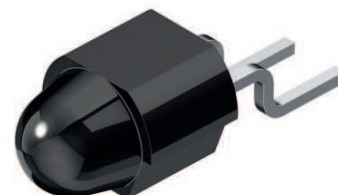


# High Power Infrared Emitter (940nm) in SMR® Package Version 1.3

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## SFH 4542



### Features:

- High Power Infrared LED
- SMR® (Surface Mount Radial) package
- Same package as photodiode SFH 2500
- Short switching times

### Applications

- Sensor technology
- Discrete interrupters
- Discrete optocouplers

### Notes

Depending on the mode of operation, these devices emit highly concentrated non visible infrared light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1 and IEC 62471.

### Ordering Information

Type:	Radiant Intensity $I_e$ [mW/sr] $I_F = 100 \text{ mA}$ , $t_p = 20 \text{ ms}$	Ordering Code
SFH 4542	230 ( $\geq 100$ )	Q65110A8093
SFH 4542-BWCW	160 ... 500	Q65111A7727

*Note:* Measured at a solid angle of  $\Omega = 0.01 \text{ sr}$

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

Parameter	Symbol	Values	Unit
Operation and storage temperature range	$T_{op}; T_{stg}$	-40 ... 85	°C
Reverse voltage	$V_R$	5	V
Forward current	$I_F$	100	mA
Surge current ( $t_p \leq 100\ \mu\text{s}$ , $D = 0$ )	$I_{FSM}$	1	A
Power consumption	$P_{tot}$	180	mW
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2	kV
Thermal resistance junction - ambient <sup>1) page 9</sup>	$R_{thJA}$	300	K / W

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

Parameter		Symbol	Values	Unit
Peak wavelength ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\lambda_{peak}$	950	nm
Centroid wavelength ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\lambda_{centroid}$	940	nm
Spectral bandwidth at 50% of $I_{max}$ ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\Delta\lambda$	42	nm
Half angle	(typ)	$\varphi$	$\pm 10$	°
Dimensions of active chip area	(typ)	L x W	0.3 x 0.3	mm x mm
Rise and fall time of $I_e$ ( 10% and 90% of $I_{e,max}$ ) ( $I_F = 100\text{ mA}$ , $R_L = 50\ \Omega$ )	(typ)	$t_r, t_f$	12	ns
Forward voltage ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ (max))	$V_F$	1.5 ( $\leq 1.8$ )	V
Forward voltage ( $I_F = 1\text{ A}$ , $t_p = 100\ \mu\text{s}$ )	(typ (max))	$V_F$	2.3 ( $\leq 3$ )	V
Reverse current ( $V_R = 5\text{ V}$ )		$I_R$	not designed for reverse operation	$\mu\text{A}$
Total radiant flux ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$\Phi_e$	65	mW
Temperature coefficient of $I_e$ or $\Phi_e$ ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$TC_I$	-0.5	% / K
Temperature coefficient of $V_F$ ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$TC_V$	-1.3	mV / K
Temperature coefficient of wavelength ( $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ )	(typ)	$TC_\lambda$	0.3	nm / K

Grouping ( $T_A = 25\text{ °C}$ )

