

Reflexlichtschranke
Reflective Optical Switch
Lead (Pb) Free Product - RoHS Compliant

SFH 7740



Preliminary datasheet

Wesentliche Merkmale

- Arbeitsabstand: 0.5 - 4 mm
- Arbeitsbereich einstellbar
- Optohybrid mit Schmitt-Trigger Ausgang, open drain
- Extrem niedriger Stromverbrauch
- Sehr kleines SMD Gehäuse
- Hohe Umgebungslicht Unterdrückung

Anwendungen

- Positionserkennung von Abdeckungen für Batteriefächer, Foto-Objektiven usw.
- Mobile Geräte

Features

- Working distance: 0.5 - 4 mm
- Working range adjustable
- Opto hybrid with Schmitt trigger output, open drain
- Extremely low power consumption
- Very small SMD package
- High ambient light suppression

Applications

- Position detection of sliding covers for battery-cases, camera lenses ect.
- Mobile devices

Typ Type	Bestellnummer Ordering Code
SFH 7740	Q65110A6668

Grenzwerte
Maximum Ratings

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Lagertemperatur Storage temperature	T_{stg}	min: - 40 max: + 85	°C
Versorgungsspannung Supply voltage	V_{dd}	0 - 6	V
Externe Spannung an Pin External voltage at pin Out Prog Test Anode LED	V_{out}	0 - 4.5 0 - 4.5 0 - 4.5 0 - 1.5	V
Sink current durch Ausgangstransistor Sink current through output transistor (please see figure 1)	I_{sink}	10	mA
Vorwärtsstrom ¹⁾ Forward current (please see figure 1)	I_{f}	60	mA
Elektrostatische Entladung Electrostatic discharge - Human Body Model (according to: Class1) - Machine model (according to: AEC-Q100-003-REV-D classification M3)	<i>ESD</i>	2 200	kV V
latch up protection latch up protection (according to: EIA/JESD78 Class 1)		20	mA

¹⁾ Der Vorwärtsstrom I_{f} durch die LED ist abhängig von V_{dd} und R_{prog} wie folgt:

* The forward current I_{f} depends on V_{dd} and R_{prog} as in the following formula:

$$I_{\text{f}} = 10\text{mA} + \left(\frac{V_{\text{dd}} \times 6}{R_{\text{prog}}} \right)$$

Empfohlene Betriebsbedingungen Recommended Operating Conditions

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Betriebstemperatur Operating temperature	T_{op}	- 20		+ 85	°C
Versorgungsspannung Supply voltage	V_{dd}	2.4		3.6	V
Ausgangsspannung Output voltage (please see figure 1)	DV_{dd}	1.7		3.6	V
Rauschen der Versorgungsspannung ¹⁾ Supply voltage ripple frequency range 0...20kHz	dV_{dd}			200	mV
Pull-up Widerstand Pull-up resistor (please see figure 1)	$R_{pull-up}$	10		1000	kΩ
Abblock Kondensatoren Bypass capacitors (please see figure 1)	C_{bypass} - stabilisation - HF		>1 10 - 100		μF nF
Max. Umgebungslicht Max. ambient light Normlicht / Standard light A	E_V $V_{dd} < 3V$ $V_{dd} > 3V$		3000 5500		lux

¹⁾ Der Emitter wird mit 10mA bis 60mA gepulst betrieben; das bedeutet, dass jeder Widerstand in Serie zu V_{dd} einen Spannungsabfall in der Versorgungsleitung verursacht. Es wird empfohlen, diesen Serienwiderstand so klein zu halten, dass max dV_{dd} nicht überschritten wird. Beim Betrieb des SFH 7740 im Labor ist vom Einsatz geregelter Spannungsversorgungen abzusehen. Durch das Einschalten der IRED wird die Quelle kurzzeitig belastet. Diese Belastung kann zu Spannungsschwankungen der Quelle führen, die wiederum die Funktion des SFH 7740 beeinträchtigen können. Im Normalbetrieb (Akku, Batterie, stabilisierte Netzteile) tritt dieser Effekt nicht auf.

