

GaAlAs-IR-Lumineszenzdiode (880 nm) und Si-Fototransistor
GaAlAs-Infrared-Emitter (880 nm) and Si-Phototransistor
Lead (Pb) Free Product - RoHS Compliant

SFH 7221



Wesentliche Merkmale

- SMT-Gehäuse mit IR-Sender (880 nm) und Si-Fototransistor
- Geeignet für SMT-Bestückung
- Gegurtet lieferbar
- Sender und Empfänger getrennt ansteuerbar

Anwendungen

- Datenübertragung
- Wegfahrsperrung
- Infrarotschnittstelle

Features

- SMT package with IR emitter (880 nm) and Si-phototransistor
- Suitable for SMT assembly
- Available on tape and reel
- Emitter und detector can be controlled separately

Applications

- Data transmission
- Lock bar
- Infrared interface

Typ Type	Bestellnummer Ordering Code	Gehäuse Package
SFH 7221	Q65110A2741	SMT Multi TOPLED®

Grenzwerte
Maximum Ratings

Bezeichnung Parameter	Symbol Symbol	Wert Value		Einheit Unit
		IRED	Transistor	
Betriebstemperatur Operating temperature range	T_{op}	- 40 ... + 100	- 40 ... + 100	°C
Lagertemperatur Storage temperature range	T_{stg}	- 40 ... + 100	- 40 ... + 100	°C
Sperrschichttemperatur Junction temperature	T_j	+ 100	+ 100	°C
Durchlassstrom (LED) Forward current (LED)	I_F	100	–	mA
Kollektorstrom (Transistor) Collector current (Transistor)	I_C	–	15	mA
Stoßstrom Surge current $t \leq 10 \mu s, D = 0.005$	I_{FM}	2500	75	mA
Sperrspannung (LED) Reverse voltage (LED)	V_R	5	–	V
Kollektor-Emitter Spannung (Transistor) Collector-emitter voltage (Transistor)	V_{CE}	–	35	V
Verlustleistung Total power dissipation	P_{tot}	180	165	mW
Wärmewiderstand Sperrschicht / Umgebung Thermal resistance junction / ambient Montage auf PC-Board ¹⁾ (Padgröße $\geq 16 \text{ mm}^2$) mounting on pcb ¹⁾ (pad size $\geq 16 \text{ mm}^2$)	$R_{th JA}$	500	450	K/W
Sperrschicht / Lötstelle junction / soldering joint	$R_{th JS}$	400	–	K/W

¹⁾ PC-board: G30/FR4

Hinweis / Notes

Die angegebenen Grenzdaten gelten für einen Chip.
The stated maximum ratings refer to one chip.

Kennwerte IRED ($T_A = 25\text{ °C}$)

Characteristics IRED

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Wellenlänge der Strahlung Wavelength of radiation $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$	λ_{peak}	880	nm
Spektrale Bandbreite bei 50% von I_{max} , $I_F = 100\text{ mA}$ Spectral bandwidth at 50% of I_{max} , $I_F = 100\text{ mA}$	$\Delta\lambda$	80	nm
Abstrahlwinkel Viewing angle	φ	± 60	Grad deg.
Aktive Chipfläche Active chip area	A	0.09	mm ²
Abmessungen der aktiven Chipfläche Dimensions of active chip area	$L \times B$ $L \times W$	0.3×0.3	mm ²
Schaltzeiten, I_e von 10% auf 90% und von 90% auf 10% Switching times, I_e from 10% to 90 % and from 90% to 10% $I_F = 100\text{ mA}$, $R_L = 50\ \Omega$	t_r , t_f	0.5	μs
Kapazität Capacitance $V_R = 0\text{ V}$, $f = 1\text{ MHz}$	C_o	15	pF
Durchlassspannung Forward voltage $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$ $I_F = 1\text{ A}$, $t_p = 100\ \mu\text{s}$	V_F V_F	1.5 (≤ 1.8) 3.0 (≤ 3.8)	V V
Sperrstrom Reverse current $V_R = 5\text{ V}$	I_R	0.01 (≤ 1)	μA
Gesamtstrahlungsfluss Total radiant flux $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$	Φ_e	23	mW
Temperaturkoeffizient von I_e bzw. Φ_e Temperature coefficient of I_e bzw. Φ_e $I_F = 100\text{ mA}$, $I_F = 100\text{ mA}$	TC_1	- 0.5	%/K

