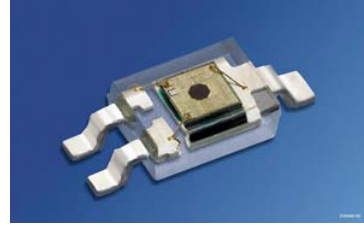


**Schmitt-Trigger IC im Smart DIL Gehäuse**  
**Schmitt-Trigger IC in Smart DIL Package**  
**Lead (Pb) Free Product - RoHS Compliant**

**SFH 5440**  
**SFH 5441**



**Wesentliche Merkmale**

- SFH 5440: Ausgang active low
- SFH 5441: Ausgang active high
- Gegurtet lieferbar
- Geeignet für Anwendungen im Bereich von 400 nm bis 1100 nm

**Anwendungen**

- Optischer Schalter
- Pulsformer
- Zähler

**Features**

- SFH 5440: Output active low
- SFH 5441: Output active high
- Available on tape and reel
- Suitable for applications from 400 nm to 1100 nm

**Applications**

- Optical threshold switch
- Pulseformer
- Counter

<b>Typ Type</b>	<b>Bestellnummer Ordering Code</b>	<b>Gehäuse Package</b>
SFH 5440	Q65110A1212	Smart-DIL Gehäuse, GND-Kennzeichnung: breiter Anschluß Smart-DIL package, GND marking: broad lead
SFH 5441	Q65110A2641	

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

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Lagertemperatur Storage temperature range	$T_{\text{stg}}$	- 40 ... + 100	°C
Betriebstemperatur Operating temperature range	$T_{\text{op}}$	- 40 ... + 85	°C
Versorgungsspannung Supply voltage	$V_{\text{CC}}$	- 0.5 ... + 20	V
Ausgangsspannung Output voltage	$V_{\text{O}}$	- 0.5 ... + 20	V
Ausgangsstrom Output current	$I_{\text{O}}$	50	mA
Verlustleistung Power dissipation	$P_{\text{tot}}$	175	mW

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

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Versorgungsspannung Supply voltage	$V_{\text{CC}}$	4 ... 18	V
Ausgangsstrom Output current	$I_{\text{O}}$	< 16	mA

Zur Stabilisierung der Versorgung wird ein Stützkondensator (angeschlossen zwischen  $V_{\text{CC}}$  und GND) von typ. 0.1  $\mu\text{F}$  empfohlen.

A bypass capacitor, 0.1  $\mu\text{F}$  typical, connected between  $V_{\text{CC}}$  and GND is recommended in order to stabilize power supply line.

**Kennwerte** ( $T_A = 25\text{ °C}$ ,  $V_{\text{CC}} = 5\text{ V}$ )**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Ausgangsspannung „high“ Output voltage “high” $I_{\text{O}} = 0$	$V_{\text{OH}}$	$V_{\text{CC}} (> 4.0)$	V
Ausgangsspannung „low“ Output voltage “low” $I_{\text{O}} = 16\text{ mA}$	$V_{\text{OL}}$	0.15 (< 0.4)	V

