

OSLON SSL

陶瓷封装 — 80° 辐射模式

Ceramic package - 80° radiation pattern

无铅设计, 符合 RoHS 标准

Lead (Pb) Free Product - RoHS Compliant

LUW CQ7P



初步数据/ Preliminary Data

特点

- **封装:** SMD 陶瓷封装, 备硅树脂透镜
- **典型光通量:** 119 lm, 最高 276 lm (工作电流分别为 350 mA 和 1 A 时)
- **装置特点:** 适用于超薄设计的小尺寸高光通量 LED
- **颜色坐标:** $x = 0.31$, $y = 0.32$ (符合 CIE 1931 (白色))
- **典型色温:** 6500 K
- **全视角:** 80°
- **技术:** ThinGaN
- **光效:** 106 lm/W (工作电流为 350 mA 时)
- **分组参数:** 光通量, 颜色坐标, 正向电压
- **焊接方式:** 回流焊接
- **预处理:** 符合 JEDEC 2 级标准
- **卷带封装:** 8 mm 卷带, 600/卷, 直径 180 mm
- **ESD 耐压:** 可达 8 kV (符合 JESD22-A114-D 标准)
- **出众的耐腐蚀性:**
详细说明请参见第 13 页
- **耐潮湿性:**
详细说明请参见第 13 页

应用

- 住宅用 LED 取代型灯泡及灯具
- 重点照明
- 装饰和娱乐照明
- 标志灯 (如台阶灯、出口通道灯等)

Features

- **package:** SMD ceramic package with silicon resin with lens
- **typical Luminous Flux:** 119 lm at 350 mA and up to 276 lm at 1 A
- **feature of the device:** small size high-flux LED for slim designs
- **color coordinates:** $x = 0.31$, $y = 0.32$ acc. to CIE 1931 (white)
- **typ. color temperature:** 6500 K
- **viewing angle:** 80°
- **technology:** ThinGaN
- **optical efficiency:** 106 lm/W at 350 mA
- **grouping parameter:** luminous flux, color coordinates, forward voltage
- **soldering methods:** reflow soldering
- **preconditioning:** acc. to JEDEC Level 2
- **taping:** 8-mm tape with 600/reel, $\varnothing 180$ mm
- **ESD-withstand voltage:** up to 8 kV acc. to JESD22-A114-D
- **Superior Corrosion Robustness:**
details see page 13
- **Humidity Robustness:**
details see page 13

Applications

- Residential retrofits & fixtures
- Accent lights
- decorative and entertainment lighting
- marker lights (e.g. steps, exit ways, etc.)

订购信息

Ordering Information

类型 Type	色温 color temperature	光通量 <small>第20页 1)</small> Luminous Flux ^{1) page 20} $I_F = 350 \text{ mA}$ $\Phi_v(\text{lm})$	发光强度 <small>第20页 2)</small> Luminous Intensity ^{2) page 20} $I_F = 350 \text{ mA}$ $I_v(\text{cd})$	订购代码 Ordering Code
LUW CQ7P-KULQ-5E8G-1 LUW CQ7P-LPLR-5E8G-1	6000K	104.2 ... 130.0 112.0 ... 140.0	66 (典型值) /(typ.) 71 (典型值) /(typ.)	承索 / on request 承索 / on request
LUW CQ7P-KULQ-5D8F-1 LUW CQ7P-LPLR-5D8F-1	6000K	104.2 ... 130.0 112.0 ... 140.0	66 (典型值) /(typ.) 71 (典型值) /(typ.)	承索 / on request 承索 / on request
LUW CQ7P-KULQ-5C8E-1 LUW CQ7P-LPLR-5C8E-1	6000K	104.2 ... 130.0 112.0 ... 140.0	66 (典型值) /(typ.) 71 (典型值) /(typ.)	承索 / on request 承索 / on request

Note: 上述类型编号代表仅包含几个亮度组的订购组（详细说明请参见第 8 页）。每个卷盘上仅装运一个亮度组（一个卷盘上不会混装两个亮度组）。例如，LUW CQ7P-KTLP-5E8G-1 表示任何一个卷盘上仅可装运一个亮度组：KT、KU 或 LP。