Kennwerte IRED ($T_A = 25\text{ °C}$)
Characteristics IRED (cont'd)

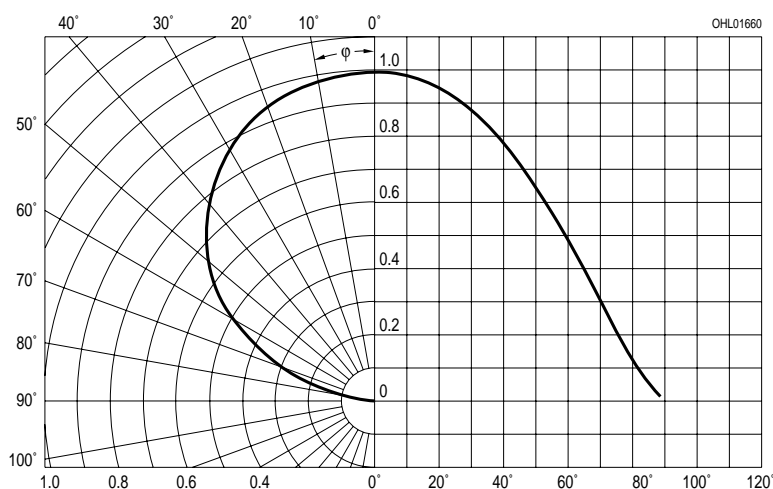
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Temperaturkoeffizient von V_F Temperature coefficient of V_F $I_F = 100\text{ mA}$	TC_V	- 2	mV/K
Temperaturkoeffizient von λ Temperature coefficient of λ $I_F = 100\text{ mA}$	TC_λ	+ 0.25	nm/K

Strahlstärke I_e in Achsrichtung

 gemessen bei einem Raumwinkel $\Omega = 0.01\text{ sr}$
Radiant Intensity I_e in Axial Direction

 at a solid angle of $\Omega = 0.01\text{ sr}$

Bezeichnung Parameter	Symbol Symbol	Werte Values	Einheit Unit
Strahlstärke Radiant intensity $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$	I_e	> 4	mW/sr
Strahlstärke Radiant intensity $I_F = 1\text{ A}$, $t_p = 100\text{ }\mu\text{s}$	$I_{e\text{ typ.}}$	48	mW/sr

IRED Radiation Characteristics $I_{\text{rel}} = f(\varphi)$
Phototransistor Directional Characteristics $S_{\text{rel}} = f(\varphi)$


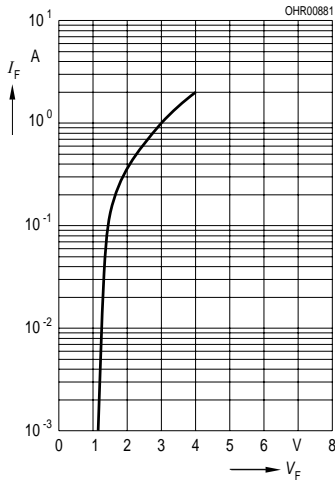
Kennwerte Fototransistor ($T_A = 25\text{ °C}$, $\lambda = 880\text{ nm}$)