**Kennwerte** ( $T_A = 25\text{ °C}$ ,  $V_{CC} = 5\text{ V}$ )  
**Characteristics** (cont'd)

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Stromaufnahme, $E = 0$ Supply current $V_{CC} = 5\text{ V}$ $V_{CC} = 18\text{ V}$	$I_{CC}$	3.3 (< 5) 5.0	mA
Schaltsschwelle, $\lambda = 950\text{ nm}$ Threshold "ON" SFH 5440: "H" → "L" SFH 5441: "L" → "H"	$E_{e, ON}$	170 (< 320)	$\mu\text{W}/\text{cm}^2$
Hysteresese Hysteresis	$E_{e, OFF}/E_{e, ON}$	0.6 (0.5 ... 0.9)	–
Halbwinkel Half angle	$\varphi$	$\pm 60$	Grad degr.
Anstiegszeit 10% bis 90% Rise time 10% to 90% $R_L = 280\ \Omega$ , $E_e = 600\ \mu\text{W}/\text{cm}^2$ , $\lambda = 950\text{ nm}$	$t_r$	100	ns
Abfallzeit 90% bis 10% Fall time 90% to 10% $R_L = 280\ \Omega$ , $E_e = 600\ \mu\text{W}/\text{cm}^2$ , $\lambda = 950\text{ nm}$	$t_f$	100	ns
Ausgangsverzögerungszeit Propagation delay time "H" → "L" $R_L = 280\ \Omega$ , $E_e = 600\ \mu\text{W}/\text{cm}^2$ , $\lambda = 950\text{ nm}$	$t_{PHL}$	5 (< 15)	$\mu\text{s}$
Ausgangsverzögerungszeit Propagation delay time "L" → "H" $R_L = 280\ \Omega$ , $E_e = 600\ \mu\text{W}/\text{cm}^2$ , $\lambda = 950\text{ nm}$	$t_{PLH}$	5 (< 15)	$\mu\text{s}$

