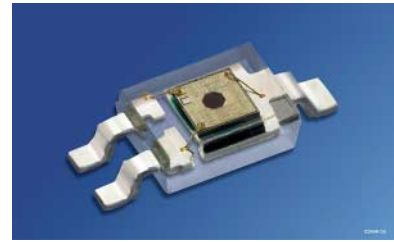


**Schmitt-Trigger IC im Smart DIL Gehäuse**  
**Schmitt-Trigger IC in Smart DIL Package**  
**Lead (Pb) Free Product - RoHS Compliant**

**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

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

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

| Bezeichnung<br>Parameter   | Symbol<br>Symbol  | Wert<br>Value  | Einheit<br>Unit |
|--|-------------------|----------------|-----------------|
| Betriebs- und Lagertemperatur<br>Operating and storage temperature range | $T_{op}; T_{stg}$ | - 40 ... + 85  | °C              |
| Versorgungsspannung<br>Supply voltage                                    | $V_{CC}$          | - 0.5 ... + 20 | V               |
| Ausgangsspannung<br>Output voltage                                       | $V_O$             | - 0.5 ... + 20 | V               |
| Ausgangsstrom<br>Output current  | $I_O$             | 50             | mA              |
| Verlustleistung<br>Power dissipation                                     | $P_{tot}$         | 175            | mW              |

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

| Bezeichnung<br>Parameter              | Symbol<br>Symbol | Wert<br>Value | Einheit<br>Unit |
|---------------------------------------|------------------|---------------|-----------------|
| Versorgungsspannung<br>Supply voltage | $V_{CC}$         | 4 ... 18      | V               |
| Ausgangsstrom<br>Output current       | $I_O$            | < 16          | mA              |

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

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

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

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

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

Characteristics (cont'd)