* The emitter is driven with 10 mA to 60 mA in pulsed mode; this means, that any series resistance on the V_{dd} line causes a voltage drop at the power pin. It is recommended to keep the series resistance low, so that max dV_{dd} is not exceeded. When testing the SFH 7740 sensor in the lab, please do not use regulated voltage supplies. The IR emitter pulse is a high, short load for the power supply. This load can influence the stability of the output voltage; this instability will influence the operation of the SFH 7740. This effect does not occur during normal operation of the sensor with batteries, storage batteries, or stabilized voltage supplies.

Kennwerte (Ta = 25°C)**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Minimale Betriebsspannung für Startphase Minimum required supply voltage for start-up (please see figure 2)	$V_{dd, start}$	0.8		2.0	V
Länge der Startphase Start up time (please see figure 2)	t_{start}	60	90	120	ms
Mess-Wiederholzeit Measurement refresh time (please see figure 2)	$t_{refresh}$	60	90	120	ms
LED „An“ Zeit LED „ON“ Time (please see figure 3)	t_{pulse}	30	45	60	µs
Einstellbarer Arbeitsabstand ¹⁾ Adjustable operating distance	d	0.5		4	mm
Variation des Arbeitsabstandes Variation of working distance	Δd			+/- 0.4	mm
Durchschnittliche Stromaufnahme ²⁾ Mean current consumption ¹⁾ ($R_{Prog} = h$, $V_{dd} = 3V$)	I_{ddmean}		25	50	µA
Maximale Stromaufnahme Maximum current consumption ($R_{Prog} = h$, $V_{dd} = 3V$)	I_{ddmax}		10	20	mA
Durchschnittliche Stromaufnahme ¹⁾ Mean current consumption ¹⁾ ($R_{Prog} = 470 \Omega$, $V_{dd} = 3V$)	I_{ddmean}		45	75	µA
Maximale Stromaufnahme Maximum current consumption ($R_{Prog} = 470 \Omega$, $V_{dd} = 3V$)	I_{ddmax}		50	65	mA
Ausgangsleckstrom „high“ Output leakage current „high“ $DV_{dd} = 2.2V$	$I_{out, H}$		5	400	nA
Ausgangsspannung „low“ Output voltage „low“ $DV_{dd} = 2.2V$; $R_{pullup} = 270 \Omega$	$V_{out, L}$		0.1	0.5	V

Kennwerte (Ta = 25°C)**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Wert Value			Einheit Unit
		min.	typ.	max.	
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S, \max}$		880		nm
Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von $S_{\max}$ Spectral range of sensitivity $S = 10\%$ of $S_{\max}$	λ	730		1080	nm
Wellenlänge der Strahlung des Emitters Wavelength at peak emission $I_F = 10 \text{ mA}$	λ_{peak}		850		nm
Spektrale Bandbreite des Emitters bei 50% von $I_{\max}$ Spectral bandwidth of the emitter at 50% of $I_{\max}$ $I_F = 10 \text{ mA}$	$\Delta\lambda$		30		nm

¹⁾ Der minimale bzw. maximale Arbeitsabstand kann nur mit einem Reflektor (Reflektionsgrad $R > 90\%$) und Absorber ($R < 9\%$) erreicht werden.

* The minimum or maximum working distance can only be reached with a reflector (reflection coefficient $R > 90\%$) and absorber ($R < 9\%$).

