

GaAIAs-IR-Lumineszenzdiode (880 nm) und Si-Fototransistor
GaAIAs-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
- Geeignet für IR-Reflow Löten

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
- Suitable for IR reflow soldering

Anwendungen

- Datenübertragung
- Wegfahrsperr
- Infrarotschnittstelle

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 $t \leq 10 \mu\text{s}$, $D = 0.005$ | 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 |
| 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 $\Omega = 0.01\text{ sr}$

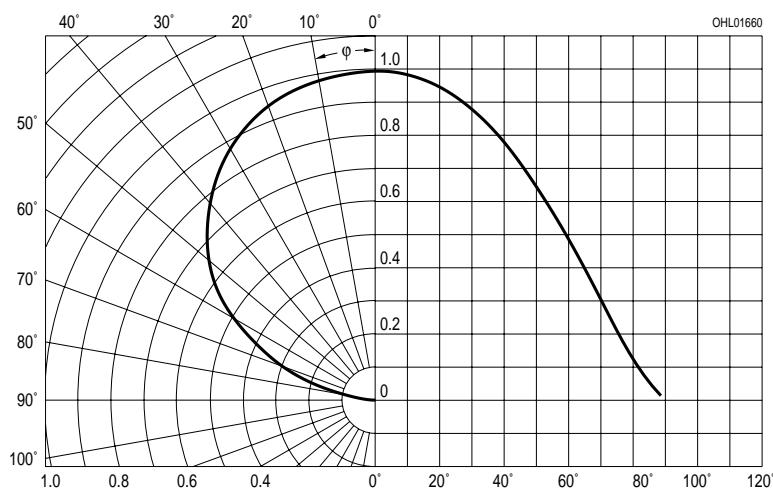
Radiant Intensity I_e in Axial Direction

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 $S_{\text{rel}} = f(\varphi)$

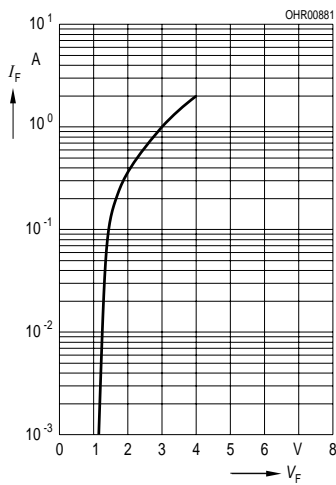


Kennwerte Fototransistor ($T_A = 25\text{ °C}$, $\lambda = 880\text{ nm}$)**Characteristics Phototransistor**

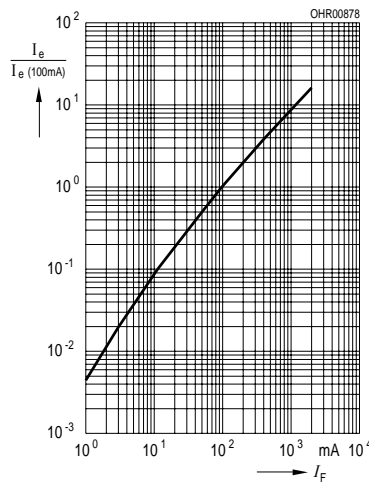
| Bezeichnung Parameter | Symbol Symbol | Wert Value | Einheit Unit |
|--|--------------------------|------------------|-----------------|
| Wellenlänge der max. Fotoempfindlichkeit Wavelength of max. sensitivity | $\lambda_{S\text{ max}}$ | 860 | nm |
| Spektraler Bereich der Fotoempfindlichkeit $S = 10\%$ von S_{max} Spectral range of sensitivity $S = 10\%$ of S_{max} | λ | 380 ... 1150 | nm |
| Bestrahlungsempfindliche Fläche ($\varnothing 240\text{ }\mu\text{m}$) Radiant sensitive area ($\varnothing 240\text{ }\mu\text{m}$) | A | 0.045 | mm ² |
| Abmessung der Chipfläche Dimensions of chip area | $L \times B$ | 0.45 × 0.45 | mm × 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 |

IRED

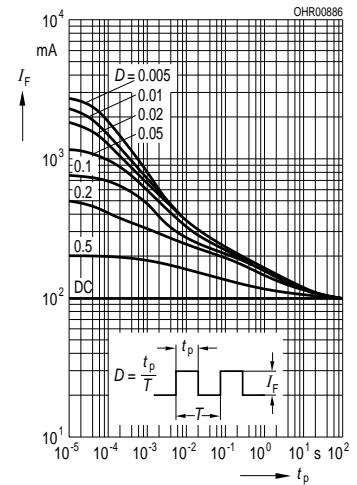
Forward Current $I_F = f(V_F)$
 $T_A = 25\text{ }^\circ\text{C}$



