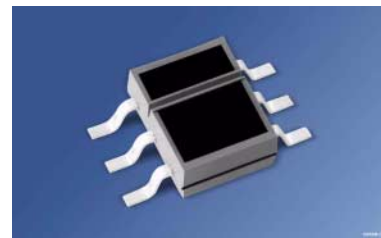


# Reflexlichtschranke mit Schmitt-Trigger Reflective Interrupter with Schmitt-Trigger

**SFH 9240**  
**SFH 9241**



## Wesentliche Merkmale

- IR-GaAs-Lumineszenzdiode in Kombination mit einem Schmitt-Trigger IC
- SFH 9240: Output active low
- SFH 9241: Output active high
- Tageslichtsperrfilter
- Einschaltstrom: typ. 3 mA
- Sender und Empfänger galvanisch getrennt

## Anwendungen

- Optischer Schalter
- Pulsformer
- Zähler

## Features

- IR-GaAs-emitter in combination with a Schmitt-Trigger IC
- SFH 9240: Output active low
- SFH 9241: Output active high
- Daylight cut-off filter
- Threshold current: typ. 3 mA
- Emitter and detector electrically isolated

## Applications

- Optical threshold switch
- Pulseformer
- Counter

| Typ<br>Type | Bestellnummer<br>Ordering Code | Gehäuse<br>Package                                                                                                                                                                                |
|-------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SFH 9240    | Q62702-P5118                   | P-DSO-6 Gehäuse mit Tageslichtsperrfilter, Anschlüsse im 1.27 mm - Raster, Ausgang: active low<br>P-DSO-6 package with daylight-cutoff-filter, lead spacing 1.27 mm (1/20"), Output active low    |
| SFH 9241    | Q62702-P5119                   | P-DSO-6 Gehäuse mit Tageslichtsperrfilter, Anschlüsse im 1.27 mm - Raster, Ausgang: active high<br>P-DSO-6 package with daylight cut-off filter, lead spacing 1.27 mm (1/20"), Output active high |

**Grenzwerte** ( $T_A = 25\text{ °C}$ )**Maximum Ratings**

| Bezeichnung<br>Parameter                                                                 | Symbol<br>Symbol | Wert<br>Value | Einheit<br>Unit |
|------------------------------------------------------------------------------------------|------------------|---------------|-----------------|
| <b>Sender</b> (GaAs-Diode)<br><b>Emitter</b> (GaAs diode)                                |                  |               |                 |
| Sperrspannung<br>Reverse voltage                                                         | $V_R$            | 5             | V               |
| Vorwärtsgleichstrom<br>Forward current                                                   | $I_F$            | 50            | mA              |
| Stoßstrom ( $t_p \leq 10\ \mu\text{s}$ )<br>Surge current ( $t_p \leq 10\ \mu\text{s}$ ) | $I_{FSM}$        | 1.5           | A               |
| Verlustleistung<br>Power dissipation                                                     | $P_{tot}$        | 80            | mW              |

**Empfänger** (Schmitt-Trigger IC)**Detector** (Schmitt-Trigger IC)

|                                                          |           |                |    |
|----------------------------------------------------------|-----------|----------------|----|
| Versorgungsspannung<br>Supply voltage                    | $V_{CC}$  | - 0.5 ... + 20 | V  |
| Ausgangsspannung<br>Output voltage                       | $V_O$     | - 0.5 ... + 20 | V  |
| Ausgangsstrom<br>Output current ( $T_A = 25\text{ °C}$ ) | $I_O$     | 20             | mA |
| Verlustleistung<br>Power dissipation                     | $P_{tot}$ | 100            | mW |

**Reflexlichtschranke****Light Reflection Switch**

|                                                                          |                   |                |    |
|--------------------------------------------------------------------------|-------------------|----------------|----|
| Betriebs- und Lagertemperatur<br>Operating and storage temperature range | $T_{op}, T_{stg}$ | - 40 ... + 100 | °C |
| Verlustleistung<br>Power dissipation                                     | $P_{tot}$         | 150            | mW |

Kennwerte ( $T_A = 25\text{ °C}$ )