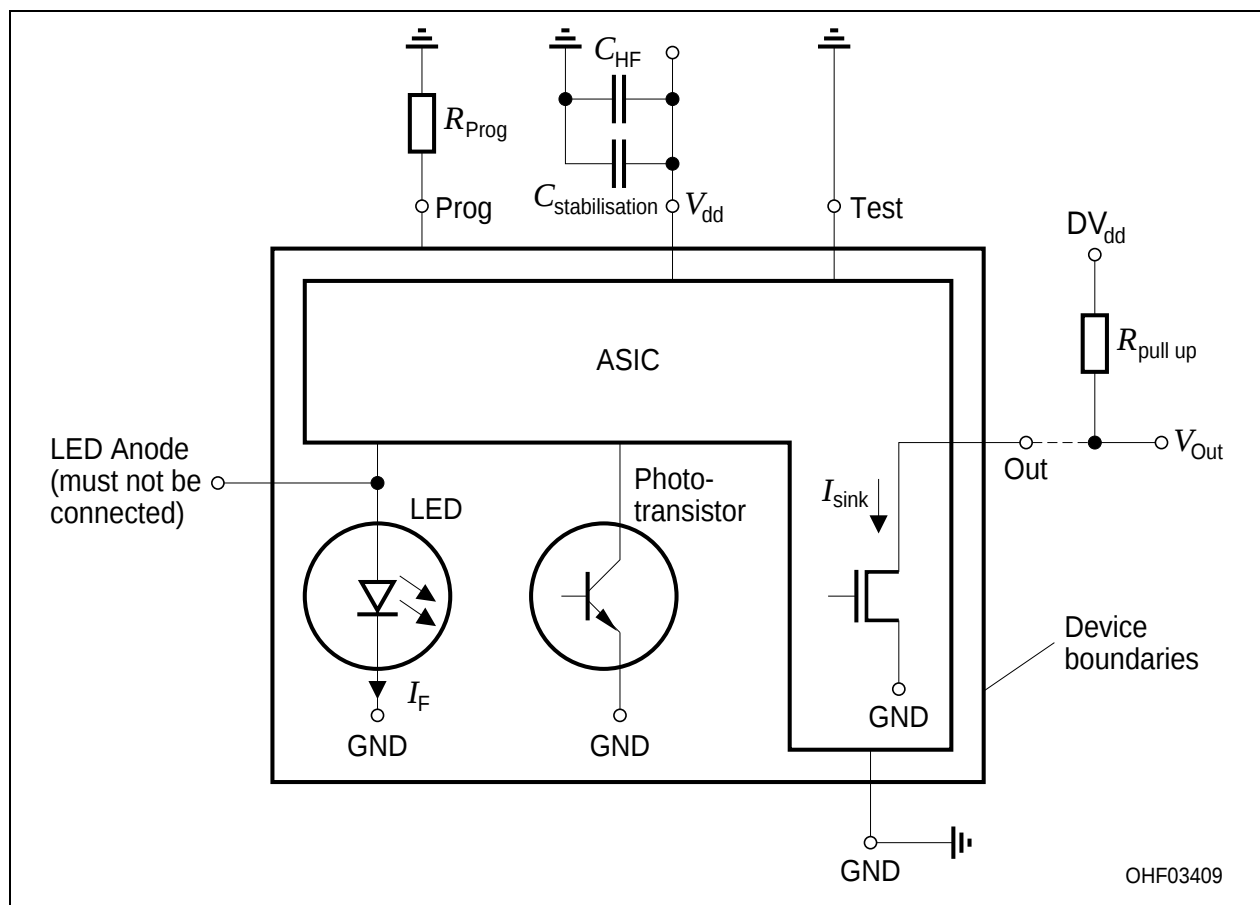
²⁾ gepulster Betrieb: Dauer LED an: $\sim 44\mu\text{s}$ / Dauer LED aus: $\sim 90\text{ms}$

* pulsed operating mode: LED on time: $\sim 44\mu\text{s}$ / LED off time: $\sim 90\text{ms}$

Blockdiagramm (empfohlener Pull-Up-Widerstand $R_{\text{pull up}} = 10\text{k}\Omega \dots 100\text{k}\Omega$)

