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# Power TOPLED® with Lens Enhanced optical Power LED (HOP2000)

LA E65B, LO E65B, LY E65B



## Vorläufige Daten / Preliminary Data

### Besondere Merkmale

- **Gehäusetyyp:** weißes P-LCC-4-Gehäuse
- **Besonderheit des Bauteils:** fokussierte Abstrahlung in SMT-Technologie; hohe Helligkeit in Achsrichtung
- **Wellenlänge:** 617 nm (amber), 606 nm (orange), 587 nm (gelb)
- **Abstrahlwinkel:** 60°
- **Technologie:** InGaAIP
- **optischer Wirkungsgrad:** 24 lm/W
- **Gruppierungsparameter:** Lichtstärke, Durchflussspannung, Wellenlänge
- **Verarbeitungsmethode:** für alle SMT-Bestücktechniken geeignet
- **Lötmethode:** IR Reflow Löten und Wellenlöten (TTW)
- **Vorbehandlung:** nach JEDEC Level 2
- **Gurtung:** 12-mm Gurt mit 2000/Rolle, ø330 mm
- **ESD-Festigkeit:** ESD-sicher bis 2 kV nach EOS/ESD-5.1-1993

### Anwendungen

- Ampelanwendung
- Hinterleuchtung (LCD, Schalter, Tasten, Displays, Werbebeleuchtung)
- Innen- und Außenbeleuchtung im Automobilbereich (z.B. Instrumentenbeleuchtung, Blinker, Bremslichter, seitl. Begrenzungsleuchten)
- Ersatz von Kleinst-Glühlampen
- Markierungsbeleuchtung (z.B. Stufen, Fluchtwege, u.ä.)
- Signal- und Symbolleuchten

### Features

- **package:** white P-LCC-4 package
- **feature of the device:** focussed radiation in SMT technology; high brightness in beam direction
- **wavelength:** 617 nm (amber), 606 nm (orange), 587 nm (yellow)
- **viewing angle:** 60°
- **technology:** InGaAIP
- **optical efficiency:** 24 lm/W
- **grouping parameter:** luminous intensity, forward voltage, wavelength
- **assembly methods:** suitable for all SMT assembly methods
- **soldering methods:** IR reflow soldering and TTW soldering
- **preconditioning:** acc. to JEDEC Level 2
- **taping:** 12-mm tape with 2000/reel, ø330 mm
- **ESD-withstand voltage:** up to 2 kV acc. to EOS/ESD-5.1-1993

### Applications

- traffic lights
- backlighting (LCD, switches, keys, displays, illuminated advertising)
- interior and exterior automotive lighting (e.g. dashboard backlighting, turn signal lamps, brake lights, sidemarkers)
- substitution of micro incandescent lamps
- marker lights (e.g. steps, exit ways, etc.)
- signal and symbol luminaire

Typ	Emissionsfarbe	Farbe der Lichtaustrittsfläche	Lichtstärke	Lichtstrom	Bestellnummer
Type	Color of Emission	Color of the Light Emitting Area	Luminous Intensity $I_F = 50 \text{ mA}$ $I_V \text{ (mcd)}$	Luminous Flux $I_F = 50 \text{ mA}$ $\Phi_V \text{ (mlm)}$	Ordering Code
LA E65B-ABCA-24-1	amber	colorless clear	1400 ... 3550	2900 (typ.)	Q62703Q5982
LO E65B-ABCA-24-1	orange	colorless clear	1400 ... 3550	2900 (typ.)	on request
LY E65B-ABCA-26-1	yellow	colorless clear	1400 ... 3550	2900 (typ.)	Q62703Q6000

Anm.: -24-1 gesamter Farbbereich, Lieferung in Einzelgruppen (siehe **Seite 5**)  
 -26-1 gesamter Farbbereich, Lieferung in Einzelgruppen (siehe **Seite 5**)  
 -24-1 gesamter Durchlassspannungsbereich, Lieferung in Einzelgruppen (siehe **Seite 5**)  
 -26-1 gesamter Durchlassspannungsbereich, Lieferung in Einzelgruppen (siehe **Seite 5**)

Die Standardlieferform von Serientypen beinhaltet eine Familiengruppe, die aus nur 4 Halbgruppen besteht. Einzelne Halbgruppen sind nicht erhältlich.  
 In einer Verpackungseinheit / Gurt ist immer nur eine Halbgruppe enthalten.  
 Dimmverhältnis im Gleichstrom-Betrieb max. 5:1

Note: -24-1 Total color tolerance range, delivery in single groups (please see **page 5**)  
 -26-1 Total color tolerance range, delivery in single groups (please see **page 5**)  
 -24-1 Total forward voltage tolerance, delivery in single groups (see **page 5**)  
 -26-1 Total forward voltage tolerance, delivery in single groups (see **page 5**)

The standard shipping format for serial types includes a group of only 4 individual groups. Individual half groups are not available.  
 No packing unit / tape ever contains more than one luminous intensity half group.  
 Dimming range for direct current mode max. 5:1

**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	$T_j$	+ 125	°C
Durchlassstrom Forward current	$I_F$	70	mA
Stoßstrom Surge current $t \leq 10 \mu s, D = 0.1$	$I_{FM}$	0.1	A
Sperrspannung <sup>1)</sup> Reverse voltage	$V_R$	12	V
Leistungsaufnahme Power consumption $T_A \leq 25 \text{ °C}$	$P_{tot}$	180	mW
Wärmewiderstand Thermal resistance Sperrschicht/Umgebung Junction/ambient	$R_{th JA}$	300	K/W
Sperrschicht/Löt­pad Junction/soldering point Montage auf PC-Board FR 4 (Padgröße $\geq 16 \text{ mm}^2$ ) mounted on PC board FR 4 (pad size $\geq 16 \text{ mm}^2$ )	$R_{th JS}$	130	K/W

<sup>1)</sup> für kurzzeitigen Betrieb geeignet / suitable for short term application