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

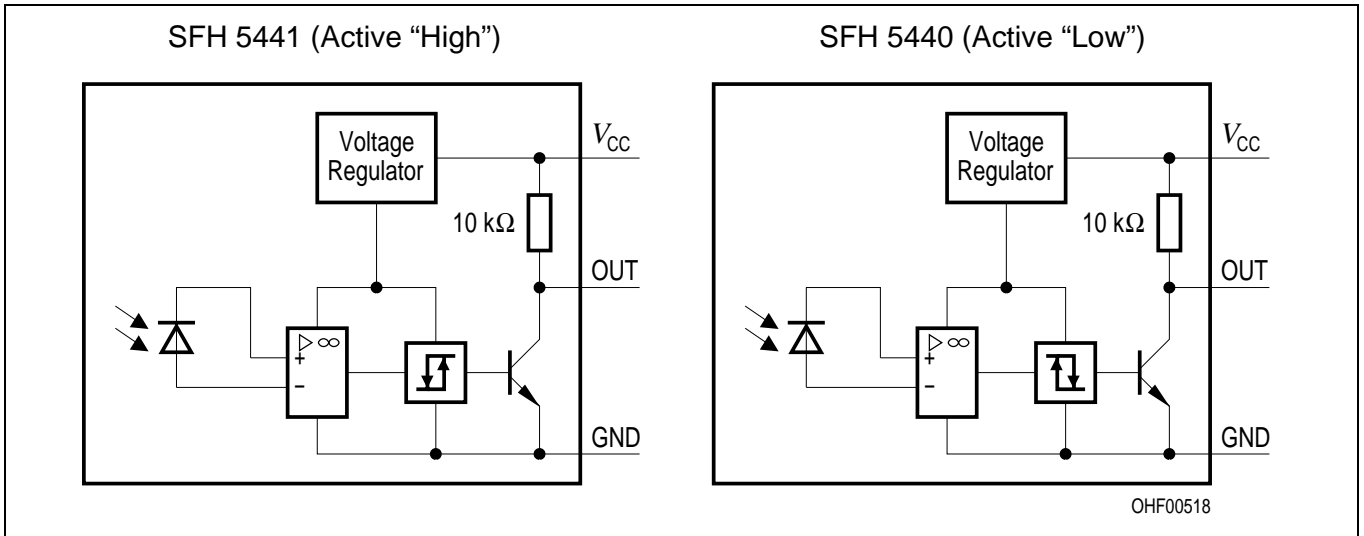


Figure 1 Block Diagram

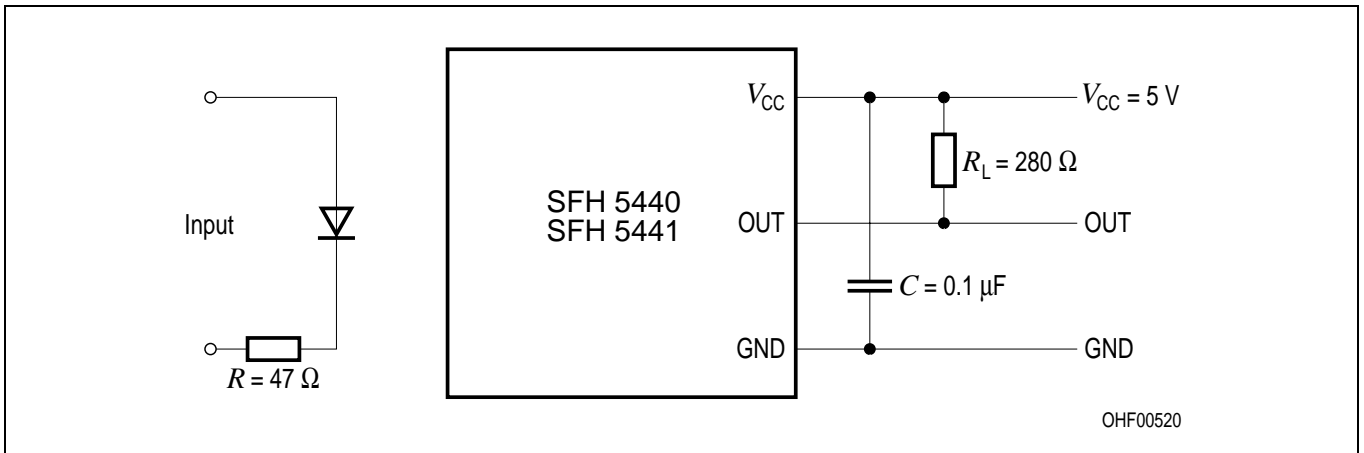


Figure 2 Test Circuit for Switching and Response Time

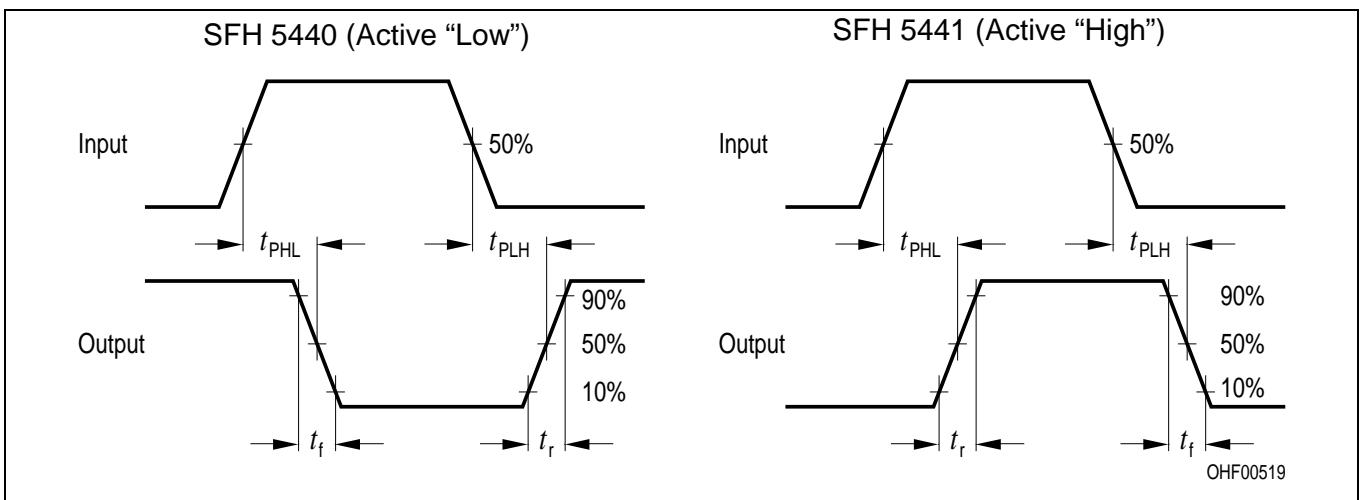
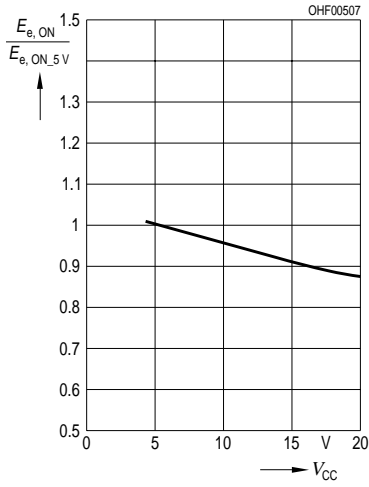


