

# IR-Empfänger für Fernbedienungen

## IR-Receiver for Remote Control Systems

**SFH 5110**  
**SFH 5111**



### Beschreibung

SFH 5110 und SFH 5111 sind Infrarot-Empfänger für die Erkennung von Signalen aus Infrarot-Fernbedienungssystemen und bestehen aus Fotodiode, Vorverstärker, automatischer Verstärkungsregelung, Bandpaß-Filter und Demodulator. Das schwarz eingefärbte Gehäuse dient zur Unterdrückung des Tageslichteinflusses.

### Wesentliche Merkmale

- IC mit monolithisch integrierter Fotodiode (Ein-Chip Lösung)
- Speziell geeignet für Anwendungen von 940 nm
- Hohe Empfindlichkeit
- Variable Bandpaß-Filterfrequenz
- TTL und CMOS kompatibel
- Ausgang: aktiv „Low“
- Keine externe Beschaltung nötig

### Anwendungen

- Empfänger in Fernbedienungen für TV, Videorekorder, HiFi, Satellitenempfänger und CD-Spieler
- Optischer Schalter

### Description

SFH 5110 and SFH 5111 are IR receivers to detect light from infrared remote control systems. The IC includes photodiode, preamplifier, automatic gain control, bandpass and demodulator. The black-colored package is designed as day-light-cutoff filter.

### Features

- IC with monolithic integrated photodiode (single chip solution)
- Especially suitable for applications of 940 nm
- High sensitivity
- Various bandpass filter frequency
- TTL and CMOS compatibility
- Output: active Low
- No external components necessary

### Applications

- Remote control module for TV sets, VCRs, hi-fi audio receivers, SAT receivers and compact disk players
- Optical Switch

Typ	Trägerfrequ.	Bestellnr.	Typ	Trägerfrequ.	Bestellnr.
Type	Carrier Frequency kHz	Ordering Code	Type	Carrier Frequency kHz	Ordering Code
SFH 5110-30	30	Q62702-P5088	SFH 5111-30	30	Q62702-P5257
SFH 5110-33	33	Q62702-P5089	SFH 5111-33	33	Q62702-P5258
SFH 5110-36	36	Q62702-P5090	SFH 5111-36	36	Q62702-P5259
SFH 5110-38	38	Q62702-P5091	SFH 5111-38	38	Q62702-P5260
SFH 5110-40	40	Q62702-P5092	SFH 5111-40	40	Q62702-P5261

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

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebs- und Lagertemperatur Operation and storage temperature range	$T_{op}$ $T_{stg}$	$-10 \dots +75$ $-30 \dots +100$	°C
Betriebsspannung Supply voltage	$V_{CC}$	6.3	V
Betriebsstrom Supply current	$I_{CC}$	5	mA
Ausgangsspannung Output voltage	$V_{OUT}$	6.3	V
Ausgangsstrom Output current	$I_{OUT}$	3	mA
Verlustleistung Total power dissipation, $T_A \leq 85\text{ °C}$	$P_{tot}$	50	mW

**Empfohlener Arbeitsbereich****Recommended Operating Conditions**

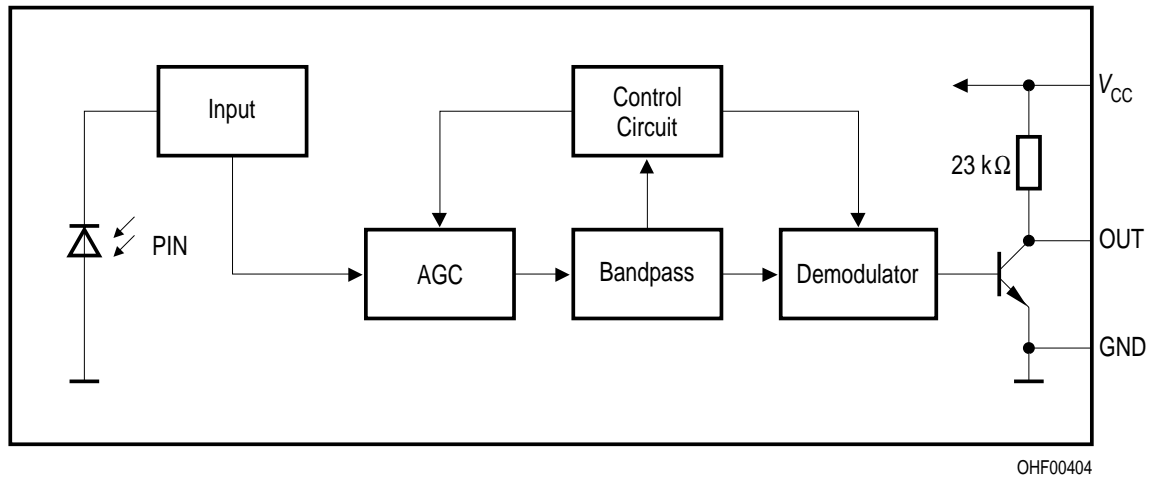
Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Betriebstemperatur Operating temperature	$T_{op}$	$-10$	—	75	°C
Betriebsspannung Supply Voltage	$V_{cc}$	4.5	5.0	5.5	V