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

Bezeichnung Parameter	Symbol Symbol	Werte Values			Einheit Unit
		LA	LO	LY	
Wellenlänge des emittierten Lichtes (typ.) Wavelength at peak emission $I_F = 50\text{ mA}$	$\lambda_{\text{peak}}$	624	610	594	nm
Dominantwellenlänge <sup>1)</sup> (typ.) Dominant wavelength $I_F = 50\text{ mA}$	$\lambda_{\text{dom}}$	617 -5/+7	606 -6/+3	587 -7/+8	nm
Spektrale Bandbreite bei 50 % $I_{\text{rel max}}$ (typ.) Spectral bandwidth at 50 % $I_{\text{rel max}}$ $I_F = 50\text{ mA}$	$\Delta\lambda$	18	16	15	nm
Abstrahlwinkel bei 50 % $I_V$ (Vollwinkel) (typ.) Viewing angle at 50 % $I_V$	$2\phi$	60	60	60	Grad deg.
Durchlassspannung <sup>2)</sup> (min.) Forward voltage (typ.) $I_F = 50\text{ mA}$ (max.)	$V_F$ <sup>2)</sup>	1.9 <sup>4)</sup>	1.9	1.9 <sup>3)</sup>	V
	$V_F$	2.2	2.2	2.2	V
	$V_F$	2.5	2.5	2.5	V
Sperrstrom (typ.) Reverse current (max.) $V_R = 12\text{ V}$	$I_R$	0.01	0.01	0.01	$\mu\text{A}$
	$I_R$	10	10	10	$\mu\text{A}$
Temperaturkoeffizient von $\lambda_{\text{peak}}$ (typ.) Temperature coefficient of $\lambda_{\text{peak}}$ $I_F = 50\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_{\lambda_{\text{peak}}}$	0.15	0.14	0.13	nm/K
Temperaturkoeffizient von $\lambda_{\text{dom}}$ (typ.) Temperature coefficient of $\lambda_{\text{dom}}$ $I_F = 50\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_{\lambda_{\text{dom}}}$	0.07	0.08	0.10	nm/K
Temperaturkoeffizient von $V_F$ (typ.) Temperature coefficient of $V_F$ $I_F = 50\text{ mA}; -10\text{ °C} \leq T \leq 100\text{ °C}$	$TC_V$	- 3.7	- 3.7	- 3.7	mV/K
Optischer Wirkungsgrad (typ.) Optical efficiency $I_F = 50\text{ mA}$	$\eta_{\text{opt}}$	24	24	24	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> Durchlassspannungsgruppen werden mit einer Stromeinprägedauer von 1 ms und einer Genauigkeit von  $\pm 0,05\text{ V}$  ermittelt.  
Forward voltage groups are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.05\text{ V}$ .

1) Wellenlängengruppen  
Wavelength groups

Gruppe Group	amber		orange		yellow		Einheit Unit
	min.	max.	min.	max.	min.	max.	
2	612	616	600	603	580	583	nm
3	616	620	603	606	583	586	nm
4	620	624	606	609	586	589	nm
5					589	592	nm
6					592	595	nm

3) Durchlassspannungsgruppen für  
orange und gelb  
Forward voltage groups for orange and yellow

Gruppe Group	Durchlassspannung Forward voltage		Einheit Unit
	min.	max.	
3	1.9	2.2	V
4	2.2	2.5	V

4) Durchlassspannungsgruppen für amber  
Forward voltage groups for amber

Gruppe Group	Durchlassspannung Forward voltage		Einheit Unit
	min.	max.	
3A	1.90	2.05	V
3B	2.05	2.20	V
4A	2.20	2.35	V
4B	2.35	2.50	V

Helligkeits-Gruppierungsschema  
Luminous Intensity Groups

Lichtgruppe Luminous Intensity Group	Lichtstärke Luminous Intensity $I_V$ (mcd)	Lichtstrom Luminous Flux $\Phi_V$ (mlm)
AB	1400 ... 1800	1900 (typ.)
BA	1800 ... 2240	2400 (typ.)
BB	2240 ... 2800	3000 (typ.)
CA	2800 ... 3550	3700 (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: BB-2-3A  
Example: BB-2-3A

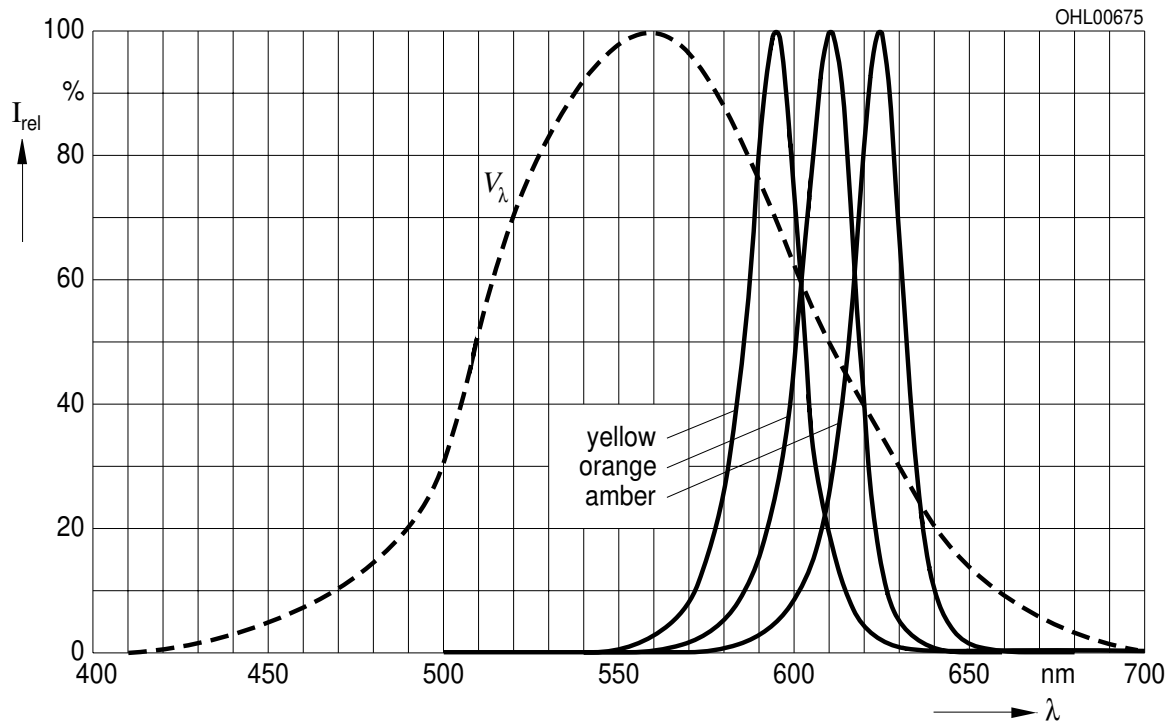
Lichtgruppe Luminous Intensity Group	Halbgruppe Half Group	Wellenlänge Wavelength	Durchlassspannung Forward Voltage
B	B	2	3A

