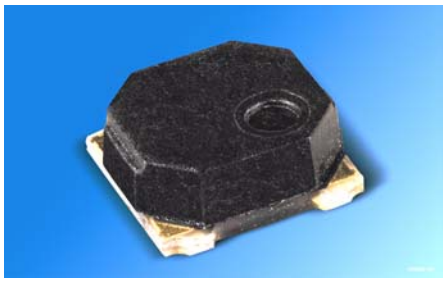
SMD Kippsensor mit digitalem Ausgang (SFH 7710)
SMD Orientation-Sensor with digital output (SFH 7710)
Lead (Pb) Free Product - RoHS Compliant

SFH 7710



Wesentliche Merkmale

- optische Erkennung der Verkippung durch gravitationsabhängige Position einer Stahlkugel
- Niedriger Stromverbrauch
- digitaler Ausgang, open drain
- definierter Schaltwinkelbereich
- sehr kleines SMD Gehäuse
- IC gesteuerter Sensor

Anwendungen

- Digitalkameras
- Camcorder
- Mobiltelefone
- Computer Zubehör

Features

- optical detection of orientationby gravity dependent position of a steel ball
- Low current consumption
- digital output, open drain
- defined range of switching angle
- very small SMD package
- IC controlled sensor

Applications

- Digital cameras
- Camcorders
- Mobile phones
- Computer peripherals

Typ Type	Bestellnummer Ordering Code
SFH 7710	Q65110A4407

Grenzwerte
Maximum Ratings

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Versorgungsspannung Supply voltage	V_{cc}	-0.2...6	V
Ausgangsspannung Output voltage	V_o	-0.3...4.5	V
Ausgangsstrom Output current	I_o	10	mA
Lagertemperatur Storage temperature range	T_s	-40...100	°C
Elektrostatische Entladung Electrostatic discharge - human body model (according to: Class I) - machine model (according to: AEC-Q100-003-REV-D, classification M3)	V_{ESD}	 2 200	 kV V
latch up Schutz latch-up protection (according to: EIA/JESD78 Class I)		20	mA

Empfohlener Arbeitsbereich
Recommended Operating conditions

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		Min	Max	
Betriebstemperatur Full operational ambient temperature range	T_A	-20	+65	°C
Versorgungsspannung Supply voltage	V_{cc}	2.3	3.6	V
Versorgungsspannungsstörungen * (Frequenzbereich: 0...20kHz) Supply voltage noise (frequency range: 0...20kHz)	$dV_{cc\ pp}$		0.2	V
Ausgangsspannung Output voltage	V_o	1.7	3.6	V
Pull-up Widerstand Pull-up resistance	$R_{pull\ up}$	10	100	kOhm

* Der Emitter wird mit 10mA gepulst betrieben; das bedeutet, dass jeder Widerstand in Serie zu V_{cc} einen Spannungsabfall in der Versorgungsleitung verursacht. Daher wird empfohlen, diesen Serienwiderstand kleiner 10 Ohm zu halten. Die minimale Versorgungsspanung ($V_{cc\ min}$) darf keinesfalls unterschritten werden.

* The emitter is driven with 10 mA in pulsed mode; this means that any series resistor to V_{cc} causes a voltage drop on the power line. It is recommended to keep the series resistor below 10 Ohm. The supply voltage may not fall below $V_{cc\ min}$

Kennwerte
Characteristics
(TA=25°C)