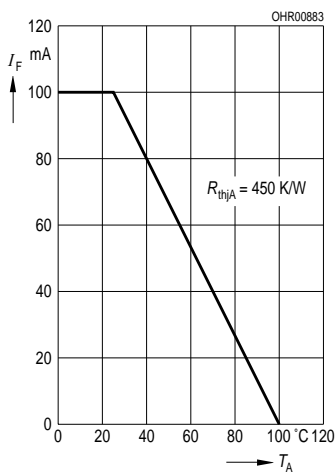
Rel Luminous Intensity
 $I_V / I_V(10\text{ mA}) = f(I_F), T_A = 25\text{ }^\circ\text{C}$



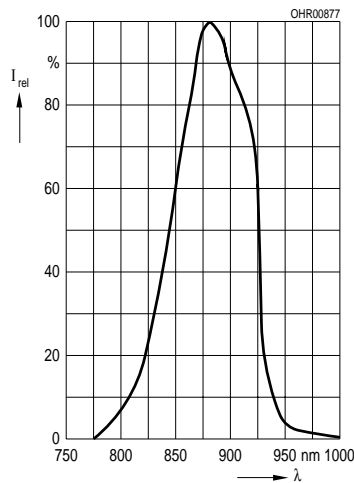
Perm. Pulse Handling Capability
 $I_F = f(t_p)$, Duty cycle $D = \text{parameter}$,
 $T_A = 25\text{ }^\circ\text{C}$



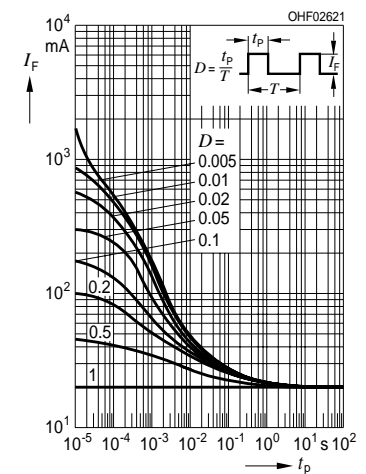
Max. Permissible Forward Current
 $I_F = f(T_A)$



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



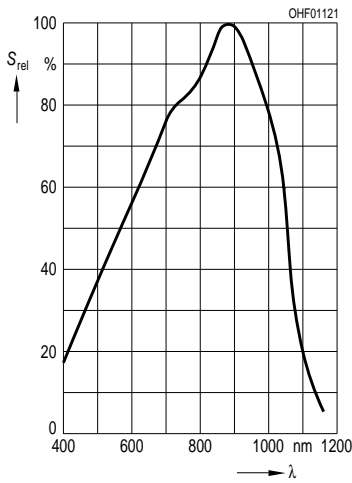
Perm. Pulse Handling Capability
 $I_F = f(t_p)$, Duty cycle $D = \text{parameter}$,
 $T_A = 85\text{ }^\circ\text{C}$