Figure 3 Switching Time Definitions

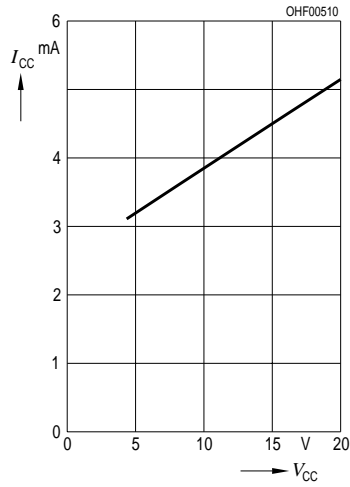
**Relative Threshold**

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



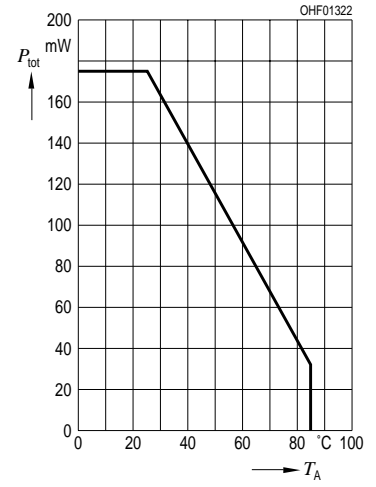
**Supply Current**

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



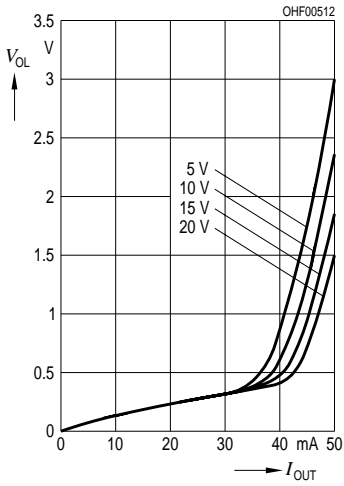
**Total Power Dissipation**

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