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

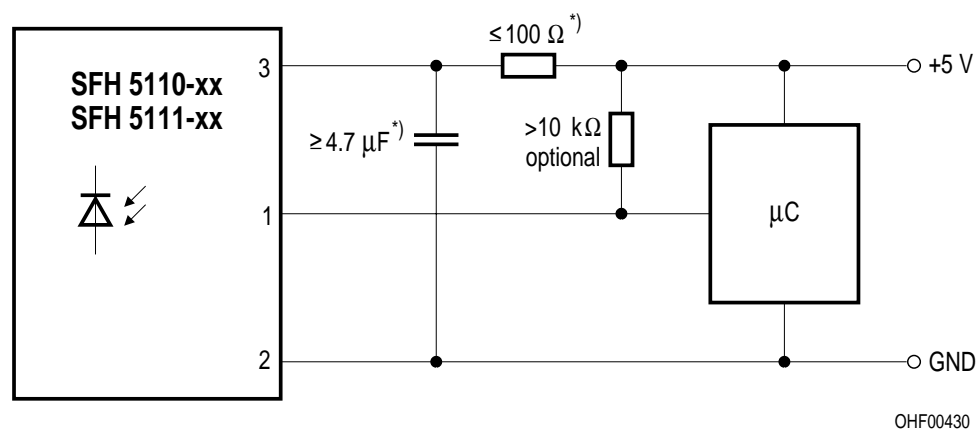
Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Stromaufnahme, $V_{CC} = 5\text{ V}$ , $E = 0$ Current consumption	$I_{CC}$	–	1.3	–	mA
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{s\text{ max}}$	–	940	–	nm
Spektraler Bereich der Fotoempfindlichkeit Spectral range of sensitivity	$\lambda$	830	–	1100	nm
Ausgangsspannung Output voltage Output "High" - ( $I_q = 10\text{ }\mu\text{A}$ ) Output "Low" - ( $I_q = 500\text{ }\mu\text{A}$ )	$V_{OUT\text{ high}}$ $V_{OUT\text{ low}}$	$V_S - 0.5$ –	– –	– 0.5	V
Trägerfrequenz Carrier frequency	$f_0$	–	30 33 36 38 40	–	kHz
Min. Bestrahlungsstärke (Testsignal, s. <b>Fig. 3</b> ) Min. Threshold irradiance (test signal, see <b>Fig. 3</b> ) $f = f_0$ , $t_{p,I} = 600\text{ }\mu\text{s}$	$E_{e\text{ min}}$	–	0.35	0.5	mW/m <sup>2</sup>
Min. Eingangspulsbreite „ON“ (Testsignal, s. <b>Fig. 3</b> ) <sup>1)</sup> Min. Input pulse width "ON" (test signal, see <b>Fig. 3</b> ) <sup>1)</sup>	$t_{p,I}$	$6/f_0$	–	–	$\mu\text{s}$
Ausgangspulsbreite „ON“ (Testsignal, s. <b>Fig. 3</b> ) Output pulse width "ON" (test signal, see <b>Fig. 3</b> , $E_e = 1\text{ mW/m}^2$ )	$t_{p,O}$	$t_{p,I} - 6/f_0$	–	$t_{p,I} + 6/f_0$	$\mu\text{s}$
50%-Filterbandbreite, $f = f_0$ , $E_V = 0$ , $V_{CC} = 5\text{ V}$ 50%-Filter bandwidth	$\Delta f_{50\%}$	3	–	6	kHz

<sup>1)</sup> Die volle Empfindlichkeit wird bei einer Burstlänge von mindestens 6 Pulsen erreicht. Die Reichweite bei Verwendung eines typischen Senders (SFH 4510/SFH 4515,  $I_F = 500\text{ mA}$ ) beträgt etwa 30 m.

<sup>1)</sup> A minimum burst length of 6 pulses is necessary for full sensitivity. The transmission distance with a typical transmitter (SFH 4510/SFH 4515,  $I_F = 500\text{ mA}$ ) is about 30 m.

