

# Hyper Multi TOPLED Hyper-Bright LED

## LHGB T686



### Vorläufige Daten / Preliminary Data

#### Besondere Merkmale

- **Gehäusetyp:** weißes P-LCC-4 Gehäuse;  
Kontrasterhöhung durch schwarze Oberfläche  
(RGB-Displays)
- **Besonderheit des Bauteils:** additive  
Farbmischung durch unabhängige  
Ansteuerung aller Chips
- **Wellenlänge:** 645 nm (hyper-rot),  
570 nm (grün), 466 nm (blau)
- **Abstrahlwinkel:** Lambertischer Strahler (120°)
- **Technologie:** AlGaAs (hyper-rot), GaP (grün),  
GaN (blau)
- **optischer Wirkungsgrad:** 3 lm/W (hyper-rot),  
2,5 lm/W (grün), 1 lm/W (blau)
- **Gruppierungsparameter:** Lichtstärke
- **Verarbeitungsmethode:** für alle  
SMT-Bestücktechniken geeignet
- **Lötmethode:** IR Reflow Löten und  
Wellenlöten (TTW)
- **Vorbehandlung:** nach JEDEC Level 2
- **Gurtung:** 8 mm Gurt mit 2000/Rolle, ø180 mm  
oder 8000/Rolle, ø330 mm

#### Anwendungen

- Anzeigen im Innenbereich  
(z.B. Laufschriftanzeigen)
- Leuchtdiodenchips getrennt ansteuerbar
- Vollfarbdisplays bzw. RGB-Displays
- Hinterleuchtung (LCD, Schalter, Tasten,  
Displays, Werbebeleuchtung,  
Allgemeinbeleuchtung)
- Einkopplung in Lichtleiter
- Für automobil Anwendungen nicht geeignet

#### Features

- **package:** white P-LCC-4 package;  
higher contrast by a black surface  
(RGB-Displays)
- **feature of the device:** additive mixture of color  
stimuli by independent driving of each chip
- **wavelength:** 645 nm (hyper-red),  
570 nm (green), 466 nm (blue)
- **viewing angle:** Lambertian Emitter (120°)
- **technology:** AlGaAs (hyper-red), GaP (green),  
GaN (blue)
- **optical efficiency:** 3 lm/W (hyper-red),  
2.5 lm/W (green), 1 lm/W (blue)
- **grouping parameter:** luminous intensity
- **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 2000/reel, ø180 mm  
or 8000/reel, ø330 mm

#### Applications

- indoor displays (e.g. light writing displays)
- LED chips can be controlled separately
- full color displays, RGB-Displays
- backlighting (LCD, switches, keys, displays,  
illuminated advertising, general lighting)
- coupling into light guides
- not suitable for automotive applications

Typ	Emissions-farbe	Farbe der Lichtaustritts-fläche	Lichtstärke			Bestell-nummer
Type	Color of Emission	Color of the Light Emitting Area	Luminous Intensity $I_F = 10 \text{ mA}$ $I_V \text{ (mcd)}$			Ordering Code
			hyper-red	green	blue	
LHGB T686	hyper-red	colorless clear	7.1 ...18.0	7.1 ...18.0	7.1 ...18.0	Q62703-Q5771
K+K+K	green	and	7.1 ...11.2	7.1 ...11.2	7.1 ...11.2	
K+K+L	blue	black painted	7.1 ...11.2	7.1 ...11.2	11.2 ...18.0	
K+L+K		package	7.1 ...11.2	11.2 ...18.0	7.1 ...11.2	
K+L+L		surface	7.1 ...11.2	11.2 ...18.0	11.2 ...18.0	
L+K+K			11.2 ...18.0	7.1 ...11.2	7.1 ...11.2	
L+K+L			11.2 ...18.0	7.1 ...11.2	11.2 ...18.0	
L+L+K			11.2 ...18.0	11.2 ...18.0	7.1 ...11.2	
L+L+L			11.2 ...18.0	11.2 ...18.0	11.2 ...18.0	

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  $\pm 11 \%$ .