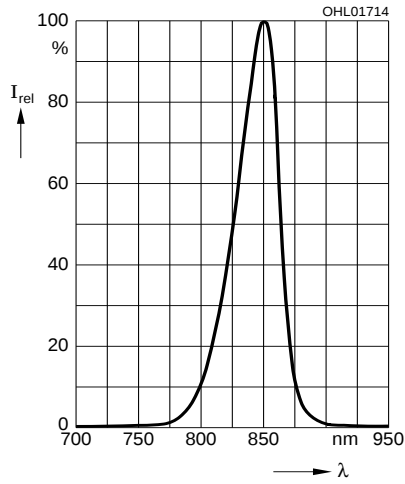
Block diagram (recommended Pull up resistance $R_{\text{pull up}} = 10\text{k}\Omega \dots 100\text{k}\Omega$)

Figure 1 **Blockdiagramm**
Block diagram



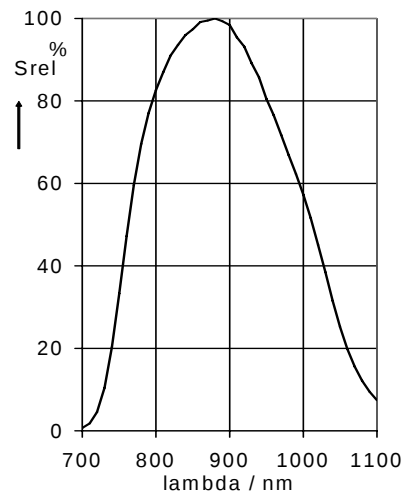
LED:
Relative Spectral Emission

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



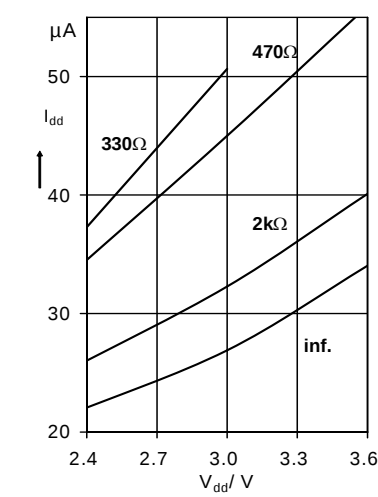
Phototransistor
Relative Spectral Sensitivity

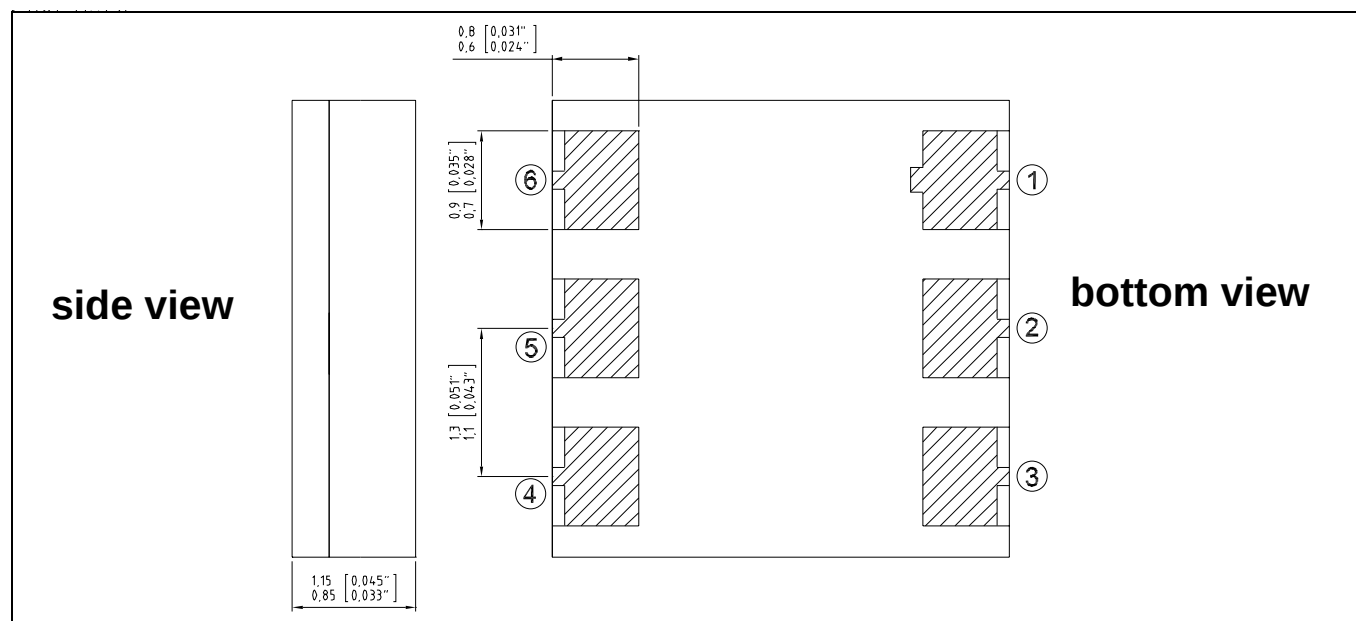
$S_{rel} = f(\lambda); T_A = 25^{\circ}\text{C}$



