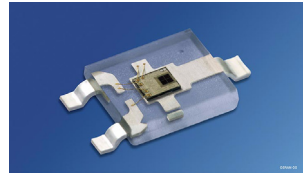


# Logic Gate Detector

## Lead (Pb) Free Product - RoHS Compliant

SFH 5400



### Wesentliche Merkmale

- Geeignet für Anwendungen im Bereich von 500 nm bis 900 nm
- Fotodiode mit integriertem Schmitt-Trigger
- SMT-Bauform
- TTL- und CMOS-kompatibel
- Ausgang: push-pull

### Anwendungen

- Optischer Schalter
- Lichtschranken
- Pulsformer
- Zähler

### Features

- Suitable for applications from 500 nm to 900 nm
- Photodiode with built-in Schmitt trigger
- SMT package
- TTL and CMOS compatible
- Output: push-pull

### Applications

- Optoelectronic switch
- Interrupter
- Pulse former
- Photoelectric counter

| Typ<br>Type | Bestellnummer<br>Ordering Code |
|-------------|--------------------------------|
| SFH 5400    | Q65110A2704                    |

### 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 ... + 85 | °C              |
| Versorgungsspannung<br>Supply voltage                                    | $V_{CC}$          | - 0.5 ... 15  | V               |
| Ausgangsspannung<br>Output voltage                                       | $V_O$             | - 0.5 ... 15  | V               |
| Ausgangsstrom<br>Output current  | $I_q$             | - 25 ... 40   | mA              |
| Ausgangsleistung $T_A = 25\text{ °C}$<br>Total output power              | $P_q$             | 100           | mW              |

### Kennwerte Characteristics

$T_A = -40 \dots 85\text{ °C}$ ,  $V_{CC} = 4.5 \dots 15\text{ V}$ ,  $E_e = 3.2 \dots 10\text{ mW/cm}^2$   
 $T_A = 25\text{ °C}$ ,  $V_{CC} = 5\text{ V}$ ,  $E_e = 6.5\text{ mW/cm}^2$  for typical values

| Bezeichnung<br>Parameter   | Symbol<br>Symbol | Wert<br>Value |        | Einheit<br>Unit    |
|--|------------------|---------------|--------|--------------------|
|  |                  | typ.          | Limit  |                    |
| Schwelle Bestrahlungsstärke<br>Threshold radiant intensity<br>(Ausgang L → H)<br>(Output L → H)<br>$\lambda = 660\text{ nm}$ | $E_{eSchw}$      | 1.3           | –      | mW/cm <sup>2</sup> |
| Min. Bestrahlungsstärke, Ausgang H<br>Min. radiant intensity, Output H<br>$\lambda = 660\text{ nm}$                          | $E_{eHmin}$      | –             | < 3.2  | mW/cm <sup>2</sup> |
| Max. Bestrahlungsstärke, Ausgang L<br>Max. radiant intensity, Output L<br>$\lambda = 660\text{ nm}$                          | $E_{eLmax}$      | –             | > 0.16 | mW/cm <sup>2</sup> |
| Hysterese<br>Hysteresis  | $\Delta E_e$     | > 0.2         | –      | mW/cm <sup>2</sup> |
| Ausgangsspannung L<br>Output voltage L<br>$I_{OL} = 6.4\text{ mA}$   | $V_{OL}$         | 0.15          | < 0.5  | V                  |

**Kennwerte****Characteristics** (cont'd)

$T_A = -40 \dots 85 \text{ }^\circ\text{C}$ ,  $V_{CC} = 4.5 \dots 15 \text{ V}$ ,  $E_e = 3.2 \dots 10 \text{ mW/cm}^2$