*Anm.: Die Standardlieferform von Serientypen beinhaltet eine Familiengruppe. Einzelne Gruppen sind nicht erhältlich.*

*In einer Verpackungseinheit / Gurt ist immer nur eine Gruppe pro Farbe enthalten.*

*Note: The standard shipping format for serial types includes a family group. Individual groups are not available.*

*No packing unit / tape ever contains more than one luminous intensity group per color.*

**Grenzwerte**  
**Maximum Ratings**

Bezeichnung Parameter	Symbol Symbol	Werte Values			Einheit Unit
		LH	LG	LB	
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	$I_F$	30	30	20	mA
Stoßstrom Surge current $t_p = 10 \mu s, D = 0.005$	$I_{FM}$	0.5	0.5	0.2	A
Sperrspannung Reverse voltage	$V_R$	3	5	5	V
Leistungsaufnahme Power consumption	$P_{tot}$	90	95	90	mW
Wärmewiderstand Thermal resistance					
Sperrschicht / Umgebung Junction / ambient	1 chip on $R_{th JA}$ 3 chips on $R_{th JA}$	480 680	480 770	580 820	K/W K/W
Sperrschicht / Lötpad Junction / solder point	1 chip on $R_{th JS}$ 3 chips on $R_{th JS}$	260 370	260 420	360 510	K/W K/W
Montage auf PC-Board FR 4 (Padgröße $\geq 16 \text{ mm}^2$ ) mounted on PC board FR 4 (pad size $\geq 16 \text{ mm}^2$ )					

**Kennwerte** ( $T_A = 25^\circ\text{C}$ )**Characteristics**

Bezeichnung Parameter	Symbol Symbol	Werte Values			Einheit Unit
		LH	LG	LB	
Wellenlänge des emittierten Lichtes (typ.) Wavelength at peak emission $I_F = 10\text{ mA}$	$\lambda_{\text{peak}}$	660	572	428	nm
Dominantwellenlänge <sup>1)</sup> Dominant wavelength $I_F = 10\text{ mA}$	$\lambda_{\text{dom}}$	645 $\pm 9$	570 $\pm 6$	466 $\pm 3$	nm
Spektrale Bandbreite bei 50 % $I_{\text{rel max}}$ Spectral bandwidth at 50 % $I_{\text{rel max}}$ $I_F = 10\text{ mA}$	$\Delta\lambda$	22	25	60	nm
Abstrahlwinkel bei 50 % $I_V$ (Vollwinkel) Viewing angle at 50 % $I_V$	$2\phi$	120	120	120	Grad deg.
Durchlassspannung <sup>2)</sup> Forward voltage $I_F = 10\text{ mA}$	$V_F$ (max.) $V_F$	1.75 2.5	2.0 2.5	3.5 4.1	V V
Sperrstrom (typ.) Reverse current (max.) $V_R = 5\text{ V}$	$I_R$ $I_R$	0.01 10	0.01 10	0.01 10	$\mu\text{A}$ $\mu\text{A}$
Temperaturkoeffizient von $\lambda_{\text{peak}}$ Temperature coefficient of $\lambda_{\text{peak}}$ $I_F = 10\text{ mA}; -10^\circ\text{C} \leq T \leq 100^\circ\text{C}$	$TC_{\lambda_{\text{peak}}}$	0.28	0.11	0.004	nm/K
Temperaturkoeffizient von $\lambda_{\text{dom}}$ Temperature coefficient of $\lambda_{\text{dom}}$ $I_F = 10\text{ mA}; -10^\circ\text{C} \leq T \leq 100^\circ\text{C}$	$TC_{\lambda_{\text{dom}}}$	0.05	0.07	0.03	nm/K
Temperaturkoeffizient von $V_F$ Temperature coefficient of $V_F$ $I_F = 10\text{ mA}; -10^\circ\text{C} \leq T \leq 100^\circ\text{C}$	$TC_V$	- 2.5	- 1.4	- 3.1	mV/K
Optischer Wirkungsgrad (typ.) Optical efficiency $I_F = 10\text{ mA}$	$\eta_{\text{opt}}$	3	2.5	1	lm/W

<sup>1)</sup> Wellenlängen werden mit einer Stromeinprägedauer von 25 ms und einer Genauigkeit von  $\pm 1\text{ nm}$  ermittelt.  
Wavelengths are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 1\text{ nm}$ .

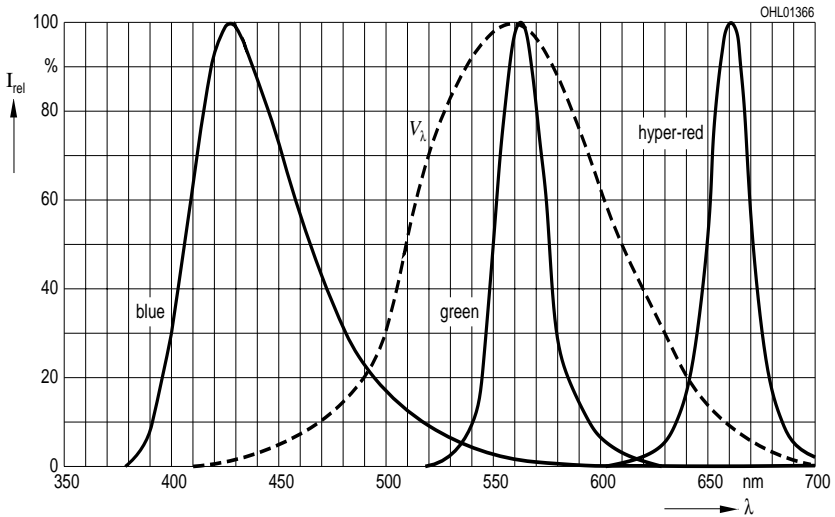
<sup>2)</sup> Spannungswerte werden mit einer Stromeinprägedauer von 1 ms und einer Genauigkeit von  $\pm 0.1\text{ V}$  ermittelt.  
Voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ .

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

**Relative Spectral Emission**

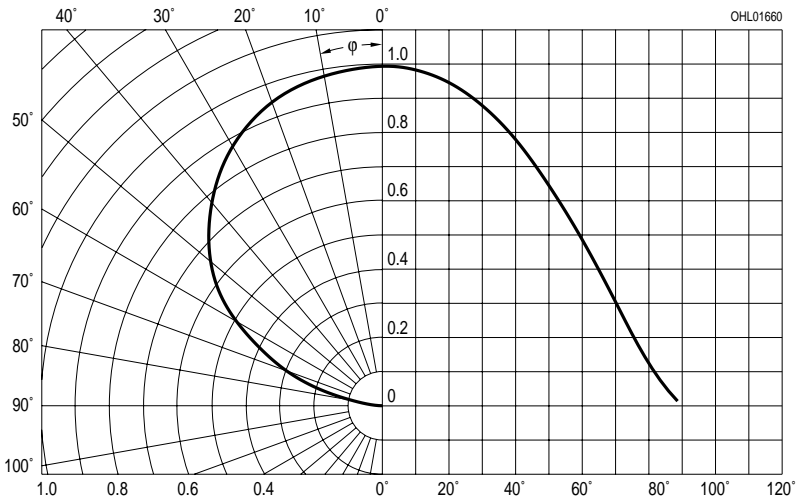
$V(\lambda)$  = spektrale Augenempfindlichkeit