SFH 7740:
Mean current consumption

$I_{dd} = f(V_{dd}); R_{prog}; T_A = 25^{\circ}\text{C}$





OSRAM

Anschlußbelegung Pin configuration

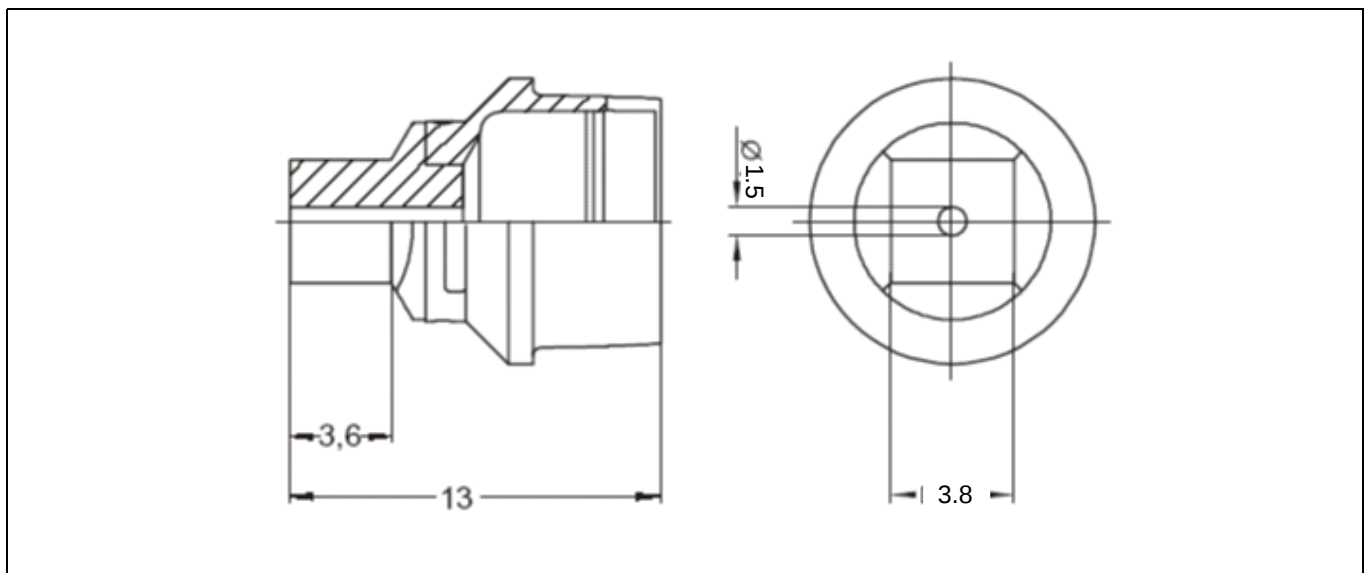
Pin #	Description
1	Anode LED (must not be connected)
2	GND
3	Out
4	Test (must be connected to GND)
5	V_{dd}
6	Prog

Bauteilaufnahme device pickup

Vakuum Pipette sollte das Bauteil am rechteckigen Außenrahmen fassen.

