

# Slotted Interrupter

## Version 1.3

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### SFH 9540



#### Features:

- Suitable for surface mounting (SMT)
- Compact housing out of black LCP
- GaAs infrared emitter (950 nm)
- Silicon phototransistor with daylight-cutoff filter
- With positioning pin
- Suitable for pick and place
- High sensing accuracy (slit width: 0.5 mm)
- Wide gap between emitter and detector (5 mm)
- High stability on pcb due to large width of device (6.8 mm)

#### Applications

- Speed control
- Motor control
- Monitoring of paper feed in printers, copiers, facsimiles
- Control of print head in printers
- Coin detection
- Optoelectronic switches

#### Ordering Information

Type:	Collector-emitter current $I_{PCE}$ [ $\mu$ A] $I_F = 20 \text{ mA}, V_{CE} = 5 \text{ V}$	Ordering Code
SFH 9540	$\geq 1000$	Q65111A6122

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

Parameter	Symbol	Values	Unit
<b>Emitter</b>			
Reverse voltage	$V_R$	5	V
Forward current	$I_F$	60	mA
Power consumption	$P_{tot}$	100	mW
Thermal resistance junction - ambient <sup>1) page 10</sup>	$R_{thJA}$	350	K / W

**Detector**

Collector-emitter voltage	$V_{CE}$	30	V
Collector-emitter voltage ( $t \leq 2\text{ min}$ )	$V_{CE}$	70	V
Emitter-collector voltage	$V_{EC}$	7	V
Collector current	$I_C$	50	mA
Total Power dissipation	$P_{tot}$	150	mW
Thermal resistance junction - ambient <sup>1) page 10</sup>	$R_{thJA}$	350	K / W

**Slotted Interrupter**

Operation temperature range	$T_{op}$	-40 ... 85	°C
Storage temperature range	$T_{stg}$	-40 ... 85	°C
Electrostatic discharge	$V_{ESD}$	2	kV
Thermal resistance junction - ambient	$R_{thJA}$	350	K / W

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

Parameter	Symbol	Values	Unit
<b>Emitter</b>			
Peak wavelength ( $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ) $\lambda_{peak}$	950	nm
Forward voltage ( $I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ (max)) $V_F$	1.3 ( $\leq 1.6$ )	V
Reverse current ( $V_R = 5\text{ V}$ )	$I_R$	not designed for reverse operation	$\mu\text{A}$
<b>Detector</b>			
Wavelength of max. sensitivity	(typ) $\lambda_{S\text{ max}}$	920	nm

Parameter		Symbol	Values	Unit
Spectral range of sensitivity	(typ)	$\lambda_{10\%}$	(typ) 840 ... 1080	nm
Capacitance ( $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ )	(typ)	$C_{CE}$	6.5	pF
Dark current ( $V_{CE} = 20\text{ V}$ )	(typ (max))	$I_{CE0}$	2 ( $\leq 50$ )	nA

### Interrupter

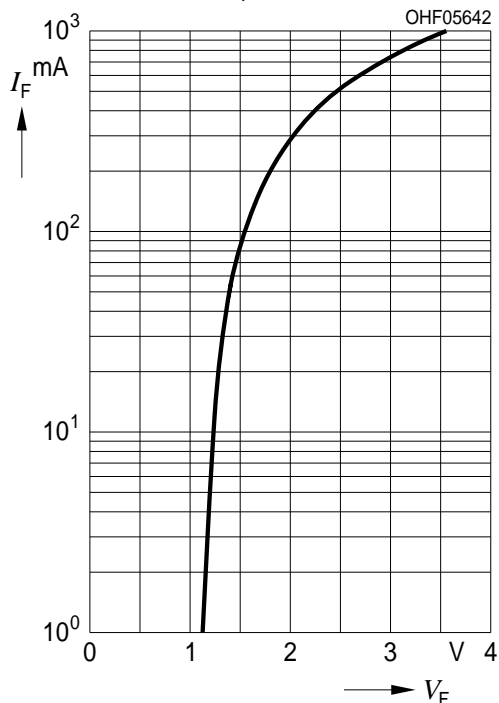
Collector-emitter current ( $I_F = 20\text{ mA}$ , $V_{CE} = 5\text{ V}$ )	(min)	$I_{PCE}$	1000	$\mu\text{A}$
Collector-emitter saturation voltage ( $I_F = 20\text{ mA}$ , $I_C = 0.3\text{ mA}$ )		$V_{CEsat}$	$\leq 400$	mV