Standard eye response curve



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

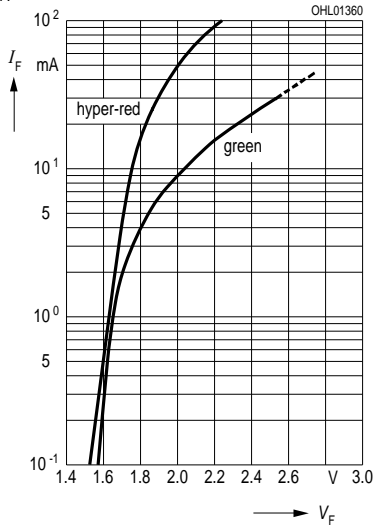
**Radiation Characteristic**



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

**Forward Current**

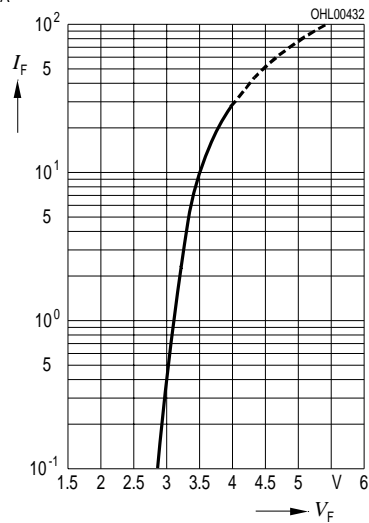
$T_A = 25^\circ\text{C}$



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

**Forward Current**

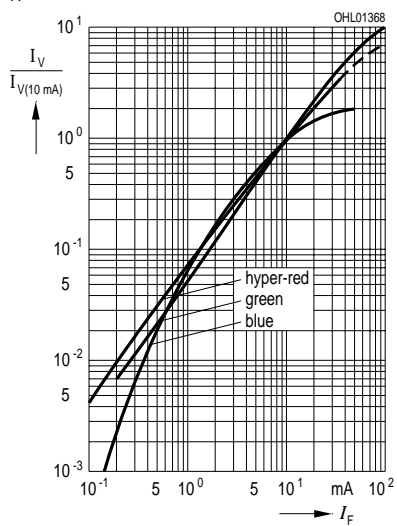
$T_A = 25^\circ\text{C}$ , blue



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

**Relative Luminous Intensity**

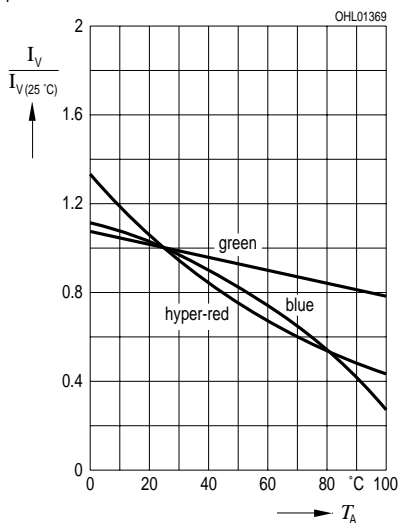
$T_A = 25^\circ\text{C}$



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

**Relative Luminous Intensity**

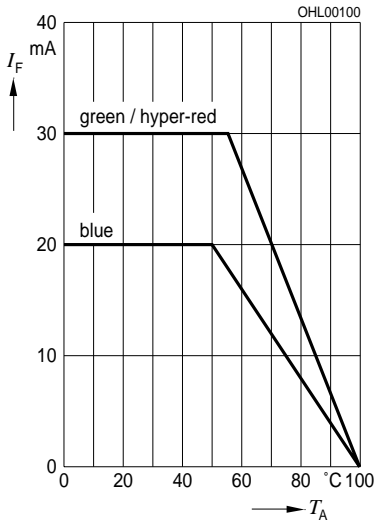
$I_F = 10\text{ mA}$



**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**

**Max. Permissible Forward Current**

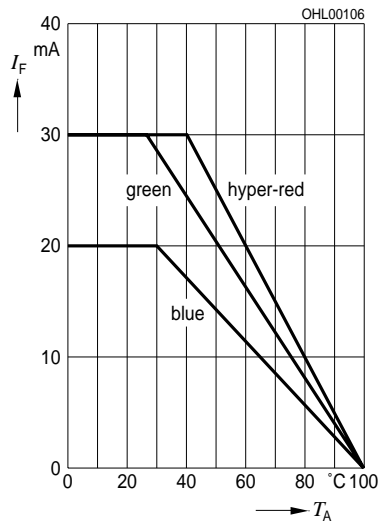
1 chip on



**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**

**Max. Permissible Forward Current**

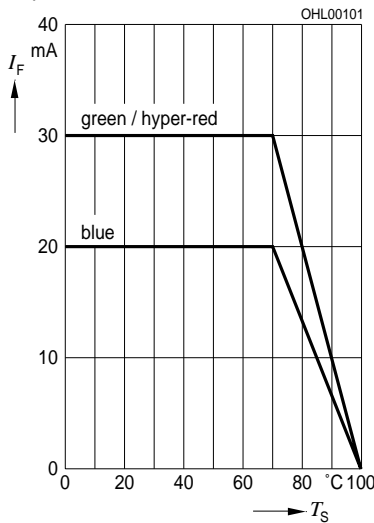
3 chips on



**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**

**Max. Permissible Forward Current**

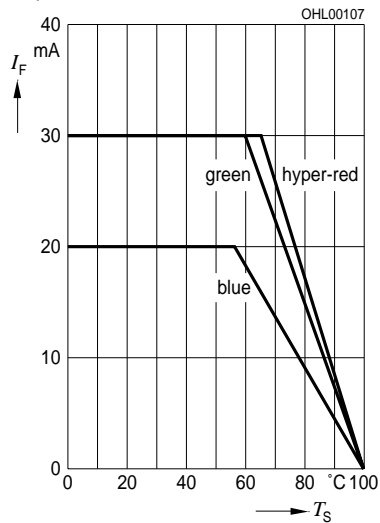
1 chip on



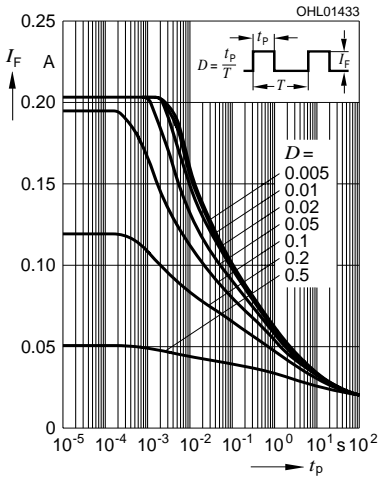
**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**