Laminar vacuum pickup nozzle should use the rectangular outer wall of the device for handling.

Empfohlenes Pickup Nadel Recommended pickup nozzle



Maße in mm/ Dimensions in mm



1:2

Label

Gurtende: 160mm
trailer: 160mm

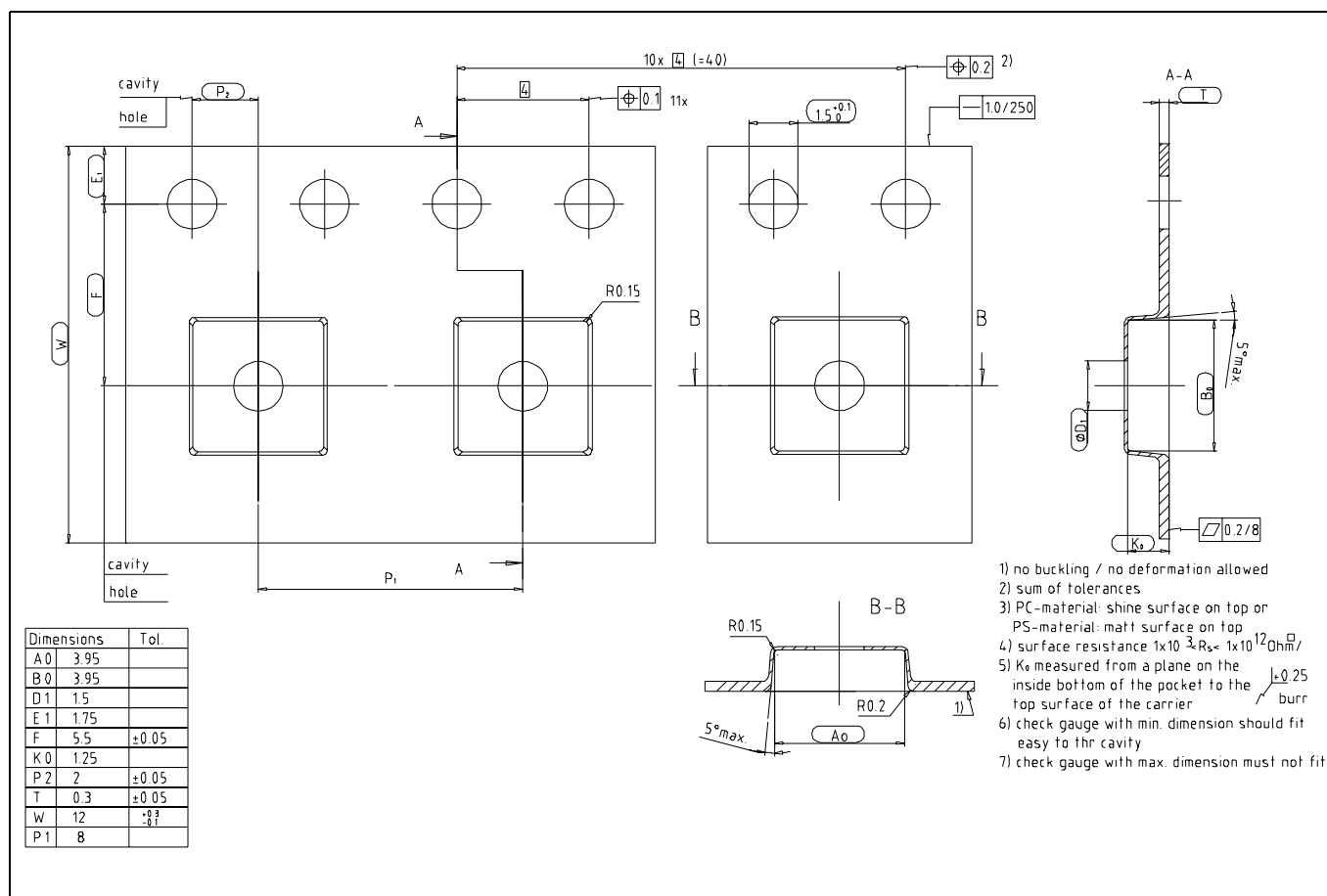
A

B

reel size	quantity
180 mm	1000 pcs
330 mm	5000 pcs