### Switching Times

Rise time ( $V_{CC} = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $R_L = 1\text{ k}\Omega$ )	(typ)	$t_r$	13	$\mu\text{s}$
Fall time ( $V_{CC} = 5\text{ V}$ , $I_C = 1\text{ mA}$ , $R_L = 1\text{ k}\Omega$ )	(typ)	$t_f$	17	$\mu\text{s}$

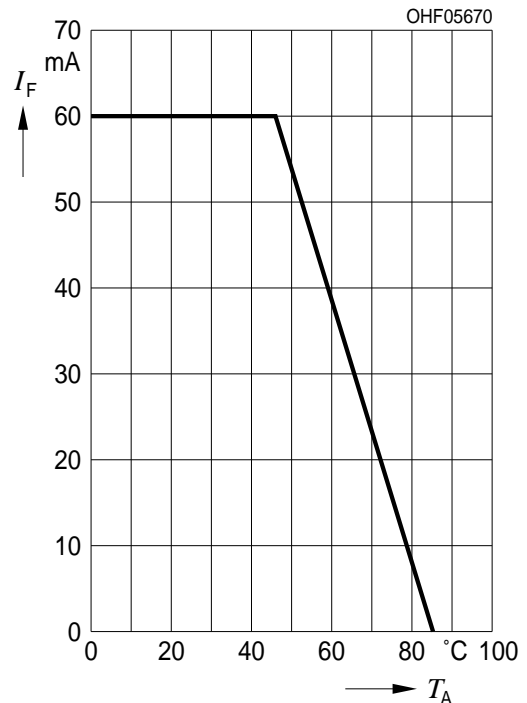
### Forward Current <sup>2) page 10</sup>

$I_F = f(V_F)$ , single pulse,  $t_p = 100\text{ }\mu\text{s}$ ,  $T_A = 25^\circ\text{C}$