**Max. Permissible Forward Current**

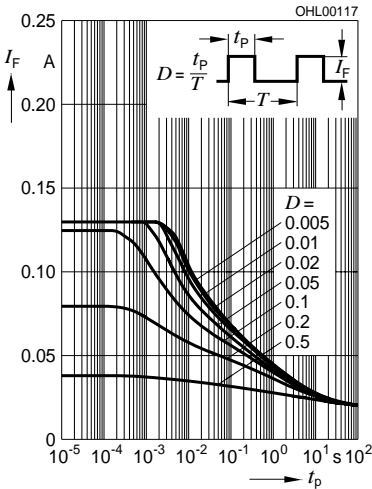
3 chips on



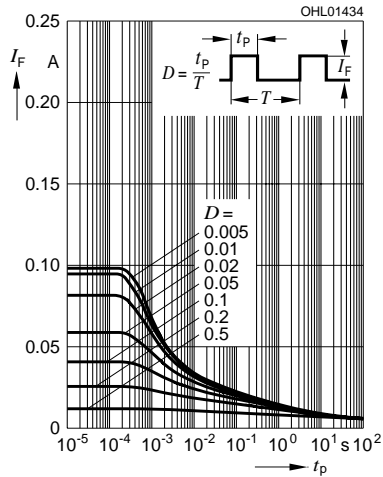
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$   
**blue (1 Chip on)**



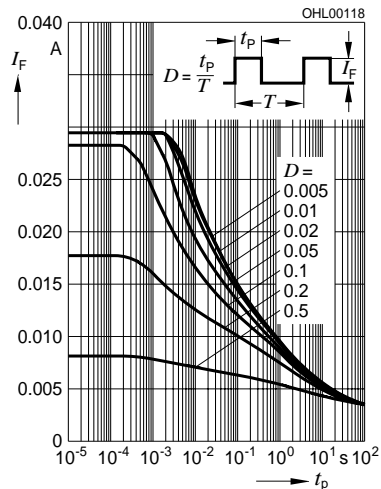
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$   
**blue (3 Chips on)**



**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 85\text{ °C}$   
**blue (1 Chip on)**

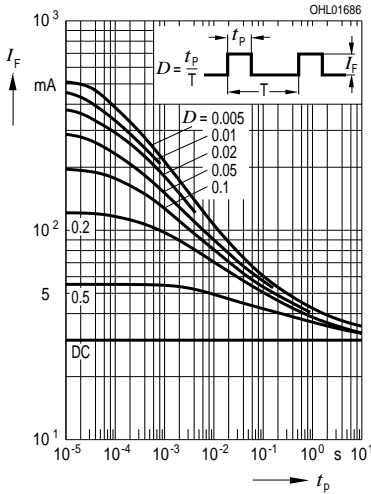


**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 85\text{ °C}$   
**blue (3 Chips on)**

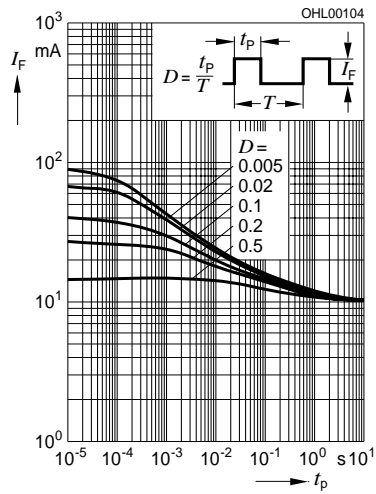




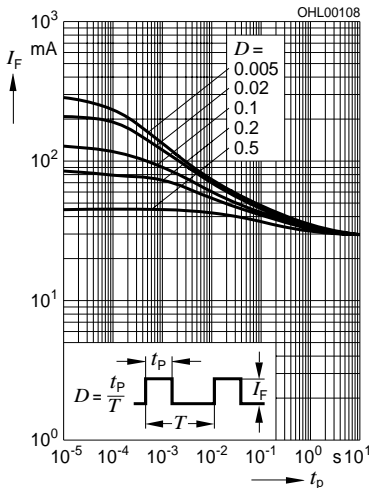
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$   
**green/hyper-red (1 Chip on)**



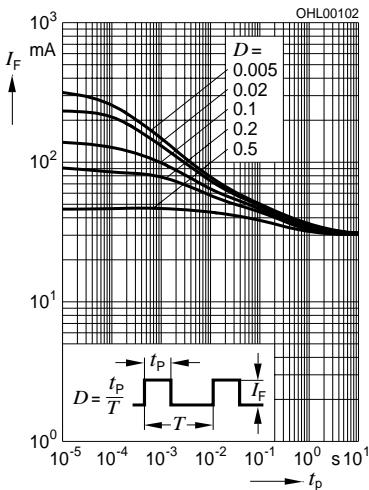
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 85\text{ °C}$   
**green/hyper-red (1 Chip on)**