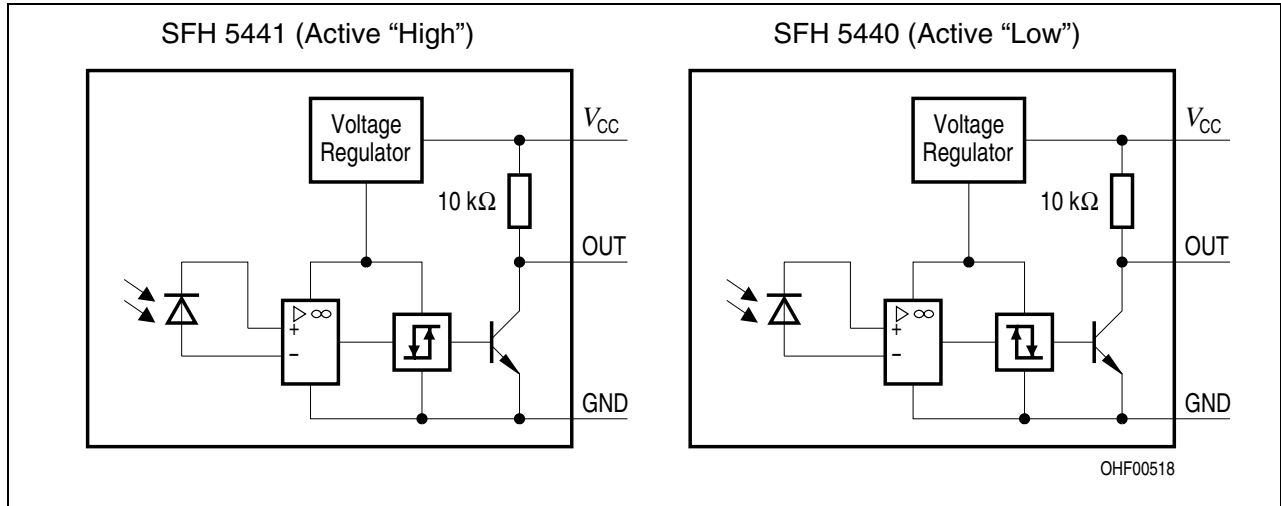


Figure 1 Block Diagram

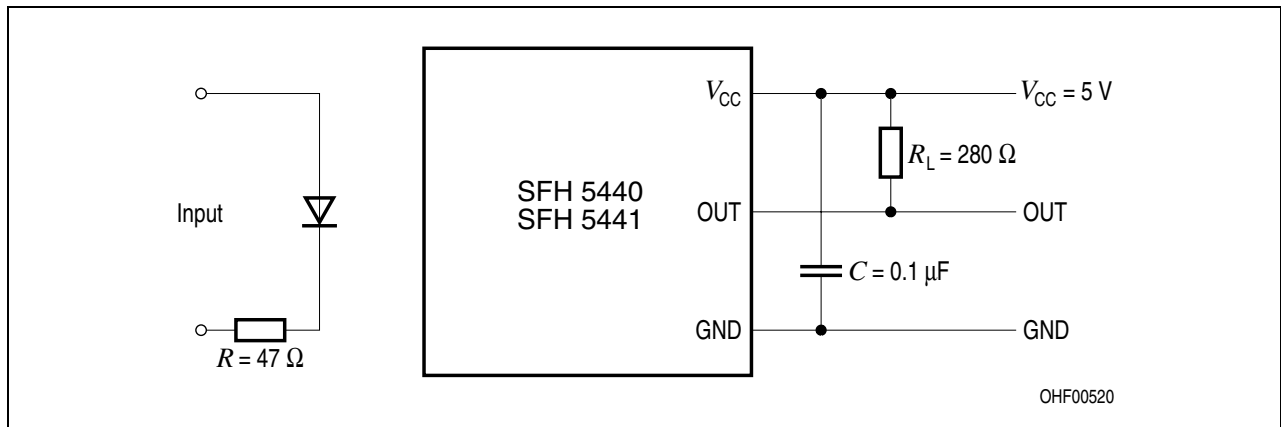


Figure 2 Test Circuit for Switching and Response Time

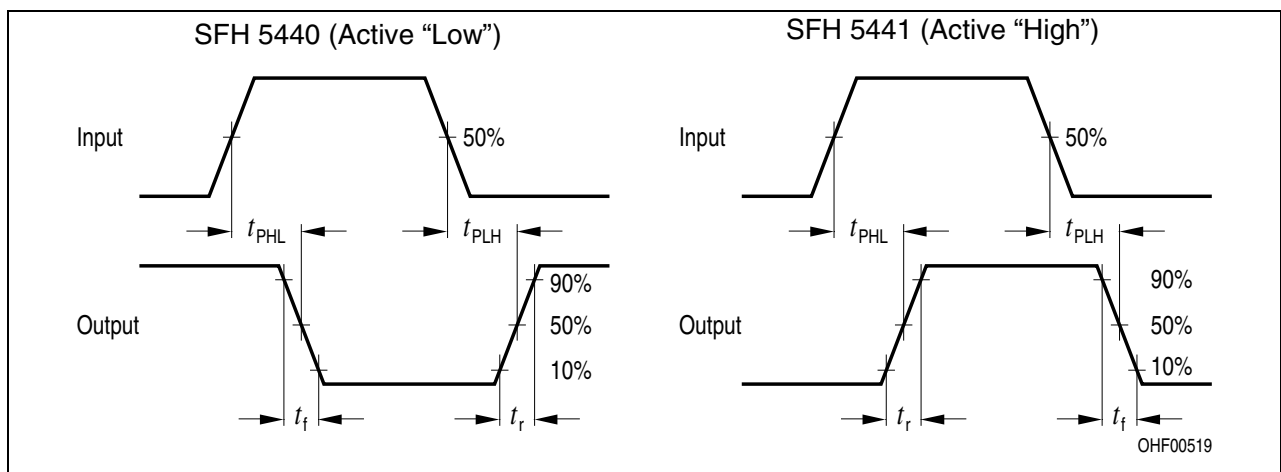
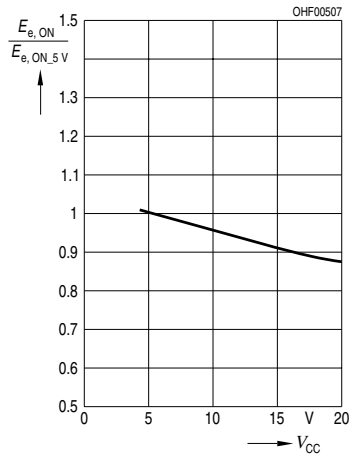


