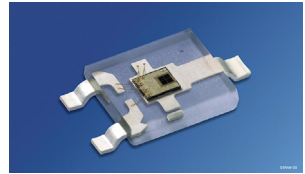


# Logic Gate Detector

## 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 Type	Bestellnummer Ordering Code
SFH 5400	Q65110A2704

### Grenzwerte Maximum Ratings

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebs- und Lagertemperatur Operating and storage temperature range	$T_{op}; T_{stg}$	- 40 ... + 85	°C
Versorgungsspannung Supply voltage	$V_{CC}$	- 0.5 ... 15	V
Ausgangsspannung Output voltage	$V_O$	- 0.5 ... 15	V
Ausgangsstrom Output current	$I_q$	- 25 ... 40	mA
Ausgangsleistung $T_A = 25\text{ °C}$ 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 Parameter	Symbol Symbol	Wert Value		Einheit Unit
		typ.	Limit	
Schwelle Bestrahlungsstärke Threshold radiant intensity (Ausgang L → H) (Output L → H) $\lambda = 660\text{ nm}$	$E_{eSchw}$	1.3	-	mW/cm <sup>2</sup>
Min. Bestrahlungsstärke, Ausgang H Min. radiant intensity, Output H $\lambda = 660\text{ nm}$	$E_{eHmin}$	-	< 3.2	mW/cm <sup>2</sup>
Max. Bestrahlungsstärke, Ausgang L Max. radiant intensity, Output L $\lambda = 660\text{ nm}$	$E_{eLmax}$	-	> 0.16	mW/cm <sup>2</sup>
Hysterese Hysteresis	$\Delta E_e$	> 0.2	-	mW/cm <sup>2</sup>
Ausgangsspannung L Output voltage L $I_{OL} = 6.4\text{ mA}$	$V_{OL}$	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 Parameter	Symbol Symbol	Wert Value		Einheit Unit
		typ.	Limit	
Ausgangsspannung H Output voltage H $I_{OH} = -2.6 \text{ mA}$	$V_{OH}$	$V_{CC} - 1.8$	> 2.4	V
Ausgangsleckstrom ( $V_O > V_{CC} = 4.5 \text{ V}$ ) Output leakage current ( $V_O > V_{CC} = 4.5 \text{ V}$ ) $V_O = 5.5 \text{ V}$ $V_O = 15 \text{ V}$	$I_{OHH}$	0.2 0.25	< 100 < 500	$\mu\text{A}$
Kurzschlußstrom L Short-circuit current L $t_p < 10 \text{ ms}$ , $E_e = 0$ ; $V_{CC} = V_O = 5.5 \text{ V}$ $V_{CC} = V_O = 15 \text{ V}$	$I_{OSL}$	40 80	> 25 > 40	mA
Kurzschlußstrom H Short-circuit current H $t_p < 10 \text{ ms}$ , $V_O = \text{GND}$ ; $V_{CC} = 5.5 \text{ V}$ $V_{CC} = 15 \text{ V}$	$I_{OSH}$	- 22 - 45	< - 10 < - 25	mA
Versorgungsstrom L Supply current L $E_e = 0$ ; $V_{CC} = 5.5 \text{ V}$ $V_{CC} = 15 \text{ V}$	$I_{CCL}$	3.5 4	< 6 < 7.5	mA
Versorgungsstrom Supply current L $V_{CC} = 5.5 \text{ V}$ $V_{CC} = 15 \text{ V}$	$I_{CCH}$	3.4 3.8	< 5 < 6	mA
Ausgangsverzögerungszeit <sup>1)</sup> Ausgang H → L Output delay time <sup>1)</sup> Output H → L	$t_{PHL}$	200	–	ns
Ausgangsverzögerungszeit <sup>1)</sup> Ausgang L → H Output delay time <sup>1)</sup> 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