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		Min.	Typ.	Max.	
Minimale Betriebsspannung für Startphase(siehe Figure 3) Minimum required supply bvoltage for start-up (see Figure 3)	$V_{cc,start}$	0.8		2.0	V
Länge der Startphase (siehe Figure 3) Start up time (see Figure 3)	t_{start}	60		120	ms
Durchschnittlicher Stromaufnahme[1)] mean current consumption[1)]	I_{mean}			50	µA
Spitzenstromaufnahme[2)] peak current consumption[1)]	I_{peak}			20	mA
Ausgangsleckstrom „high“ Output leakage current „high“ V_O = 3,6V	I_{OH}			5	µA
Ausgangsleckstrom „low“ Output leakage current „low“ I_{OI} = 10mA (V_{cc} = 2,3V)	V_{OL}			0.5	V
Aktualisierung des Ausgangssignals [1)] Refresh of output signal [1)]	$t_{refresh}$		90		ms
Kippwinkel mit Ausgangszustand „low“ (siehe Figure1) Tilt angle with output state „low“ (see Figure 1)	α_t	70		200	°
Kippwinkel mit Ausgangszustand „high“ (siehe Figure1) Tilt angle with output state „high“ (see Figure 1)	α_u	250		20	°

[1)] gepulster Betrieb: Dauer LED an: ~44µs / Dauer LED aus: ~90ms
pulsed operation mode: LED on time: ~44µs / LED off time: ~90ms

[2)] gepulster Betrieb: Dauer LED an: ~44µs / Dauer LED aus: ~90ms
pulsed operation mode: LED on time: ~44µs / LED off time: ~90ms

Funktionsdiagramm
Functional diagram

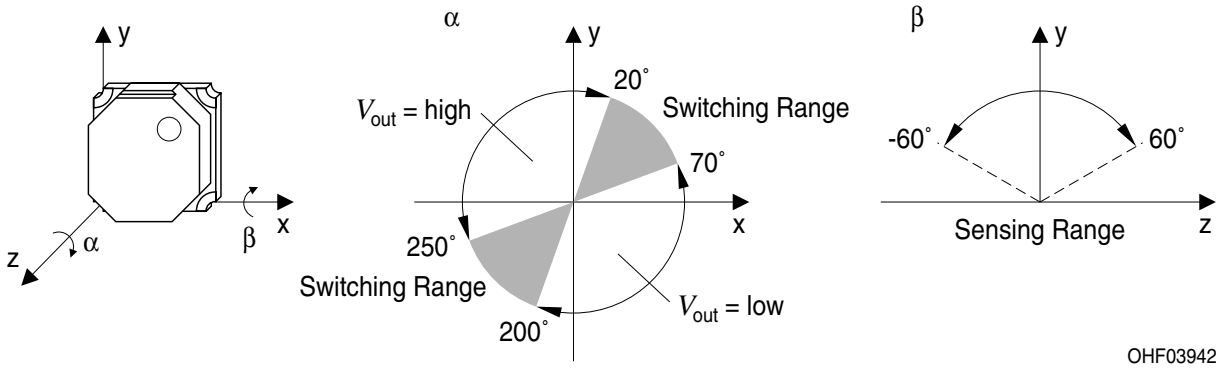


Figure1:
Erfassungscharakteristik / Detecting characteristics
(Unter extremen Bedingungen (hohe Temperatur und/oder hohe relative Feuchte) kann vorübergehend eine grössere Schaltwinkeltoleranz auftreten)
(Under extreme conditions (high temperature and/or high relative humidity) a wider switching angle tolerance can occur temporarily)