$T_A = 25 \text{ }^\circ\text{C}$ ,  $V_{CC} = 5 \text{ V}$ ,  $E_e = 6.5 \text{ mW/cm}^2$  for typical values

| Bezeichnung<br>Parameter   | Symbol<br>Symbol | Wert<br>Value  |                  | Einheit<br>Unit |
|--|------------------|----------------|------------------|-----------------|
|  |                  | typ.           | Limit            |                 |
| Ausgangsspannung H<br>Output voltage H<br>$I_{OH} = -2.6 \text{ mA}$   | $V_{OH}$         | $V_{CC} - 1.8$ | > 2.4            | V               |
| Ausgangsleckstrom ( $V_O > V_{CC} = 4.5 \text{ V}$ )<br>Output leakage current ( $V_O > V_{CC} = 4.5 \text{ V}$ )<br>$V_O = 5.5 \text{ V}$<br>$V_O = 15 \text{ V}$ | $I_{OHH}$        | 0.2<br>0.25    | < 100<br>< 500   | $\mu\text{A}$   |
| Kurzschlußstrom L<br>Short-circuit current L<br>$t_p < 10 \text{ ms}$ , $E_e = 0$ ;<br>$V_{CC} = V_O = 5.5 \text{ V}$<br>$V_{CC} = V_O = 15 \text{ V}$             | $I_{OSL}$        | 40<br>80       | > 25<br>> 40     | mA              |
| Kurzschlußstrom H<br>Short-circuit current H<br>$t_p < 10 \text{ ms}$ , $V_O = \text{GND}$ ;<br>$V_{CC} = 5.5 \text{ V}$<br>$V_{CC} = 15 \text{ V}$                | $I_{OSH}$        | - 22<br>- 45   | < - 10<br>< - 25 | mA              |
| Versorgungsstrom L<br>Supply current L<br>$E_e = 0$ ;<br>$V_{CC} = 5.5 \text{ V}$<br>$V_{CC} = 15 \text{ V}$   | $I_{CCL}$        | 3.5<br>4       | < 6<br>< 7.5     | mA              |
| Versorgungsstrom<br>Supply current L<br>$V_{CC} = 5.5 \text{ V}$<br>$V_{CC} = 15 \text{ V}$  | $I_{CCH}$        | 3.4<br>3.8     | < 5<br>< 6       | mA              |
| Ausgangsverzögerungszeit <sup>1)</sup><br>Ausgang H → L<br>Output delay time <sup>1)</sup><br>Output H → L   | $t_{PHL}$        | 200            | –                | ns              |
| Ausgangsverzögerungszeit <sup>1)</sup><br>Ausgang L → H<br>Output delay time <sup>1)</sup><br>Output L → H   | $t_{PLH}$        | 200            | –                | ns              |

**Kennwerte****Characteristics (cont'd)**

$T_A = -40 \dots 85 \text{ }^\circ\text{C}$ ,  $V_{CC} = 4.5 \dots 15 \text{ V}$ ,  $E_e = 3.2 \dots 10 \text{ mW/cm}^2$

$T_A = 25 \text{ }^\circ\text{C}$ ,  $V_{CC} = 5 \text{ V}$ ,  $E_e = 6.5 \text{ mW/cm}^2$  for typical values

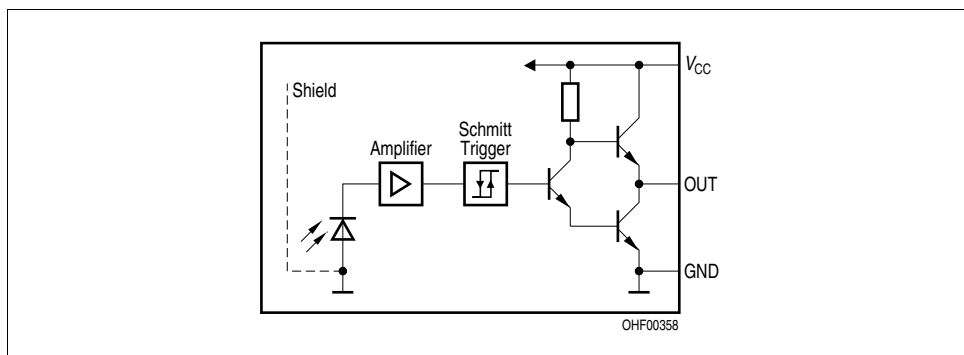
| Bezeichnung<br>Parameter   | Symbol<br>Symbol | Wert<br>Value |       | Einheit<br>Unit |
|--|------------------|---------------|-------|-----------------|
|  |                  | typ.          | Limit |                 |
| Anstiegszeit Ausgang (10% → 90%)<br>Rise time output (10% → 90%) | $t_r$            | 30            | –     | ns              |
| Abfallzeit Ausgang (90% → 10%)<br>Fall time output (90% → 10%)   | $t_f$            | 10            | –     | ns              |

1) Gemessen von 50% Punkt der ansteigenden Flanke Eingangspuls bis zu 1,3 V Punkt der ansteigenden Flanke Ausgangspuls ( $t_{PLH}$ ), bzw. von 50% Punkt der abfallenden Flanke Eingangspuls bis zu 1,3 V Punkt der abfallenden Flanke Ausgangspuls ( $t_{PHL}$ ).

