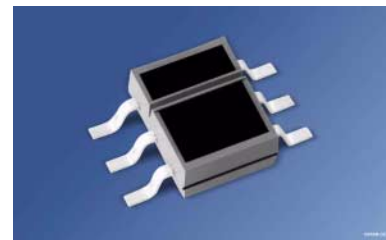


# Reflexlichtschranke Reflective Interrupter

## SFH 9201



### Wesentliche Merkmale

- Optimaler Arbeitsabstand 1 mm bis 5 mm
- IR-GaAs-Lumineszenzdiode in Kombination mit einem Si-NPN-Fototransistor
- Tageslichtsperrfilter
- Hoher Kollektor-Emitter-Strom typ. 0.7 mA
- Geringe Sättigungsspannung
- Sender und Empfänger galvanisch getrennt

### Anwendungen

- Positionsmelder
- Drehzahlüberwachung, -regelung
- Bewegungssensor

### Features

- Optimal operating distance 1 mm to 5 mm
- IR-GaAs-emitter in combination with a Silicon NPN phototransistor
- Daylight cut-off filter
- High collector-emitter current typ. 0.7 mA
- Low saturation voltage
- Emitter and detector electrically isolated

### Applications

- Position reporting
- End position switch
- Speed monitoring and regulating
- Motion transmitter

Typ Type	Bestellnummer Ordering Code	$I_{CE}$ $I_F = 10 \text{ mA}, V_{CE} = 5 \text{ V}, d = 1 \text{ mm}$ mA
SFH 9201	Q62702-P5038	0.25 ... 2.00
SFH 9201-2/3	Q62702-P5056	0.40 ... 1.25
SFH 9201-3/4	Q62702-P5057	0.63 ... 2.00

**Grenzwerte**  
**Maximum Ratings**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
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**Sender (GaAs-Diode)**
**Emitter (GaAs diode)**

Sperrspannung Reverse voltage	$V_R$	5	V
Vorwärtsgleichstrom Forward current	$I_F$	50	mA
Verlustleistung Power dissipation	$P_{tot}$	80	mW

**Empfänger (Si-Fototransistor)**
**Detector (silicon phototransistor)**

Dauer-Kollektor-Emitter-Sperrspannung Continuous collector-emitter voltage	$V_{CE}$	16	V
Kollektor-Emitter-Sperrspannung, ( $t \leq 2$ min) Collector-emitter voltage, ( $t \leq 2$ min)	$V_{CE}$	30	
Emitter-Kollektor-Sperrspannung Emitter-collector voltage	$V_{EC}$	7	
Kollektorstrom Collector current	$I_C$	10	mA
Verlustleistung Total power dissipation	$P_{tot}$	100	mW

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

Lagertemperatur Storage temperature range	$T_{stg}$	- 40 ... + 100	°C
Umgebungstemperatur Ambient temperature range	$T_A$	- 40 ... + 100	
Elektrostatistische Entladung Electrostatic discharge	ESD	2	KV
Umweltbedingungen / Environment conditions	3 K3 acc. to EN 60721-3-3 (IEC 721-3-3)		

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

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
<b>Sender</b> (IR-GaAs-Diode)			
<b>Emitter</b> (IR-GaAs diode)			
Durchlaßspannung Forward voltage $I_F = 50\text{ mA}$	$V_F$	1.25 ( $\leq 1.65$ )	V
Sperrstrom Reverse current $V_R = 5\text{ V}$	$I_R$	0.01 ( $\leq 1$ )	$\mu\text{A}$
Kapazität Capacitance $V_R = 0\text{ V}, f = 1\text{ MHz}$	$C_O$	25	pF
Wärmewiderstand <sup>1)</sup> Thermal resistance <sup>1)</sup>	$R_{thJA}$	400	K/W

**Empfänger** (Si-Fototransistor)**Detector** (silicon phototransistor)

Kapazität Capacitance $V_{CE} = 5\text{ V}, f = 1\text{ MHz}$	$C_{CE}$	10	pF
Kollektor-Emitter-Reststrom Collector-emitter leakage current $V_{CE} = 20\text{ V}$	$I_{CEO}$	3 ( $\leq 200$ )	nA
Fotostrom (Fremdlichtempfindlichkeit) Photocurrent (outside light density) $V_{CE} = 5\text{ V}, E_V = 1000\text{ Lx}$	$I_P$	3.5	mA
Wärmewiderstand <sup>1)</sup> Thermal resistance <sup>1)</sup>	$R_{thJA}$	400	K/W

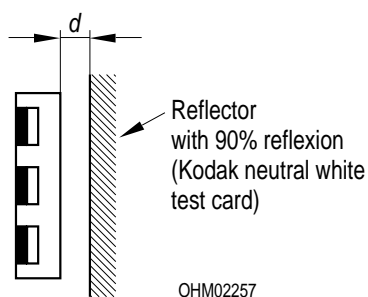
Kennwerte ( $T_A = 25\text{ °C}$ )