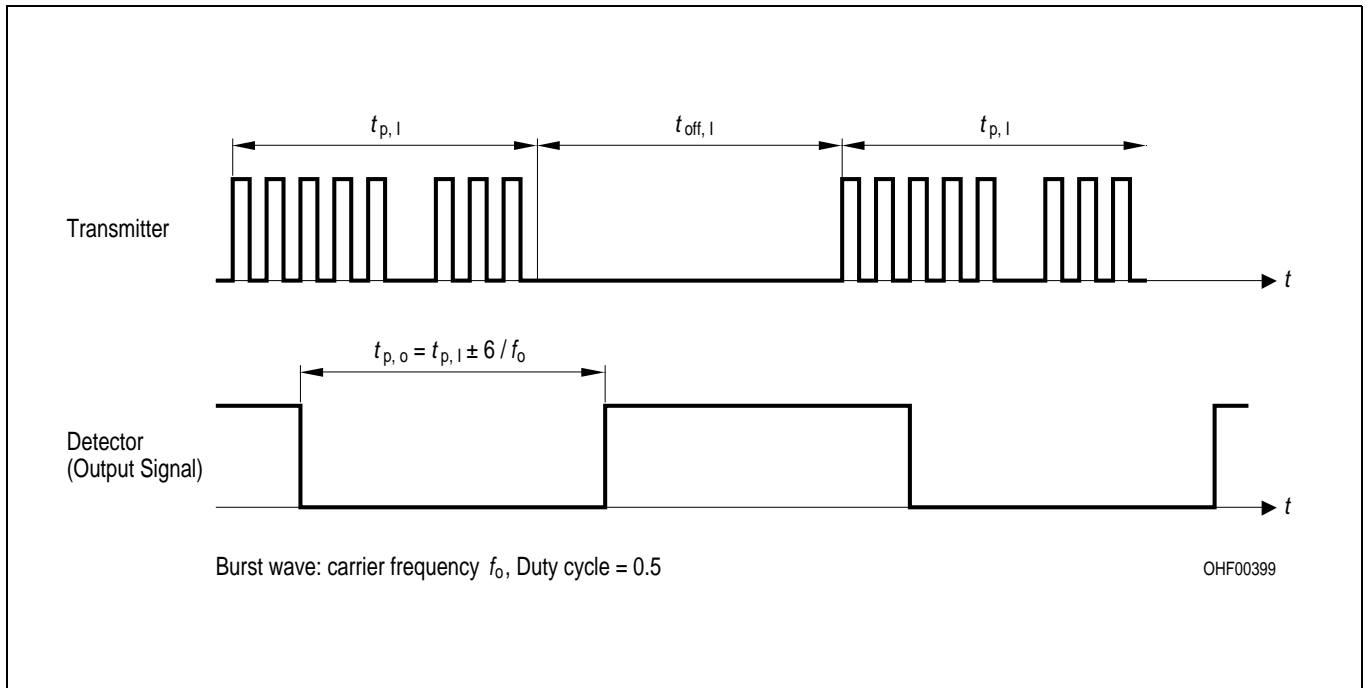


**Figure 1**      **Blockschaltbild**  
**Block Diagram**



<sup>\*)</sup> only necessary to suppress power supply disturbances

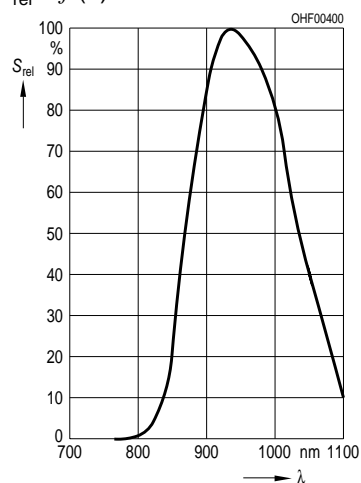
**Figure 2**      **Externe Beschaltung**  
**External Circuit**



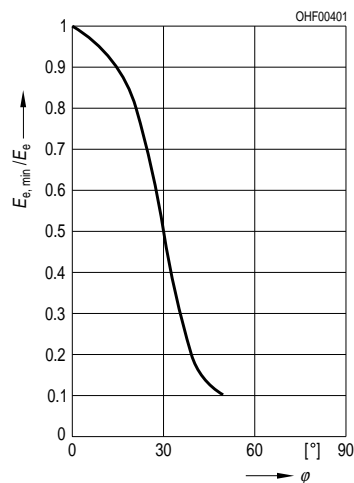
**Figure 3**      **Optisches Testsignal**  
**Optical Test Signal**