## Characteristics

| Bezeichnung<br>Parameter                                                                                                                                | Symbol<br>Symbol | Wert<br>Value        | Einheit<br>Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|-----------------|
| <b>Sender (GaAs-Diode)</b><br><b>Emitter (GaAs diode)</b>                                                                                               |                  |                      |                 |
| Durchlassspannung<br>Forward voltage<br>$I_F = 50\text{ mA}$                                                                                            | $V_F$            | 1.25 ( $\leq 1.65$ ) | V               |
| Sperrstrom<br>Reverse current<br>$V_R = 5\text{ V}$                                                                                                     | $I_R$            | 0.01 ( $\leq 1$ )    | $\mu\text{A}$   |
| Kapazität<br>Capacitance<br>$V_R = 0\text{ V}, f = 1\text{ MHz}$                                                                                        | $C_O$            | 25                   | pF              |
| Wärmewiderstand (Montage auf PC-Board mit<br>> 5 mm <sup>2</sup> Padgröße)<br>Thermal resistance (mounting on pcb with > 5 mm <sup>2</sup><br>pad size) | $R_{thJA}$       | 400                  | K/W             |

**Empfänger (Schmitt-Trigger IC)** (wenn nicht anders angegeben,  $V_{CC} = 5\text{ V}$ )**Detector (Schmitt-Trigger IC)** (unless otherwise specified,  $V_{CC} = 5\text{ V}$ )

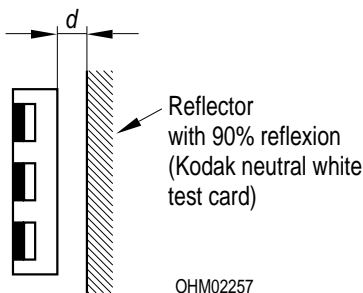
|                                                                                             |          |                      |                     |
|---------------------------------------------------------------------------------------------|----------|----------------------|---------------------|
| Ausgangsspannung „high“<br>Output voltage “high”<br>$I_O = 0$                               | $V_{OH}$ | $V_{CC} (> 4.0)$     | V                   |
| Ausgangsspannung „low“<br>Output voltage “low”<br>$I_O = 16\text{ mA}$                      | $V_{OL}$ | 0.15 ( $< 0.4$ )     | V                   |
| Stromaufnahme<br>Supply current<br>$V_{CC} = 5\text{ V}$<br>$V_{CC} = 18\text{ V}$          | $I_{CC}$ | 3.3 ( $< 5$ )<br>5.0 | mA                  |
| Anstiegszeit 10% bis 90%<br>Rise time 10% to 90%<br>$R_L = 280\ \Omega, I_F = 20\text{ mA}$ | $t_r$    | SFH9240<br>20        | SFH9241<br>30<br>ns |
| Abfallzeit 90% bis 10%<br>Fall time 90% to 10%<br>$R_L = 280\ \Omega, I_F = 20\text{ mA}$   | $t_f$    | SFH9240<br>10        | SFH9241<br>20<br>ns |

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

| Bezeichnung<br>Parameter                                                                               | Symbol<br>Symbol | Wert<br>Value | Einheit<br>Unit |
|--------------------------------------------------------------------------------------------------------|------------------|---------------|-----------------|
| Ausgangsverzögerungszeit<br>Propagation delay time "ON"<br>$R_L = 280\ \Omega$ , $I_F = 20\text{ mA}$  | $t_{ON}$         | 1             | $\mu\text{s}$   |
| Ausgangsverzögerungszeit<br>Propagation delay time "OFF"<br>$R_L = 280\ \Omega$ , $I_F = 20\text{ mA}$ | $t_{OFF}$        | 2             | $\mu\text{s}$   |

**Reflexlichtschranke****Light Reflection Switch**

|                                                                                                                                         |                          |                      |    |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------|----|
| Schaltsschwelle<br>Threshold current, Kodak neutral white test card<br>with 90% reflection<br>$V_{CC} = 5\text{ V}$ , $d = 1\text{ mm}$ | $I_{F, ON}$              | 3 (< 10)             | mA |
| Hysterese<br>Hysteresis                                                                                                                 | $I_{F, OFF} / I_{F, ON}$ | 0.6<br>(0.5 ... 0.9) | –  |

**Zulässiger Arbeitsbereich****Operating Conditions**

| Bezeichnung<br>Parameter              | Symbol<br>Symbol | Wert<br>Value | Einheit<br>Unit |
|---------------------------------------|------------------|---------------|-----------------|
| Versorgungsspannung<br>Supply voltage | $V_{CC}$         | 4 ... 18      | V               |
| Ausgangsstrom<br>Output current       | $I_O$            | < 16          | mA              |

Zur Stabilisierung der Versorgung wird ein Stützkondensator (angeschlossen zwischen  $V_{CC}$  und GND) von typ.  $0.1\ \mu\text{F}$  empfohlen.