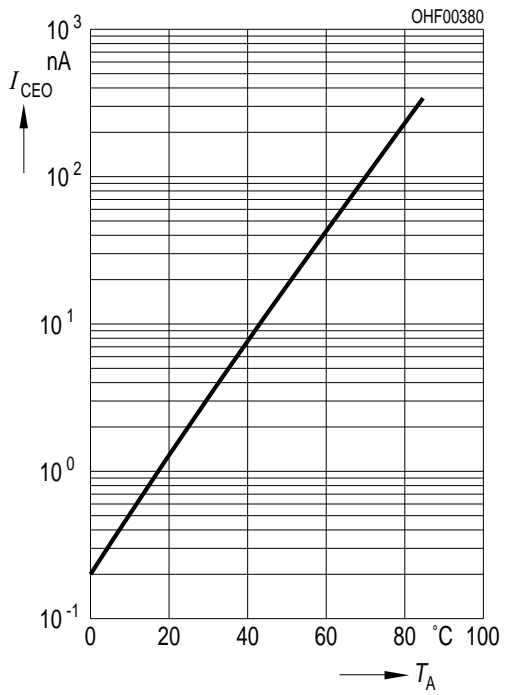
### Max. Permissible Forward Current

$I_{F,max} = f(T_A)$ ,  $R_{thJA} = 350\text{ K/W}$



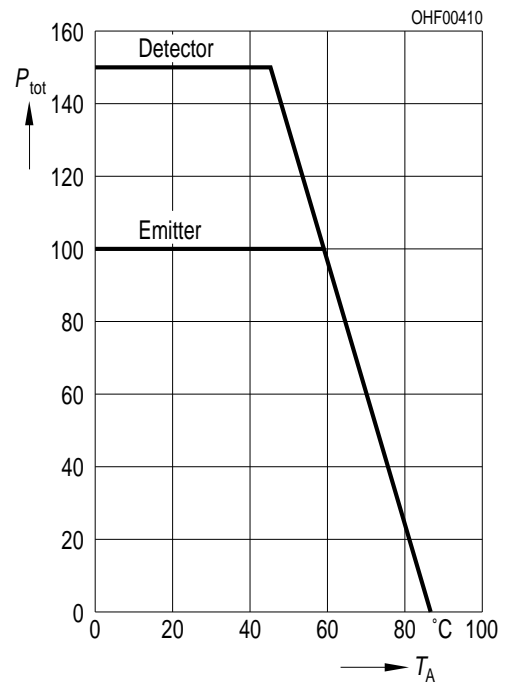
**Dark Current** 2) page 10

$I_{CEO} = f(T_A), V_{CE} = 20\text{ V}, E = 0$

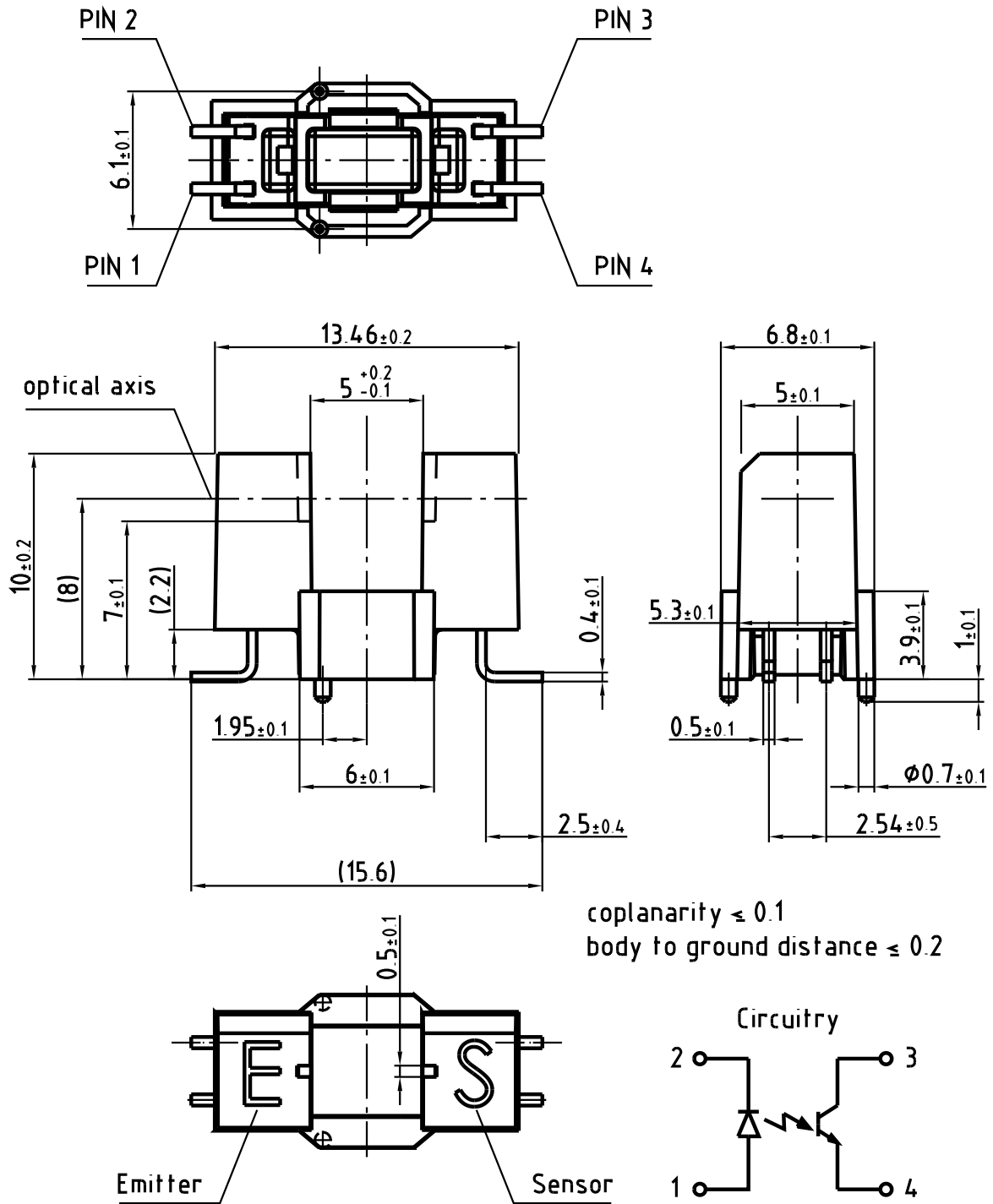


**Power Consumption**

$P_{tot} = f(T_A)$



