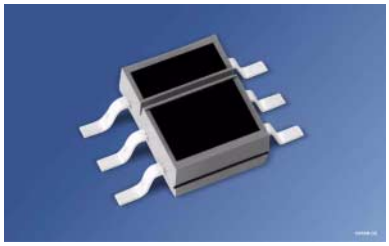
Reflexlichtschranke mit VCSEL-Sender
Reflective Interrupter with VCSEL-Emitter

SFH 9221



Wesentliche Merkmale

- Großer Arbeitsabstand (2-10mm)
- IR-GaAs-VCSEL (Vertical Cavity Surface Emitting Laser)in Kombination mit einer Si-Fotodiode
- Enge Strahlverteilung des Senders
- Tageslichtsperrfilter

Features

- Long operating distance (2-10mm)
- IR-GaAs-VCSEL (Vertical Cavity Surface Emitting Laser) in combination with a Silicon photodiode
- Narrow beam characteristics of the emitter
- Daylight cut-off filter

Anwendungen

- Positionssensor
- Endabschaltung
- Drehzahlüberwachung, -regelung
- Bewegungssensor
- Strichcodeleser

Applications

- Position sensor
- End position switch
- Speed monitoring and regulating
- Motion sensor
- Bar Code reading

Typ **Type**	**Bestellnummer** **Ordering Code**	I_P **[µA]** **(I_F = 8 mA, V_R = 5 V, d = 5 mm)** (see note on **page 5**)
SFH 9221	Q62702-P5468	1 <

Beim Betrieb dieses Bauteils sind die Sicherheitsvorschriften für die Laserklasse 1M nach IEC 60825-1 Am. 2 zu beachten.

Operating this device the safety instructions for laser class 1M according to IEC 60825-1 Am. 2 have to be observed.

ATTENTION - Observe Precautions For Handling - Electrostatic Sensitive Device

Grenzwerte
Maximum Ratings

Bezeichnung **Parameter**	**Symbol** **Symbol**	**Wert** **Value**	**Einheit** **Unit**
Sender (GaAs-VCSEL-Diode) **Emitter** (GaAs VCSEL diode)			
Sperrspannung Reverse voltage	V_R	3	V
Vorwärtsgleichstrom Forward current	I_F	10	mA
Verlustleistung Power dissipation	P_{tot}	25	mW
Empfänger (Si-Fotodiode) **Detector** (silicon photodiode)			
Sperrspannung Reverse Voltage	V_R	20	V
Verlustleistung Total power dissipation	P_{tot}	150	mW
Reflexlichtschranke **Reflective Interrupter**			
Lagertemperatur Storage temperature range	T_{stg}	– 40 … + 85	°C
Betriebstemperatur Operating temperature range	T_{op}	– 40 … + 85	°C
Elektrostatische Entladung Electrostatic discharge	ESD	400	V
Umweltbedingungen / Environment conditions	3 K3 acc. to EN 60721-3-3 (IEC 721-3-3)		

Kennwerte (T_A = 25 °C)
Characteristics

Bezeichnung **Parameter**	**Symbol** **Symbol**	**Wert** **Value**	**Einheit** **Unit**
Sender (GaAs-VCSEL Diode) **Emitter** (GaAs-VCSEL diode)			
Wellenlänge der Strahlung Wavelength at peak emission I_F = 8 mA, t_p = 20 ms	λ_{peak}	850	nm
Spektrale Bandbreite bei 50% von I_{max} Spectral bandwidth at 50% of I_{max} I_F = 8 mA	$\Delta\lambda$	1	nm
Abstrahlwinkel Half angle I_F = 10 mA	φ	± 15	Grad deg.
Schwellenstrom[1)] Threshold current[1)]	I_{th}	2.6 (<5)	mA
Durchlaßspannung Forward voltage I_F = 10 mA	V_F	1.8 (≤ 2.3)	V
Sperrstrom Reverse current V_R = 3 V	I_R	0.01 (≤ 1)	µA
Kapazität Capacitance V_R = 0 V, f = 1 MHz	C_O	25	pF
Wärmewiderstand[2)] Thermal resistance[2)]	R_{thJA}	1500	K/W
Empfänger (Si-Fotodiode) **Detector** (silicon photodiode)			
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S\ max}$	900	nm
Dunkelstrom, V_R = 10 V Dark current	I_R	50 (≤ 5000)	pA
Kapazität, V_R = 0 V, f = 1 MHz, E = 0 Capacitance	C_0	13	pF

