

# SmartLED™ White Hyper-Bright LED

## LW L88S



### Besondere Merkmale

- **Gehäusotyp:** SMT Gehäuse SCD 80
- **Besonderheit des Bauteils:** kleinste Bauform 1,7 x 0,8 x 0,65 mm (LxBxH)
- **Farbort:** x = 0,33, y = 0,33 nach CIE 1931 (weiß)
- **typische Farbtemperatur:** 5600 K
- **Farbwiedergabeindex:** 80
- **Abstrahlwinkel:** horizontal 170°, vertikal 130°
- **Technologie:** InGaN
- **optischer Wirkungsgrad:** 4 lm/W
- **Gruppierungsparameter:** Lichtstärke, Farbort
- **Verarbeitungsmethode:** für alle SMT-Bestücktechniken geeignet
- **Lötmethode:** IR Reflow Löten und Wellenlöten (TTW)
- **Vorbehandlung:** nach JEDEC Level 2
- **Gurtung:** 8 mm Gurt mit 10000/Rolle, ø180 mm oder 40000/Rolle, ø330 mm
- **ESD-Festigkeit:** ESD-sicher bis 2 kV nach EOS/ESD-5.1-1993

### Anwendungen

- flache Hinterleuchtung (LCD, Mobile Phone, Schalter, Display)
- Spielsachen
- Informationsanzeigen im Außenbereich
- Signal- und Symbolleuchten
- Markierungsbeleuchtung (Stufen, Fluchtwege u. ä.)

### Features

- **package:** SMT package SCD 80
- **feature of the device:** smallest package 1.7 x 0.8 x 0.65 mm (LxWxH)
- **color coordinates:** x = 0.33, y = 0.33 acc. to CIE 1931 (white)
- **typ. color temperature:** 5600 K
- **color reproduction index:** 80
- **viewing angle:** horizontal 170°, vertical 130°
- **technology:** InGaN
- **optical efficiency:** 4 lm/W
- **grouping parameter:** luminous intensity, color coordinates
- **assembly methods:** suitable for all SMT assembly methods
- **soldering methods:** IR reflow soldering and TTW soldering
- **preconditioning:** acc. to JEDEC Level 2
- **taping:** 8 mm tape with 10000/reel, ø180 mm or 40000/reel, ø330 mm
- **ESD-withstand voltage:** up to 2 kV acc. to EOS/ESD-5.1-1993

### Applications

- flat backlighting (LCD, cellular phones, switches, displays)
- toys
- outdoor displays
- signal and symbol luminary
- marker lights (e.g. steps, exit ways, etc.)

Typ	Emissions- farbe	Farbe der Lichtaustritts- fläche	Lichtstärke	Lichtstrom	Bestellnummer
Type	Color of Emission	Color of the Light Emitting Area	Luminous Intensity $I_F = 10 \text{ mA}$ $I_V \text{ (mcd)}$	Luminous Flux $I_F = 10 \text{ mA}$ $\Phi_V \text{ (lm)}$	Ordering Code
LW L88S-L1M1-35	white	colored diffused	11.2 ...22.4	65 (typ.)	Q65110-A0048
LW L88S-M1N2-35			18.0 ...45.0	120 (typ.)	Q65110-A0046
LW L88S-N2P2-35			35.5 ...71.0	210 (typ.)	Q65110-A0044

Anm.: -35 Farbselektiert nach Farbortgruppen, Lieferung in Einzelgruppen(siehe **Seite 5**)

*Die Standardlieferform von Serientypen beinhaltet eine untere bzw. eine obere Familiengruppe, die aus nur 3 bzw. 4 Halbgruppen besteht. Einzelne Halbgruppen sind nicht erhältlich.  
In einer Verpackungseinheit / Gurt ist immer nur eine Halbgruppe enthalten.*

Note: -35 Color selection acc. to chromaticity coordinate groups, delivery in single groups (see **page 5**)

*The standard shipping format for serial types includes a lower or upper family group of 3 or 4 individual groups. Individual half groups are not available.  
No packing unit / tape ever contains more than one luminous intensity half group.*

**Grenzwerte**  
**Maximum Ratings**

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Betriebstemperatur Operating temperature range	$T_{op}$	- 40 ... + 100	°C
Lagertemperatur Storage temperature range	$T_{stg}$	- 40 ... + 100	°C
Sperrschichttemperatur Junction temperature	$T_j$	+ 100	°C
Durchlassstrom Forward current	$I_F$	15	mA
Stoßstrom Surge current $t \leq 10 \mu s, D = 0.005$	$I_{FM}$	150	mA
Sperrspannung Reverse voltage	$V_R$	5	V
Leistungsaufnahme Power consumption $T_A \leq 25 \text{ °C}$	$P_{tot}$	60	mW
Wärmewiderstand Thermal resistance Sperrschicht/Umgebung Junction/ambient	$R_{th JA}$	450	K/W
Sperrschicht/Löt看pad Junction/solder point Montage auf PC-Board FR 4 (Padgröße $\geq 5 \text{ mm}^2$ ) mounted on PC board FR 4 (pad size $\geq 5 \text{ mm}^2$ )	$R_{th JS}$	260	K/W

Kennwerte ( $T_A = 25\text{ °C}$ )