为了确保可用性，单个亮度组将不接受订购。

类似地，对于需要测量和分选色度坐标组的颜色，每个卷盘上将仅装运单个色度坐标组。例如，LUW CQ7P-KTLP-5E8G-1 表示仅可装运从 5E 到 8G 范围内的一个色度坐标组（详细说明请参见第 8 页）。

为了确保可用性，单个色度坐标组将不接受订购。

同样，对于需要测量和分选正向电压组的 LED，每个卷盘上将仅装运一个正向电压组。例如，LUW CQ7P-KTLP-5E8G-1 表示仅可装运一个正向电压组：3、4 或 5。为了确保可用性，单个正向电压组将不接受订购（详细说明请参见第 8 页）。

Note: The above Type Numbers represent the order groups which include only a few brightness groups (see page 8 for explanation). Only one group will be shipped on each reel (there will be no mixing of two groups on each reel). E.g. LUW CQ7P-KTLP-5E8G-1 means that only one group KT, KU or LP will be shippable for any one reel.

In order to ensure availability, single brightness groups will not be orderable.

In a similar manner for colors where chromaticity coordinate groups are measured and binned, single chromaticity coordinate groups will be shipped on any one reel. E.g. LUW CQ7P-KTLP-5E8G-1 means that only 1 chromaticity coordinate group -5E to -8G will be shippable (see page 8 for explanation).

In order to ensure availability, single chromaticity coordinate groups will not be orderable.

In a similar manner for LED, where forward voltage groups are measured and binned, single forward voltage groups will be shipped on any one reel. E.g. LUW CQ7P-KTLP-5E8G-1 means that only 1 forward voltage group -3, -4 or -5 will be shippable. In order to ensure availability, single forward voltage groups will not be orderable (see page 8 for explanation).

最大额定值

Maximum Ratings

参数 Parameter	符号 Symbol	值 Value	单位 Unit
工作温度范围 Operating temperature range	T_{op}	- 40 ... + 110	°C
储存温度范围 Storage temperature range	T_{stg}	- 40 ... + 110	°C
结点温度 Junction temperature	T_j	125	°C
正向电流 Forward current ($T_S=25^\circ\text{C}$)	I_F I_F	100 1000	mA mA
脉冲电流 Surge current $t \leq 50 \text{ ms}, D = 0.016, T_S = 25^\circ\text{C}$	I_{FM}	2000	mA
反向电压 Reverse voltage ($T_S=25^\circ\text{C}$)	V_R	非为反向运行而设计 not designed for reverse operation	V