Relative spektrale Emission  $I_{rel} = f(\lambda)$ ,  $T_A = 25\text{ °C}$ ,  $I_F = 50\text{ mA}$

**Relative Spectral Emission**

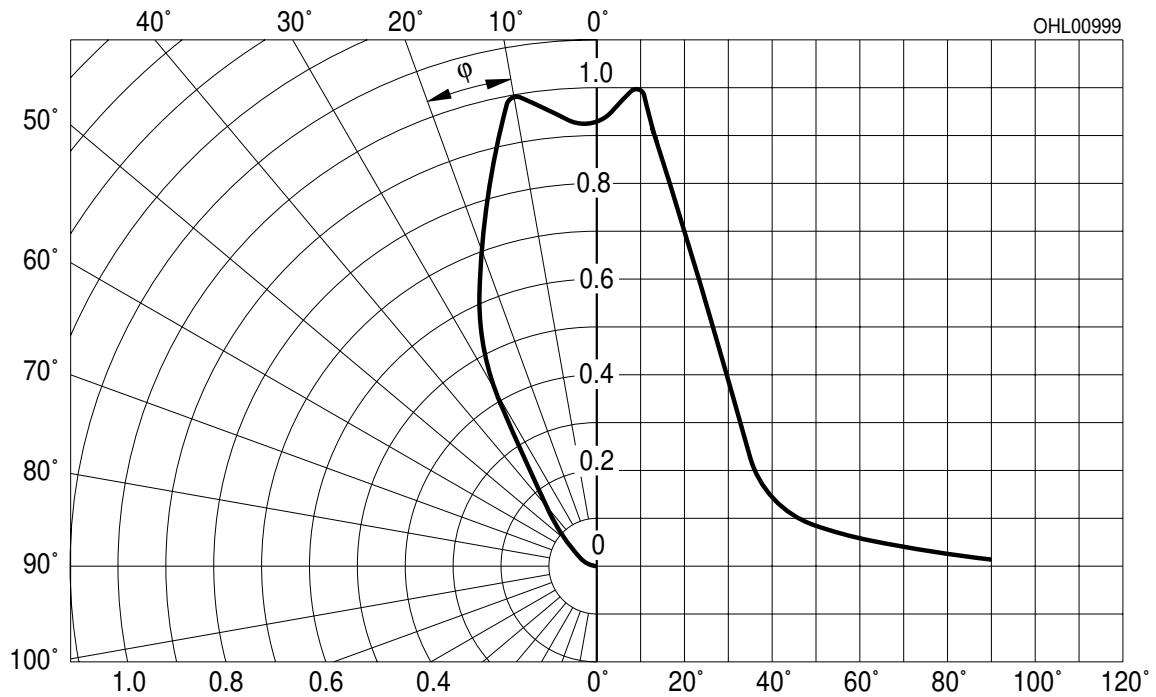
$V(\lambda)$  = spektrale Augenempfindlichkeit

Standard eye response curve



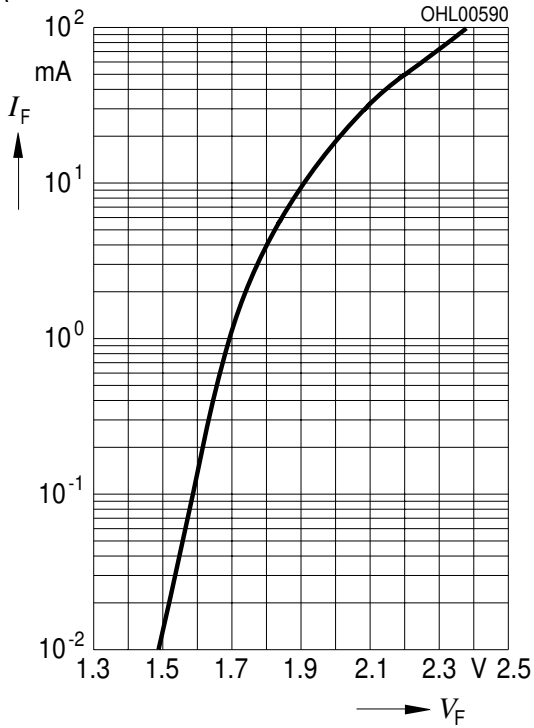
Abstrahlcharakteristik  $I_{rel} = f(\varphi)$