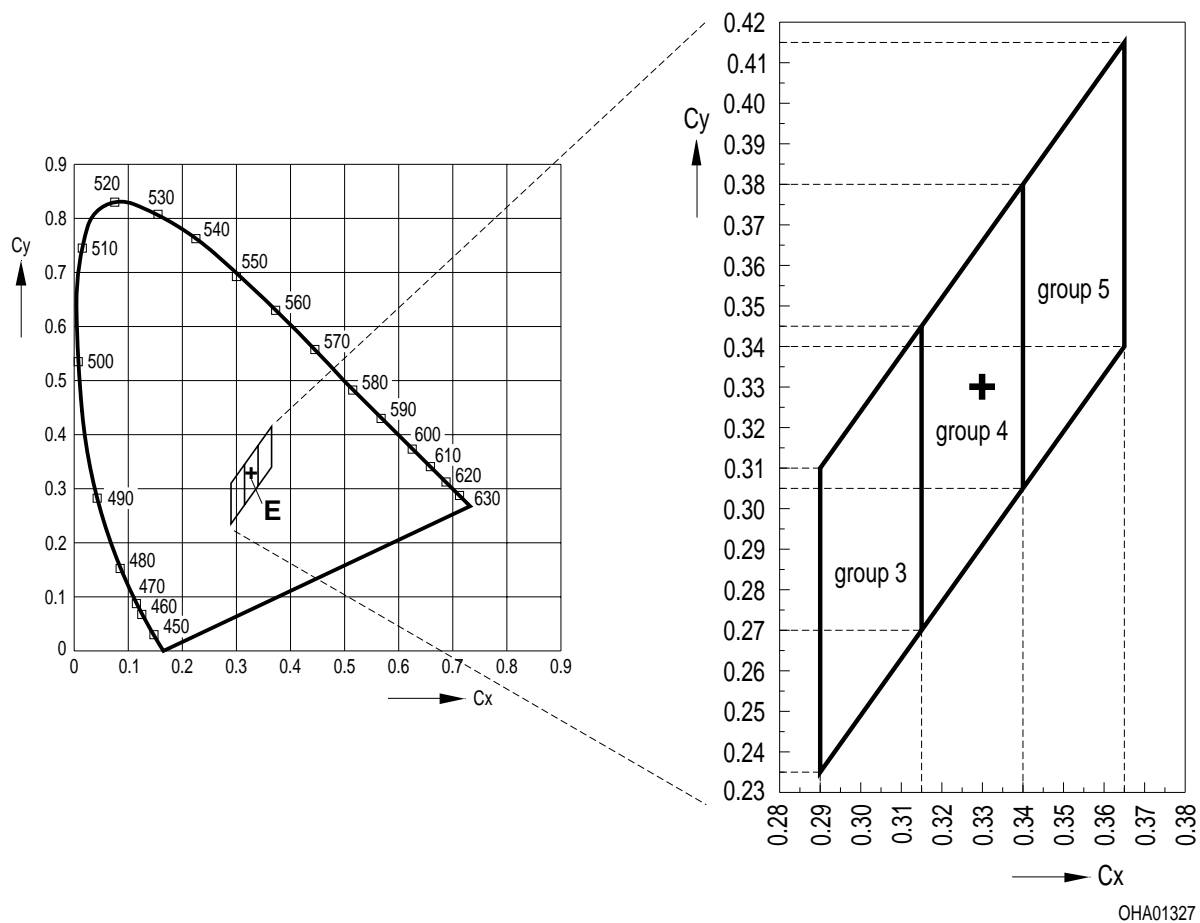
## Characteristics

Bezeichnung Parameter	Symbol Symbol	Wert Value	Einheit Unit
Farbkoordinate x nach CIE 1931 <sup>1)</sup> (typ.) Chromaticity coordinate x acc. to CIE 1931 $I_F = 10\text{ mA}$	x	0.33	–
Farbkoordinate y nach CIE 1931 (typ.) Chromaticity coordinate y acc. to CIE 1931 $I_F = 10\text{ mA}$	y	0.33	–
Abstrahlwinkel bei 50 % $I_V$ (Vollwinkel) (typ.) Viewing angle at 50 % $I_V$	$2\phi$	170 (horizontal) 130 (verical)	Grad deg.
Durchlassspannung <sup>2)</sup> (typ.) Forward voltage (max.) $I_F = 10\text{ mA}$	$V_F$ $V_F$	3.4 3.8	V V
Sperrstrom (typ.) Reverse current (max.) $V_R = 5\text{ V}$	$I_R$ $I_R$	0.01 10	$\mu\text{A}$ $\mu\text{A}$
Temperaturkoeffizient von x (typ.) Temperature coefficient of x $I_F = 10\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_x$	–0.1	$10^{-3}/\text{K}$
Temperaturkoeffizient von y (typ.) Temperature coefficient of y $I_F = 10\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_y$	–0.2	$10^{-3}/\text{K}$
Temperaturkoeffizient von $V_F$ (typ.) Temperature coefficient of $V_F$ $I_F = 10\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_V$	– 3.0	mV/K
Optischer Wirkungsgrad (typ.) Optical efficiency $I_F = 10\text{ mA}$	$\eta_{\text{opt}}$	4	lm/W

<sup>1)</sup> Farbortgruppen werden mit einer Stromeinprägungsdauer von 25 ms und einer Genauigkeit von  $\pm 0,01$  ermittelt.  
Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

<sup>2)</sup> Spannungswerte werden mit einer Stromeinprägungsdauer von 1 ms und einer Genauigkeit von  $\pm 0,1\text{ V}$  ermittelt.  
Voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ .

1) Farbortgruppen  
Chromaticity coordinate groups



**Helligkeits-Gruppierungsschema**  
**Luminous Intensity Groups**

<b>Lichtgruppe</b> <b>Luminous Intensity Group</b>	<b>Lichtstärke</b> <b>Luminous Intensity</b> $I_V$ (mcd)	<b>Lichtstrom</b> <b>Luminous Flux</b> $\Phi_V$ (mlm)
L1	11.2 ... 14.0	50 (typ.)
L2	14.0 ... 18.0	60 (typ.)
M1	18.0 ... 22.4	80 (typ.)
M2	22.4 ... 28.0	100 (typ.)
N1	28.0 ... 35.5	130 (typ.)
N2	35.5 ... 45.0	160 (typ.)
P1	45.0 ... 56.0	200 (typ.)
P2	56.0 ... 71.0	250 (typ.)

Helligkeitswerte werden mit einer Stromeinprägedauer von 25 ms und einer Genauigkeit von  $\pm 11\%$  ermittelt.  
 Luminous intensity is tested at a current pulse duration of 25 ms and a tolerance of  $\pm 11\%$ .