Blockdiagramm
block diagram

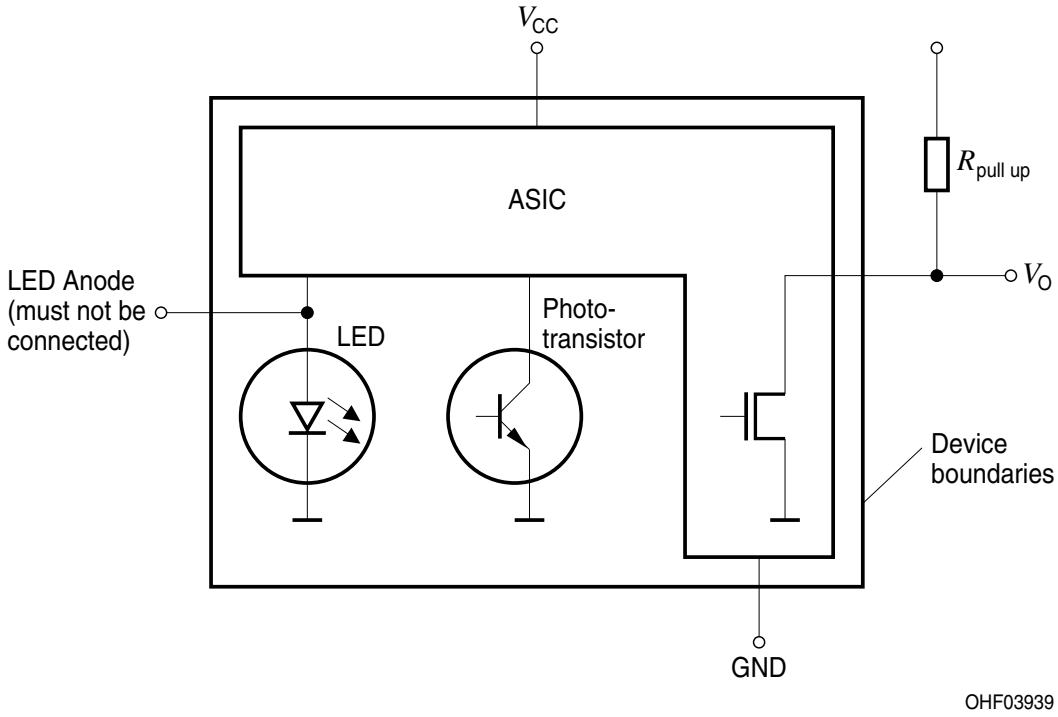


Figure2:
Blockdiagramm (empfohlener Pull-Up-Widerstand $R_{pull\ up}$ = 10kOhm...100kOhm)
Block diagram (recommended Pull up resistance $R_{pull\ up}$ = 10kOhm...100kOhm)

Startverhalten und Ablaufdiagramm

Start-up behavior and Timing diagramm

Der Ausgang ist immer hochohmig, wenn an Vcc keine Spannung angeschlossen ist. Wenn die Versorgungsspannung Vcc , start erreicht, bleibt der Ausgang für 60ms <tstart <120ms auf „low“. Anschließend findet etwa alle 90ms eine Messung der Orientierung statt und der Ausgang wird entprechend geschalten.

The Output is always high ohmic when voltage at Vcc is not connected. When supply voltage reaches Vcc, start the sensor output stays low for 60ms <tstart <120ms. Subsequently approx. every 90ms the orientation is measured and the output is set accordingly.