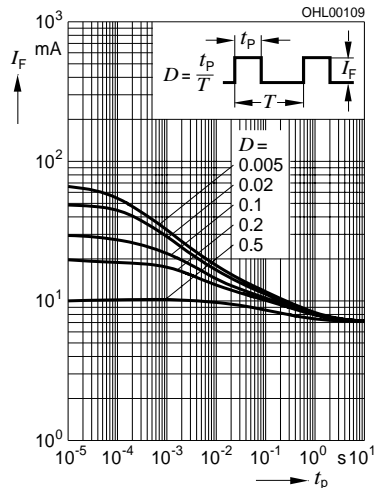
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$   
**green (3 Chips on)**



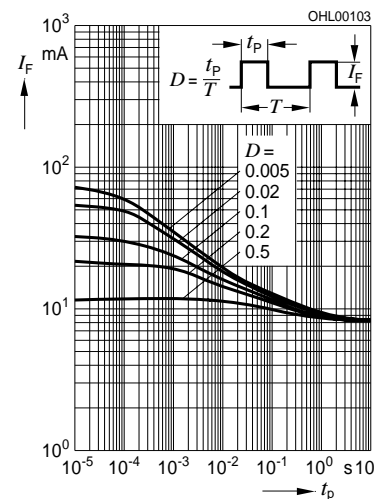
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$   
**hyper-red (3 Chips on)**

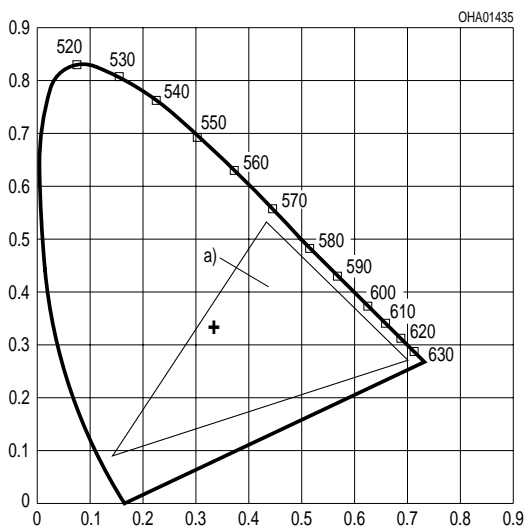


**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 85\text{ °C}$   
**green (3 Chips on)**



**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
Duty cycle  $D =$  parameter,  $T_A = 85\text{ °C}$   
**hyper-red (3 Chips on)**





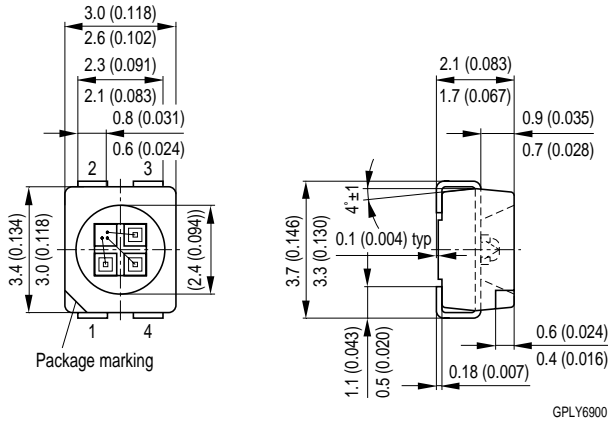
Die Farbkoordinaten des Mischlichtes können innerhalb des mit a) gekennzeichneten Bereichs des Farbdreiecks erwartet werden.

Der Unbuntpunkt ( $x = 0,33$ ,  $y = 0,33$ ) ist mit „+“ gekennzeichnet.

The color coordinates of the mixed light can be expected within the area of the color triangle marked a).

The achromatic point ( $x = 0,33$ ,  $y = 0,33$ ) is marked “+”.