**Gruppenbezeichnung auf Etikett**  
**Group Name on Label**

Beispiel: M1-4

Example: M1-4

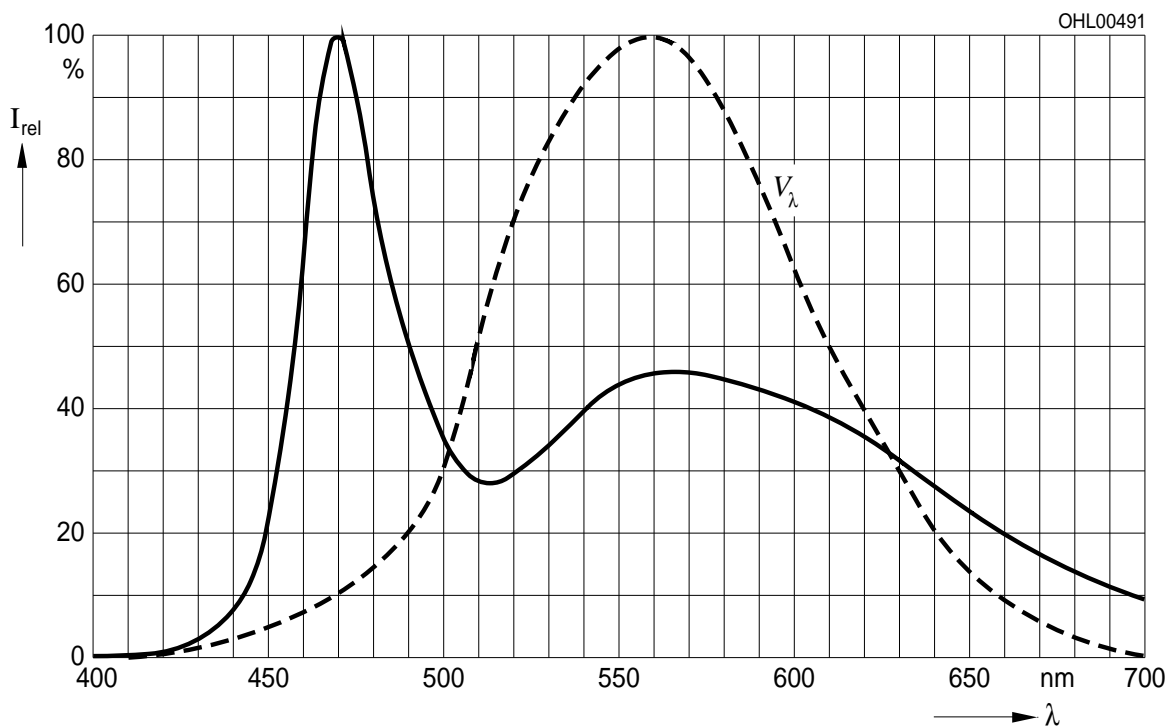
<b>Lichtgruppe</b> <b>Luminous Intensity Group</b>	<b>Halbgruppe</b> <b>Half Group</b>	<b>Farbortgruppe</b> <b>Chromaticity Coordinate Group</b>
M	1	4

Relative spektrale Emission  $I_{rel} = f(\lambda)$ ,  $T_A = 25\text{ °C}$ ,  $I_F = 10\text{ mA}$

Relative Spectral Emission

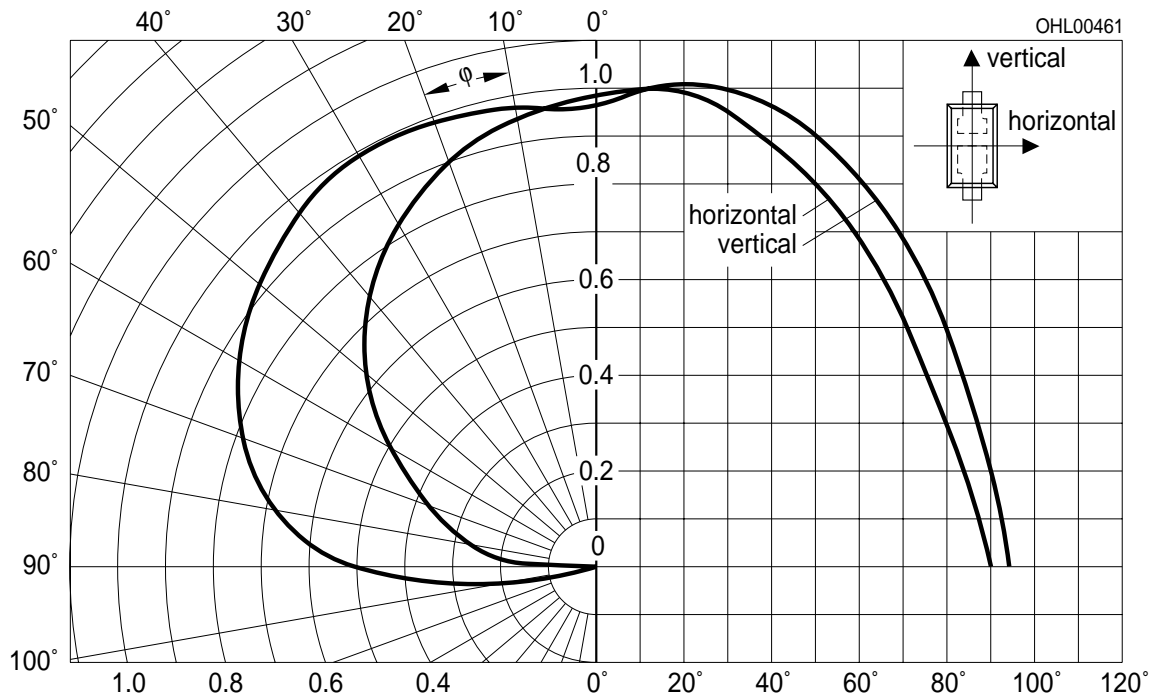
$V(\lambda)$  = spektrale Augenempfindlichkeit