Figure 3 Switching Time Definitions

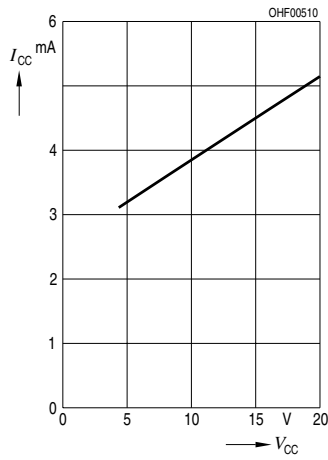
**Relative Threshold**

$$E_{e, ON} / E_{e, ON} (V_{CC} = 5 V) = f(V_{CC})$$



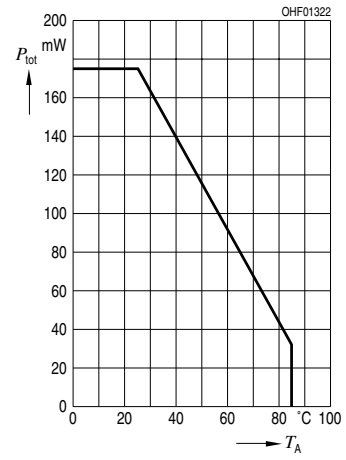
**Supply Current**

$$I_{CC} = f(V_{CC})$$



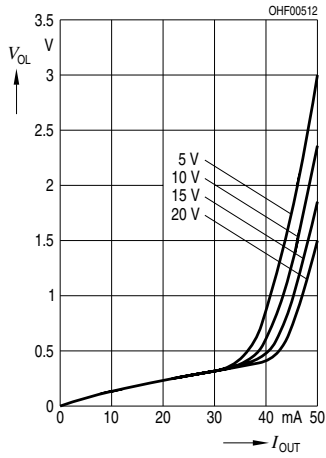
**Total Power Dissipation**

$$P_{tot} = f(T_A)$$



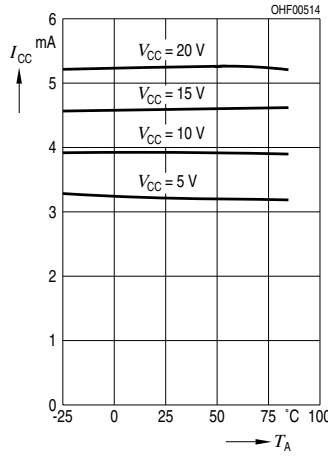
