $t_p = 20 \mu\text{s}$ **Max. Permissible Forward Current**

$$I_F = f(T_A)$$

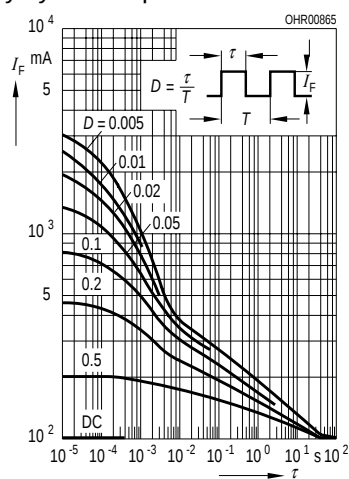
**Forward Current**

$$I_F = f(V_F), \text{ Single pulse, } t_p = 20 \mu\text{s}$$

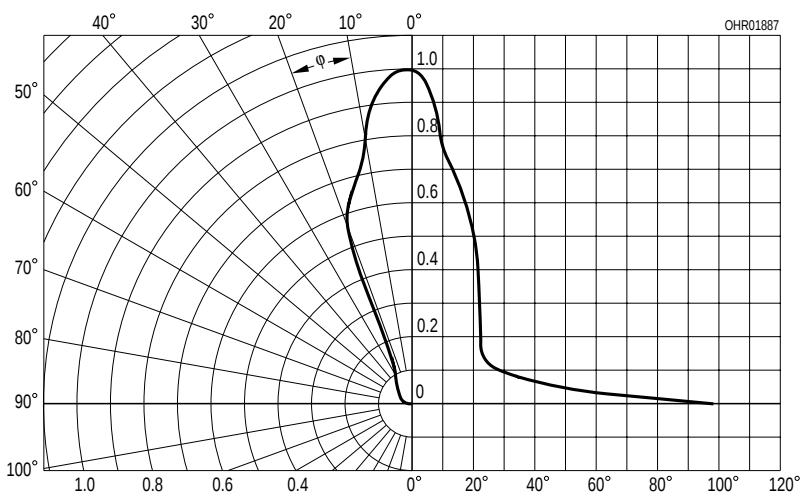
**Permissible Pulse Handling**

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

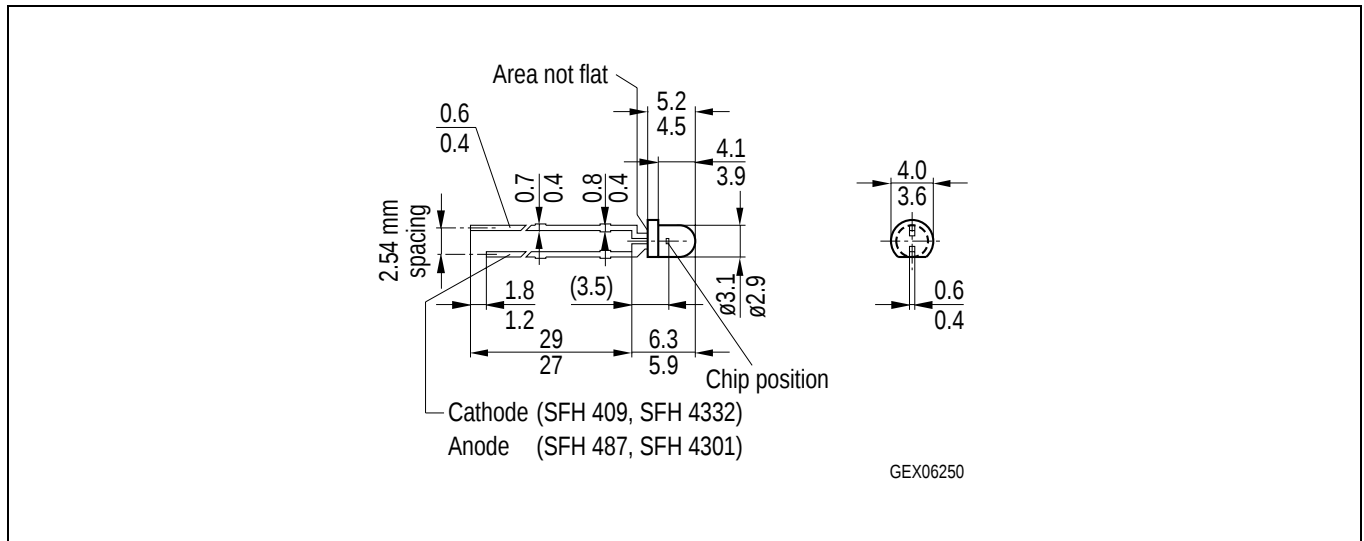
duty cycle  $D = \text{parameter}$

**Radiation Characteristics**

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



## Maßzeichnung Package Outlines



Maße in mm, wenn nicht anders angegeben / Dimensions in mm, unless otherwise specified.