Standard eye response curve



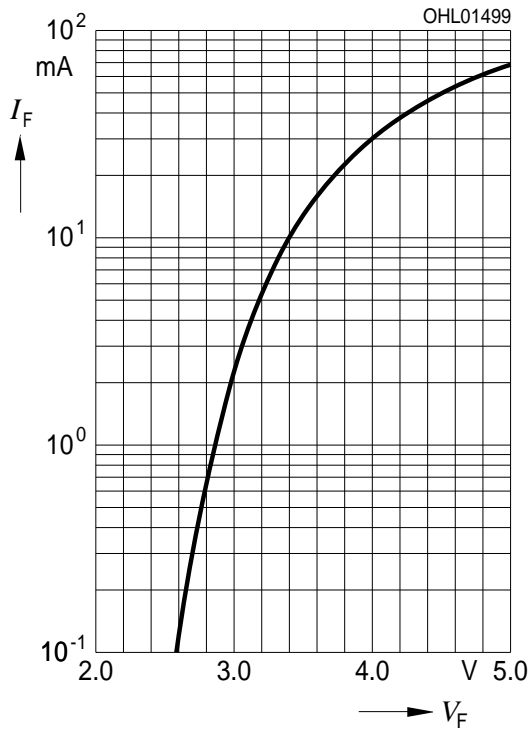
Abstrahlcharakteristik  $I_{rel} = f(\varphi)$

Radiation Characteristic



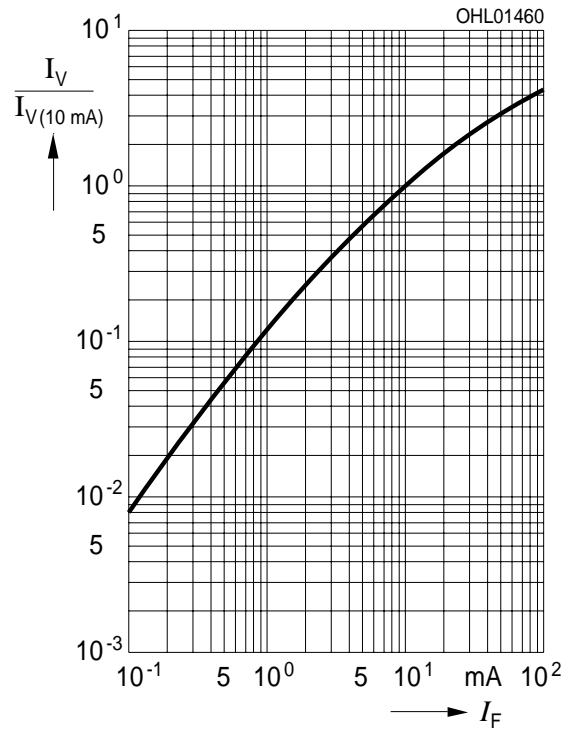
**Durchlassstrom  $I_F = f(V_F)$**   
**Forward Current**