**Radiation Characteristic**



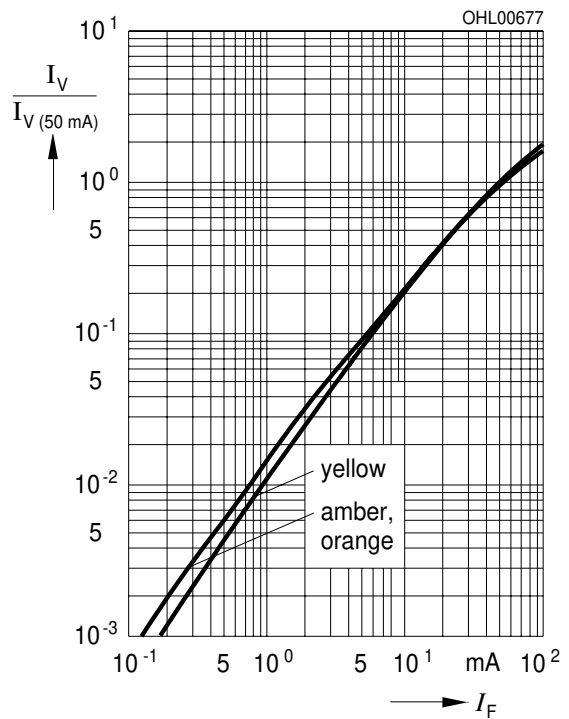
**Durchlassstrom  $I_F = f(V_F)$**   
**Forward Current**

$T_A = 25\text{ °C}$

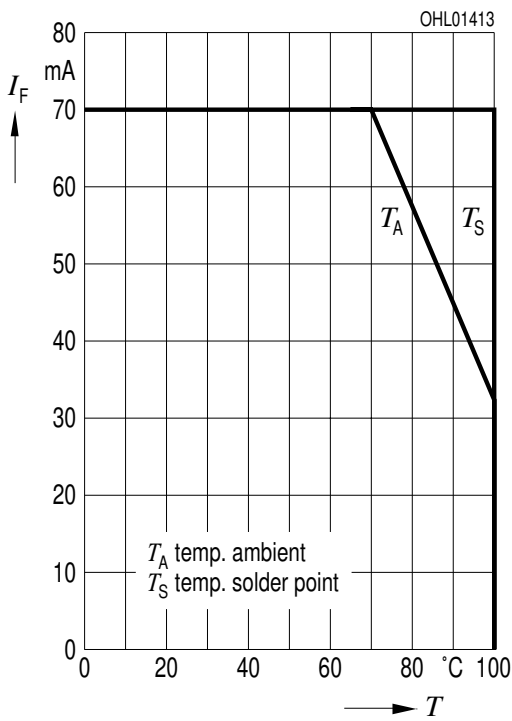


**Relative Lichtstärke  $I_V/I_{V(50\text{ mA})} = f(I_F)$**   
**Relative Luminous Intensity**

$T_A = 25\text{ °C}$

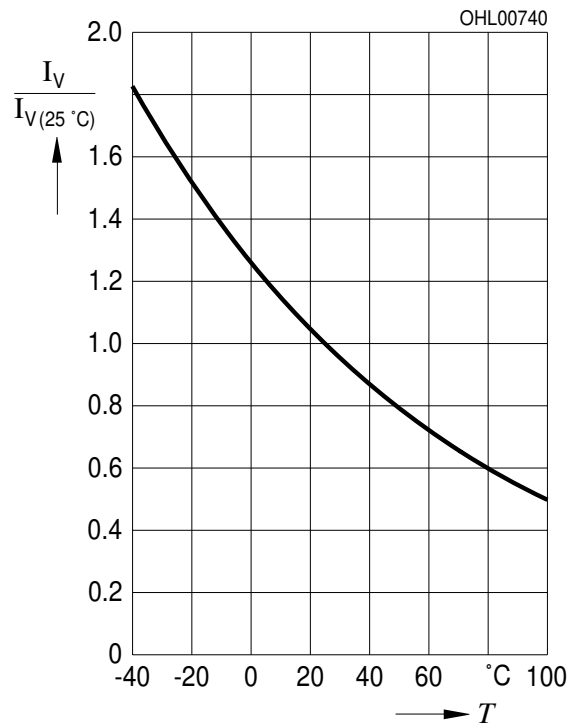


**Maximal zulässiger Durchlassstrom  $I_F = f(T)$**   
**Max. Permissible Forward Current**



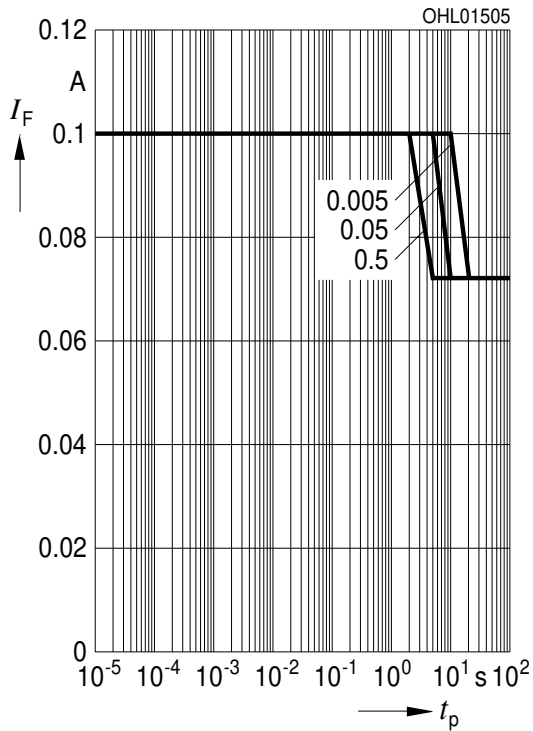
**Relative Lichtstärke  $I_V/I_{V(25\text{ °C})} = f(T_A)$**   
**Relative Luminous Intensity**