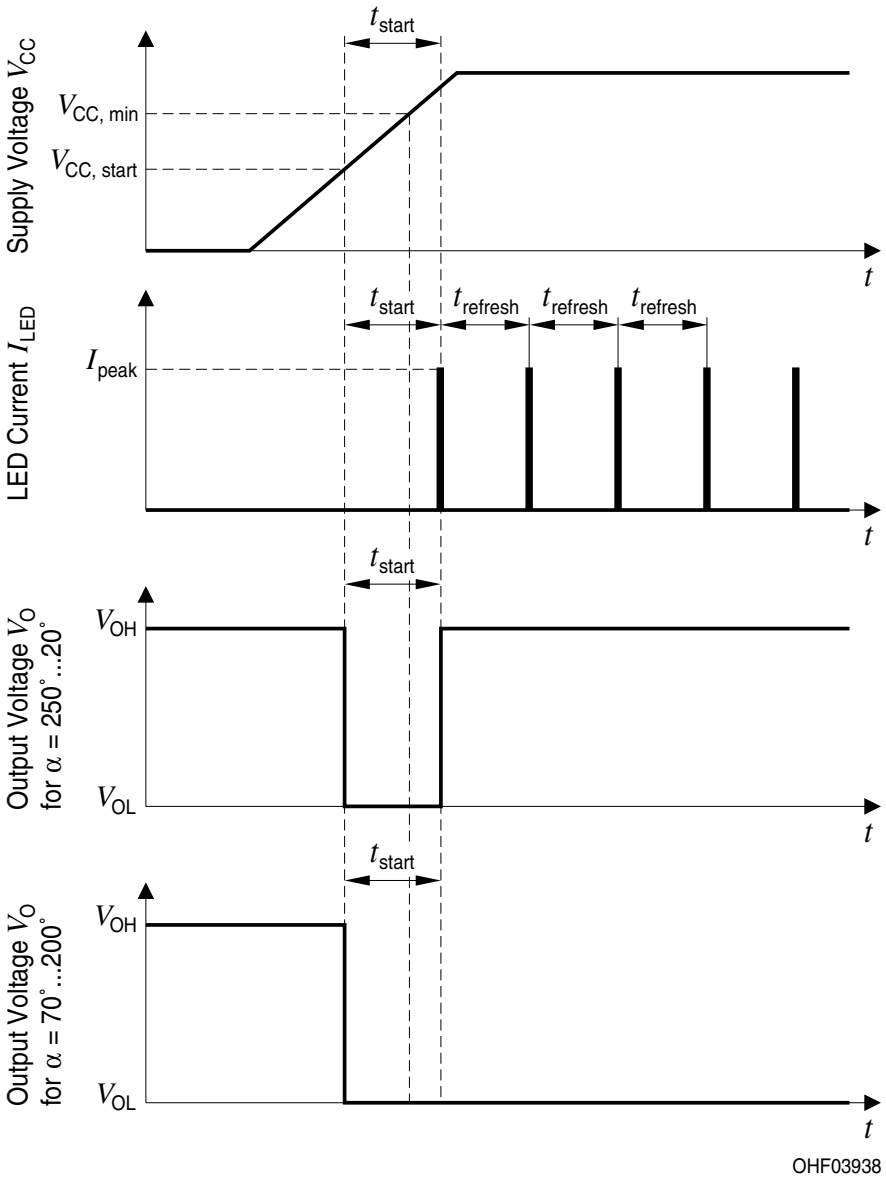