**Maßzeichnung  
Package Outlines**



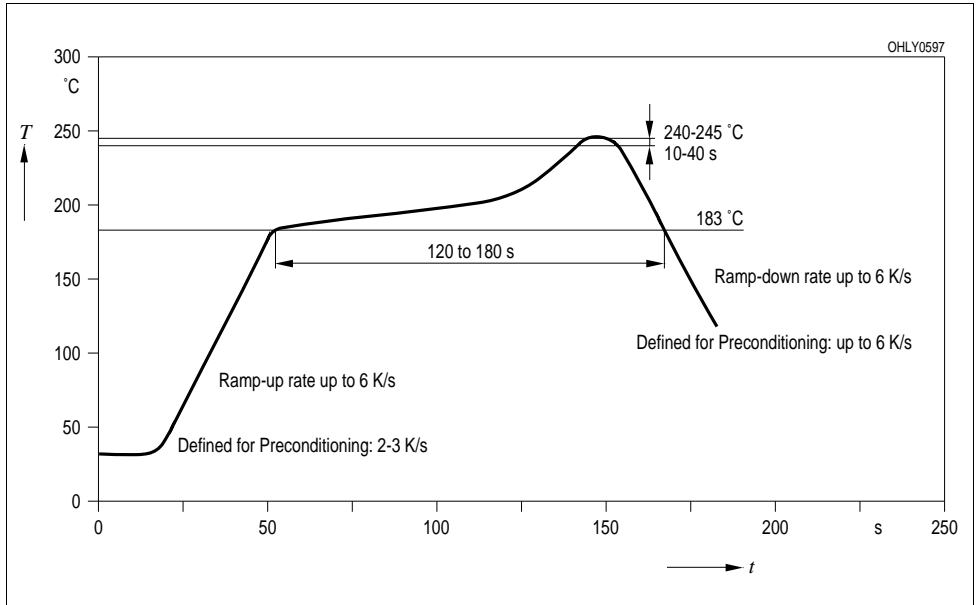
1	Cathode	Hyper-red(H)
2	Anode	H, G, B
3	Cathode	Blue (B)
4	Cathode	Green (G)

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

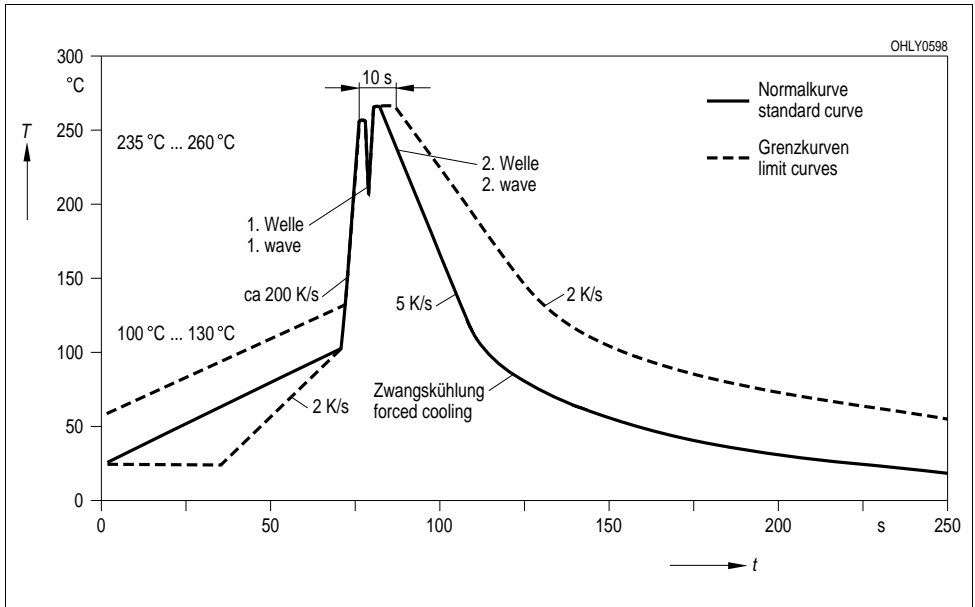
**Gewicht / Approx. weight:** 34 mg

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

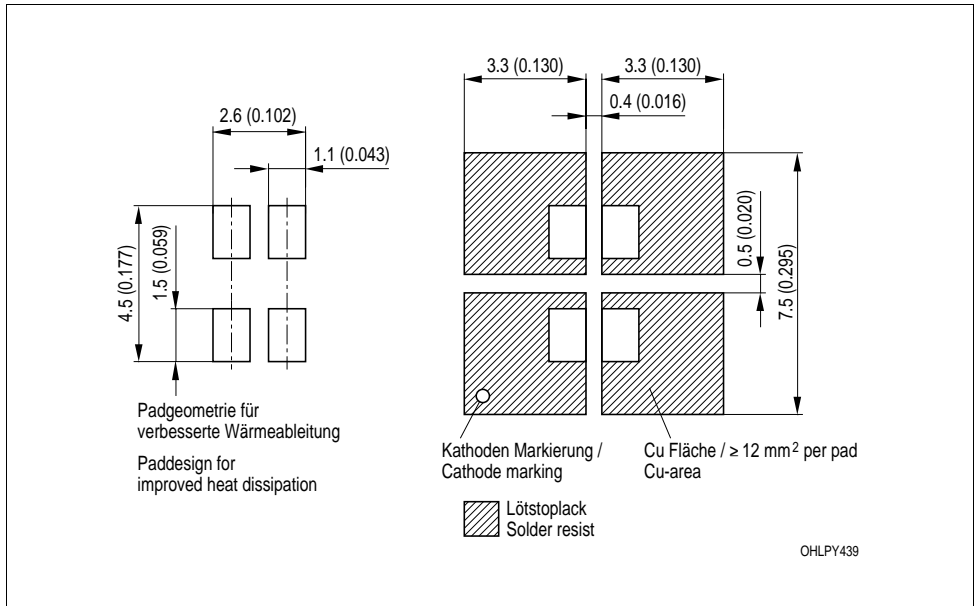
**IR-Reflow Lötprofil** (nach IPC 9501)  
**IR Reflow Soldering Profile** (acc. to IPC 9501)



