

# Gabellichtschranke mit Schmitt-Trigger IC Slotted Interrupter with Schmitt-Trigger-IC

**SFH 9340**  
**SFH 9341**



## Wesentliche Merkmale

- Kompaktes Gehäuse
- IR-Sender: GaAs (950 nm)
- Empfänger: Schmitt-Trigger IC
- Empfänger: Tageslichtsperrfilter
- SFH 9340: Ausgang active low
- SFH 9341: Ausgang active high
- Einschaltstrom: typ. 0.6 mA

## Anwendungen

- Optischer Schalter
- Pulsformer
- Zähler

## Features

- Compact Type
- IR-emitter: GaAs (950 nm)
- Detector: Schmitt-Trigger IC
- Detector: Daylight-Cutoff Filter
- SFH 9340: Output active low
- SFH 9341: Output active high
- Threshold current: typ. 0.6 mA

## Applications

- Optical threshold switch
- Pulseformer
- Counter

Typ Type	Bestellnummer Ordering Code	Gehäuse Package
SFH 9340	Q62702-P5120	Polykarbonat Plastikgehäuse.
SFH 9341	Q62702-P5121	Senderseite durch Buchstaben „E“, Empfängerseite durch Buchstaben „S“ gekennzeichnet. Polycarbonate plastic material housing. Emitter side marked with letter “E”, Detector/Sensor side marked with letter “S”.

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

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
<b>Sender</b> (GaAs-Diode) <b>Emitter</b> (GaAs diode)			
Sperrspannung Reverse voltage	$V_R$	5	V
Durchlassstrom Forward current	$I_F$ (DC)	60	mA
Stoßstrom ( $t_p \leq 10\ \mu\text{s}$ , $D = 0$ ) Surge current	$I_{FSM}$	1	A
Verlustleistung Power dissipation	$P_{tot}$	100	mW
Wärmewiderstand Thermal resistance	$R_{thJA}$	280	K/W

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

Versorgungsspannung Supply voltage	$V_{CC}$	- 0.5 ... + 20	V
Ausgangsspannung Output voltage	$V_{OUT}$	- 0.5 ... + 20	V
Ausgangsstrom ( $T_A = 25\text{ °C}$ ) Output current	$I_O$	50	mA
Verlustleistung Power dissipation	$P_{tot}$	150	mW

**Gabellichtschranke****Slotted Interrupter**

Lagertemperatur Storage temperature range	$T_{stg}$	- 40 ... + 85	°C
Betriebstemperatur Operating temperature range	$T_{op}$	- 40 ... + 85	°C
Elektrostatische Entladung Electrostatic discharge	ESD	2	kV

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

**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
<b>Sender</b> (GaAs-Diode)			
<b>Emitter</b> (GaAs diode)			
Durchlassspannung ( $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$ ) Forward voltage	$V_F$	1.2 (< 1.4)	V
Sperrstrom ( $V_R = 3\text{ V}$ ) Reverse current	$I_R$	0.01 (< 1)	$\mu\text{A}$
Kapazität ( $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ ) Capacitance	$C_0$	16	pF
Wellenlänge der Strahlung Wavelength of peak emission	$\lambda_{\text{peak}}$	950	nm

**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“ Output voltage “High” $I_O = 0$ , $V_{CC} = 4.5 - 18\text{ V}$	$V_{OH}$	$V_{CC} (> 4.0)$	V	
Ausgangsspannung „Low“ Output voltage “Low” $I_O = 16\text{ mA}$	$V_{OL}$	0.15 (< 0.4)	V	
Stromaufnahme Supply current $V_{CC} = 5\text{ V}$ $V_{CC} = 18\text{ V}$	$I_{CC}$	3.5 (< 5) 5.0	mA	
Anstiegszeit 10% bis 90% Rise time 10% to 90% $R_L = 280\ \Omega$ , $I_F = 4\text{ mA}$ , $\lambda = 950\text{ nm}$	$t_r$	<b>SFH 9340</b>	<b>SFH 9341</b>	ns
		20	30	
Abfallzeit 90% bis 10% Fall time 90% to 10% $R_L = 280\ \Omega$ , $I_F = 4\text{ mA}$ , $\lambda = 950\text{ nm}$	$t_f$	<b>SFH 9340</b>	<b>SFH 9341</b>	ns
		10	20	
Ausgangsverzögerungszeit Propagation delay time “ON” $R_L = 280\ \Omega$ , $I_F = 4\text{ mA}$ , $\lambda = 950\text{ nm}$	$t_{ON}$	1	$\mu\text{s}$	
Ausgangsverzögerungszeit Propagation delay time “OFF” $R_L = 280\ \Omega$ , $I_F = 4\text{ mA}$ , $\lambda = 950\text{ nm}$	$t_{OFF}$	2	$\mu\text{s}$	