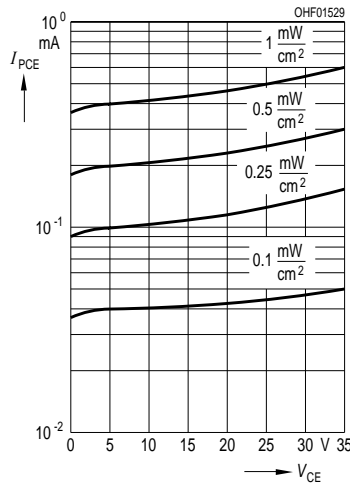
Phototransistor

Rel. Spectral Sensitivity

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

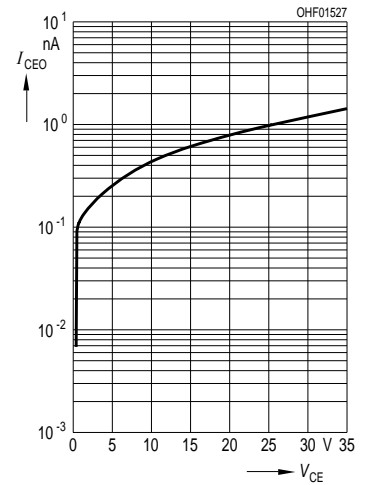


Photocurrent $I_{PCE} = f(V_{CE})$, $E_e = \text{Parameter}$



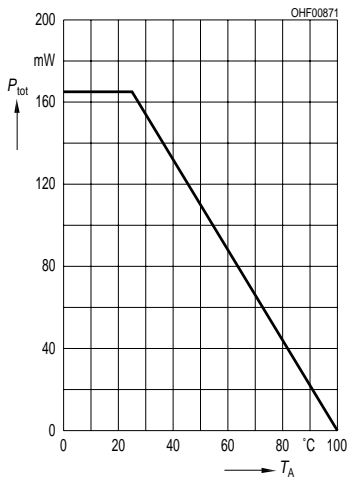
Dark Current

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



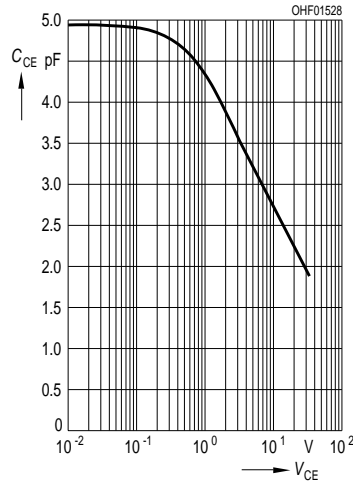
Total Power Dissipation

$P_{tot} = f(T_A)$

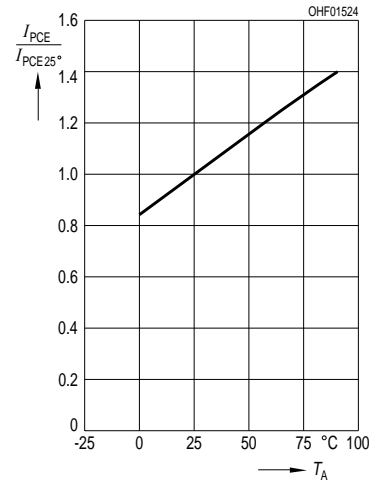


Capacitance

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