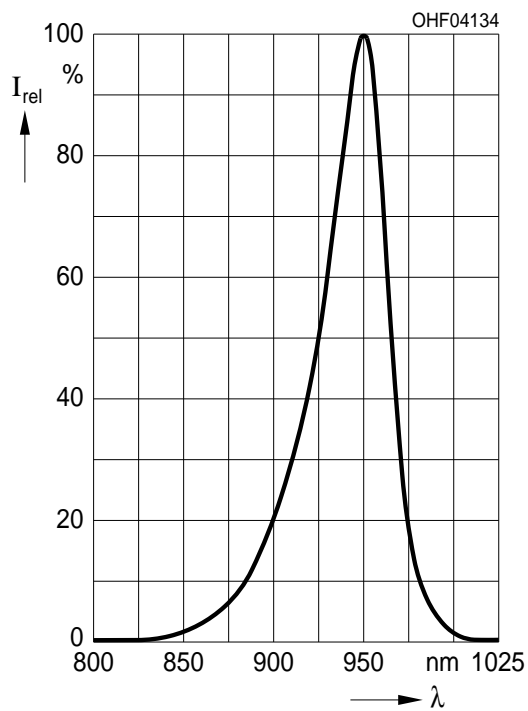
Group	Min Radiant Intensity $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ $I_{e, \min}$ [mW / sr]	Max Radiant Intensity $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$ $I_{e, \max}$ [mW / sr]	Typ Radiant Intensity $I_F = 1\text{ A}$ , $t_p = 25\text{ }\mu\text{s}$ $I_{e, \text{typ}}$ [mW / sr]
SFH4542 - AW	100	200	1000
SFH4542 - BW	160	320	1700
SFH4542 - CW	250	500	2600

Note: measured at a solid angle of  $\Omega = 0.01\text{ sr}$

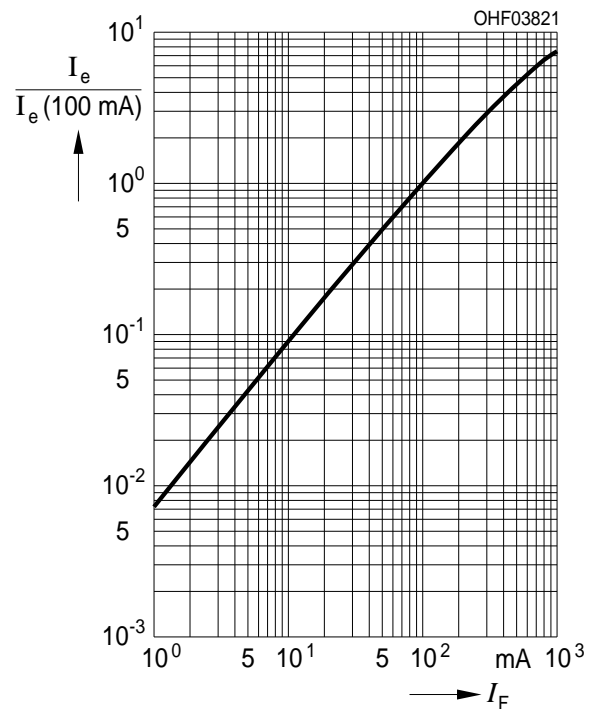
Only one group in one packing unit (variation lower 2:1).

Relative Spectral Emission <sup>2) page 9</sup>

$$I_{\text{rel}} = f(\lambda), T_A = 25\text{ °C}$$

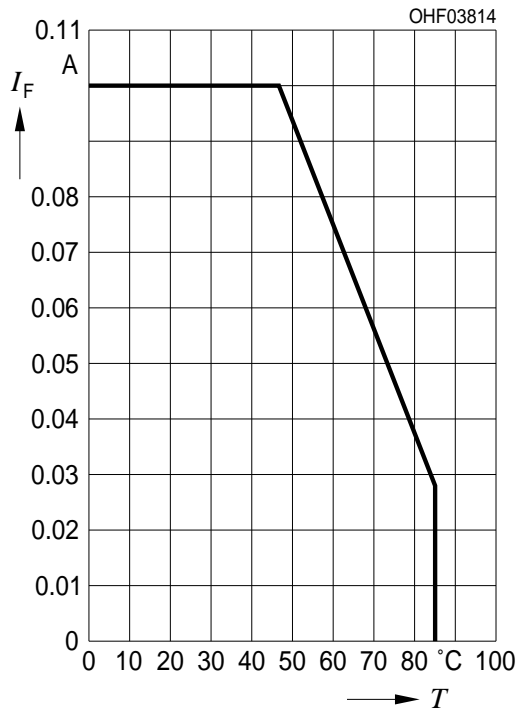
Radiant Intensity <sup>2) page 9</sup>

$$I_e / I_e(100\text{ mA}) = f(I_F), \text{ single pulse, } t_p = 25\text{ }\mu\text{s}, T_A = 25\text{ °C}$$