Characteristics (cont'd)

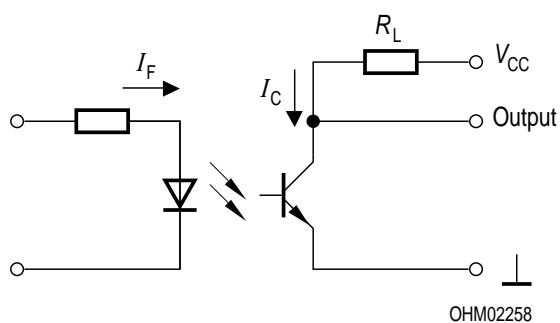
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
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**Reflexlichtschranke**  
**Light Reflection Switch**

Kollektor-Emitterstrom Collector-emitter current Kodak neutral white test card, 90% Reflexion $I_F = 10\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $d = 1\text{ mm}$	$I_{CE\text{ min.}}$ $I_{CE\text{ typ.}}$	0.25 0.70	mA mA
Kollektor-Emitter-Sättigungsspannung Collector-emitter-saturation voltage Kodak neutral white test card, 90% Reflexion $I_F = 10\text{ mA}$ ; $d = 1\text{ mm}$ ; $I_C = 85\text{ }\mu\text{A}$	$V_{CE\text{ sat}}$	0.15 ( $\leq 0.6$ )	V

1) Montage auf PC-Board mit  $> 5\text{ mm}^2$  Padgröße1) Mounting on pcb with  $> 5\text{ mm}^2$  pad size

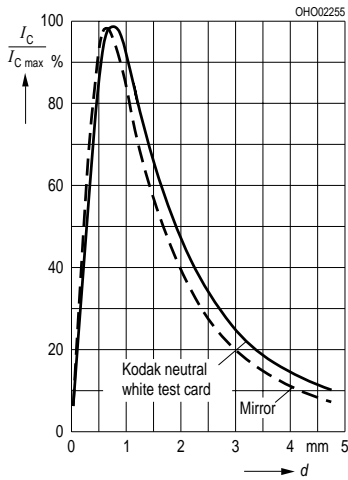
**Schaltzeiten** ( $T_A = 25\text{ °C}$ ,  $V_{CC} = 5\text{ V}$ ,  $I_C = 1\text{ mA}^1$ ,  $R_L = 1\text{ k}\Omega$ )  
**Switching Times**



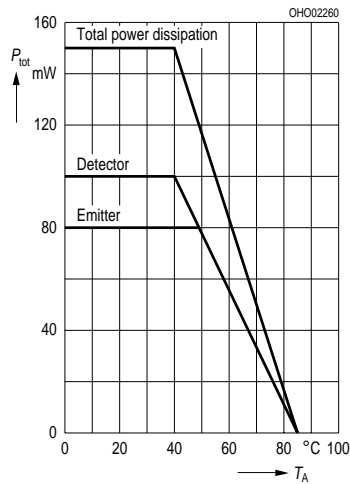
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Einschaltzeit Turn-on time	$t_{\text{ein}}$ $t_{\text{on}}$	65	$\mu\text{s}$
Anstiegszeit Rise time	$t_r$	50	$\mu\text{s}$
Ausschaltzeit Turn-off time	$t_{\text{aus}}$ $t_{\text{off}}$	55	$\mu\text{s}$
Abfallzeit Fall time	$t_f$	50	$\mu\text{s}$

- <sup>1)</sup>  $I_C$  eingestellt über den Durchlaßstrom der Sendediode, den Reflexionsgrad und den Abstand des Reflektors vom Bauteil ( $d$ )
- <sup>1)</sup>  $I_C$  as a function of the forward current of the emitting diode, the degree of reflection and the distance between reflector and component ( $d$ )

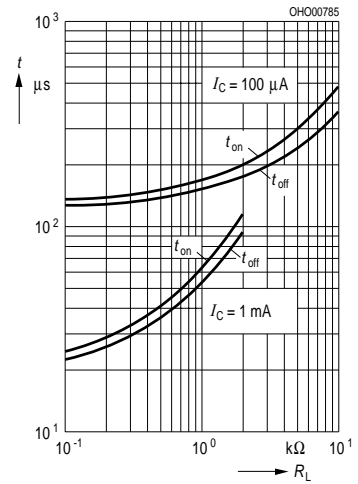
**Collector Current**  $\frac{I_C}{I_{Cmax}} = f(d)$