$T_A = 25\text{ °C}$

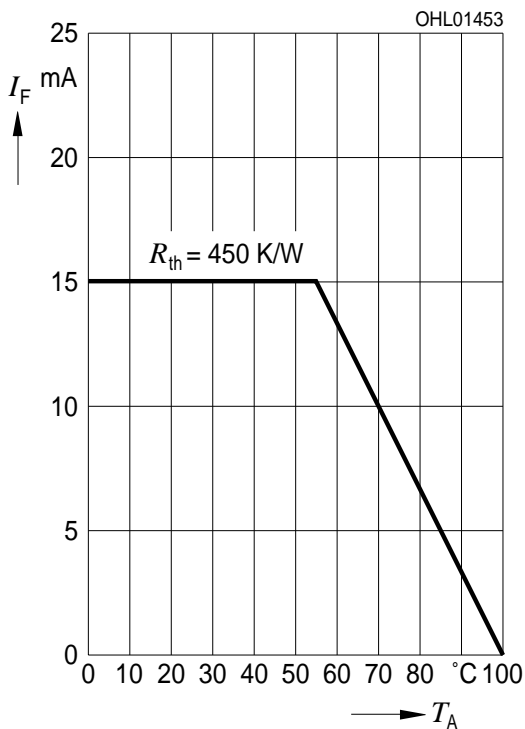


**Relative Lichtstärke  $I_V/I_{V(10\text{ mA})} = f(I_F)$**   
**Relative Luminous Intensity**

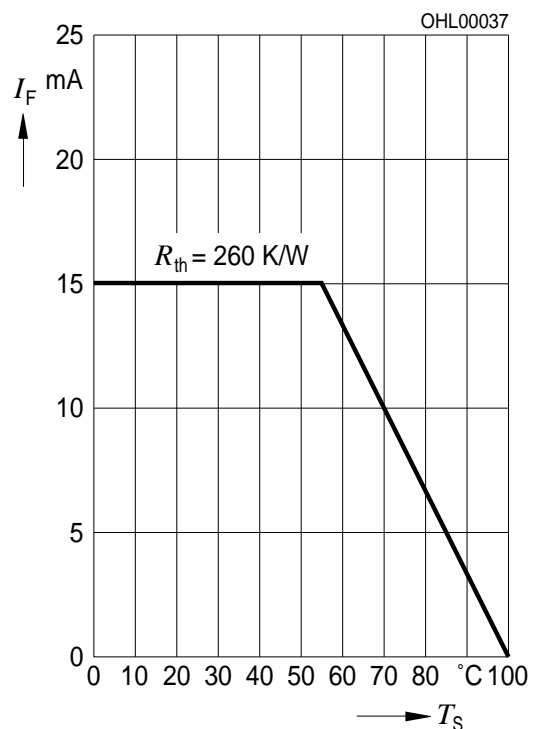
$T_A = 25\text{ °C}$



**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**   
**Max. Permissible Forward Current**

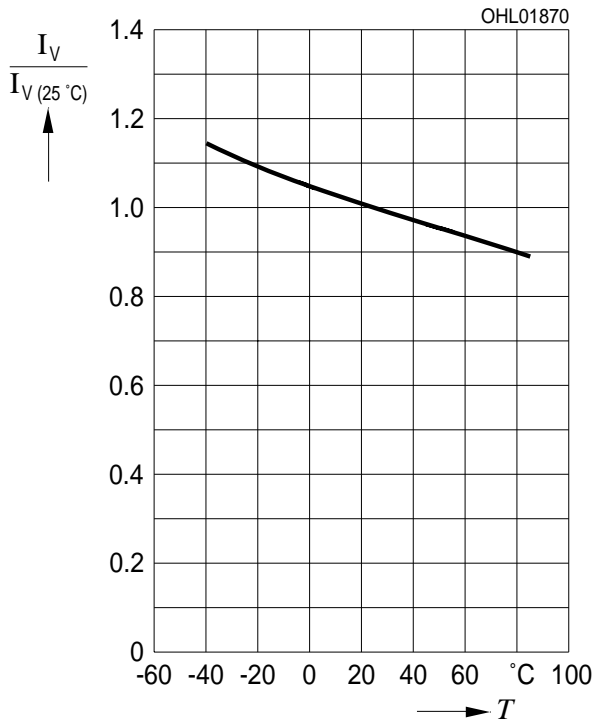


**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**   
**Max. Permissible Forward Current**

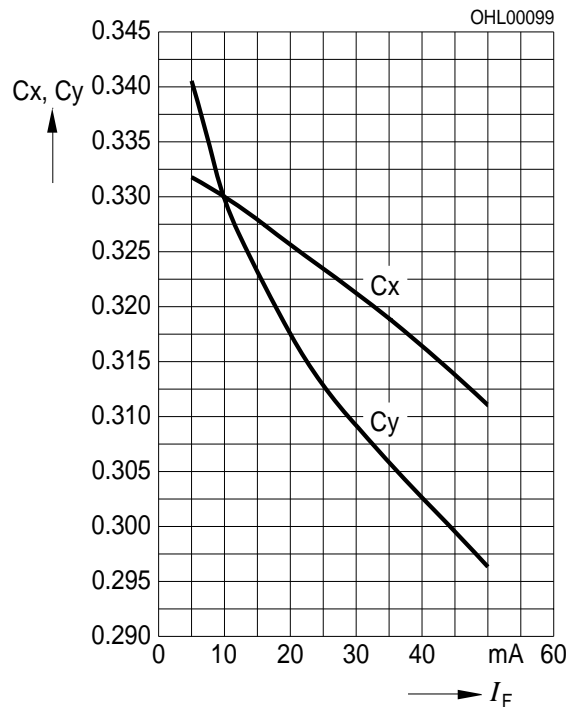




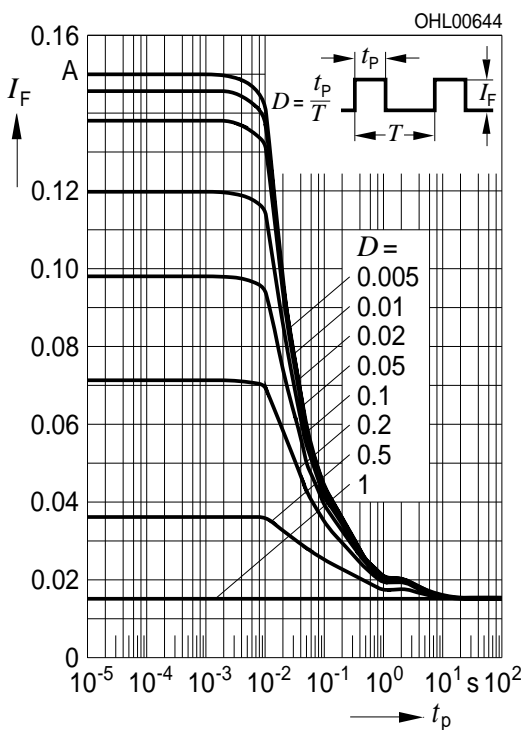
**Relative Lichtstärke  $I_V/I_{V(25^\circ\text{C})} = f(T_A)$**   
**Relative Luminous Intensity**  
 $I_F = 10 \text{ mA}$



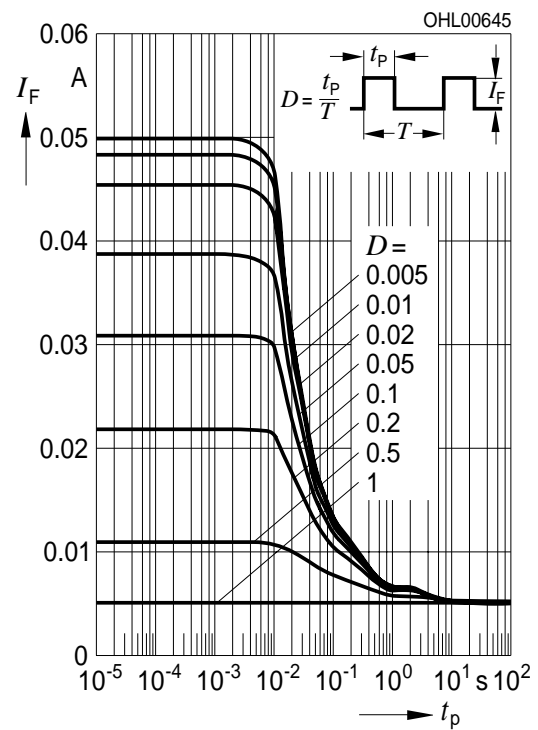
**Farbortverschiebung  $x, y = f(I_F)$**   
**Chromaticity Coordinate Shift**  
 $T_A = 25^\circ\text{C}$