$I_F = 50\text{ mA}$

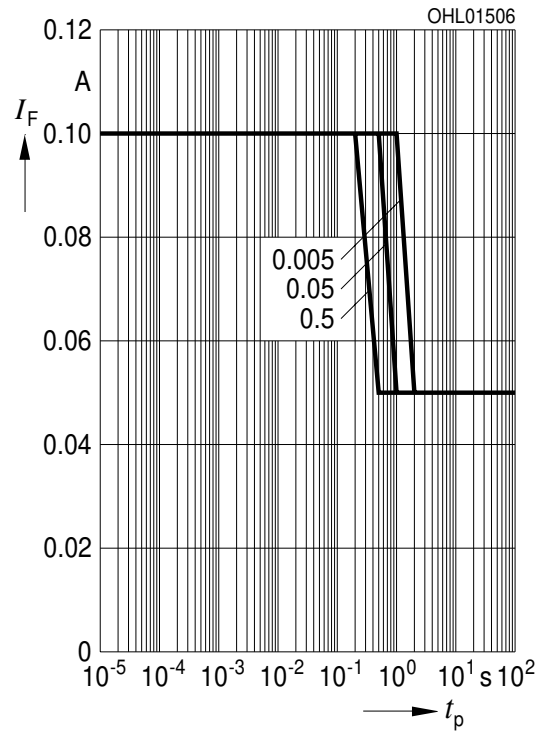




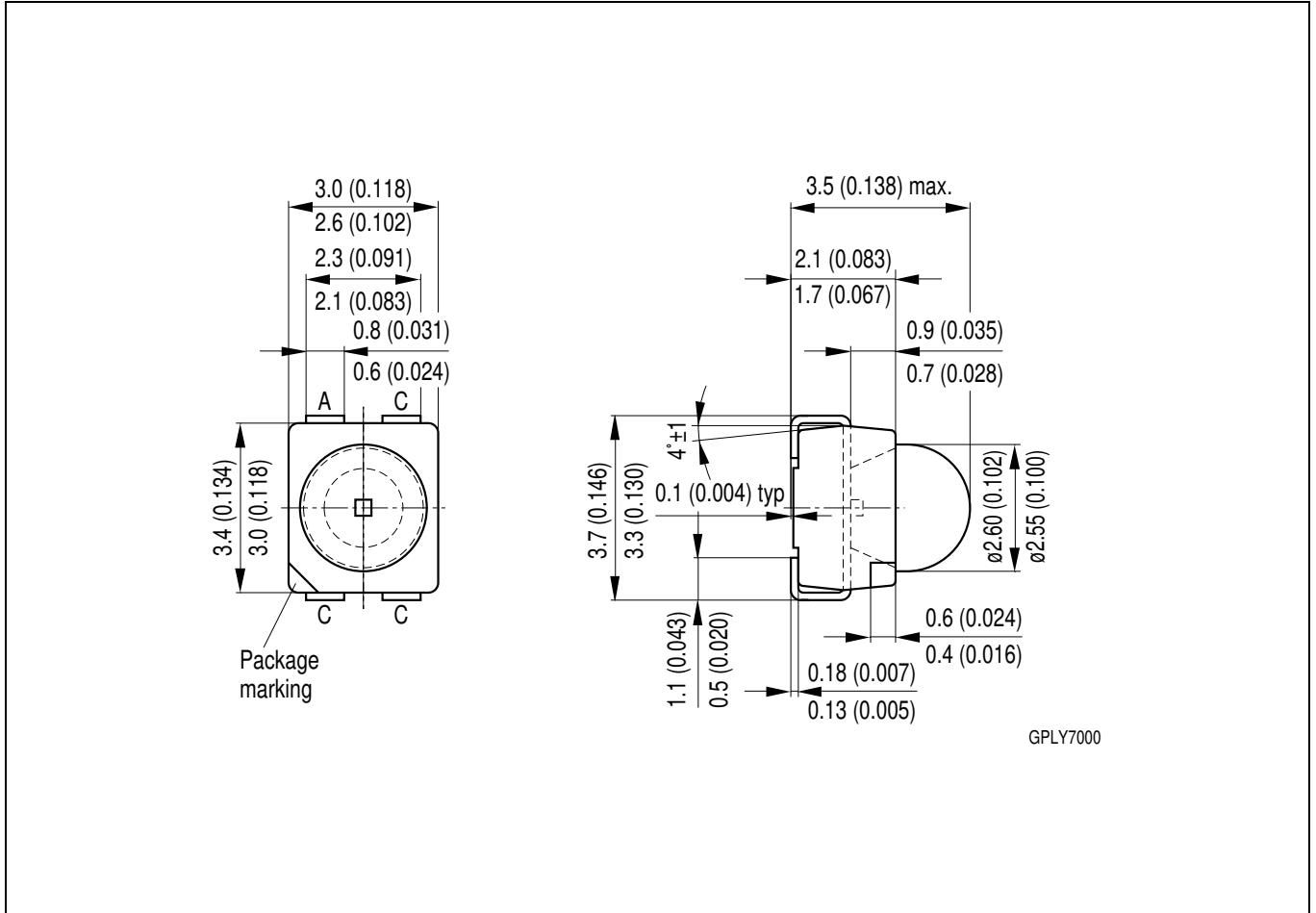
**Zulässige Impulsbelastbarkeit  $I_F = f(t_p)$**   
**Permissible Pulse Handling Capability**  
 Duty cycle  $D =$  parameter,  $T_A = 25\text{ °C}$