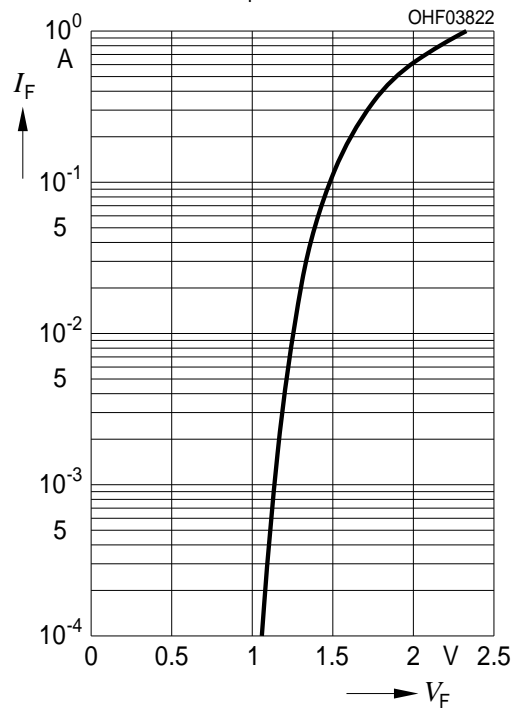
**Max. Permissible Forward Current**

$I_F = f(T_A), R_{thJA} = 300 \text{ K/W}$



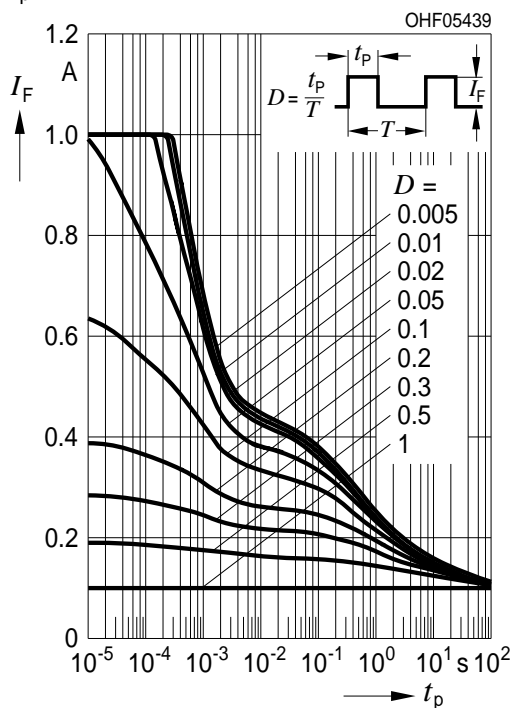
**Forward Current** <sup>2) page 9</sup>

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



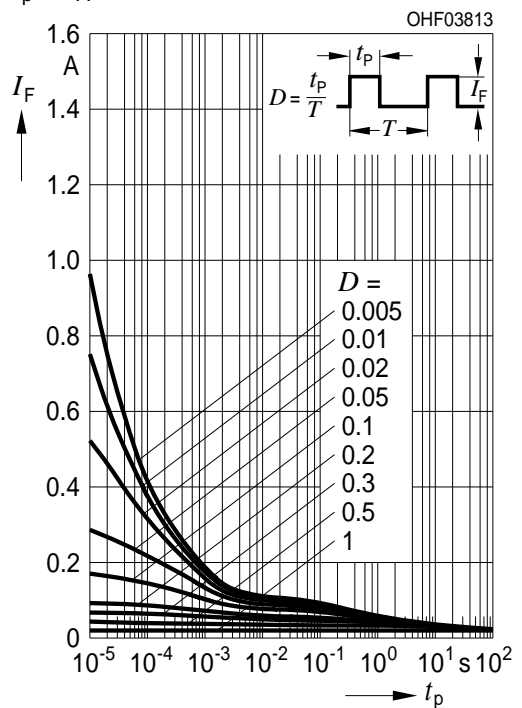
**Permissible Pulse Handling Capability**