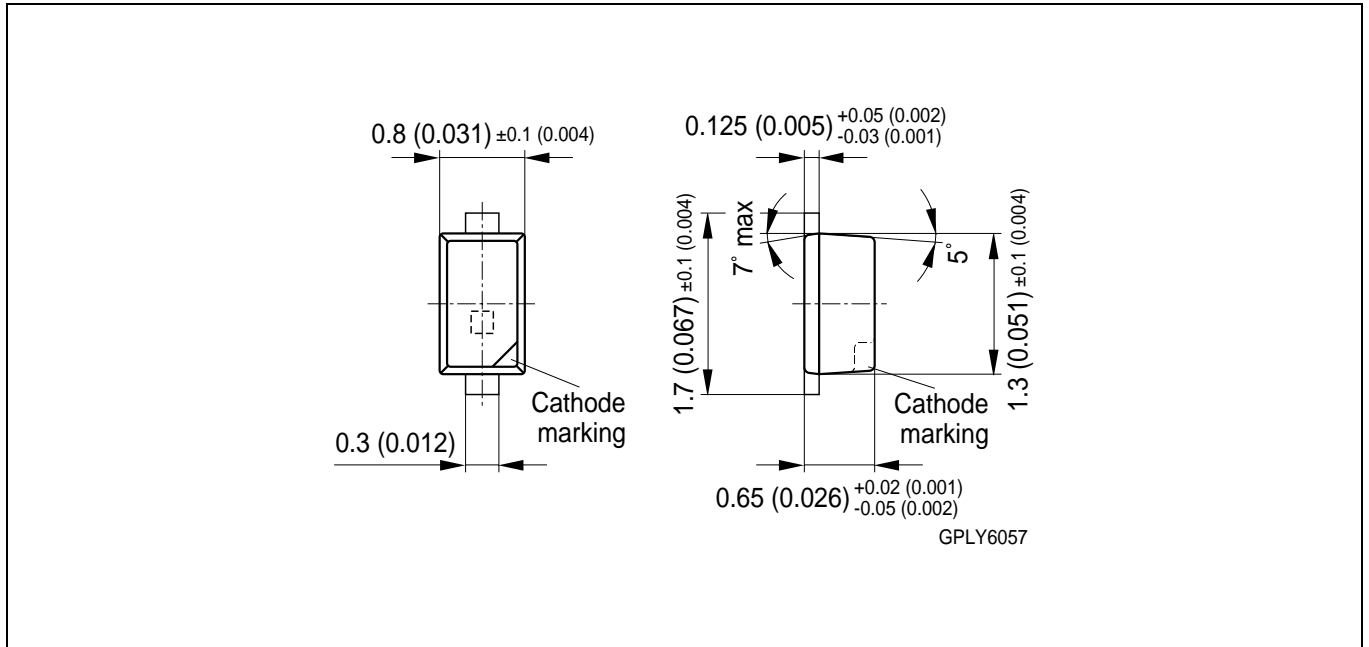
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
 Duty cycle  $D = \text{parameter}$ ,  $T_A = 25^\circ\text{C}$