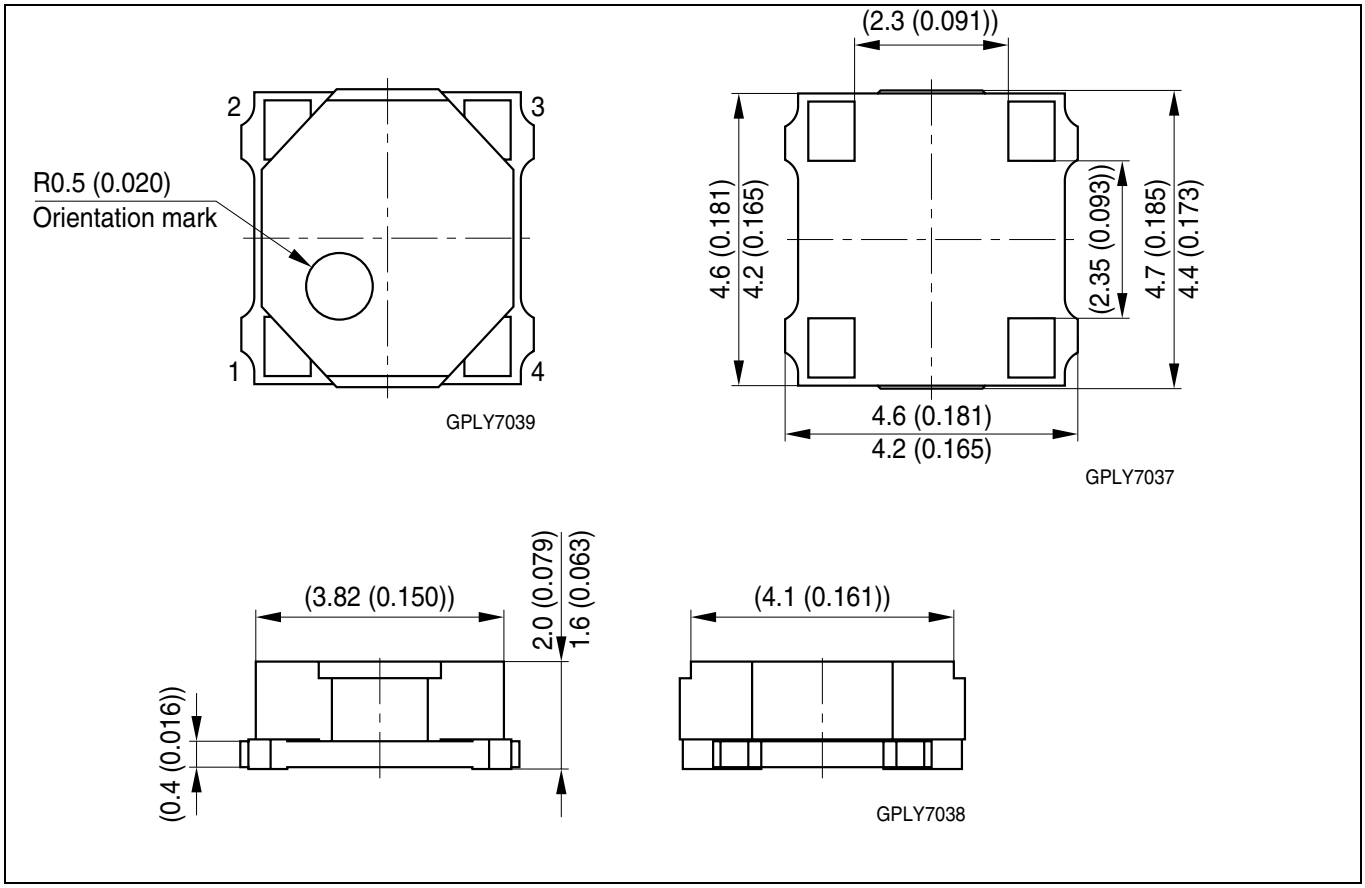