1) Measured from 50% of the rising edge of the input pulse to 1.3 V of the rising edge of the output pulse ( $t_{PLH}$ ) or from 50% of the descending edge input pulse to 1.3 V of the descending output pulse edge ( $t_{PHL}$ ), respectively.

**Funktionsbereich****Functional Characteristics**

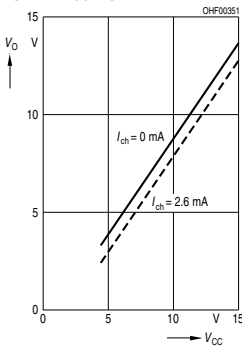
| Bezeichnung<br>Parameter   | Symbol<br>Symbol     | Wert<br>Value   | Einheit<br>Unit  |
|--|----------------------|-----------------|------------------|
| Betriebs- und Lagertemperatur<br>Operating and storage temperature range | $T_{op}$ ; $T_{stg}$ | $-40 \dots +85$ | $^\circ\text{C}$ |
| Versorgungsspannung<br>Supply voltage                                    | $V_{CC}$             | $4.5 \dots 15$  | V                |



**Figure 1** Block Diagram

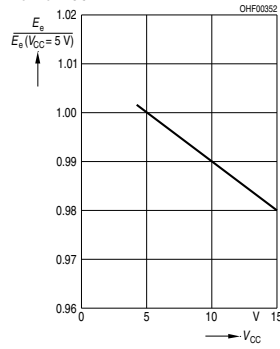
**Output Voltage**

$V_O = f(V_{CC}, I_C)$