Gurtvorlauf: 400mm
leader: 400mm

Schnitt A-B
crosssection A-B



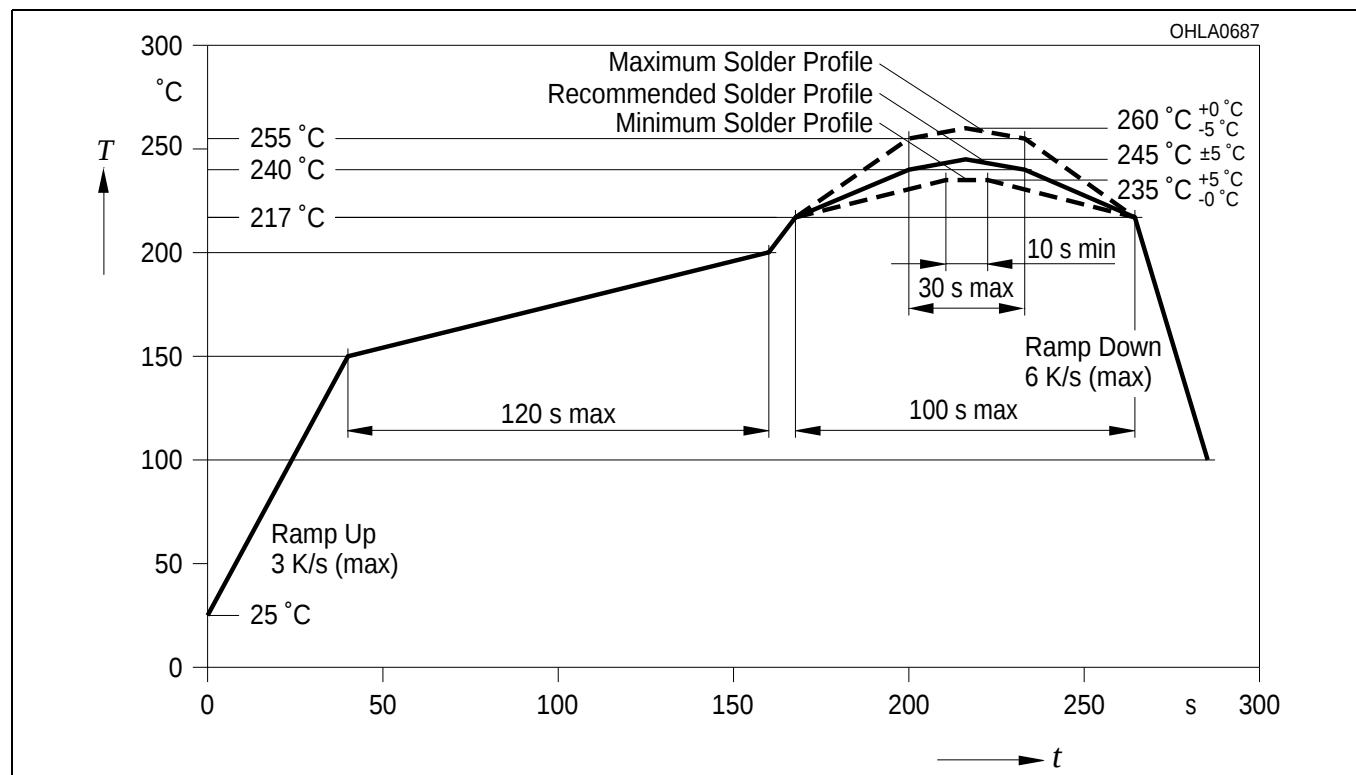
Maße in mm / Dimensions in mm

Lötbedingungen Soldering Conditions

Reflow Lötprofil für bleifreies Lötén

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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