特性

Characteristics

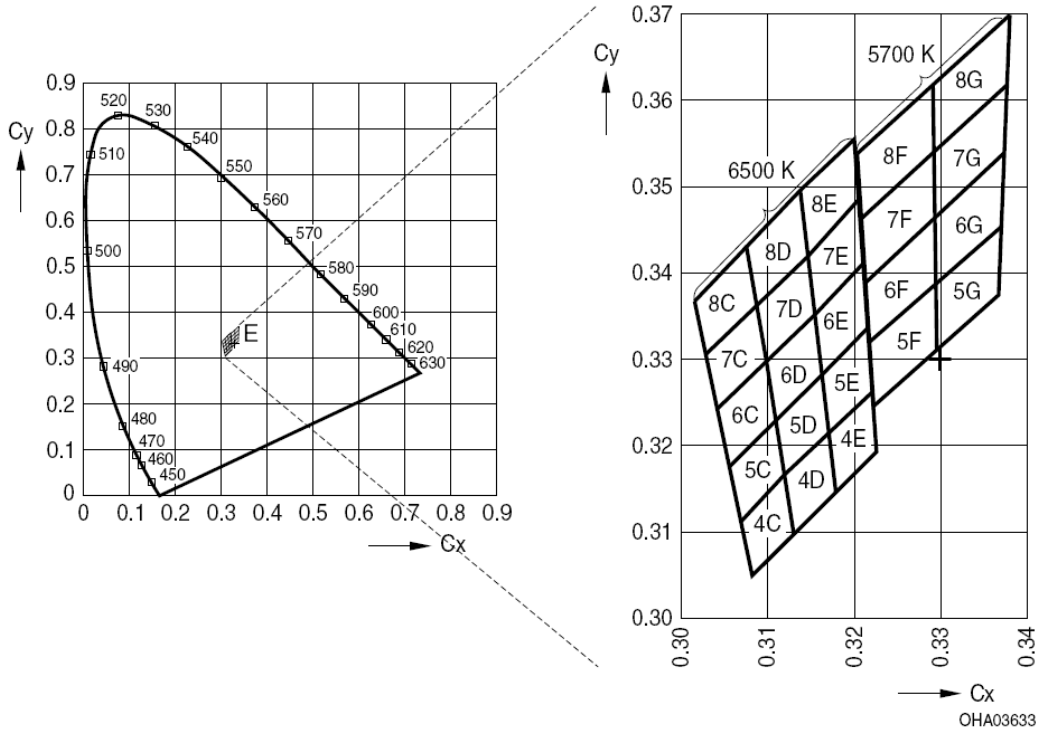
 $(T_S = 25\text{ }^\circ\text{C})$

参数 Parameter	符号 Symbol	值 Value	单位 Unit
CIE 1931色度坐标 x <small>第20页 3)</small> (典型值) / (typ.) Chromaticity coordinate x acc. to CIE 1931 ³⁾ page 20 $I_F = 350\text{ mA}$	x	0.31	—
CIE 1931色度坐标 y <small>第20页 3)</small> (典型值) / (typ.) Chromaticity coordinate y acc. to CIE 1931 ³⁾ page 20 $I_F = 350\text{ mA}$	y	0.32	—
50% I_V 时的全视角 (典型值) / (typ.) Viewing angle at 50 % I_V	2φ	80	梯度 deg.
正向电压 <small>第20页 4)</small> (最小值) / (min.) Forward voltage ⁴⁾ Page 20 (典型值) / (typ.) $I_F = 350\text{ mA}$ (最大值) / (max.)	V_F V_F V_F	2.75 3.2 3.75	V V V
反向电流 (最大值) / (max.) Reverse current	I_R	非为反向运行而设计 not designed for reverse operation	μA
结点-焊点热阻 (典型值) / (typ.) Thermal resistance	$R_{th\text{ JS}}$	7	K/W
Junction/solder point (最大值) / (max.)	$R_{th\text{ JS}}$	9.4*	K/W

 R_{th} (最大值) 取自统计值 R_{th} (max) is based on statistic values

色度坐标组 第20页 3)

Chromaticity Coordinate Groups³⁾ page 20



组 Group	Cx	Cy
4C	0.308	0.305
	0.307	0.311
	0.312	0.316
	0.313	0.310
5C	0.307	0.311
	0.306	0.318
	0.311	0.323
	0.312	0.316
6C	0.306	0.318
	0.304	0.324
	0.310	0.330
	0.311	0.323
7C	0.304	0.324
	0.303	0.330
	0.309	0.336
	0.310	0.330
8C	0.303	0.330
	0.302	0.337
	0.308	0.343
	0.309	0.336

组 Group	Cx	Cy
5F	0.322	0.324
	0.322	0.332
	0.329	0.338
	0.329	0.331
6F	0.322	0.332
	0.321	0.339
	0.329	0.346
	0.329	0.338
7F	0.321	0.339
	0.321	0.346
	0.329	0.354
	0.329	0.346
8F	0.321	0.346
	0.320	0.354
	0.329	0.362
	0.329	0.354
5G	0.329	0.331
	0.329	0.338
	0.337	0.345
	0.337	0.337

组 Group	Cx	Cy
4D	0.313	0.310
	0.312	0.316
	0.317	0.321
	0.318	0.314
5D	0.312	0.316
	0.311	0.323
	0.316	0.328
	0.317	0.321
6D	0.311	0.323
	0.310	0.330
	0.315	0.335
	0.316	0.328
7D	0.310	0.330
	0.309	0.336
	0.315	0.342
	0.315	0.335
8D	0.309	0.336
	0.308	0.343
	0.314	0.349
	0.315	0.342
4E	0.318	0.314
	0.317	0.321
	0.322	0.326
	0.323	0.319
5E	0.317	0.321
	0.316	0.328
	0.322	0.333
	0.322	0.326
6E	0.316	0.328
	0.315	0.335
	0.321	0.341
	0.322	0.333
7E	0.315	0.335
	0.315	0.342
	0.321	0.348
	0.321	0.341
8E	0.315	0.342
	0.314	0.349
	0.320	0.355
	0.321	0.348