Characteristics Phototransistor

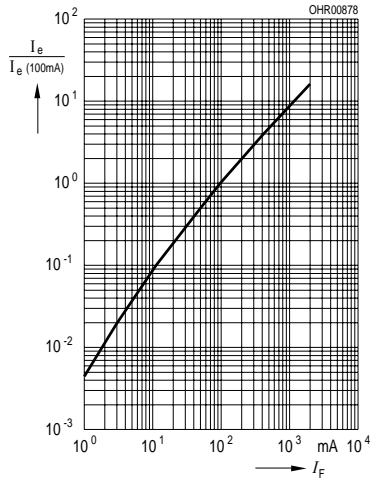
Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$	990	nm
Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von S_{max} Spectral range of sensitivity $S = 10\%$ of S_{max}	λ	440 ... 1150	nm
Bestrahlungsempfindliche Fläche ($\varnothing 240\text{ }\mu\text{m}$) Radiant sensitive area ($\varnothing 240\text{ }\mu\text{m}$)	A	0.038	mm^2
Abmessung der Chipfläche Dimensions of chip area	$L \times B$	0.45×0.45	$\text{mm} \times \text{mm}$
Abstand Chipoberfläche zu Gehäuseoberfläche Distance chip front to case surface	H	0.5 ... 0.7	mm
Halbwinkel Half angle	φ	± 60	Grad deg.
Kapazität Capacitance $V_{\text{CE}} = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$	C_{CE}	5.0	pF
Dunkelstrom Dark current $V_{\text{CE}} = 25\text{ V}$, $E = 0$	I_{CEO}	1 (≤ 200)	nA
Fotostrom Photocurrent $E_e = 0.1\text{ mW/cm}^2$, $V_{\text{CE}} = 5\text{ V}$	I_{PCE}	≥ 16	μA
Anstiegszeit/Abfallzeit Rise time/Fall time $I_{\text{C}} = 1\text{ mA}$, $V_{\text{CC}} = 5\text{ V}$, $R_{\text{L}} = 1\text{ k}\Omega$	t_r, t_f	7	μs
Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage $I_{\text{C}} = 5\text{ }\mu\text{A}$, $E_e = 0.1\text{ mW/cm}^2$	V_{CEsat}	150	mV

URED

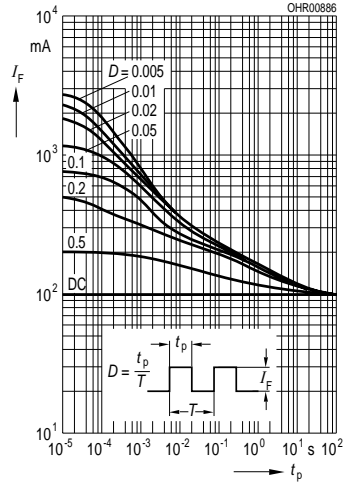
Forward Current $I_F = f(V_F)$
 $T_A = 25\text{ }^\circ\text{C}$



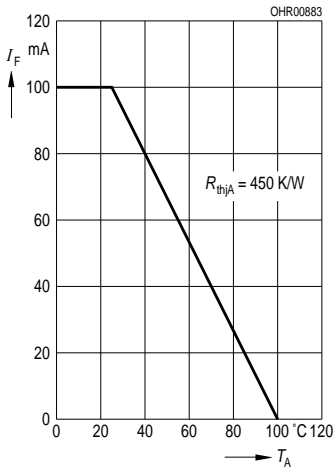
Rel Luminous Intensity
 $I_V / I_V(10\text{ mA}) = f(I_F), T_A = 25\text{ }^\circ\text{C}$



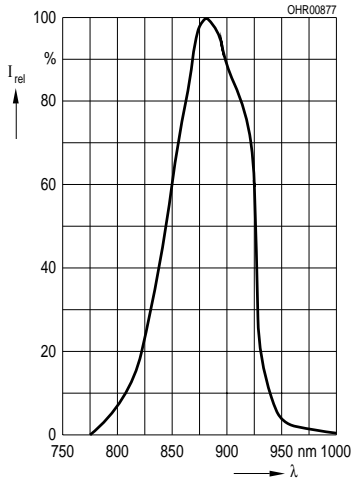
Perm. Pulse Handling Capability
 $I_F = f(t_p)$, Duty cycle $D = \text{parameter}$,
 $T_A = 25\text{ }^\circ\text{C}$