Kennwerte ( $T_A = 25\text{ °C}$ )

Characteristics (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
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Gabellichtschranke (wenn nicht anders angegeben,  $V_{CC} = 5\text{ V}$ )Slotted Interrupter (unless otherwise specified:  $V_{CC} = 5\text{ V}$ )

Schaltswelle Threshold current "ON"	$I_{F, ON}$	typ. 0.6 (< 2.0)	mA
Schaltswelle Threshold current "OFF"	$I_{F, OFF}$	0.36 (> 0.05)	mA
Hysterese Hysteresis	$I_{F, OFF} / I_{F, ON}$	0.6 (0.5 ... 0.9)	–

Zulässiger Arbeitsbereich Detektor (Schmitt-Trigger IC)

Operating Conditions Detector (Schmitt-Trigger IC)

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Versorgungsspannung Supply voltage	$V_{CC}$	4 ... 18	V
Ausgangsstrom 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.

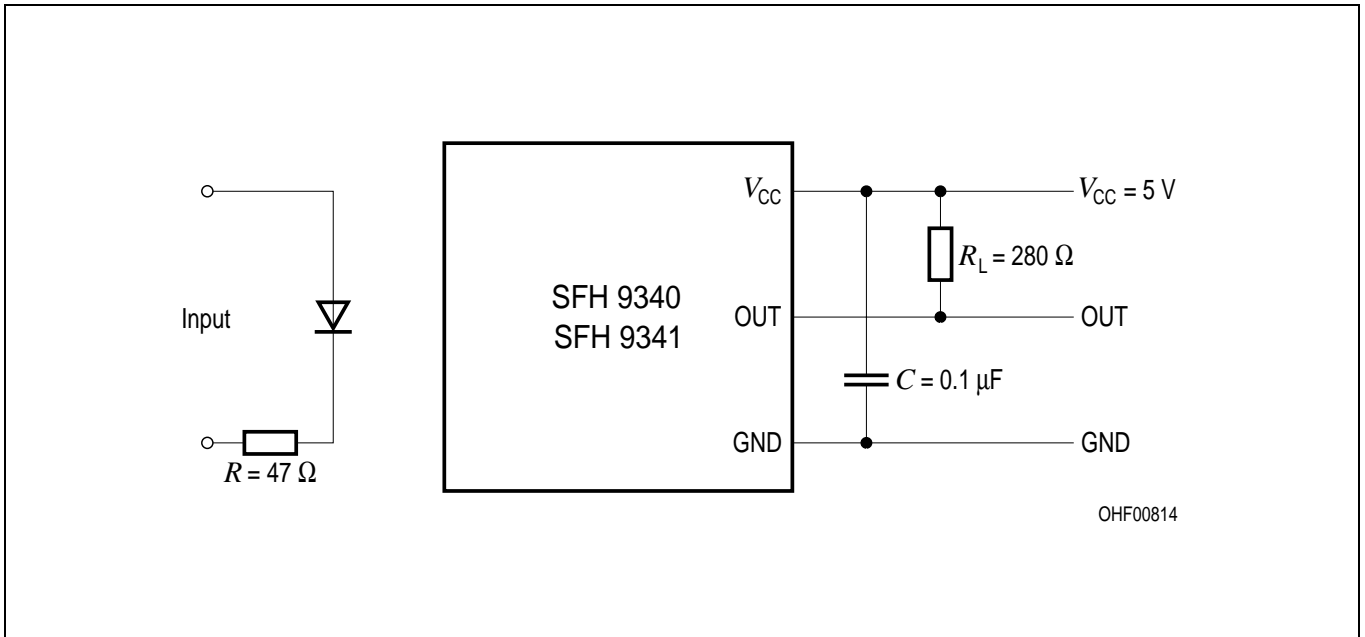


Figure 1 Test Circuit for Switching and Response Time

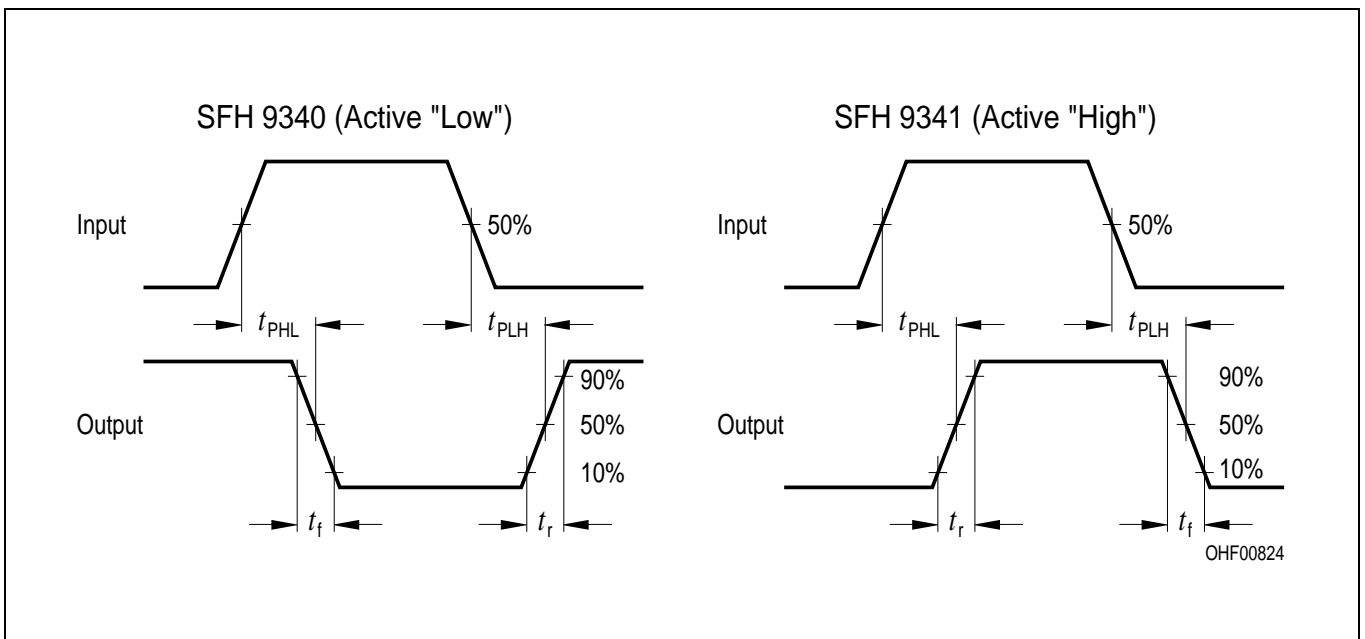
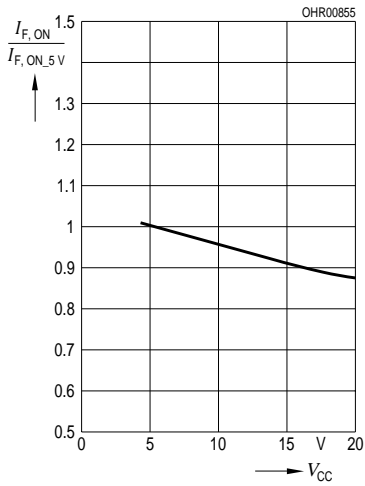