组 Group	Cx	Cy
6G	0.329	0.338
	0.329	0.346
	0.337	0.353
	0.337	0.345
7G	0.329	0.346
	0.329	0.354
	0.338	0.362
	0.337	0.353
8G	0.329	0.354
	0.329	0.362
	0.338	0.370
	0.338	0.362

正向电压组 第18页 4)

Forward Voltage Groups⁴⁾ page 18

组 Group	正向电压 Forward voltage		单位 Unit
	最小值/min.	最大值/max.	
3	2.75	3.0	V
4	3.0	3.25	V
5	3.25	3.5	V

亮度组

Brightness Groups

亮度组 Brightness Group	光通量 第20页 1) Luminous Flux ¹⁾ page 20 Φ_v (lm)	发光强度 第20页 2) Luminous Intensity ²⁾ page 20 I_v (cd)
KU	104.2 ... 112.0	60.0 (典型值) / (typ.)
LP	112.0 ... 121.0	65.0 (典型值) / (typ.)
LQ	121.0 ... 130.0	70.0 (典型值) / (typ.)
LR	130.0 ... 140.0	76.0 (典型值) / (typ.)

注释：系列类型的标准装运格式包括仅由几个单个亮度组组成的产品族亮度组。单个亮度组不接受订购。

Note: The standard shipping format for serial types includes a family group of only a few individual brightness groups. Individual brightness groups cannot be ordered.

标签上的组名

Group Name on Label

示例： KU-5E

Example: KU-5E

亮度组 Brightness Group	色度坐标组 Chromaticity Coordinate Group
KU	5E

注释：每个包装单元/卷带均仅包含一个亮度组。

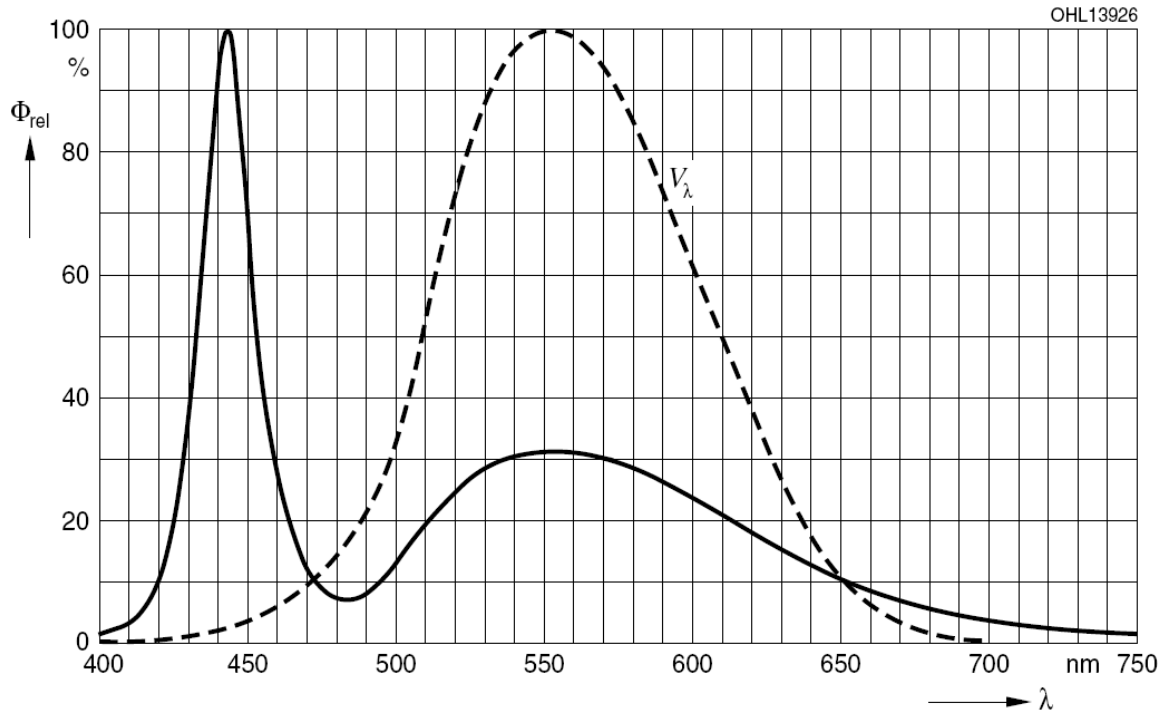
Note: No packing unit / tape ever contain more than one brightness group.