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



Maßzeichnung  
Package Outlines

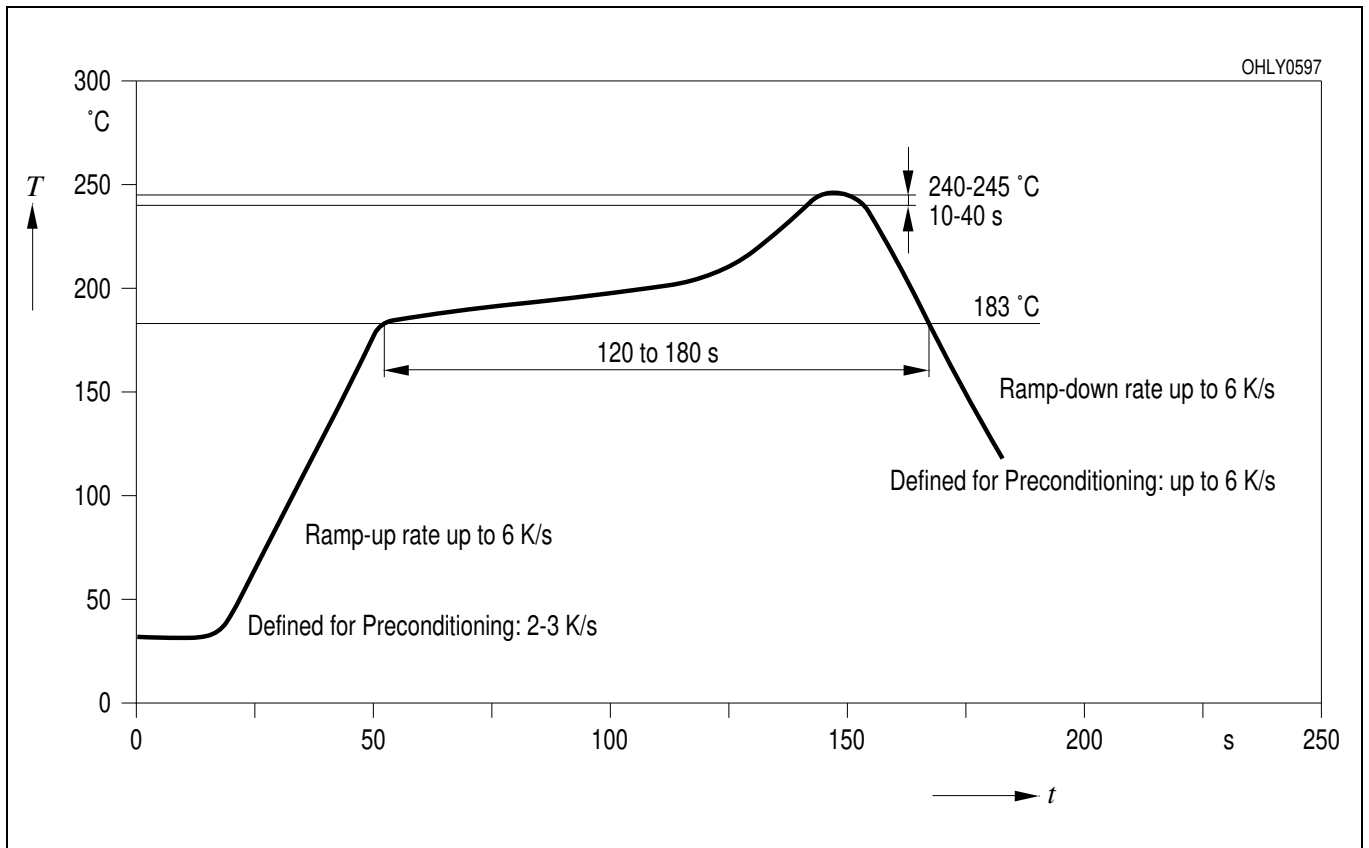


Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

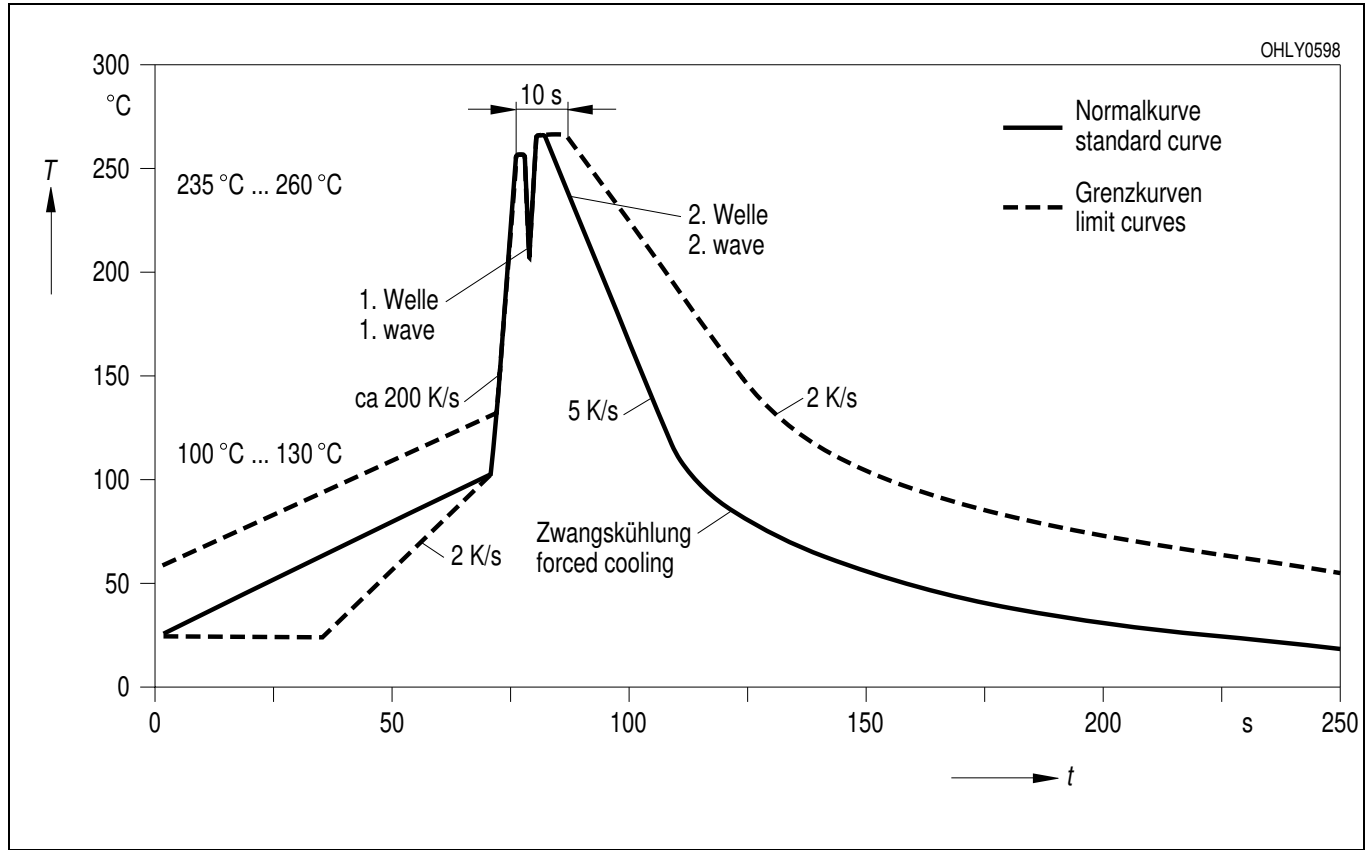