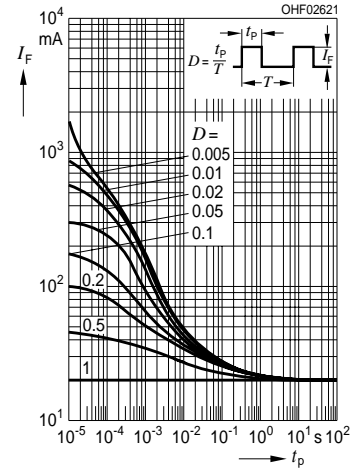
Max. Permissible Forward Current
 $I_F = f(T_A)$



Relative Spectral Emission
 $I_{rel} = f(\lambda)$



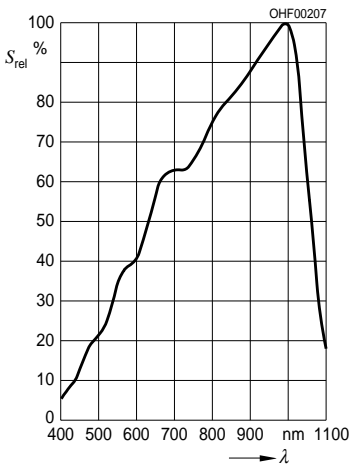
Perm. Pulse Handling Capability
 $I_F = f(t_p)$, Duty cycle $D = \text{parameter}$,
 $T_A = 85\text{ }^\circ\text{C}$