$I_F = f(t_p), T_A = 25^\circ\text{C}, \text{ duty cycle } D = \text{parameter}$



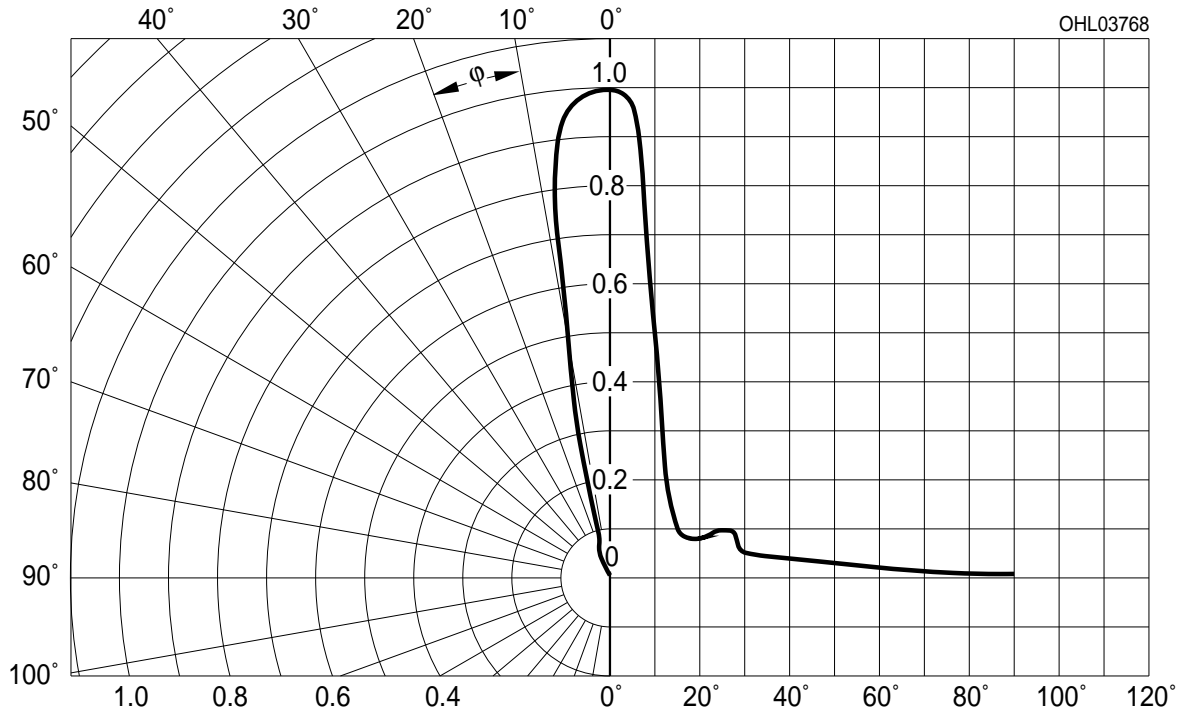
**Permissible Pulse Handling Capability**