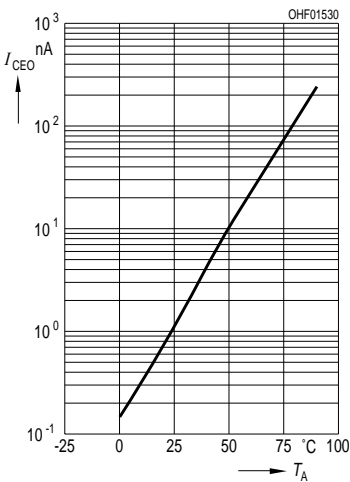


Photocurrent $I_{PCE}/I_{PCE25^\circ} = f(T_A)$, $V_{CE} = 5 \text{ V}$



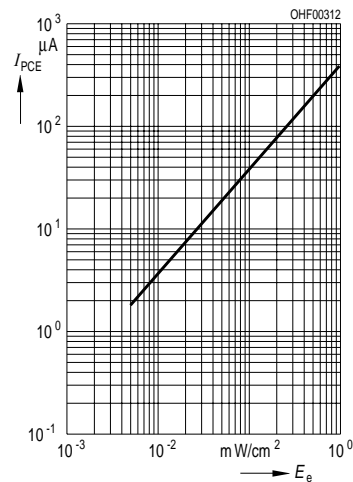
Dark Current

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

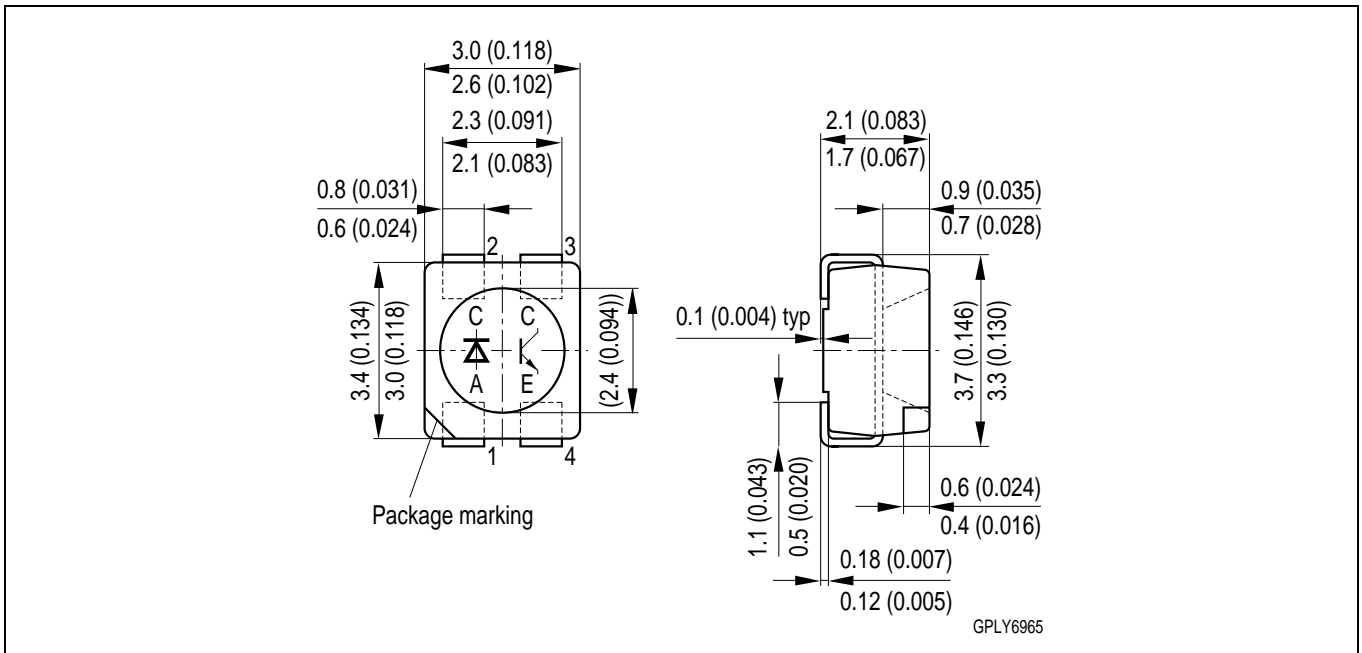


Photocurrent

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



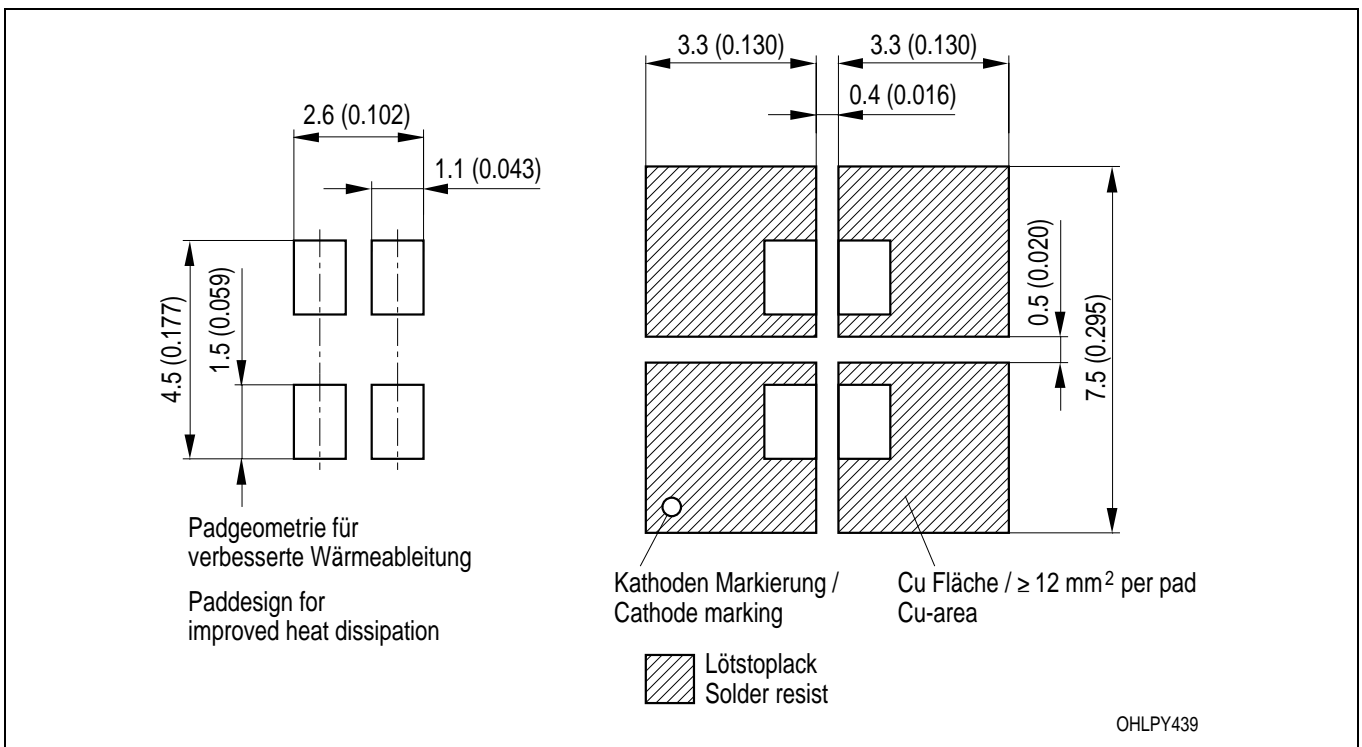
**Maßzeichnung
Package Outlines**



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

**Empfohlenes Lötpaddesign
Recommended Solder Pad**