**Gewicht / Approx. weight:** 38 mg

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

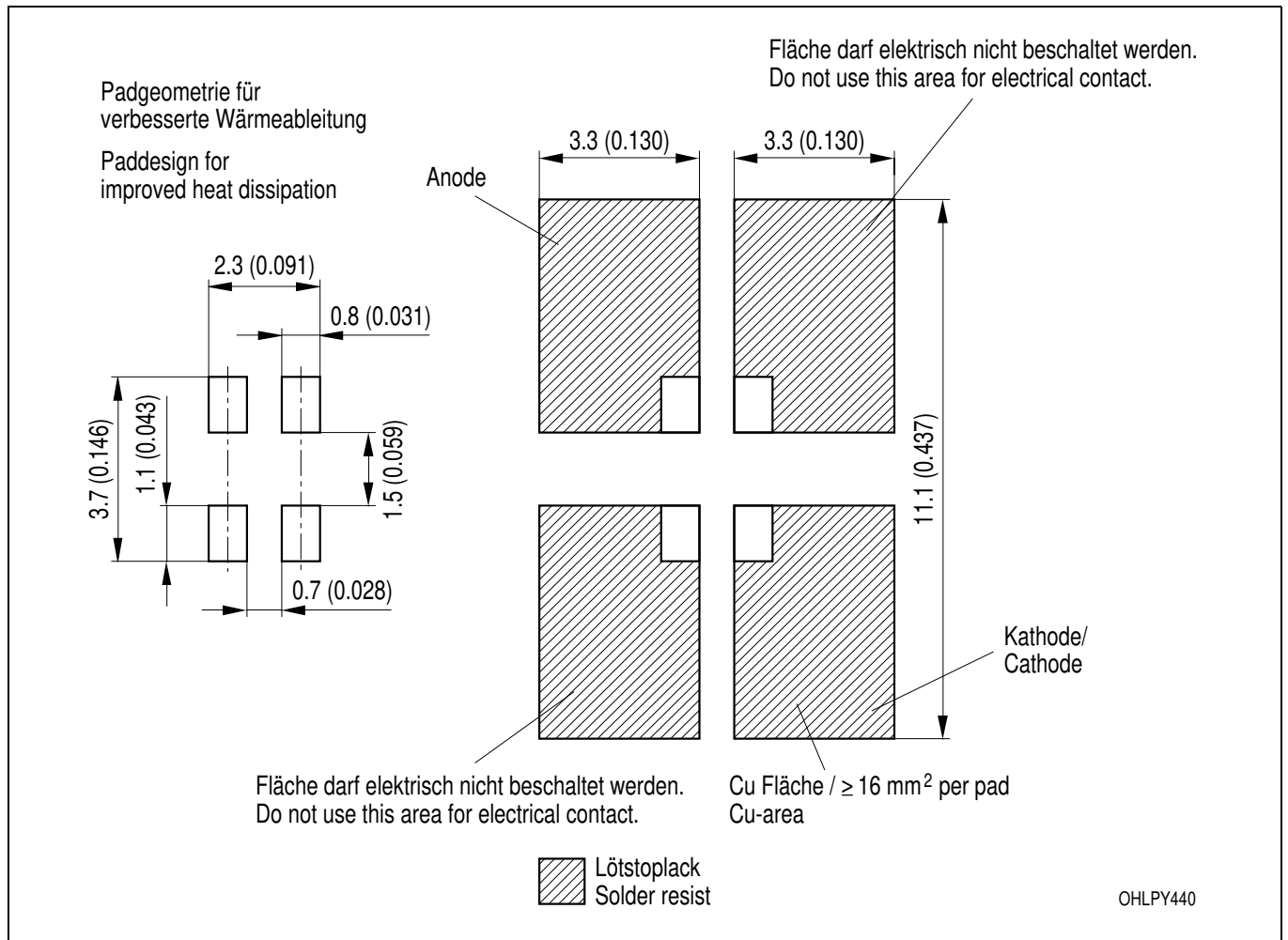
**IR-Reflow Lötprofil** (nach IPC 9501)  
**IR Reflow Soldering Profile** (acc. to IPC 9501)