Package Outline



C63062-A3402-A1-04

Dimensions in mm.

**Pinning**

Pin	Description
1	Emitter - Anode
2	Emitter - Cathode
3	Sensor - Collector
4	Sensor - Emitter

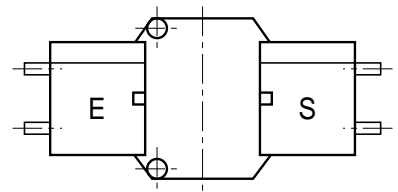
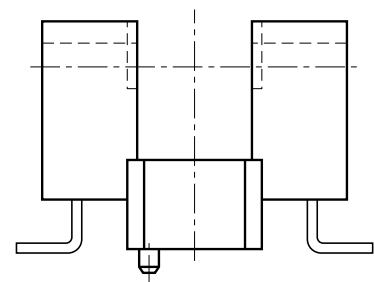
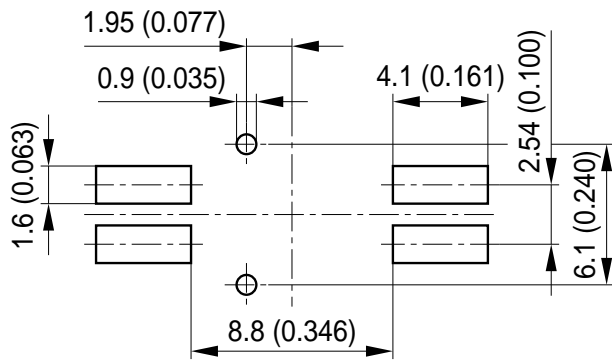
**Package**