Figure 3:

Startverhalten und Ablaufdiagramm des Sensors
Start-up behavior and Timing diagram of sensor

Maßzeichnung
Package Outlines

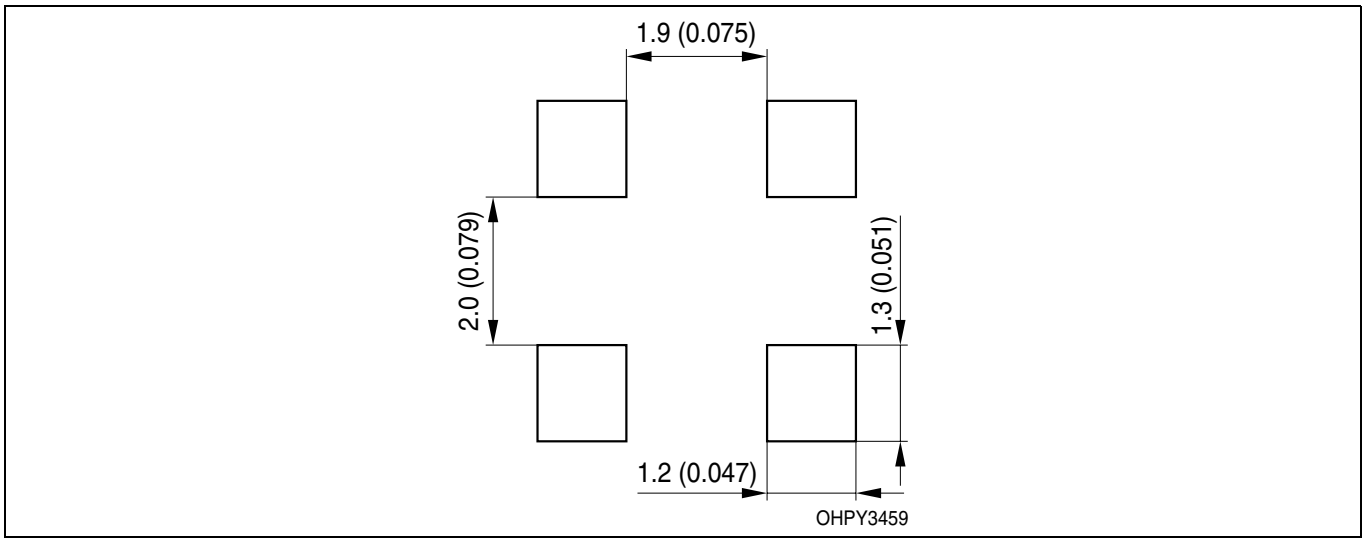


Maße in mm (inch) / Dimensions in mm (inch)

Anschlußbelegung
Pin configuration

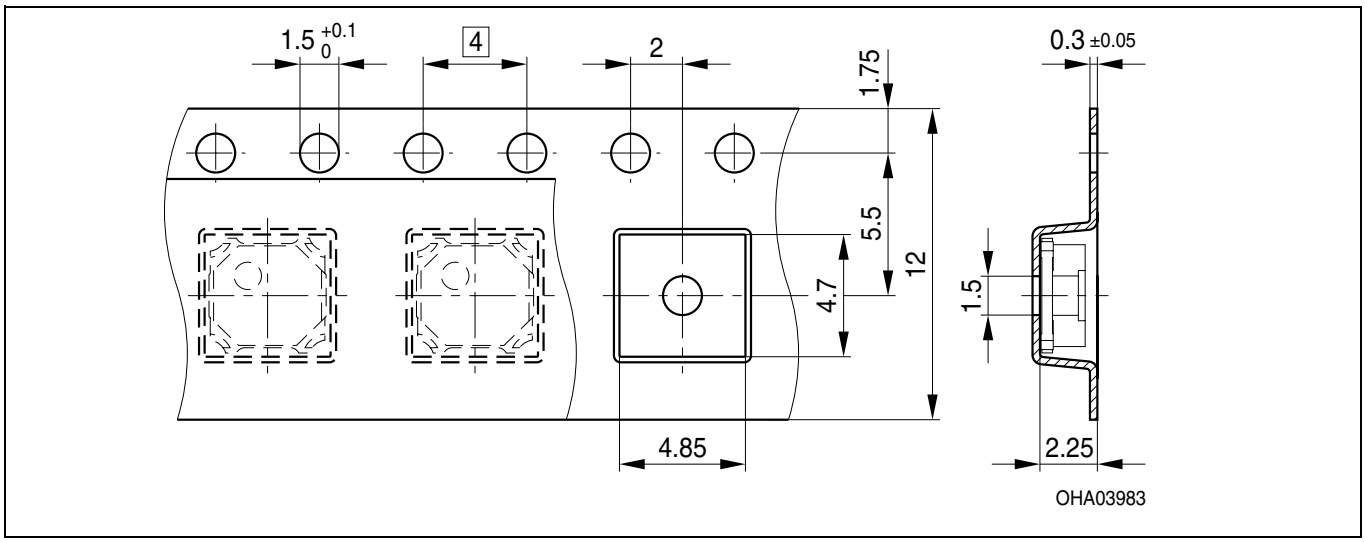
Pin #	Description
1	GND
2	Vcc
3	LED Anode (must not be connected)
4	Out