# Relative Luminous Sensitivity

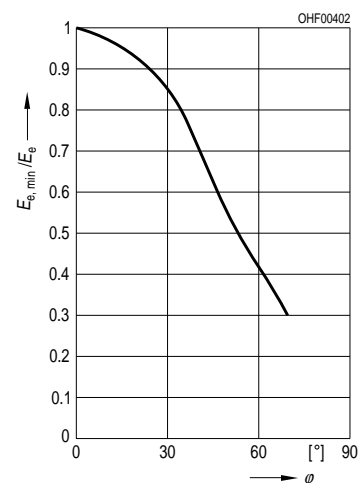
$$S_{\text{rel}} = f(\lambda)$$



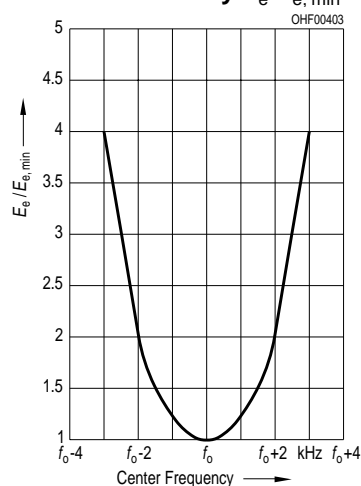
# Vertical Directivity $\varphi_y$



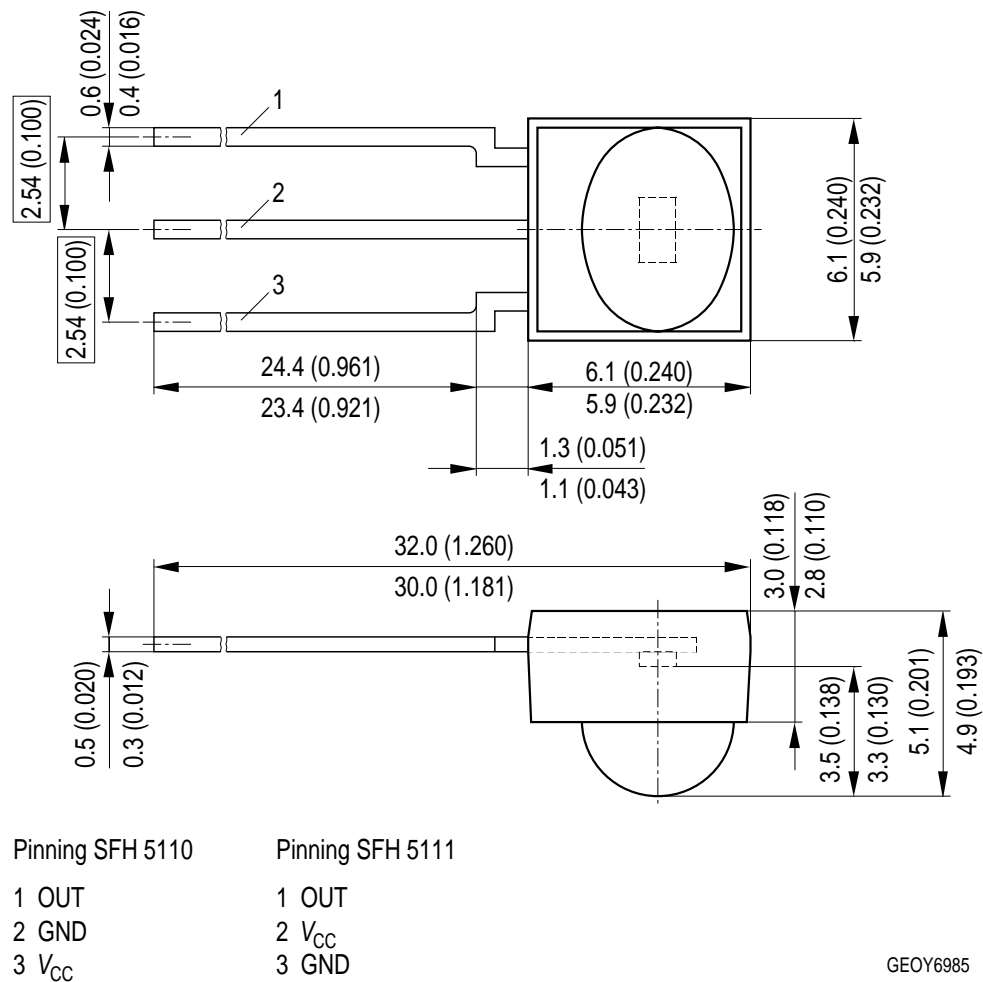
# Horizontal Directivity $\varphi_x$



# Relative Sensitivity $E_e/E_{e, \text{min}} = f(f_0)$



## Maßzeichnung Package Outlines



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

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