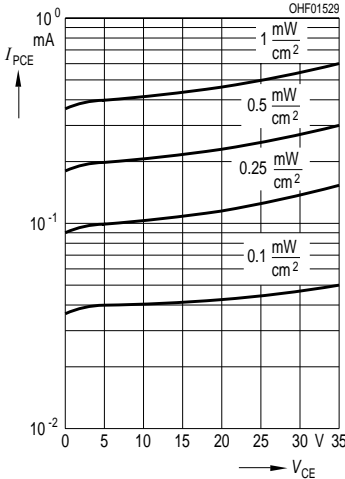
Phototransistor

Rel. Spectral Sensitivity

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

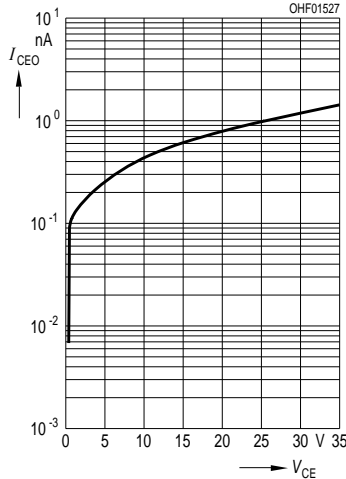


Photocurrent $I_{PCE} = f(V_{CE})$, $E_e = \text{Parameter}$



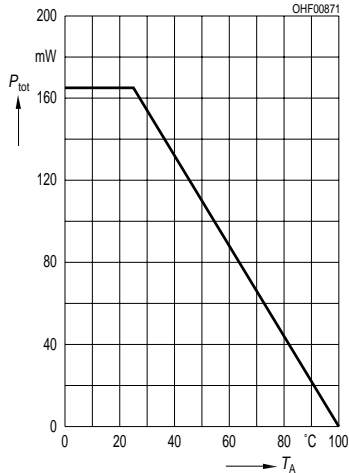
Dark Current

$I_{CEO} = f(V_{CE}), E = 0$



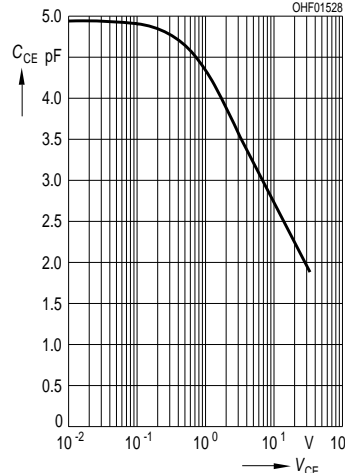
Total Power Dissipation

$P_{tot} = f(T_A)$

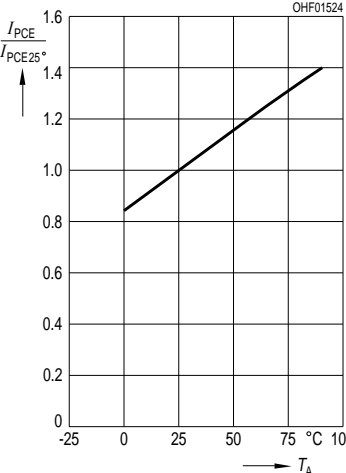


Capacitance