Empfohlenes Lötpaddesign
Recommended Solderpad Design



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

Gurtung und Lage
Method of taping and orientation



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

Lötbedingungen
Soldering Conditions

Vorbehandlung nach JEDEC Level 4
Preconditioning acc. to JEDEC Level 4

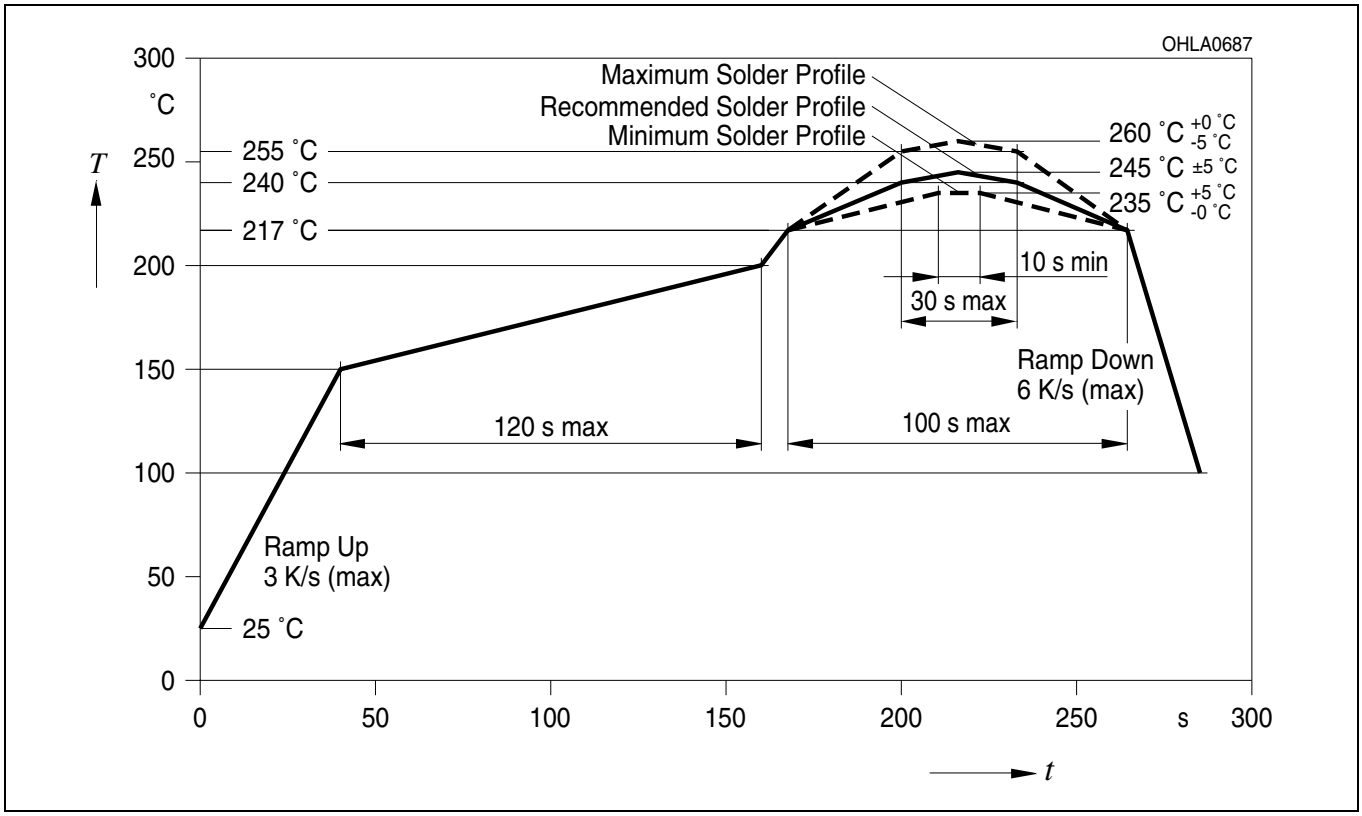


Figure 8: Temperaturprofil für Reflow-Löten (Der Sensor darf nach dem Löten nicht gewaschen werden.)
Temperature profile for Reflow-soldering (Do not wash the sensor after soldering)

EU RoHS and China RoHS compliant product

此产品符合欧盟 RoHS 指令的要求；

按照中国的相关法规和标准，不含有毒有害物质或元素。

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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.

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