Kennwerte (T_A = 25 °C)
Characteristics (cont'd)

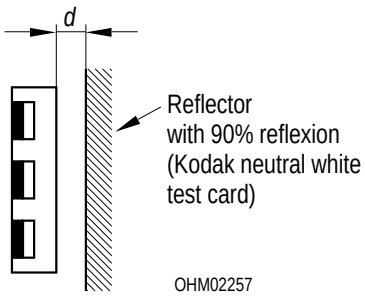
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Reflexlichtschranke **Reflective Interrupter**			
Fotostrom Photocurrent Kodak neutral white test card, 90% Reflexion I_F = 8 mA; V_R = 5 V; d = 5 mm (see note on **page 5**)	$I_{P\ min.}$	1	µA

1) Der VCSEL emittiert nur bei Flussströmen größer als I_{th}

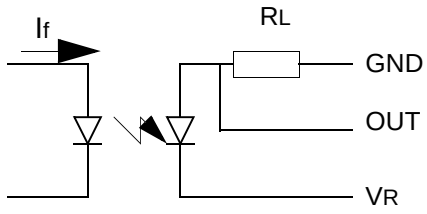
1) VCSEL only emits at forward currents higher than I_{th}

2) Montage auf PC-Board mit > 5 mm^2 Padgröβe

2) Mounting on pcb with > 5 mm^2 pad size



Schaltzeiten (T_A = 25 °C, V_R = 5 V, I_P = 1.5 µA[1)], R_L = 50 Ω)
Switching Times



Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Anstiegzeit Rise time	t_r	10	ns
Abfallzeit Fall time	t_f	10	ns

1) I_P eingestellt über den Durchlaβstrom der Sendediode, den Reflexionsgrad und den Abstand des Reflektors vom Bauteil (d)

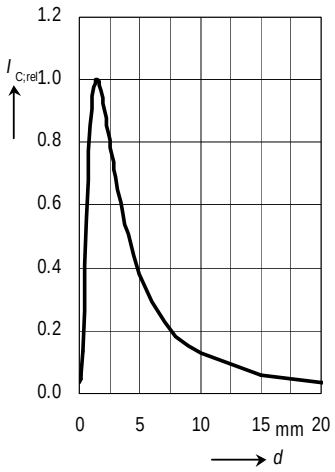
1) I_P as a function of the forward current of the emitting diode, the degree of reflection and the distance between reflector and component (d)

Anm.: Es wird empfohlen die Lichtschranke bei dem spezifizierten Arbeitpunkt von ca. 8mA für den Emitter einzusetzten, weil andere Betriebsströme zu einem größeren Streubereich beim Koppelfaktor führen. Der Abgleich erfolgt über den Arbeitswiderstand am Detektor.
Von einem Einsatz der Lichtschranke mit glänzenden oder gar spiegelnden Oberflächen wird abgeraten. Die Abstrahlcharakteristik des Senders ändert sich sowohl über die Temperatur als auch mit dem Flußstrom stärker als bei Standardemittern und führt somit ebenfalls zur Erhöhung des Streubereichs beim Koppelfaktor. Bei diffuser Streuung ist dieser Einfluß jedoch gering, und kann für die meisten Anwendungen vernachlässigt werden.

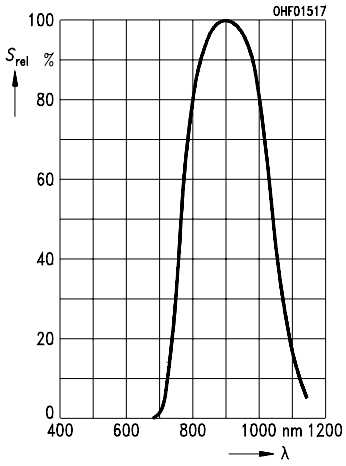
Note: It is recomended to use the interrupter at the specified emitter current of about 8mA, as other operating currents lead to a larger coupling factor variation. The tuning is done using the operating resistor on the detector side.
It is not recomended to use the interrupter in combination with shiny or mirror like surfaces. Changes in temperatures and operating current are having a bigger influence on the radiation characteristic as it is the case for standard emitters. This means a higher variance of the coupling factor. For diffuse surfaces the mentioned influence is low, and can be neglected for most of the applications.