**IR-Reflow Löten
IR Reflow Soldering**



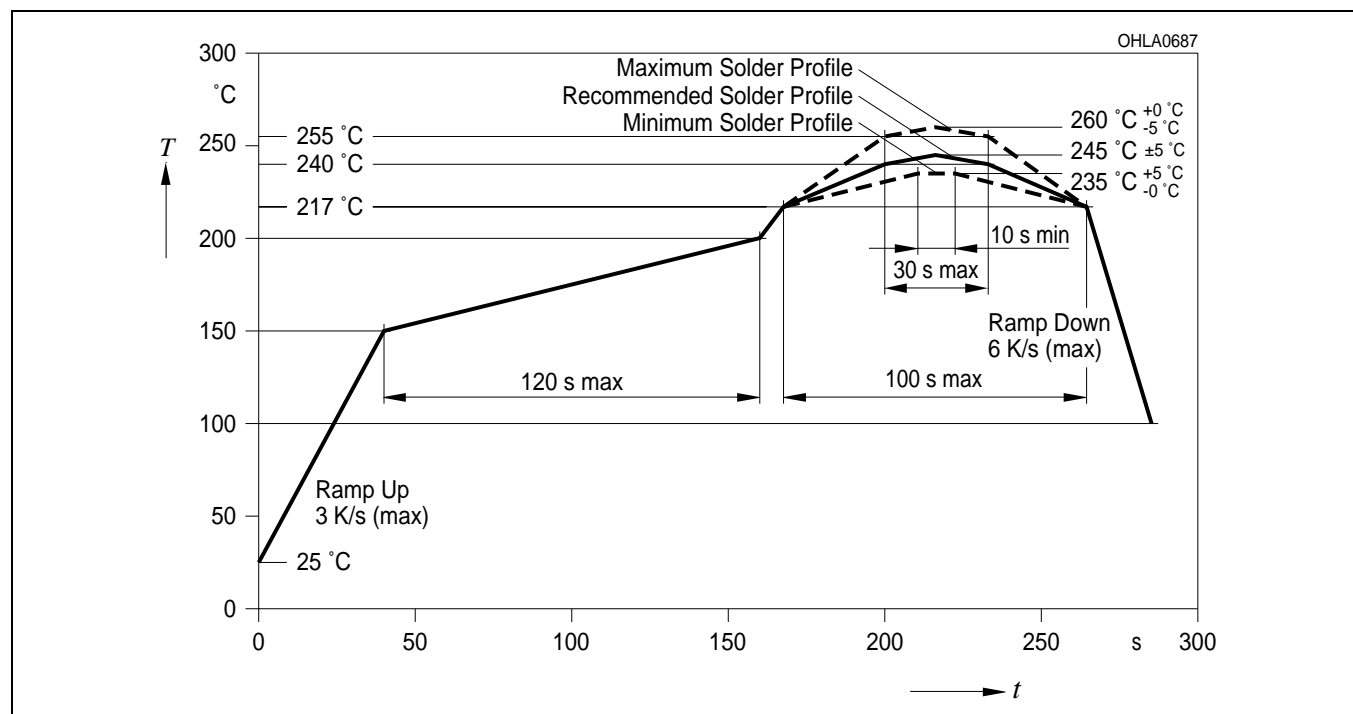
Lötbedingungen**Soldering Conditions****IR-Reflow Lötprofil für bleifreies Löten****IR Reflow Soldering Profile for lead free soldering**

Vorbehandlung nach JEDEC Level 2

Preconditioning acc. to JEDEC Level 2

(nach J-STD-020B)

(acc. to J-STD-020B)

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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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² 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.