Figure 2 Switching Time Definitions

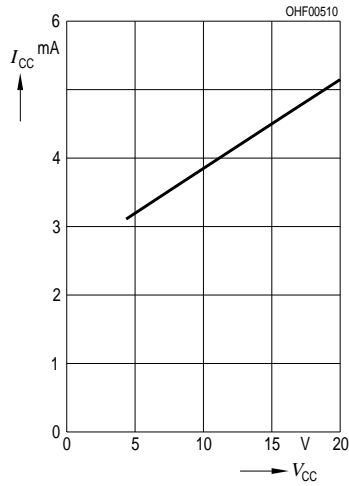
**Relative Threshold**

$I_{F, ON} / I_{F, ON} (V_{CC} = 5 V) = f(V_{CC})$



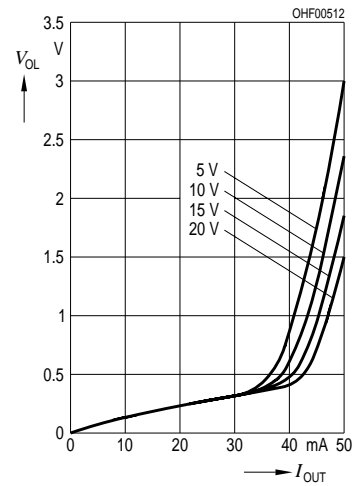
**Supply Current**

$I_{CC} = f(V_{CC})$



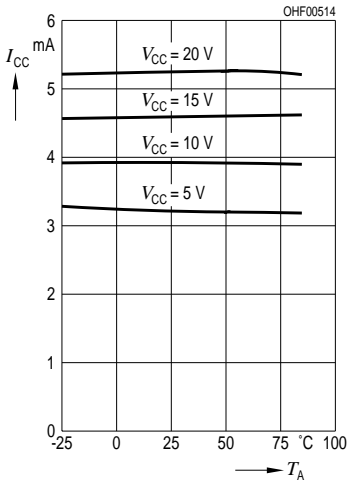
**Output Voltage**

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



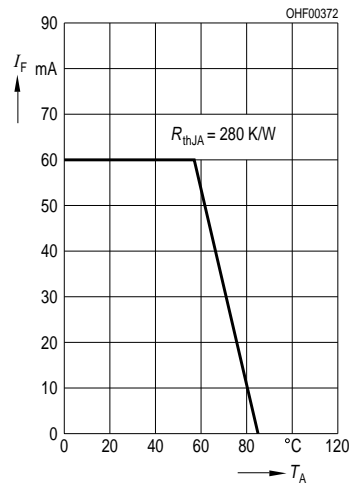
**Supply Current vs. Ambient Temperature**