相对辐射光谱 第20页 2)

Relative Spectral Emission²⁾ page 20

$V(\lambda)$ = 标准视觉曲线 / Standard eye response curve

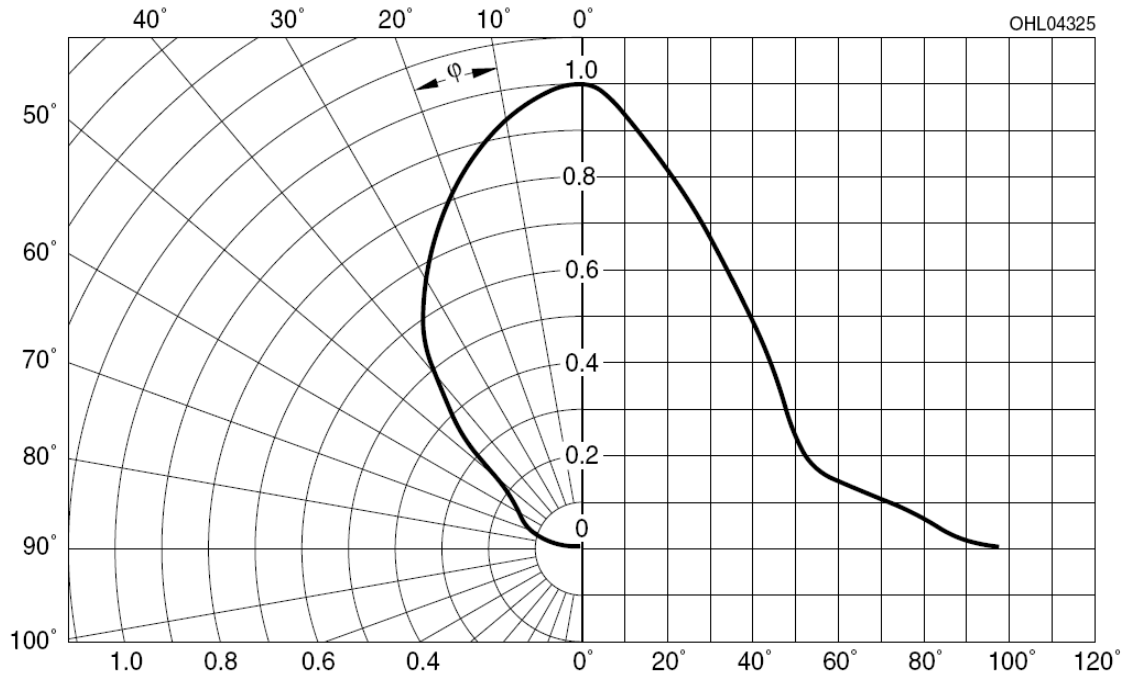
$\Phi_{rel} = f(\lambda); T_S = 25^\circ\text{C}; I_F = 350\text{ mA}$



配光曲线 第20页 2)

Radiation Characteristic²⁾ page 20

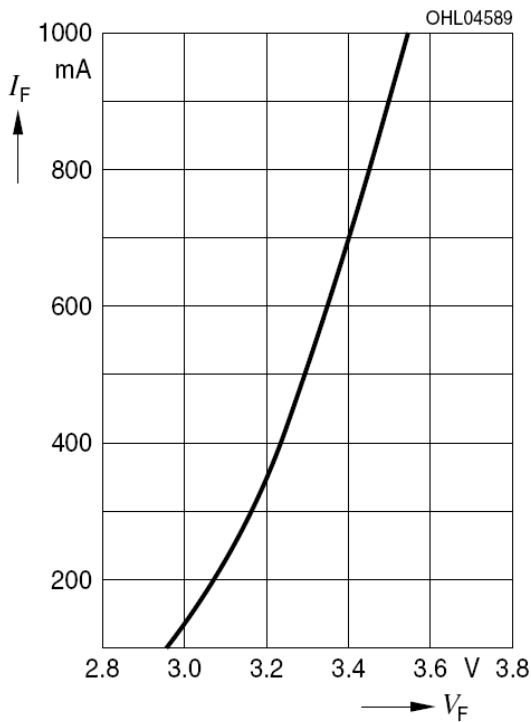
$I_{rel} = f(\varphi); T_S = 25^\circ\text{C}$