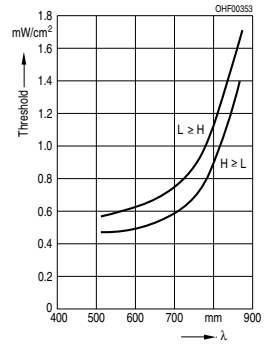


**Rel. Threshold**

$E_e/E_e(V_{CC} = 5\text{ V})$

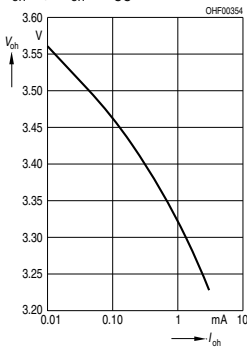


**Switching Threshold**

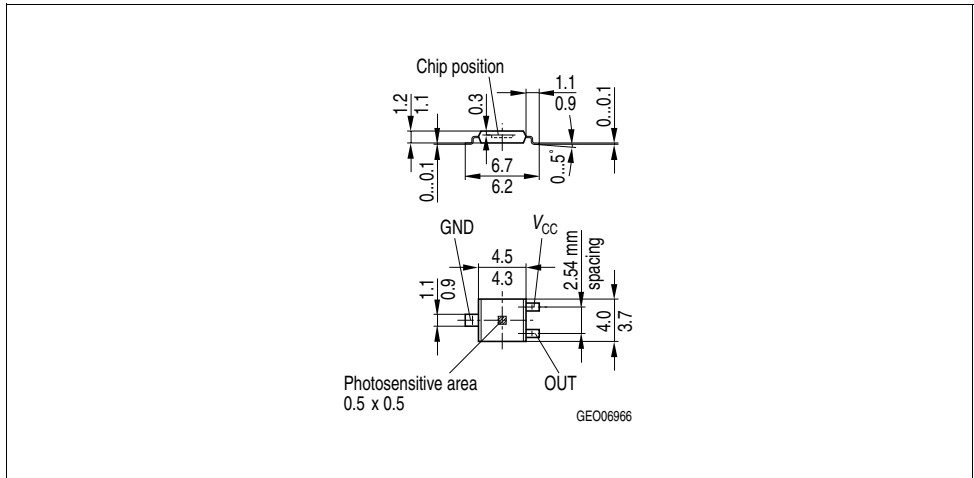


**Output Characteristics**

$V_{oh} = f(I_{oh}), V_{CC} = 5\text{ V}$

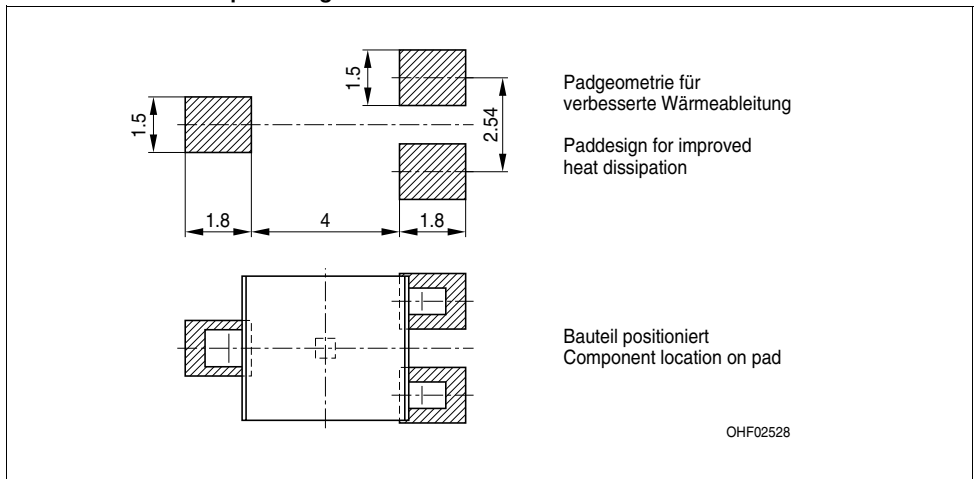


## Maßzeichnung Package Outlines



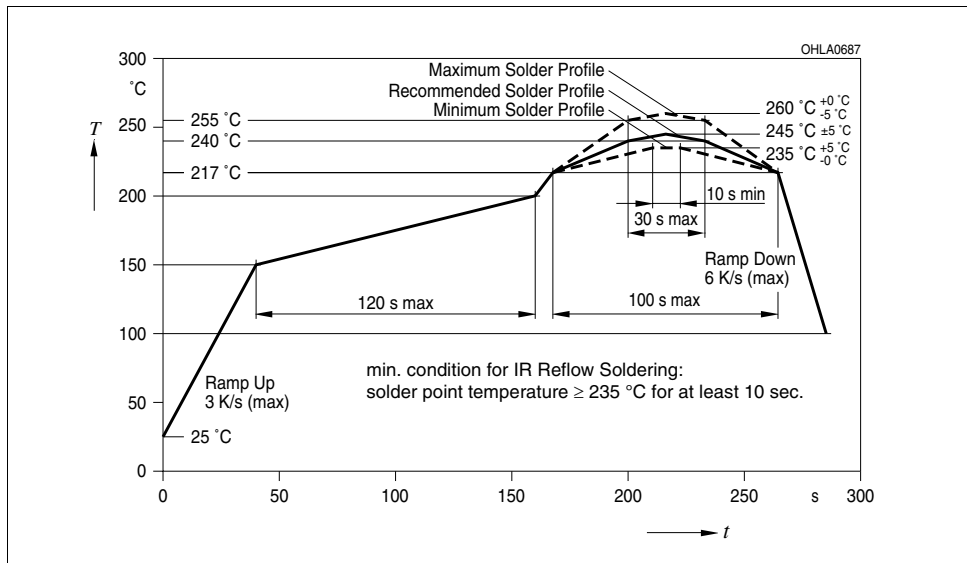
Maße in mm, wenn nicht anders angegeben / Dimensions in mm, unless otherwise specified.

## Empfohlenes Lötpaddesign Recommended Solderpad Design



**Lötbedingungen**  
**Soldering Conditions**  
**IR-Reflow Lötprofil für bleifreies Löten**  
**IR Reflow Soldering Profile for lead free soldering**

Vorbehandlung nach JEDEC Level 2  
 Preconditioning acc. to JEDEC Level 2  
 (nach J-STD-020B)  
 (acc. to J-STD-020B)



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