$I_{CC} = f(T_A, V_{CC})$



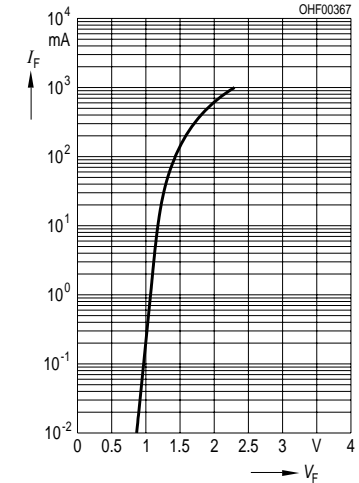
**Max. Permissible Forward Current**

$I_F = f(T_A)$

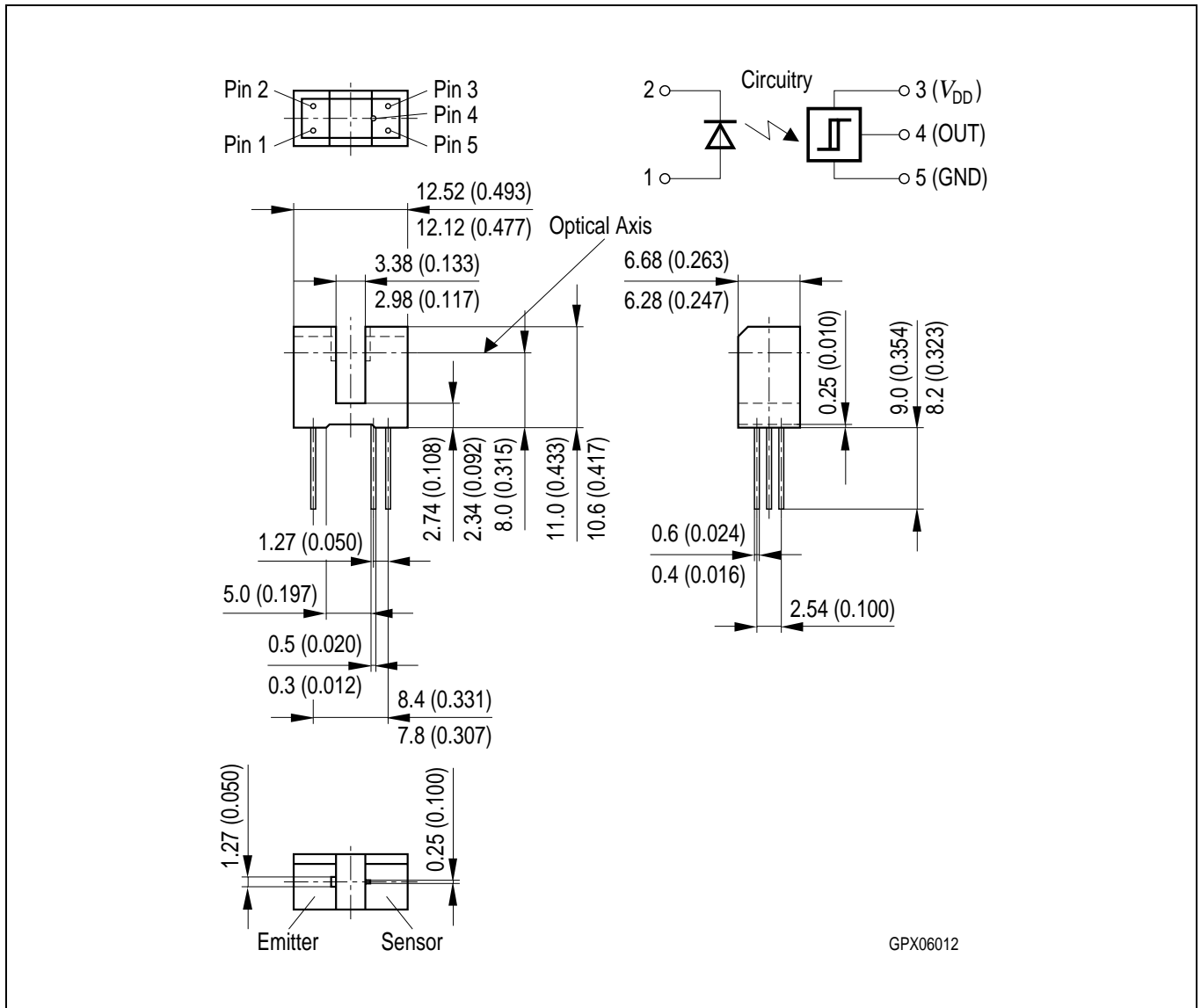


**Forward Current  $I_F = f(V_F)$**

Single pulse,  $t_p = 20 \mu s$



Maßzeichnung  
Package Outlines



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

**Löthinweise**  
**Soldering Conditions**

Bauform Type	Tauch-, Schwalllötung Dip, Wave Soldering		Reflowlötung Reflow Soldering		Kolbenlötung Iron Soldering	
	Peak Temp. (solderbath)	Max. Time in Peak Zone	Peak Temp. (package temp.)	Max. Time in Peak Zone	(Iron temp.)	Max. Time
SFH 9340 SFH 9341	260 °C	10 s	n.a.	–	300 °C	5 s

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