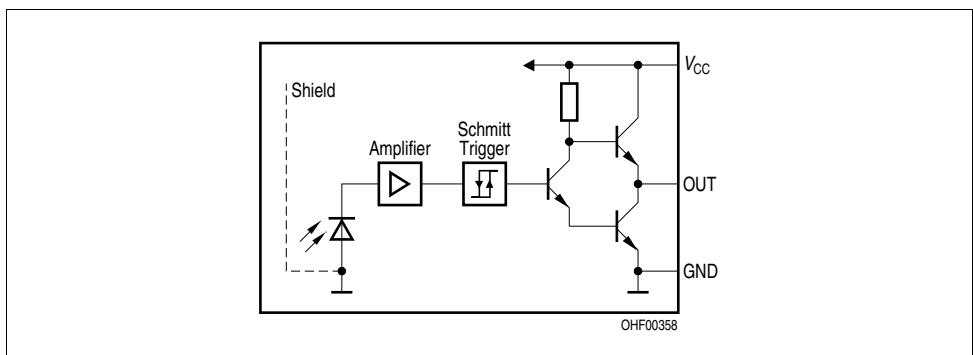
Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		typ.	Limit	
Anstiegszeit Ausgang (10% → 90%) Rise time output (10% → 90%)	$t_r$	30	–	ns
Abfallzeit Ausgang (90% → 10%) Fall time output (90% → 10%)	$t_f$	10	–	ns

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**

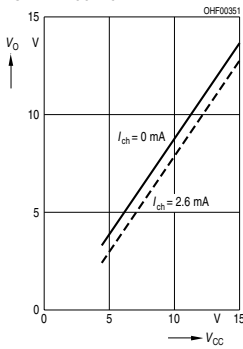
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebs- und Lagertemperatur Operating and storage temperature range	$T_{op}$ ; $T_{stg}$	$-40 \dots +85$	$^\circ\text{C}$
Versorgungsspannung Supply voltage	$V_{CC}$	$4.5 \dots 15$	V