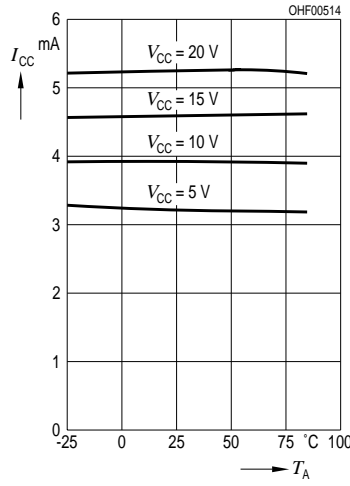
**Output Voltage**

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

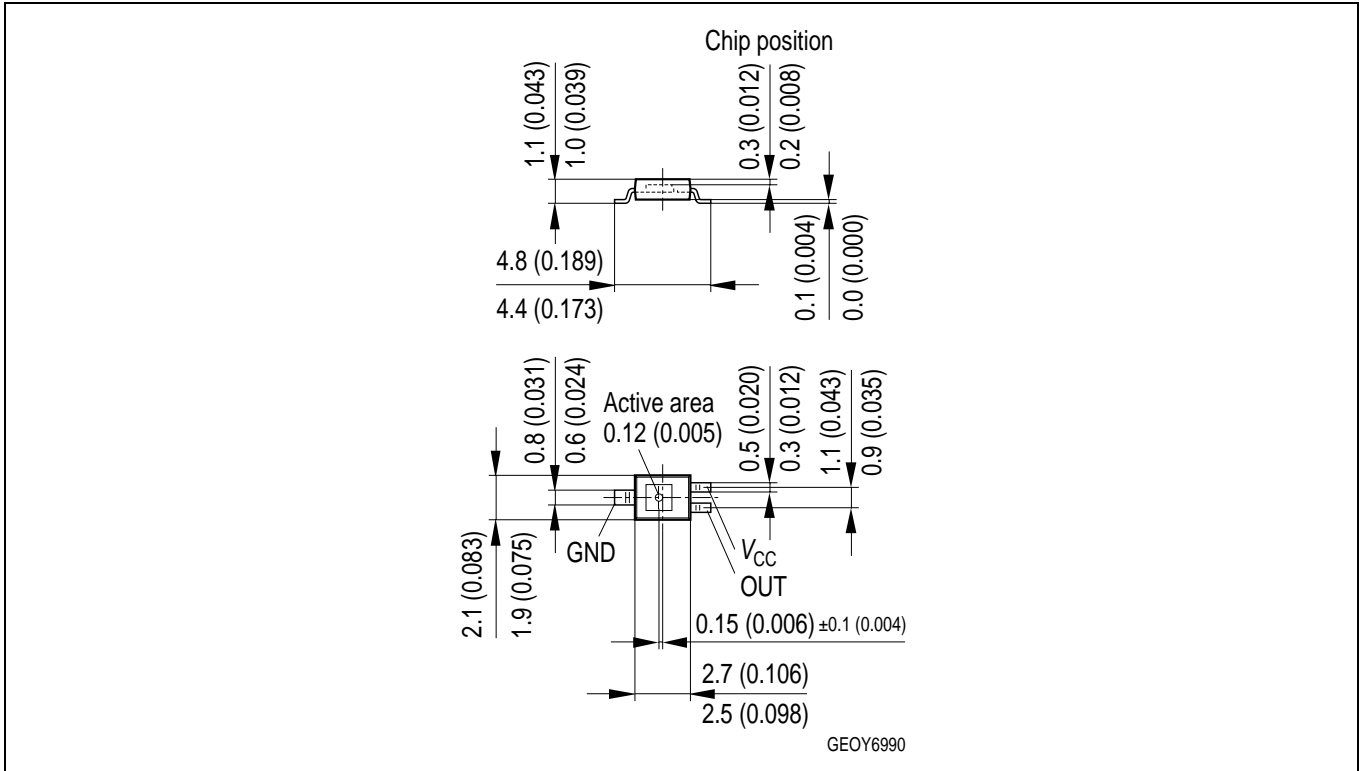


**Supply Current vs. Ambient Temperature**

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

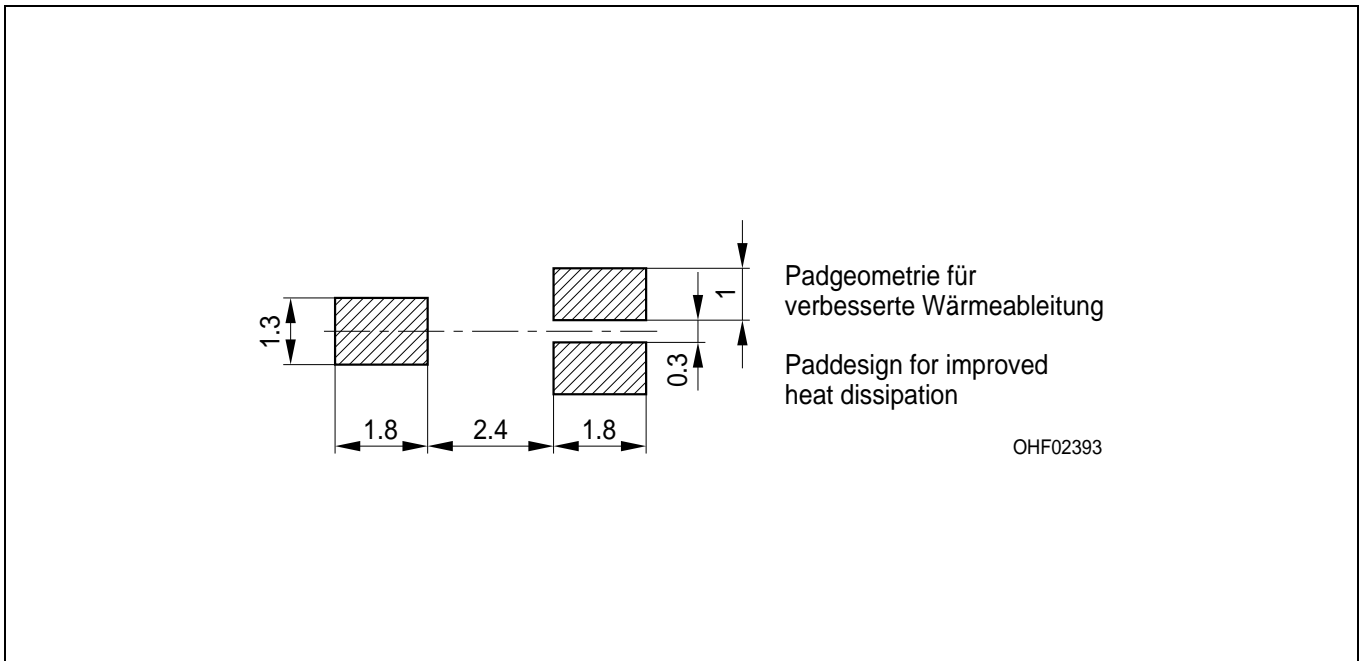


**Maßzeichnung  
Package Outlines**