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0$

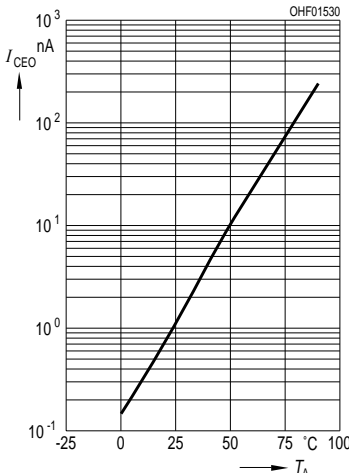


Photocurrent $I_{PCE}/I_{PCE25^\circ} = f(T_A)$, $V_{CE} = 5 \text{ V}$



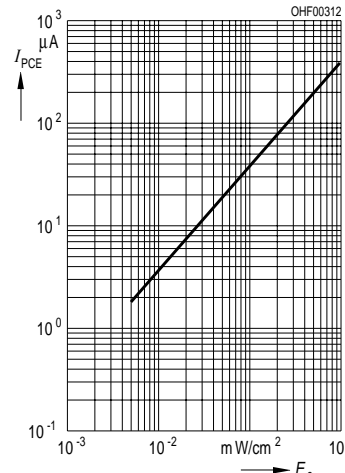
Dark Current

$I_{CEO} = f(T_A), V_{CE} = 5 \text{ V}, E = 0$

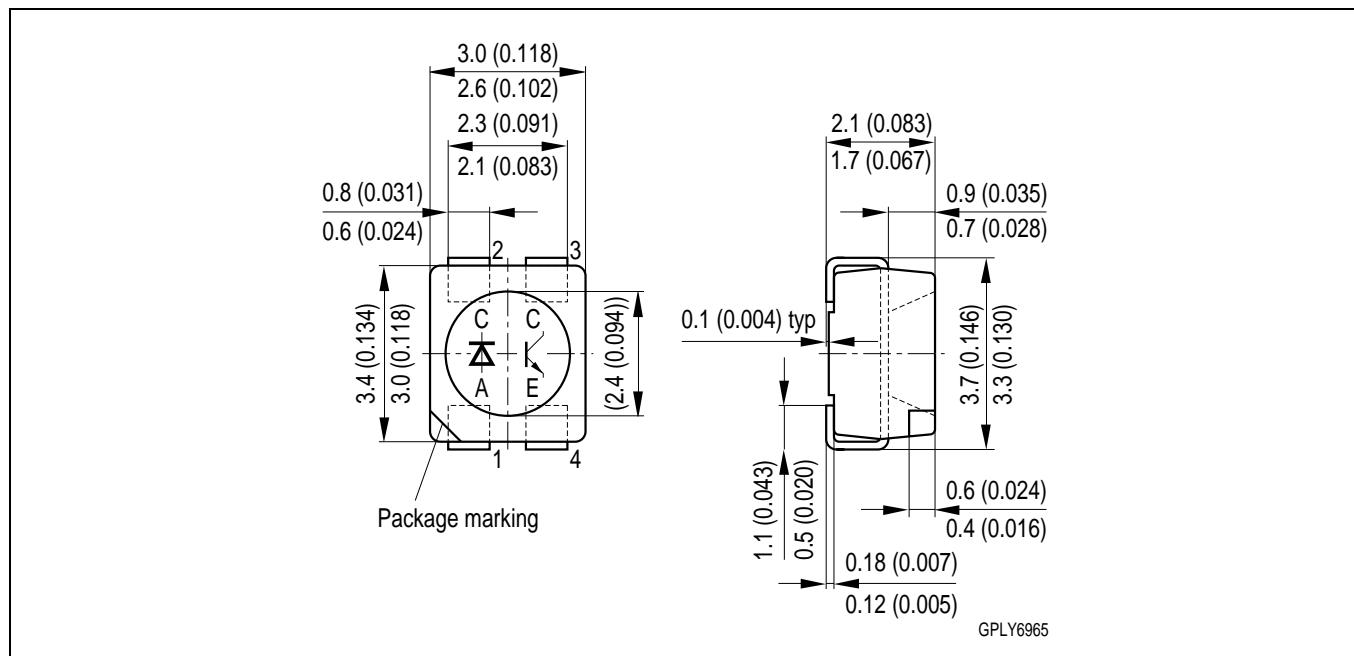


Photocurrent

$I_{PCE} = f(E_e), V_{CE} = 5 \text{ V}$



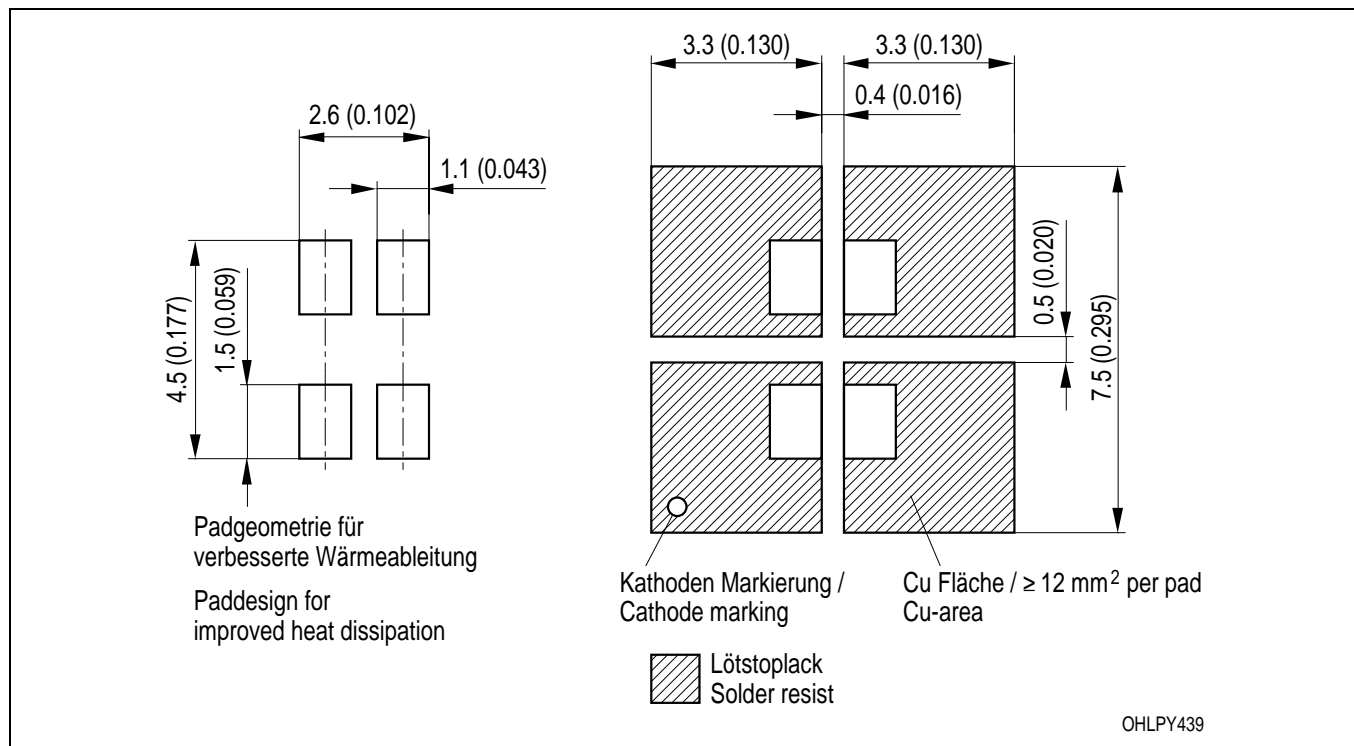
**Maßzeichnung
Package Outlines**