Photocurrent $\frac{I_p}{I_{pmax}} = f(d)$

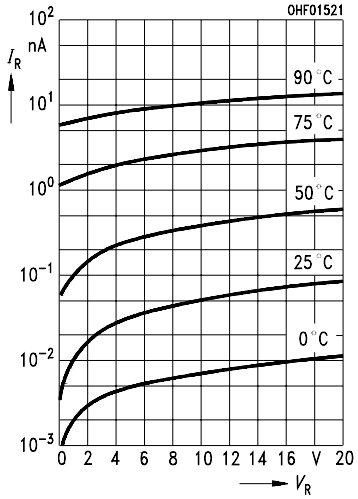
Kodak 90%



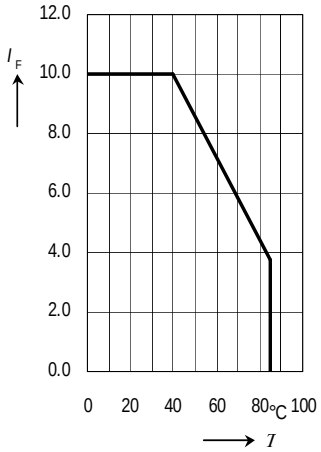
Relative Spectral Sensitivity



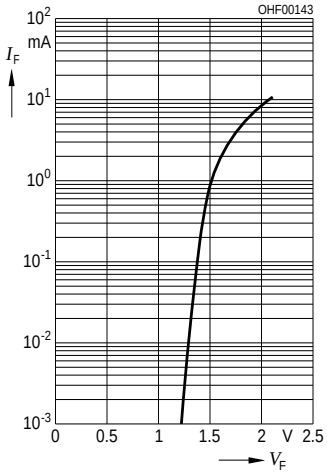
Dark Current



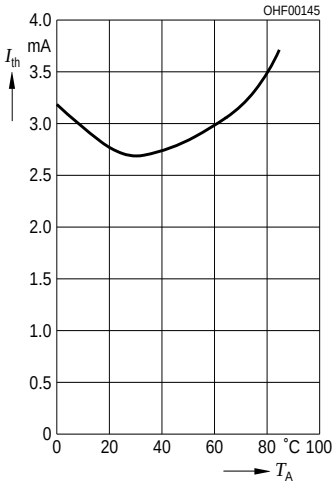
Max. Permissible Forward Current
$I_F = f(T_A)$