Slotted Interrupter

**Approximate Weight:**

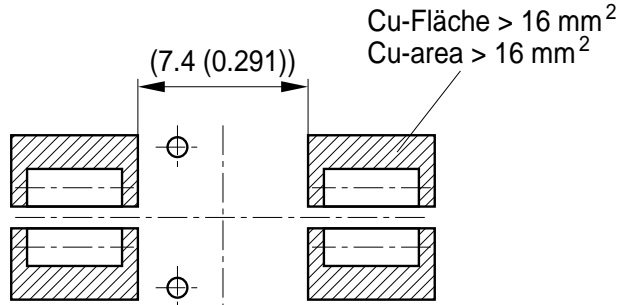
0.6 g

Recommended Solder Pad

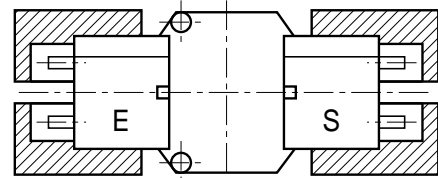


Padgeometrie für verbesserte Wärmeableitung

Paddesign for improved heat dissipation



Bauteil positioniert  
Component Location on Pad



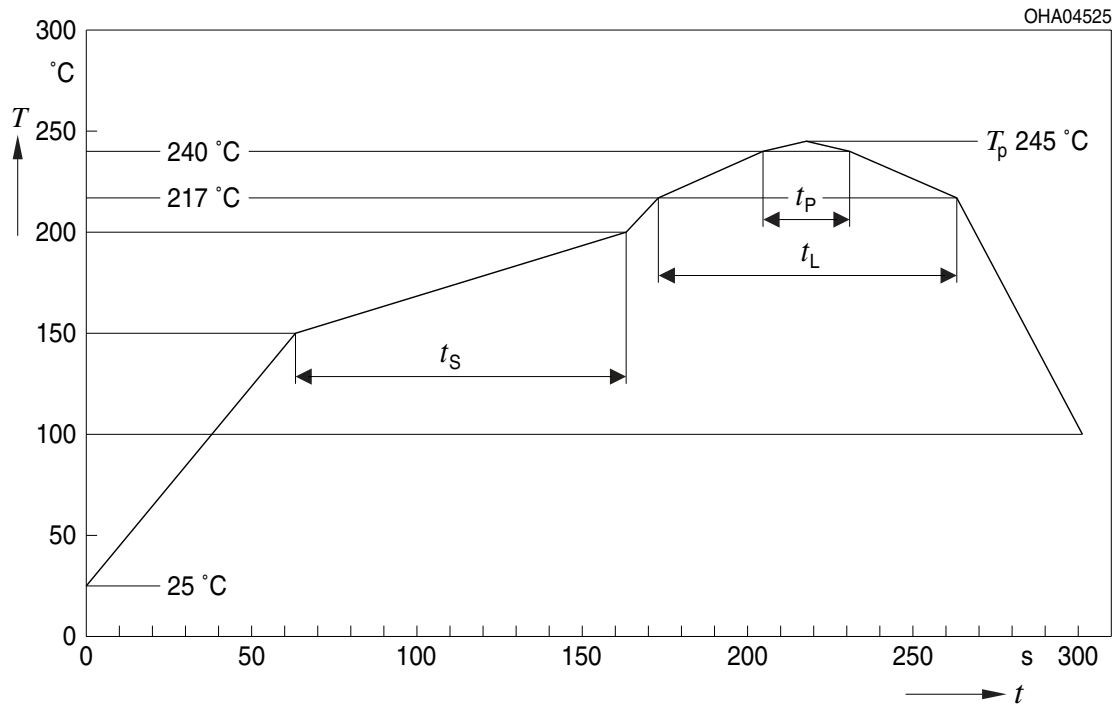
 Lötstopplack  
Solder resist

OHFY1950

Dimensions in mm (inch).

### Reflow Soldering Profile

Product complies to MSL Level 1 acc. to JEDEC J-STD-020D.01



Profil-Charakteristik Profile Feature	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Einheit Unit
		Minimum	Recommendation	Maximum	
Ramp-up Rate to Preheat*) 25 °C to 150 °C			2	3	K/s
Time $t_S$ $T_{Smin}$ to $T_{Smax}$	$t_S$	60	100	120	s
Ramp-up Rate to Peak*) $T_{Smax}$ to $T_P$			2	3	K/s
Liquidus Temperature	$T_L$		217		°C
Time above Liquidus temperature	$t_L$		80	100	s
Peak Temperature	$T_P$		245	250	°C
Time within 5 °C of the specified peak temperature $T_P - 5$ K	$t_P$	10	20	30	s
Ramp-down Rate* $T_P$ to 100 °C			3	4	K/s
Time 25 °C to $T_P$				480	s

All temperatures refer to the center of the package, measured on the top of the component

\* slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range



**Disclaimer**

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

**Attention please!**

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.

If printed or downloaded, please find the latest version in the Internet.

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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\* may only be used in life-support devices\*\* or systems with the express written approval of OSRAM OS.

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\*\*) 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 and the life of the user may be endangered.

**Glossary**

- 1) **Thermal resistance:** Mounting on PC-board with  $> 5 \text{ mm}^2$  pad size
- 2) **Typical Values:** Due to the special conditions of the manufacturing processes of LED, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.

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