正向电流 第20页 2)

Forward Current²⁾ page 20

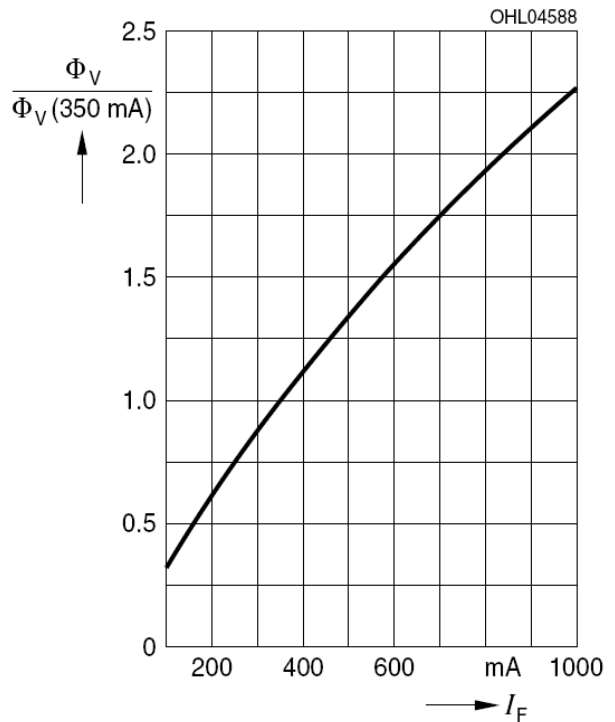
$I_F = f(V_F); T_S = 25\text{ }^\circ\text{C}$



相对光通量 第20页 2)

Relative Luminous Flux²⁾ page 20

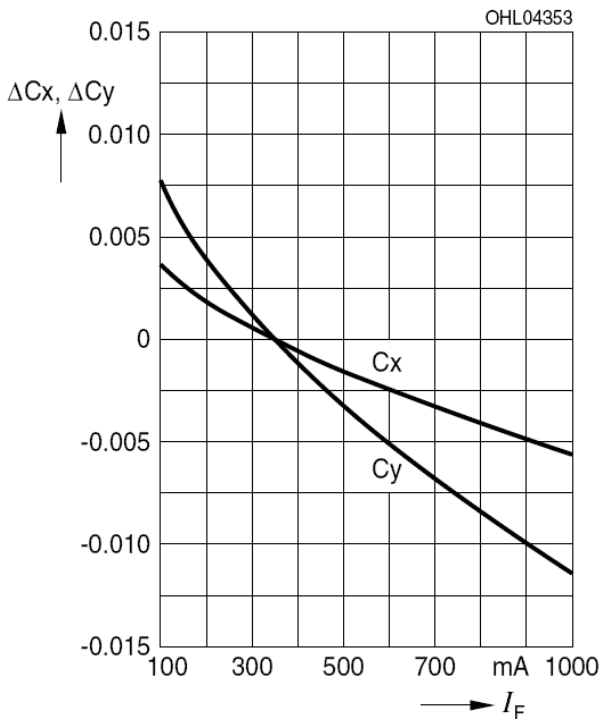
$\Phi_V / \Phi_V(350\text{ mA}) = f(I_F); T_S = 25\text{ }^\circ\text{C}$



色度坐标偏移 第20页 2)