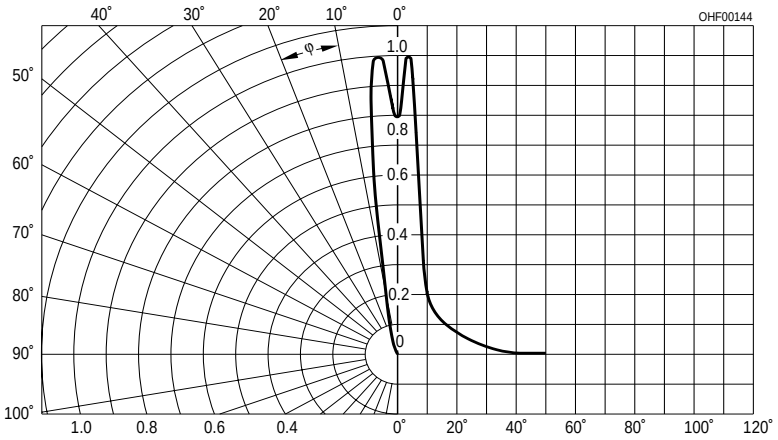
Forward Current
$I_F = f(V_F)$



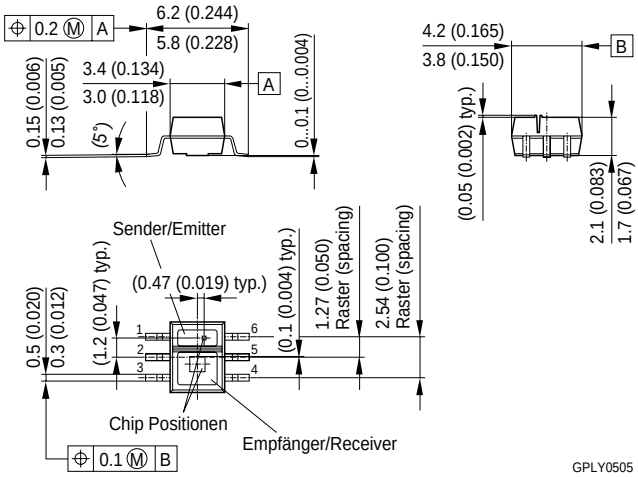
Threshold Current $I_{th} = f(T_A)$



Target Radiation characteristics
$I_{rel} = f(\varphi)$ I_F =10mA



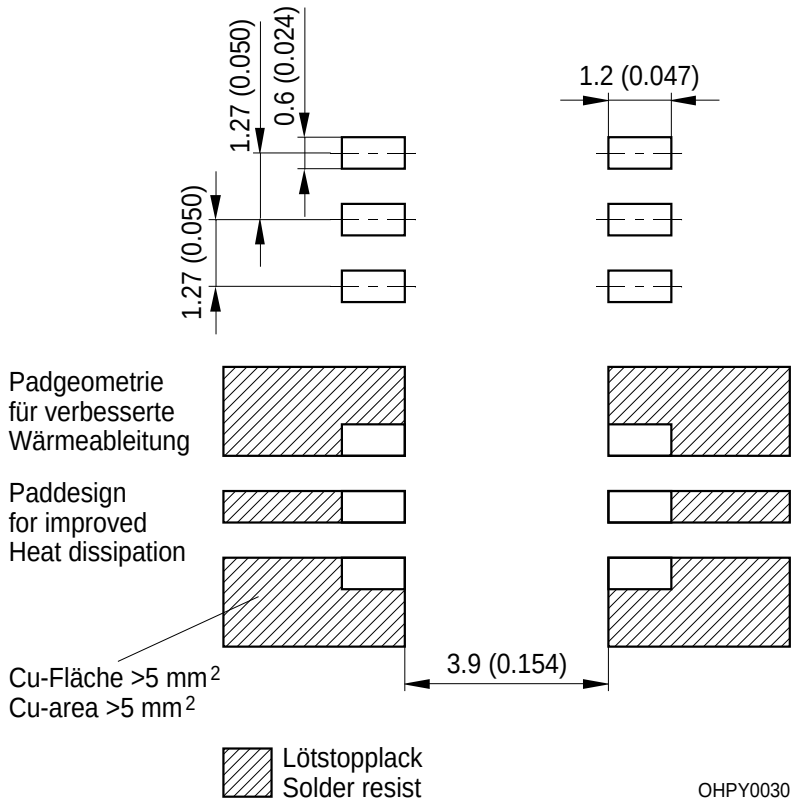
Maßzeichnung
Package Outlines



Type	1	2	3	4	5	6
SFH 9221	Anode(E)	–	Anode(S)	Cathode(S)	–	Cathode(E)

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

Empfohlenes Lötpaddesign IR-Reflow Löten
Recommended Solder Pad IR REflow Soldering