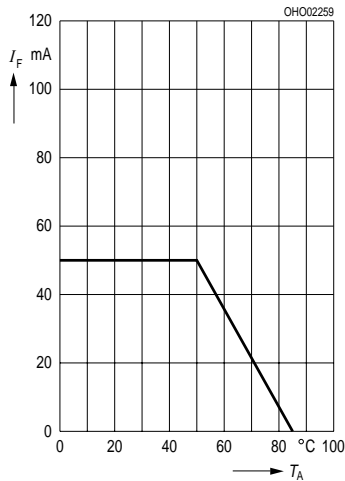
**Permissible Power Dissipation for Diode and Transistor**  $P_{tot} = f(T_A)$



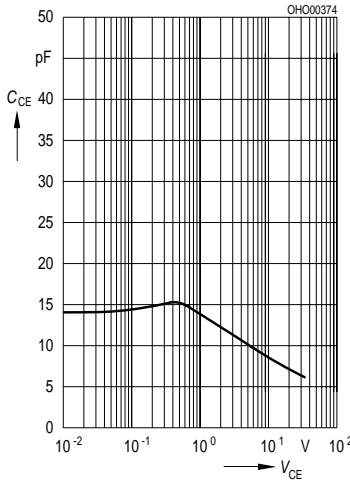
**Switching Characteristics**  $t = f(R_L)$   
 $T_A = 25^\circ\text{C}, I_F = 10\text{ mA}$



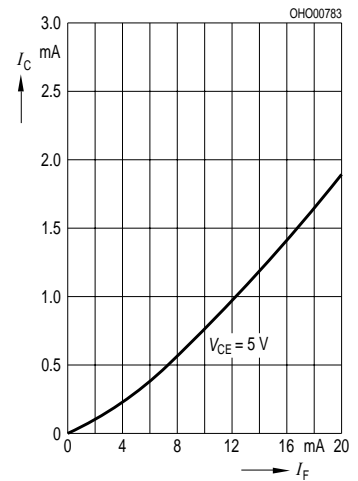
**Max. Permissible Forward Current**  
 $I_F = f(T_A)$



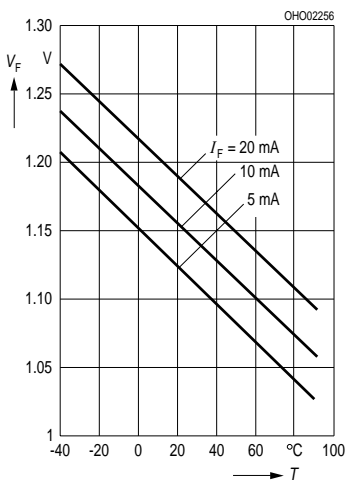
**Transistor Capacitance (typ.)**  
 $C_{CE} = f(V_{CE}), T_A = 25^\circ\text{C}, f = 1\text{ MHz}$



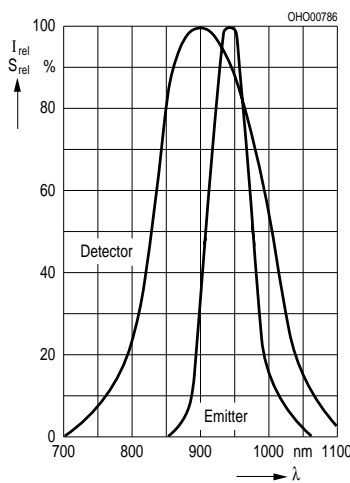
**Collector Current**  $I_C = f(I_F)$ , spacing  $d$  to reflector = 1 mm, 90% reflection



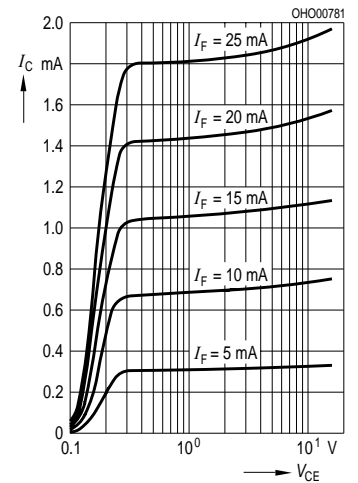
**Forward Voltage (typ.) of the Diode**  $V_F = f(T)$



**Relative Spectral Emission of Emitter (GaAs)  $I_{rel} = f(\lambda)$  and Detector (Si)  $S_{rel} = f(\lambda)$**



**Output Characteristics (typ.)**  
 $I_C = f(V_{CE})$ , spacing to reflector:  $d = 1\text{ mm}, 90\% \text{ reflection}, T_A = 25^\circ\text{C}$





**Löthinweise**  
**Soldering Conditions**

Bauform Type	Drypack Level acc. to IPS-stand. 020	Tauch-, Schwallötung Dip, Wave Soldering		Reflowlötung Reflow Soldering		Kolbenlötung Iron Soldering  (Iron temp.)
		Peak Temp. (solderbath)	Max. Time in Peak Zone	Peak Temp. (package temp.)	Max. Time in Peak Zone	
SFH 9201	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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