Chromaticity Coordinate Shift²⁾ page 20

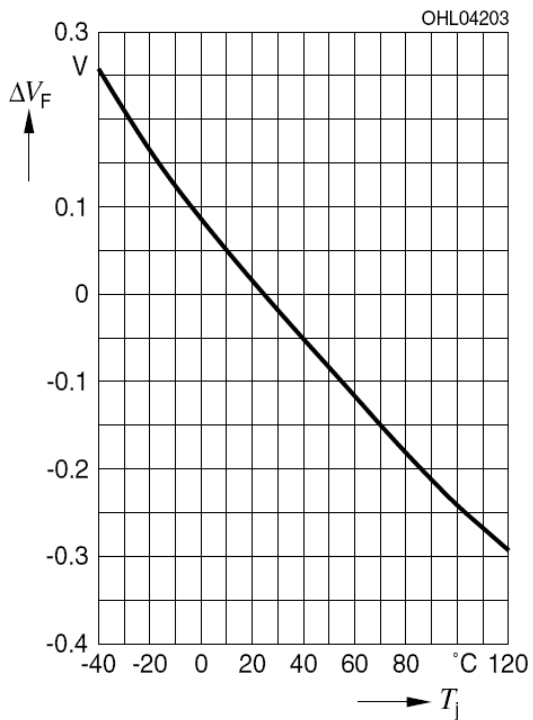
$x, y = f(I_F); T_S = 25\text{ }^\circ\text{C}$



相对正向电压 第20页 2)

Relative Forward Voltage²⁾ page 20

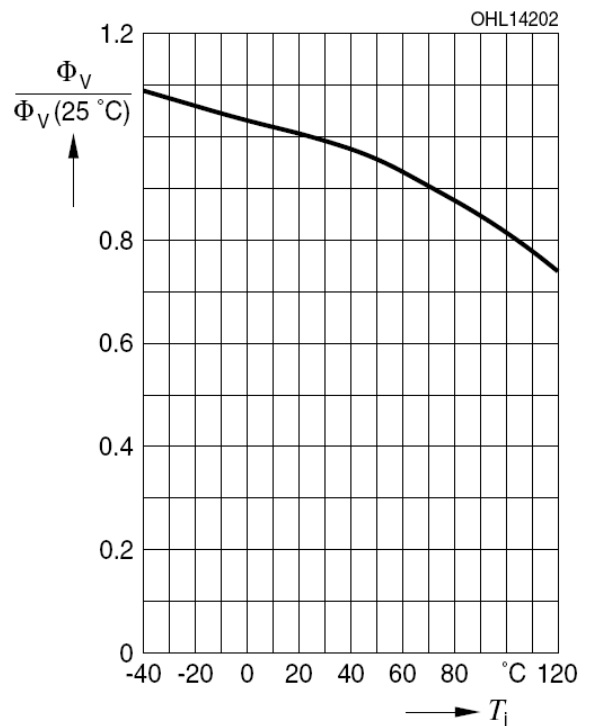
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 350\text{ mA}$$



相对光通量 第20页 2)

Relative Luminous Flux²⁾ page 20

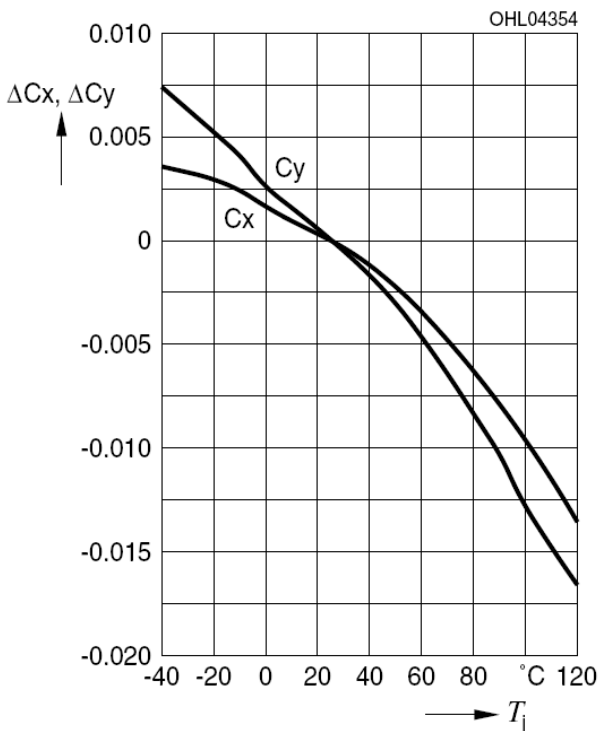
$$\Phi_V / \Phi_V(25^\circ\text{C}) = f(T_j); I_F = 350\text{ mA}$$



色度坐标偏移 第20页 2)