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



**Empfohlenes Lötpaddesign** IR Reflow Löten  
**Recommended Solder Pad** IR Reflow Soldering

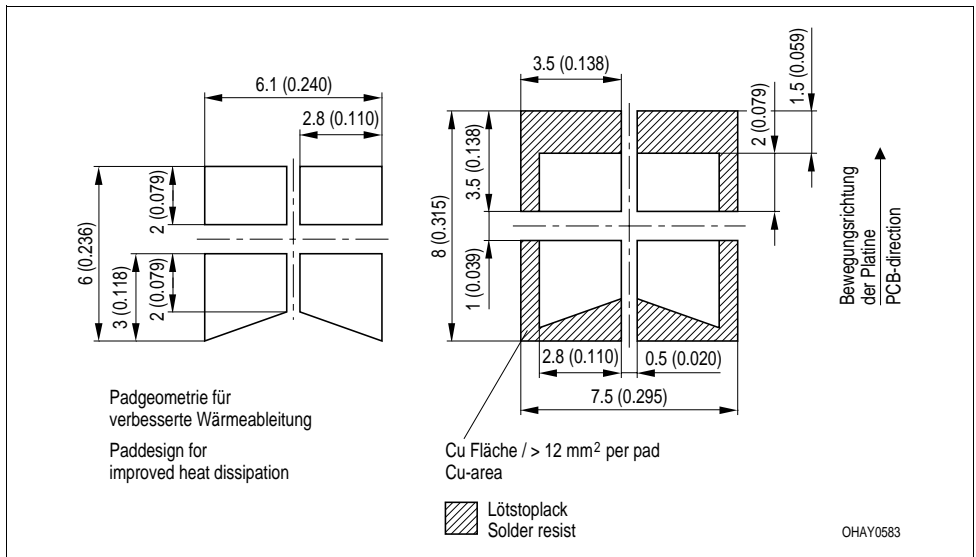


Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

## Empfohlenes Lötpad design Recommended Solder Pad

## Wellenlötén (TTW)

### TTW Soldering



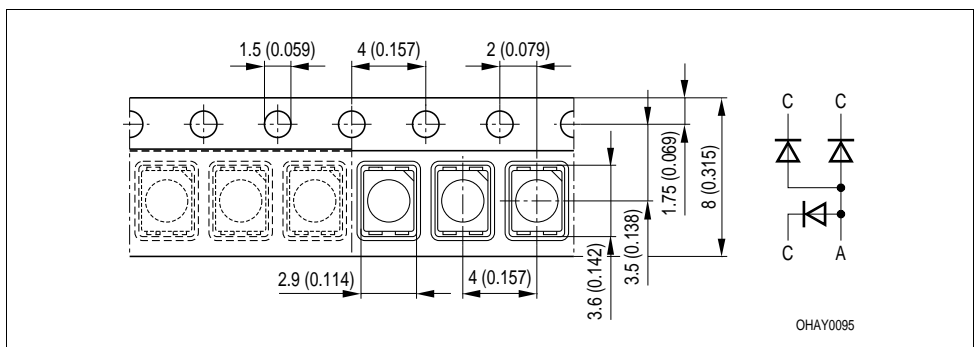
Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

### Gurtung / Polarität und Lage

Verpackungseinheit 2000/Rolle, ø180 mm  
oder 8000/Rolle, ø330 mm

### Method of Taping / Polarity and Orientation

Packing unit 2000/reel,  $\varnothing 180$  mm  
or 8000/reel,  $\varnothing 330$  mm



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



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**Revision History: 2001-07-06**

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Previous Version: 2001-05-21

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Page	Subjects (major changes since last revision)
4	Durchlassspannung / Forward voltage (typ.)

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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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<sup>1</sup> A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

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