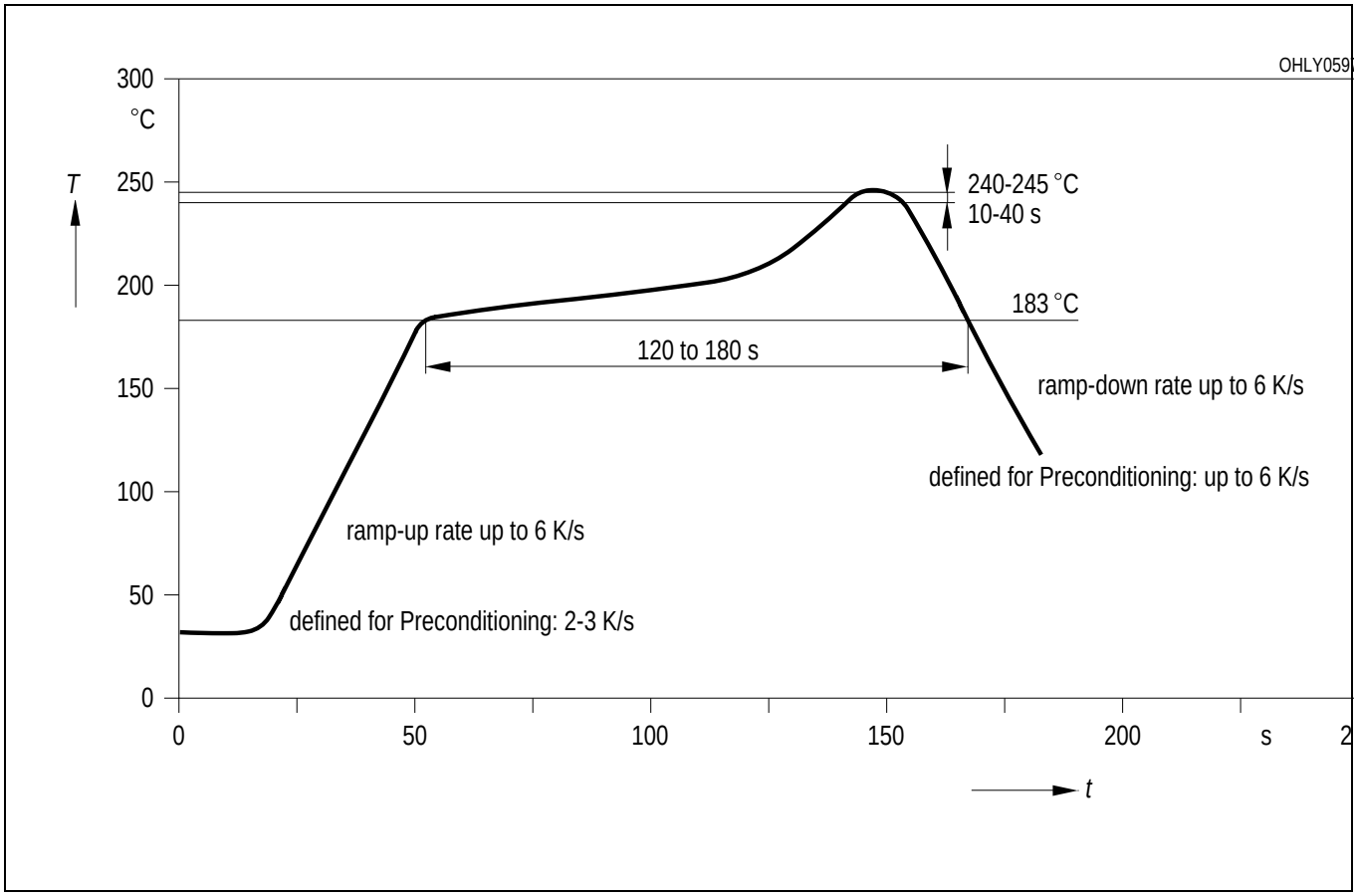
Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

Löthinweise
Soldering Conditions

Bauform Type	Drypack Level acc. to IPS-stand. 020	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.)
SFH 9221	4	n. a.	–	245 °C	10 sec.	n.a.

Bitte Verarbeitungshinweise für SMT-Bauelemente beachten!
Please observe the handling guidelines for SMT devices!

IR-Reflow Lötprofil (nach IPC 9501)
IR Reflow Soldering Profile (acc. to IPC 9501)



Gurtung / Polarität und Lage	siehe Dokument: Short Form Katalog: Gurtung und Verpackung - SMT-Bauelemente - Gehäuse:SMT RLS
Methode of Taping / Polarity and Orientation	see document: Short Form Catalog: Tape and Reel - SMT-Components - Package: SMT-RLS

Published by OSRAM Opto Semiconductors GmbH
Wernerwerkstrasse 2, D-93049 Regensburg
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