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

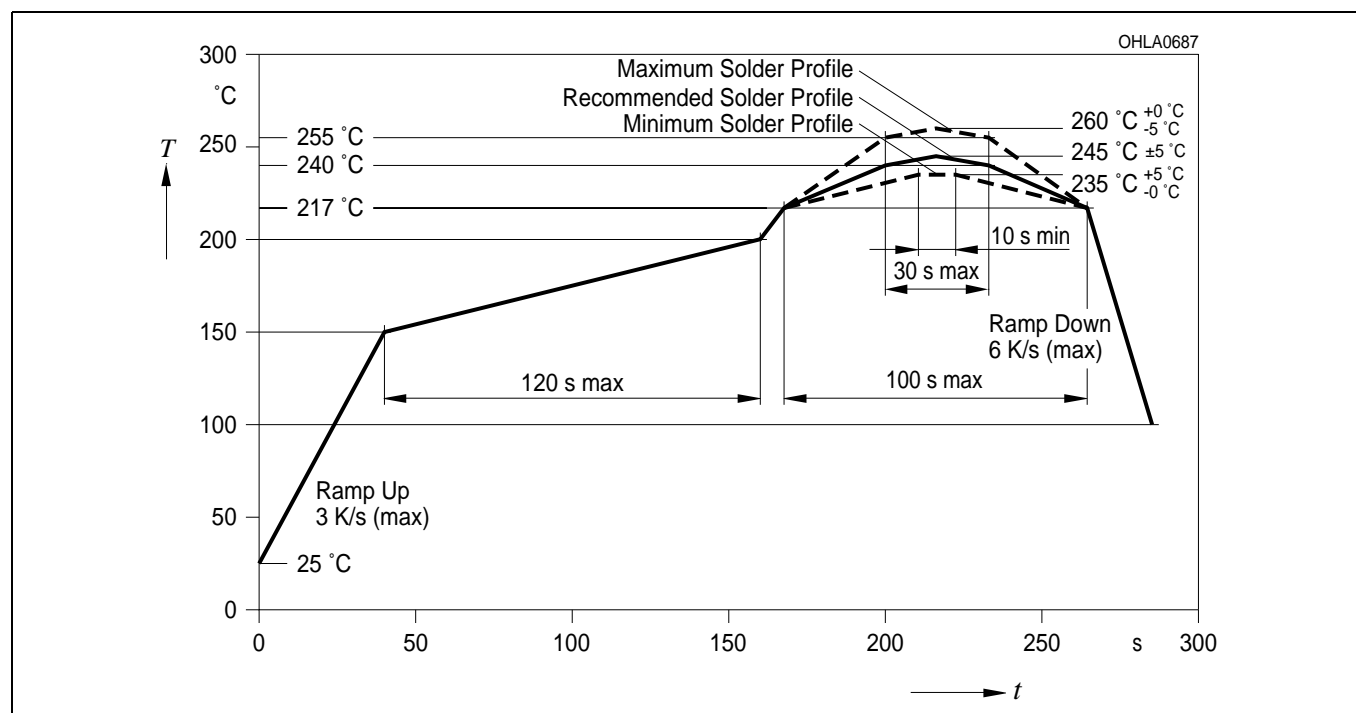
**Empfohlenes Lötpaddesign
Recommended Solder Pad**

**Reflow Lötén
Reflow Soldering**



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

Vorbehandlung nach JEDEC Level 2
 Preconditioning acc. to JEDEC Level 2
 (nach J-STD-020C)
 (acc. to J-STD-020C)



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 Wernerwerkstrasse 2, D-93049 Regensburg
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