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

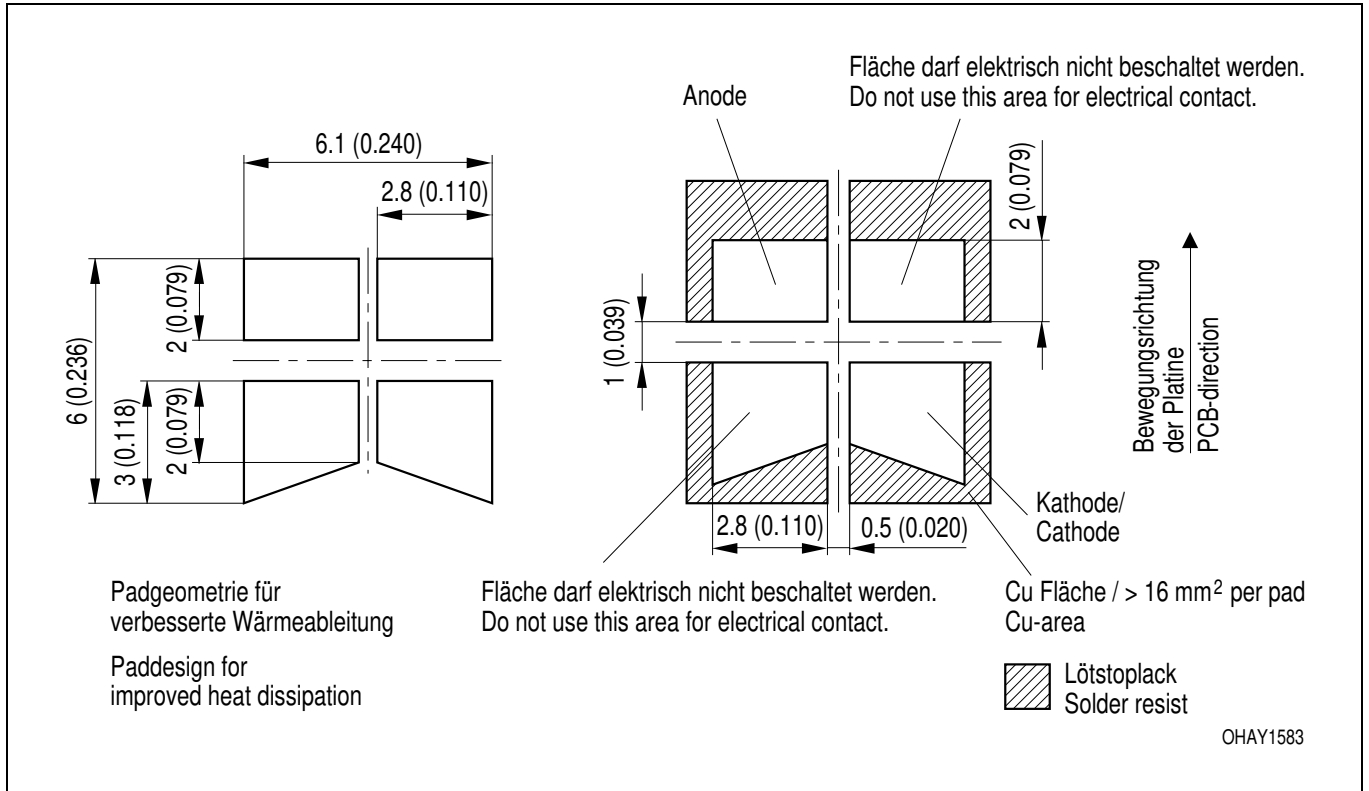


**Empfohlenes Lötpad Design** IR Reflow Lötten  
**Recommended Solder Pad** IR Reflow Soldering



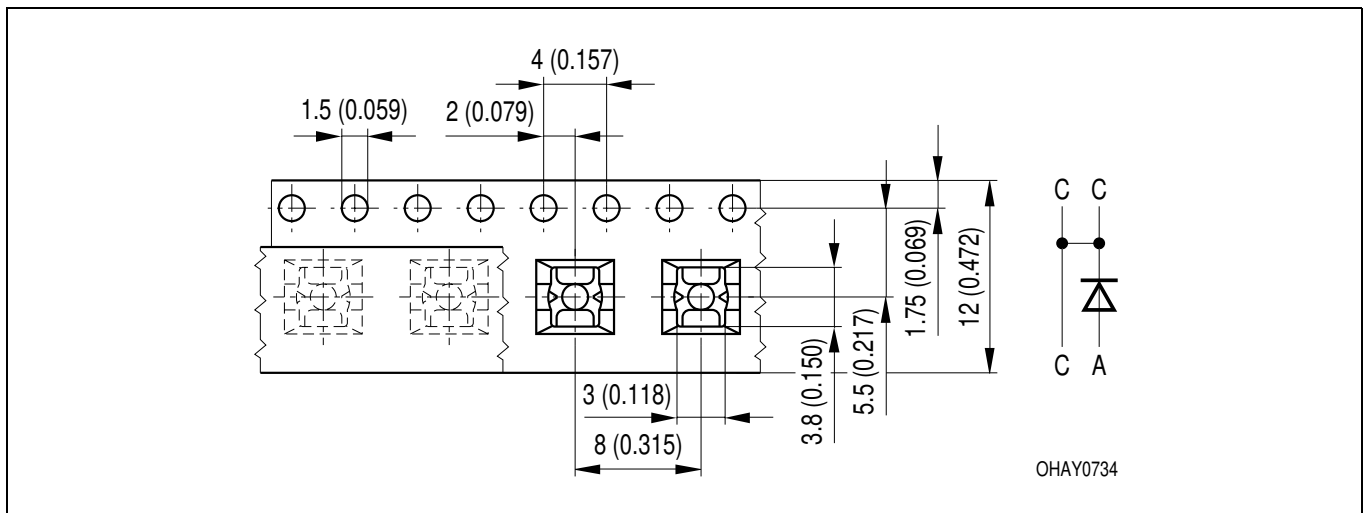
Maße werden wie folgt angegeben: mm (inch) / Dimensions are specified as follows: mm (inch).

**Empfohlenes Lötpad Design** Wellenlöten (TTW)  
**Recommended Solder Pad** TTW Soldering



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

**Gurtung / Polarität und Lage** Verpackungseinheit 2000/Rolle, ø330 mm  
**Method of Taping / Polarity and Orientation** Packing unit 2000/reel, ø330 mm



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

Revision History: 2003-06-02		Date of change
Previous Version: 2003-02-27		
Page	Subjects (major changes since last revision)	
2	wavelength grouping for yellow and orange	
2	forward voltage grouping for amber and yellow	
7	change of diagram rel. lum. intensity ( $T_A$ ) from OHL00678 to OHL00740	
4	value (orange; temperature coefficient of $V_F$ from -1.8 to -3.7 mV/K)	2002-06-14
14	annotations	2002-07-23
12	new IR solder pad (OHLPY439 to OHLPY440)	2002-08-05
3, 4	value (reverse voltage from 5 V to 12 V)	2002-09-18
5	forward voltage groups for orange	2003-01-30
6	diagram forward current OHL00676 replaced by OHL00590	2003-02-12
6	new diagram: radiation characteristic	2003-03-27
13	new recommended solder pad	2003-06-02

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**Attention please!**

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