A bypass capacitor,  $0.1\ \mu\text{F}$  typical, connected between  $V_{CC}$  and GND is recommended in order to stabilize power supply line.

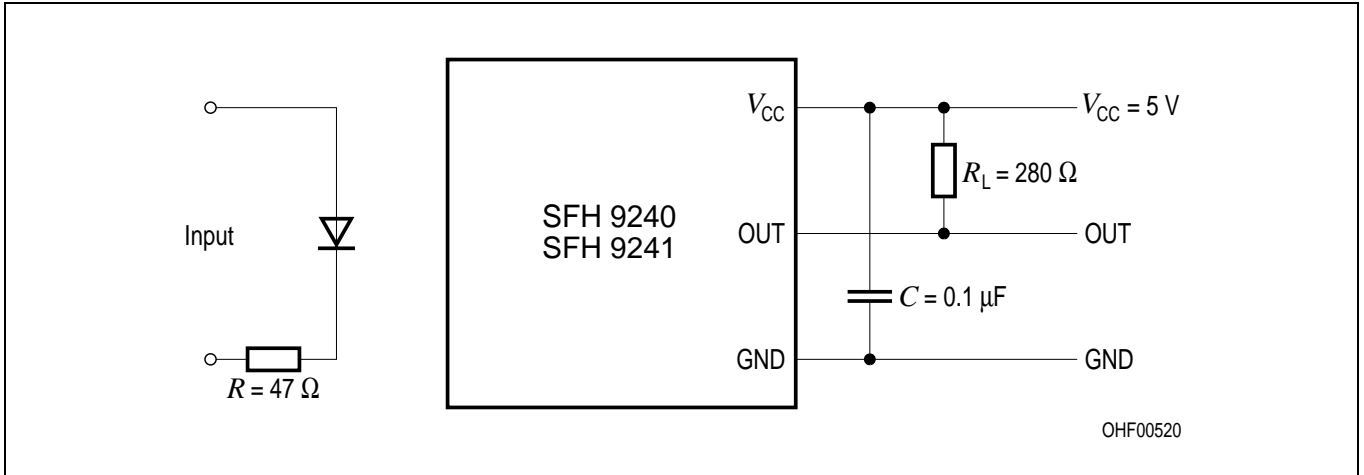


Figure 1 Test Circuit for Switching and Response Time

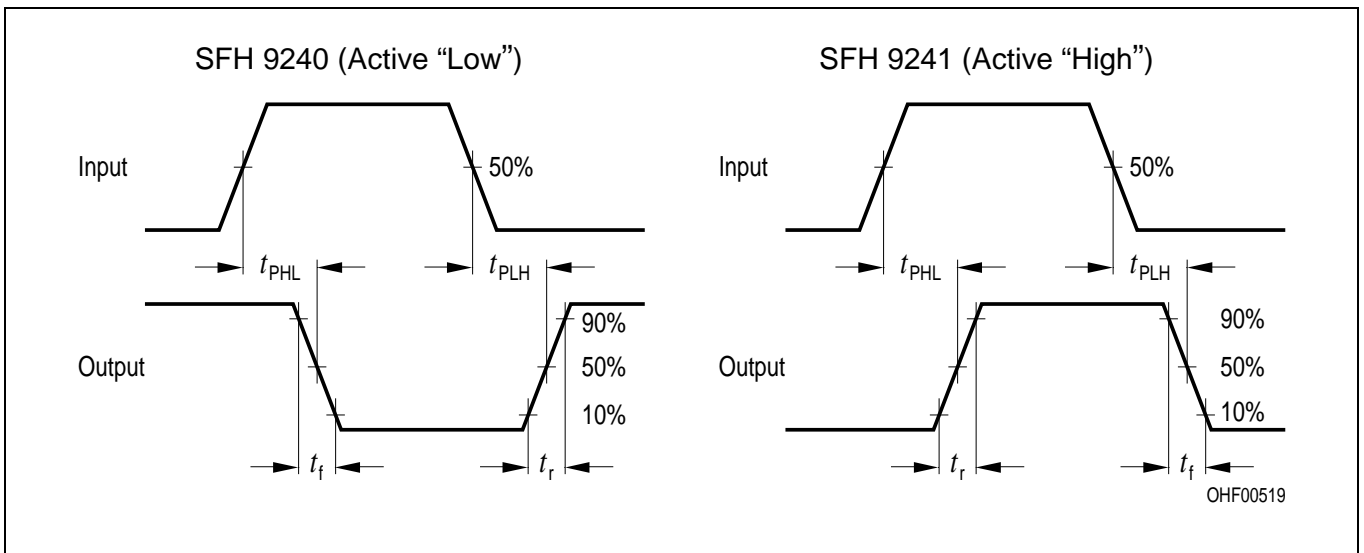
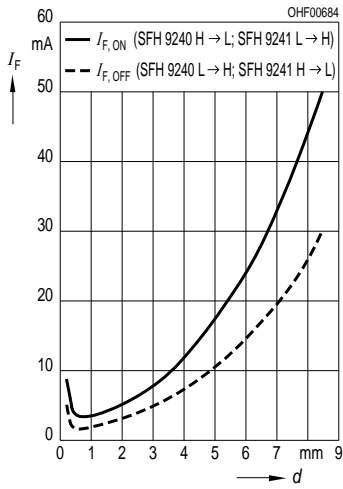
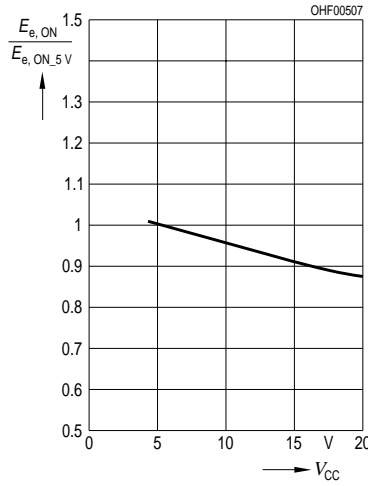