$I_F = f(t_p), T_A = 85^\circ\text{C}, \text{ duty cycle } D = \text{parameter}$

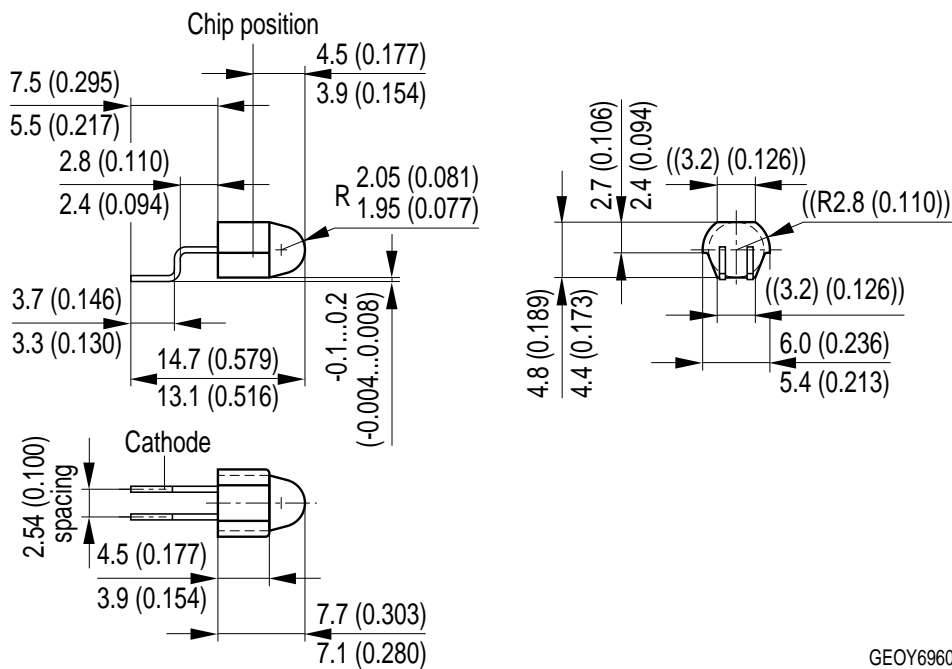


**Radiation Characteristics** 2) page 9

$I_{rel} = f(\phi), T_A = 25^\circ\text{C}$



**Package Outline**



GEOY6960

*Dimensions in mm (inch).*

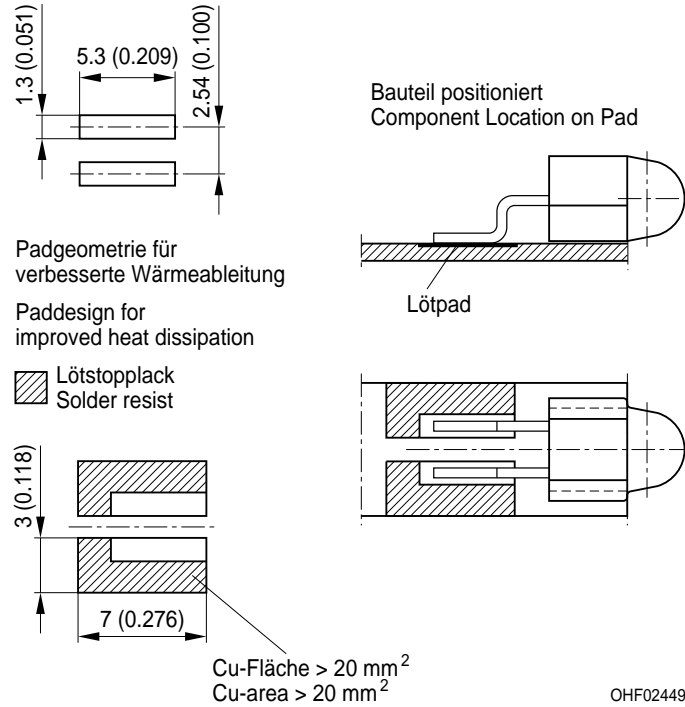
**Approximate Weight:**

0.2 g

**Note**

Packing information is available on the internet (online product catalog).

**Recommended Solder Pad**



*Dimensions in mm (inch).*

### Reflow Soldering Profile

Product complies to MSL Level 3 acc. to JEDEC J-STD-020D.01



OHA04612

Profile Feature Profil-Charakteristik	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Unit Einheit
		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	260	°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	6	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.

**Packing**

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.

\*) A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

\*\*) 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:** junction -ambient, mounted on PC-board (FR4), pads size 20 mm<sup>2</sup> each
- 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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