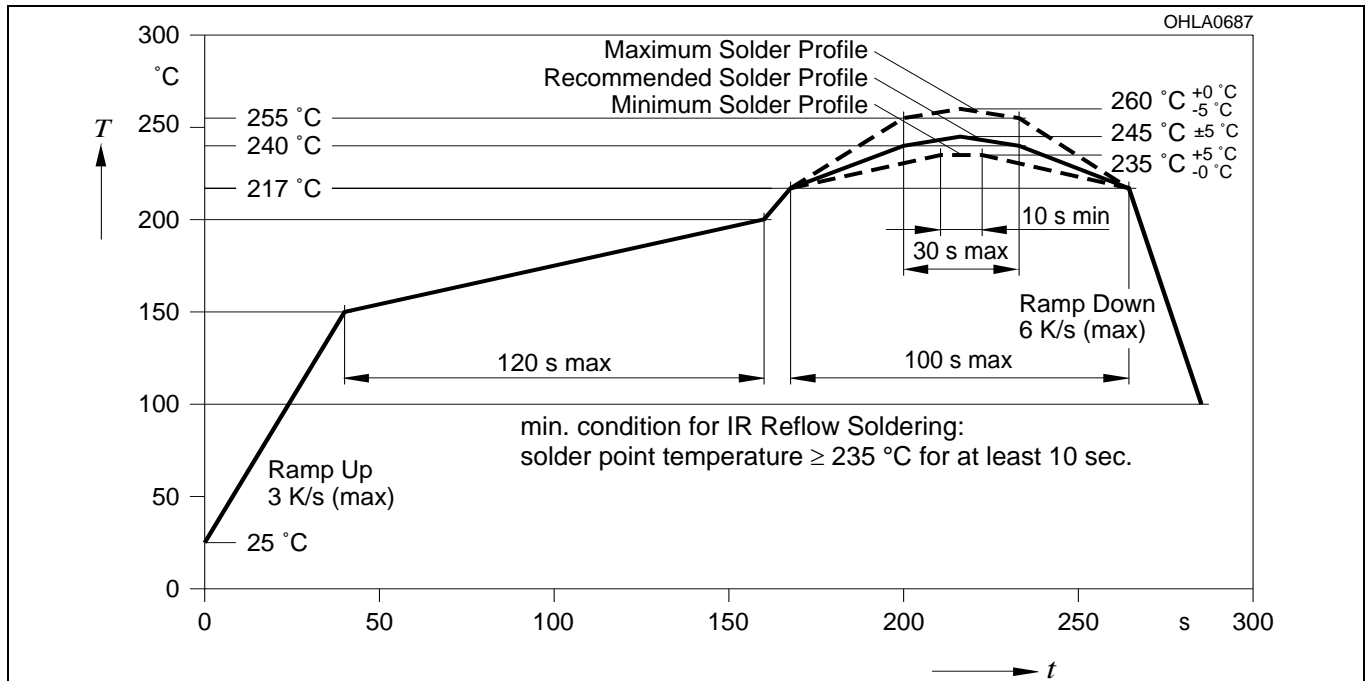
Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

**Empfohlenes Lötpaddesign  
Recommended Solderpad Design**



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

Vorbehandlung nach JEDEC Level 4  
 Preconditioning acc. to JEDEC Level 4  
 (nach J-STD-020B)  
 (acc. to J-STD-020B)



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