Figure 2 Switching Time Definitions

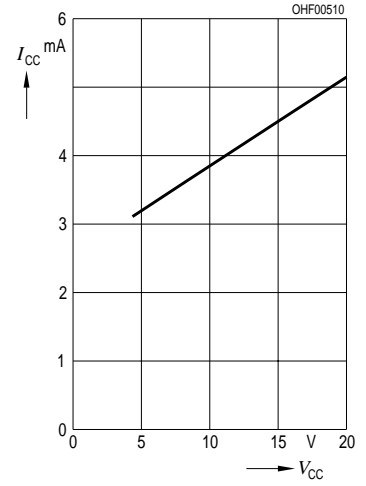
**Threshold Current vs. Distance**  
 $I_F = f(d)$



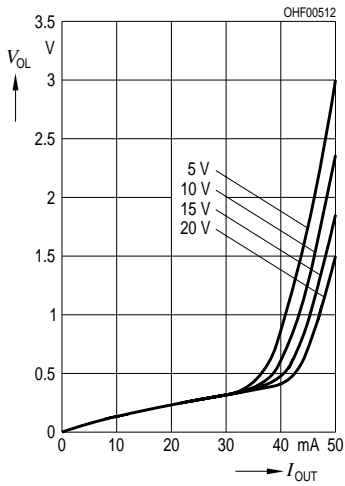
**Relative Threshold**  
 $E_{e,ON}/E_{e,ON VCC=5V} = f(V_{CC})$



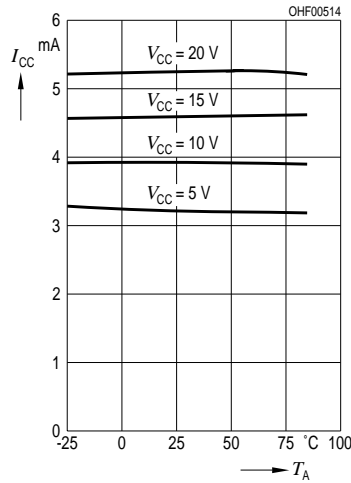
**Supply Current**  
 $I_{CC} = f(V_{CC})$