**Figure 1** Block Diagram

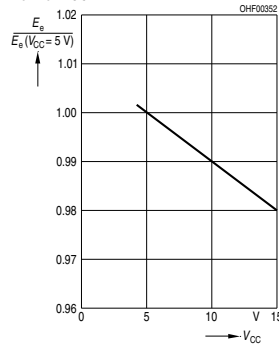
**Output Voltage**

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

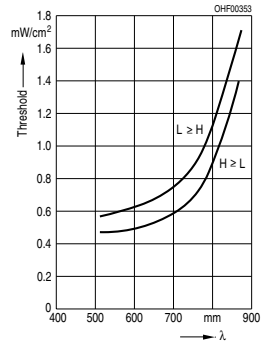


**Rel. Threshold**

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

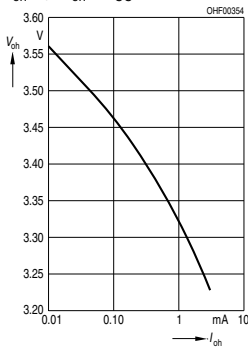


**Switching Threshold**

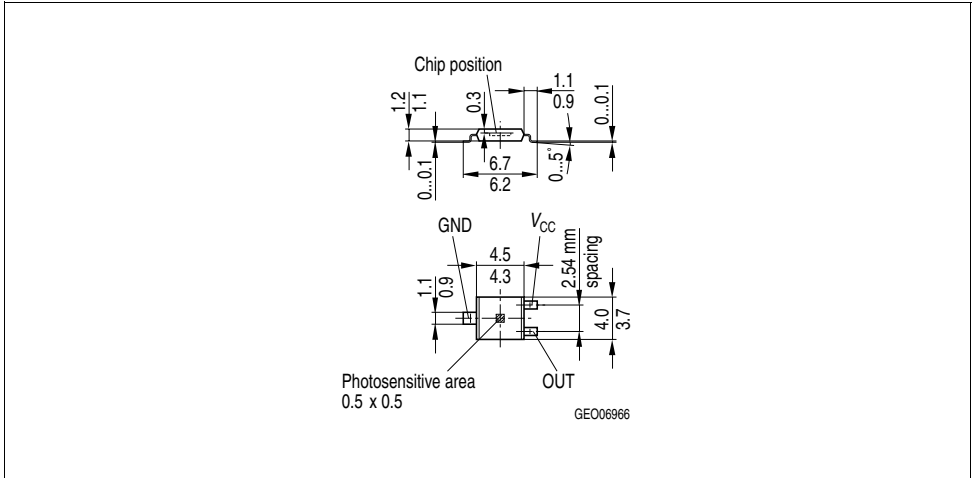


**Output Characteristics**

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

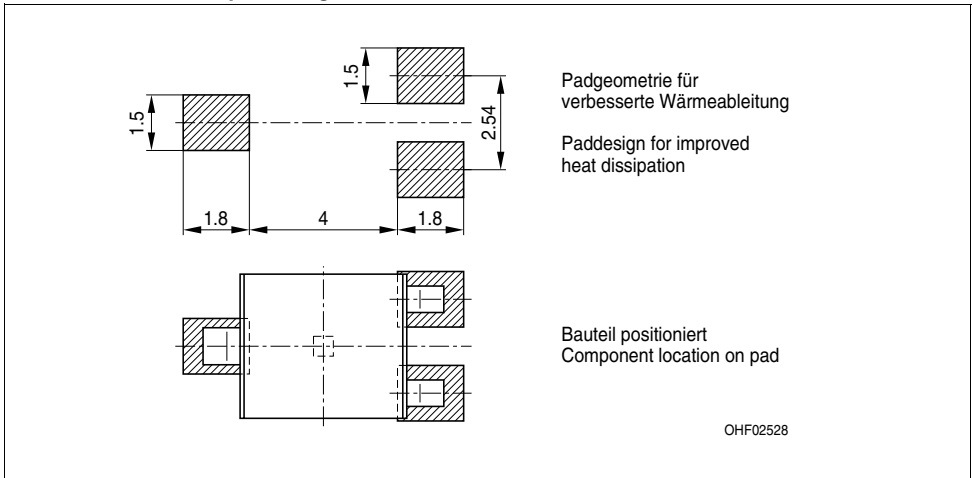


**Maßzeichnung  
Package Outlines**



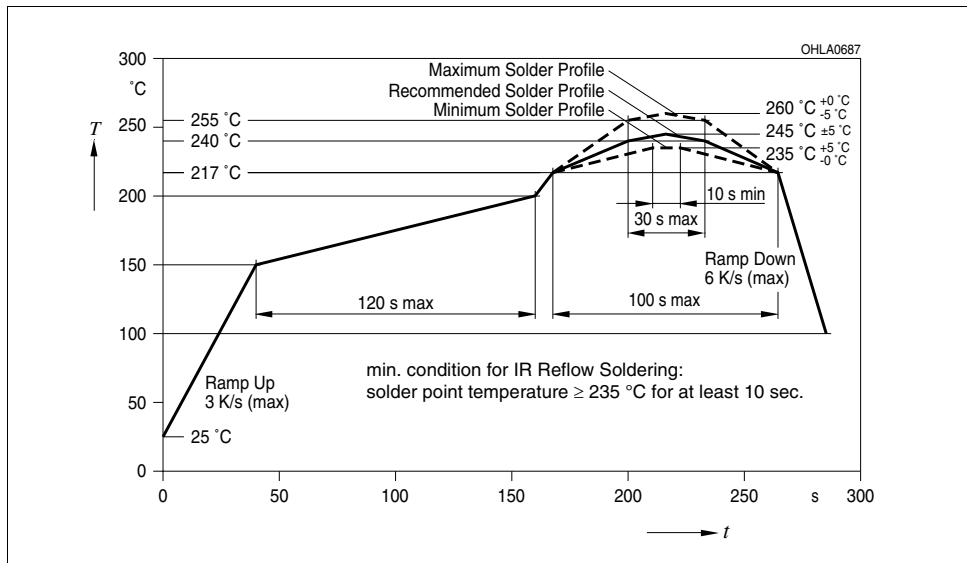
Maße in mm, wenn nicht anders angegeben / Dimensions in mm, unless otherwise specified.

**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)



Published by  
**OSRAM Opto Semiconductors GmbH**  
 Wernerwerkstrasse 2, D-93049 Regensburg  
[www.osram-os.com](http://www.osram-os.com)  
 © All Rights Reserved.

The information describes the type of component and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances. For information on the types in question please contact our Sales Organization.

**Packing**

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office. By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

**Components used in life-support devices or systems must be expressly authorized for such purpose!** Critical components<sup>1</sup>, may only be used in life-support devices or systems<sup>2</sup> with the express written approval of OSRAM OS.

<sup>1</sup> A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or effectiveness of that device or system.

<sup>2</sup> Life support devices or systems are intended (a) to be implanted in the human body, or (b) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health of the user may be endangered.