**Output Voltage**

$$V_{OL} = f(I_{OUT}, V_{CC})$$

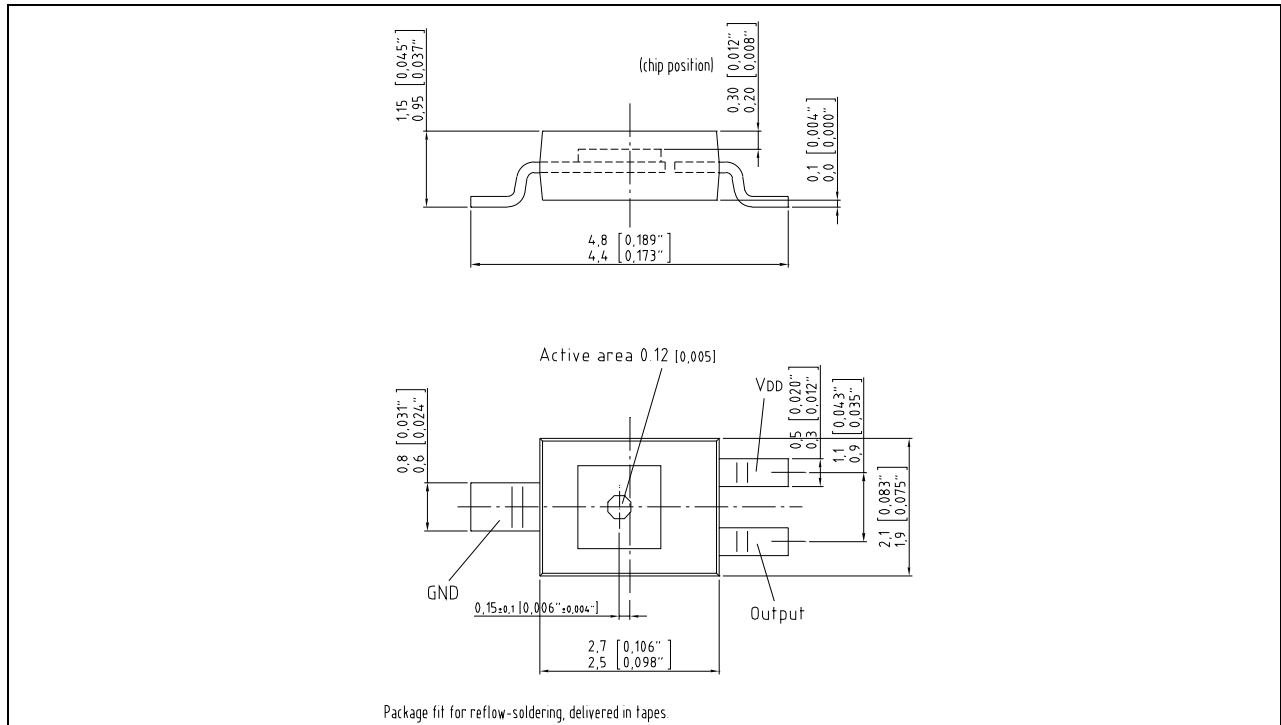


**Supply Current vs. Ambient Temperature**

$$I_{CC} = f(T_A, V_{CC})$$

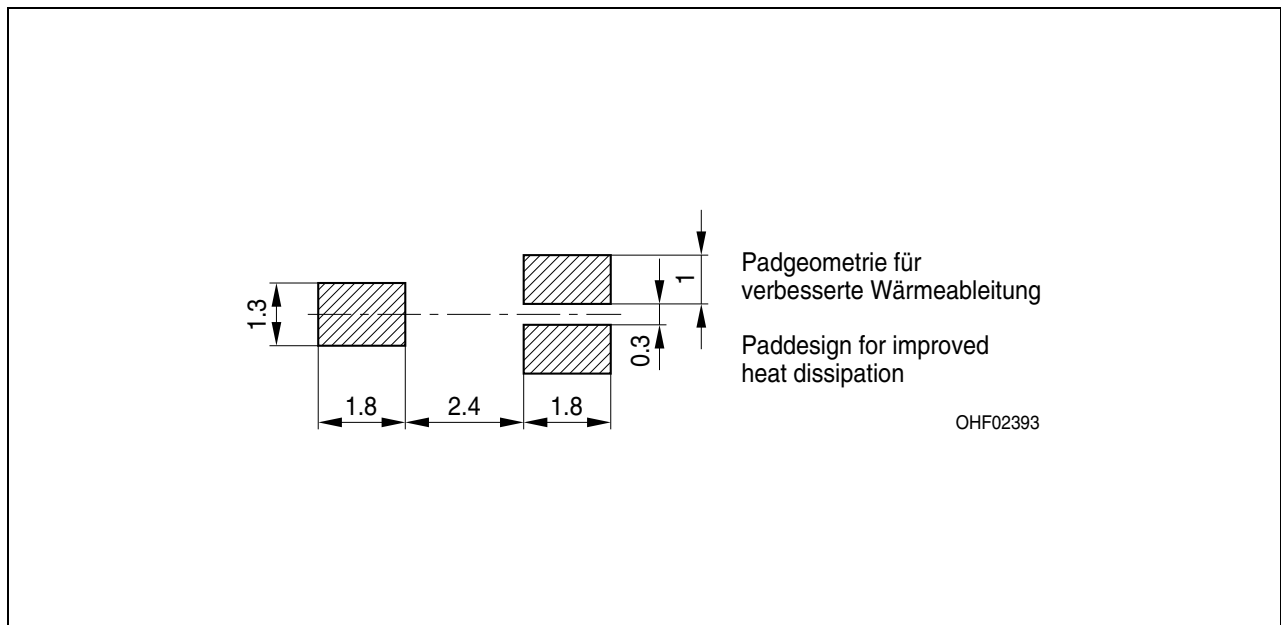


**Maßzeichnung  
Package Outlines**



Maße in mm (inch) / Dimensions in mm (inch).

**Empfohlenes Lötpaddesign  
Recommended Solderpad Design**



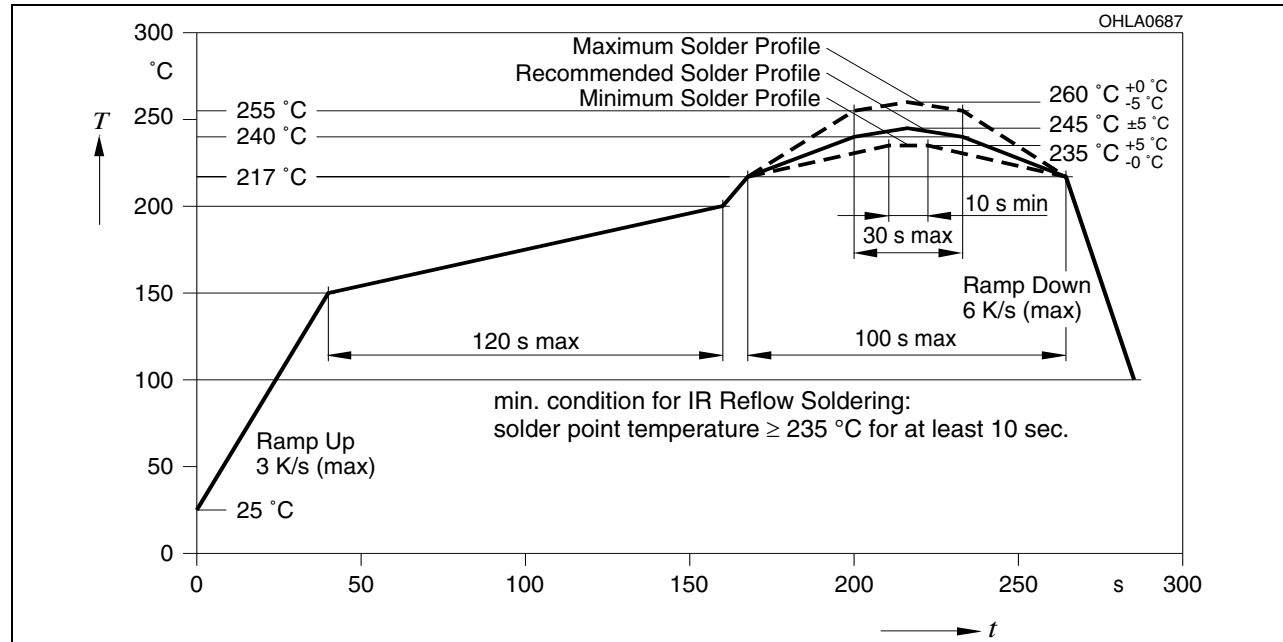
**Lötbedingungen****Soldering Conditions****Reflow Lötprofil für bleifreies Löten****Reflow Soldering Profile for lead free soldering**

Vorbehandlung nach JEDEC Level 4

Preconditioning acc. to JEDEC Level 4

(nach J-STD-020C)

(acc. to J-STD-020C)



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<sup>2</sup> 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 of the user may be endangered.