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



**Maßzeichnung**  
**Package Outlines**

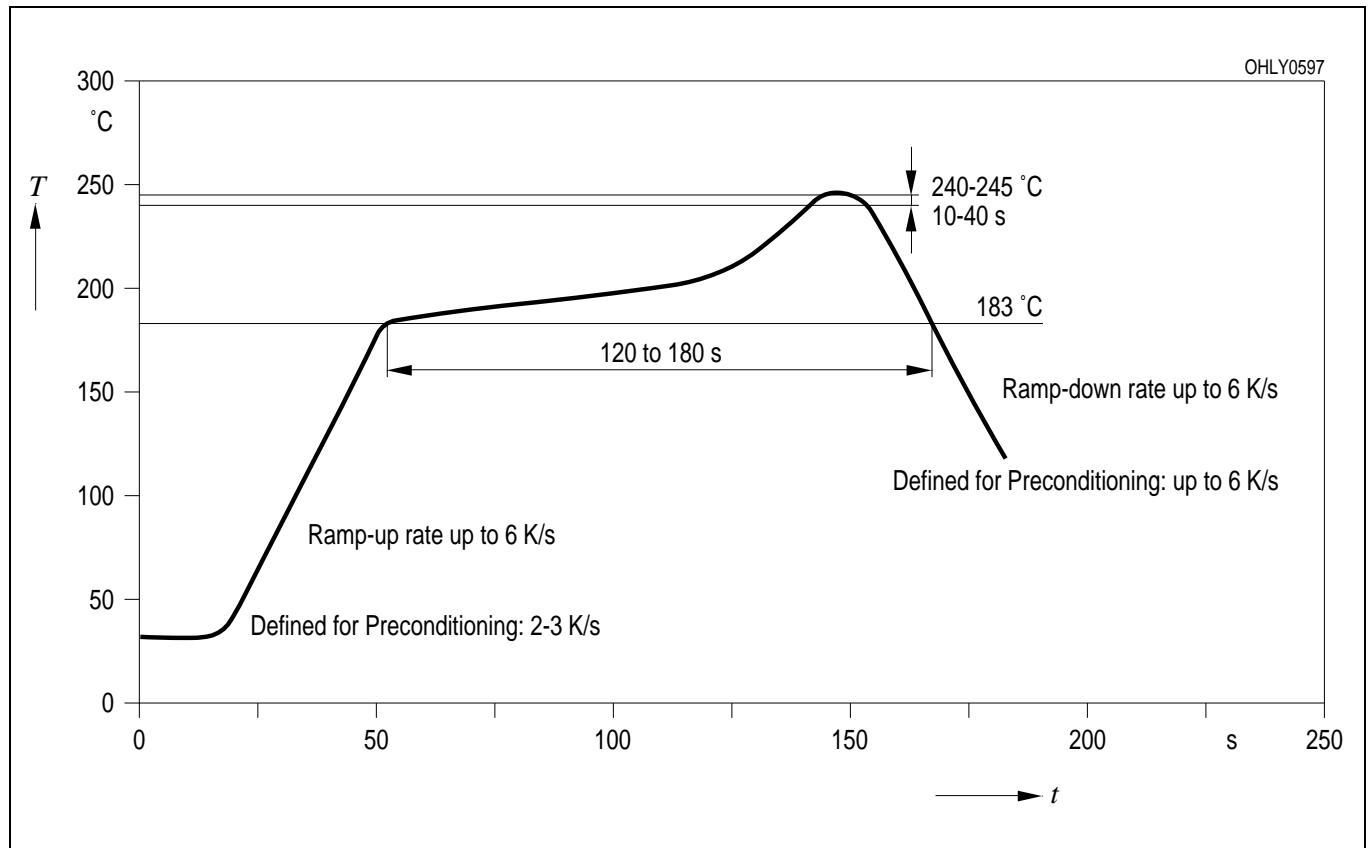


Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

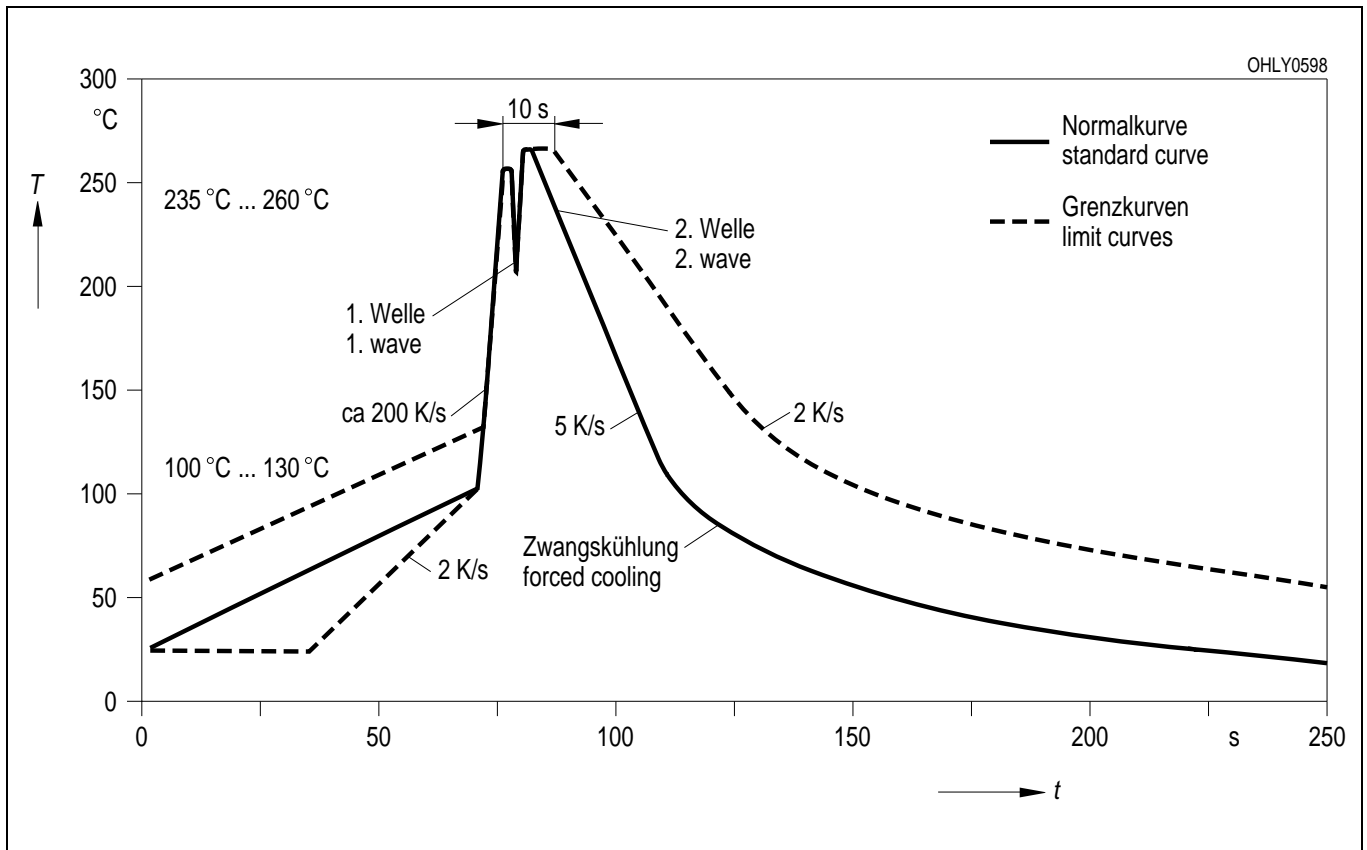
**Gewicht / Approx. weight:** 1.4 mg

**Lötbedingungen** Vorbehandlung nach JEDEC Level 2  
**Soldering Conditions** Preconditioning acc. to JEDEC Level 2

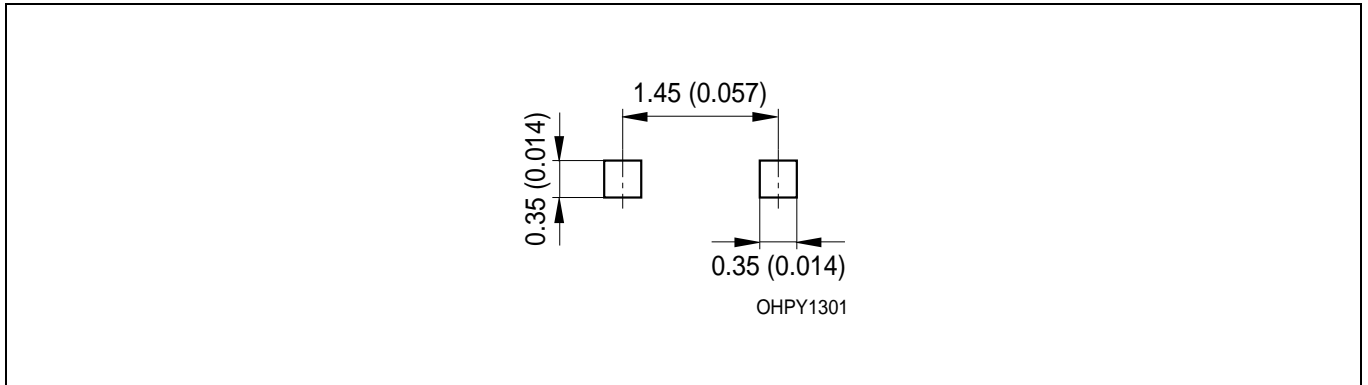
**IR-Reflow Lötprofil** (nach IPC 9501)  
**IR Reflow Soldering Profile** (acc. to IPC 9501)