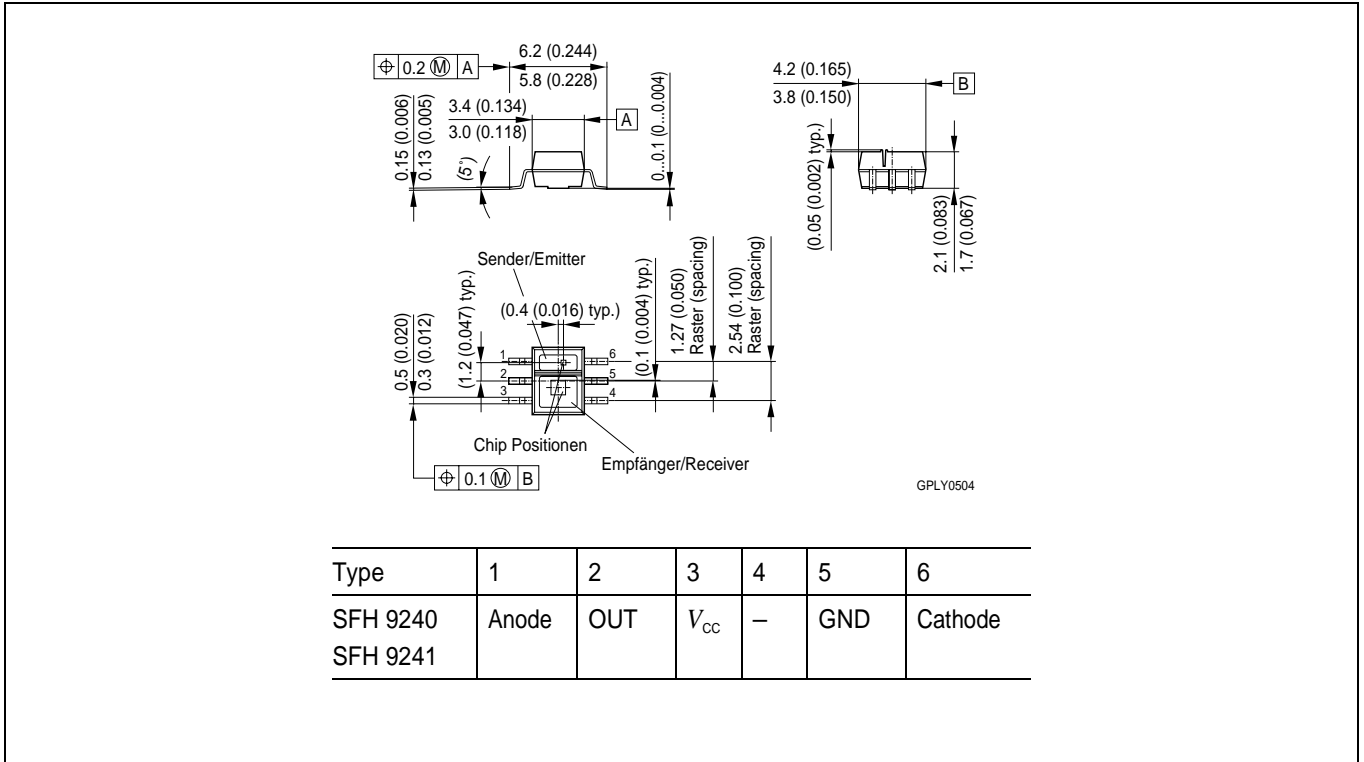
**Output Voltage**  
 $V_{OL} = f(I_{OUT}, V_{CC})$



**Supply Current vs. Ambient Temperature**  
 $I_{CC} = f(T_A, V_{CC})$



Maßzeichnung  
Package Outlines



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

**Löthinweise**  
**Soldering Conditions**

| Bauform<br>Type      | Drypack<br>Level acc.<br>to JEDEC<br>A112-A | Tauch-, Schwalllötung<br>Dip, Wave Soldering |                           | Reflowlötung<br>Reflow Soldering |                              | Kolbenlötung<br>Iron Soldering<br>(Iron temp.) |
|----------------------|---------------------------------------------|----------------------------------------------|---------------------------|----------------------------------|------------------------------|------------------------------------------------|
|                      |                                             | Peak Temp.<br>(solderbath)                   | Max. Time in<br>Peak Zone | Peak Temp.<br>(package<br>temp.) | Max. Time<br>in Peak<br>Zone |                                                |
| SFH 9240<br>SFH 9241 | 4                                           | n. a.                                        | –                         | 245 °C                           | 10 sec.                      | n.a.                                           |

Bitte Verarbeitungshinweise für SMT-Bauelemente beachten!

Please observe the handling guidelines for SMT devices!

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