**Wellenlöten (TTW)** (nach CECC 00802)  
**TTW Soldering** (acc. to CECC 00802)

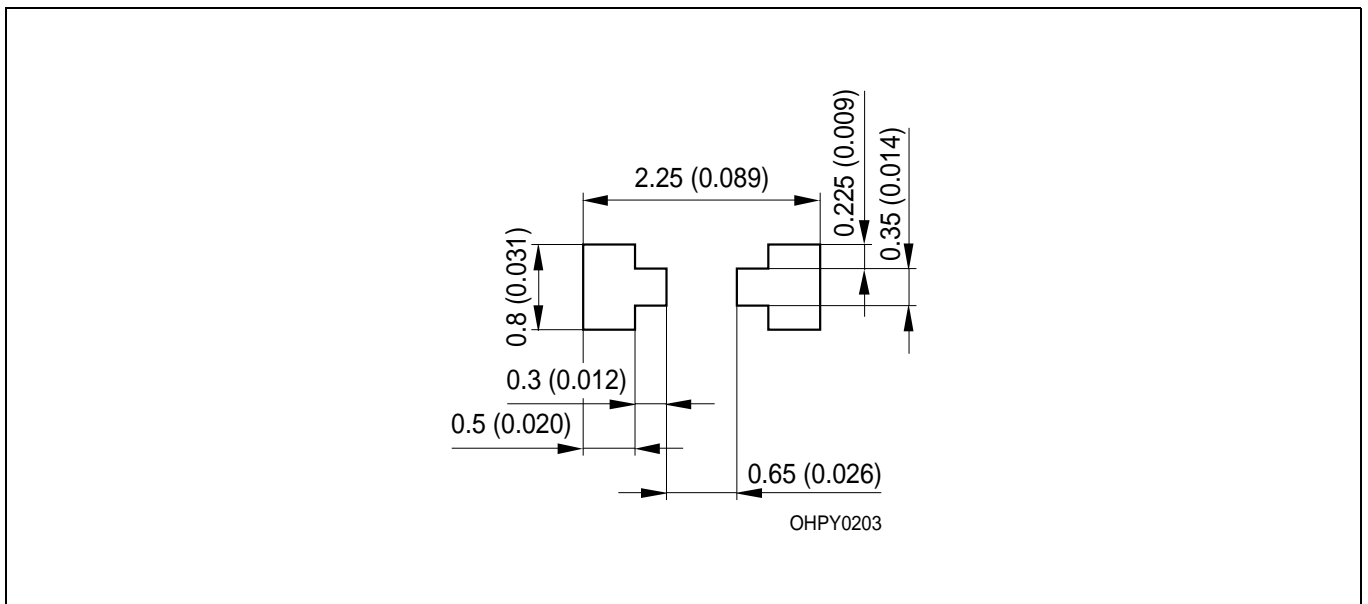


**Empfohlenes Lötpad design** IR Reflow Lötén  
**Recommended Solder Pad** IR Reflow Soldering



Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).  
 Gehäuse für Wellenlötén (TTW) geeignet / Package suitable for TTW-soldering

**Empfohlenes Lötpad design verwendbar für SmartLED™ und Chipléd - Bauform 0603**  
 IR Reflow Lötén  
**Recommended Solder Pad useable for SmartLED™ and Chipléd - Package 0603**  
 IR Reflow Soldering



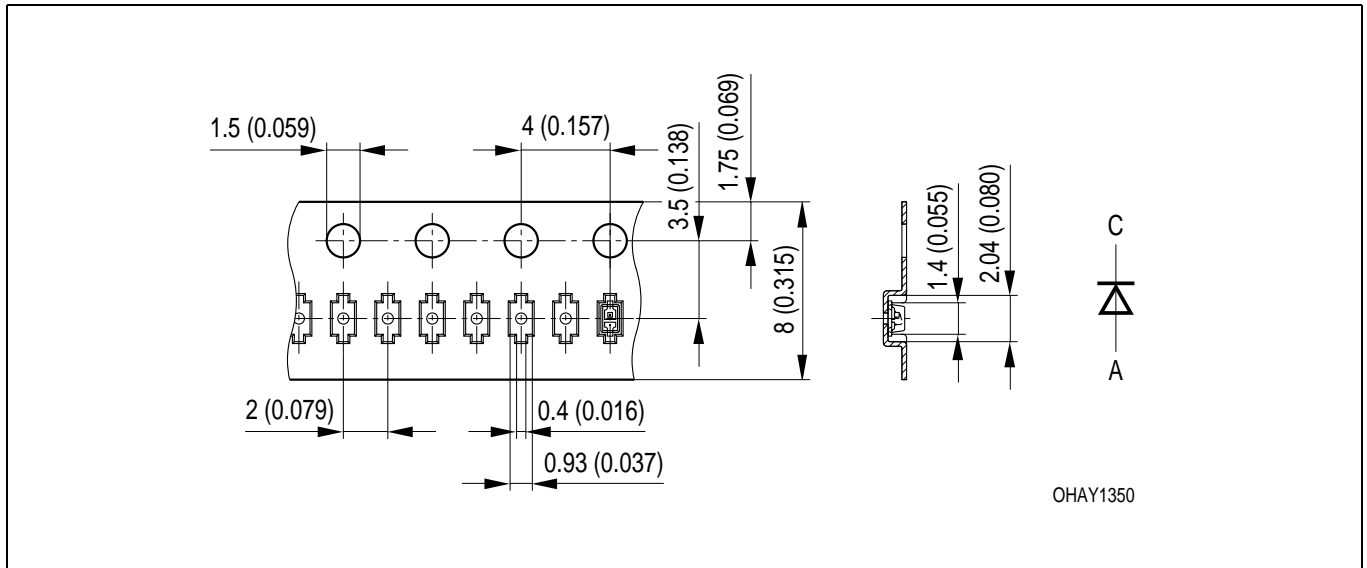
Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).  
 Empfohlene Lötpastendicke: 120 µm / recommended thickness of solder paste: 120 µm  
 Gehäuse für Wellenlötén (TTW) geeignet / Package suitable for TTW-soldering

**Gurtung / Polarität und Lage**

Verpackungseinheit 8 mm Gurt mit 10000/Rolle,  
 ø180 mm oder 40000/Rolle, ø330 mm

**Method of Taping / Polarity and Orientation**

Packing unit 8 mm tape with 10000/reel, ø180 mm  
 or 40000/reel, ø330 mm



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

**Revision History: 2002-05-15**

Previous Version: 2002-04-05

Page	Subjects (major changes since last revision)
13	recommended solder pad
2	color coordinate grouping for white
3	pad size from 16 mm <sup>2</sup> to 5 mm <sup>2</sup>
2	ordering code inserted

**Patent List****Patent No.**

US 6 066 861, US 6 277 301

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