Chromaticity Coordinate Shift²⁾ page 20

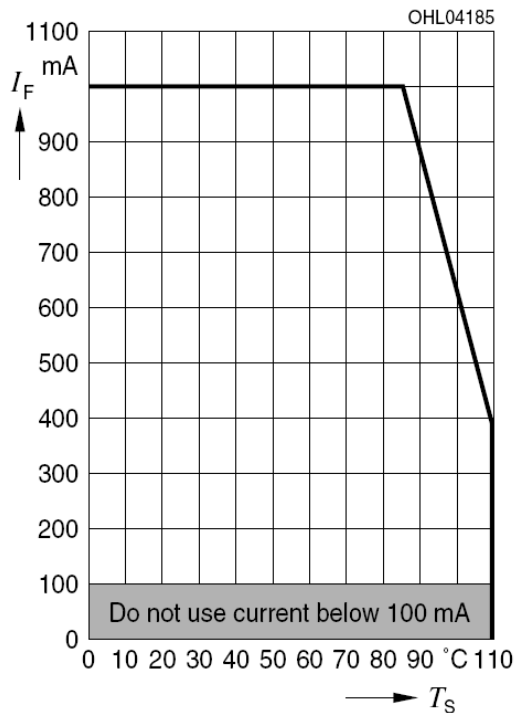
$$x, y = f(T_j); I_F = 350\text{ mA}$$



最大容许正向电流

Max. Permissible Forward Current

$I_F = f(T_S)$

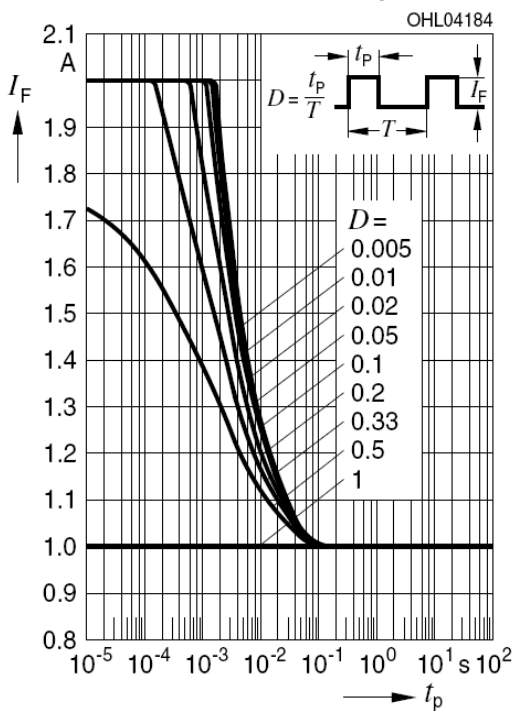


容许脉冲调制能力 $I_F = f(t_p)$

Permissible Pulse Handling Capability

占空比 $D =$ 参数, $T_S = 25^\circ\text{C}$

Duty cycle $D =$ parameter, $T_S = 25^\circ\text{C}$

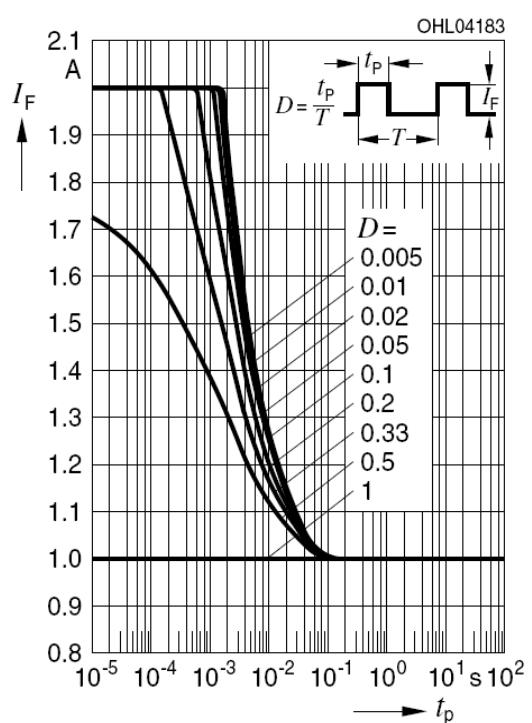


容许脉冲调制能力 $I_F = f(t_p)$

Permissible Pulse Handling Capability

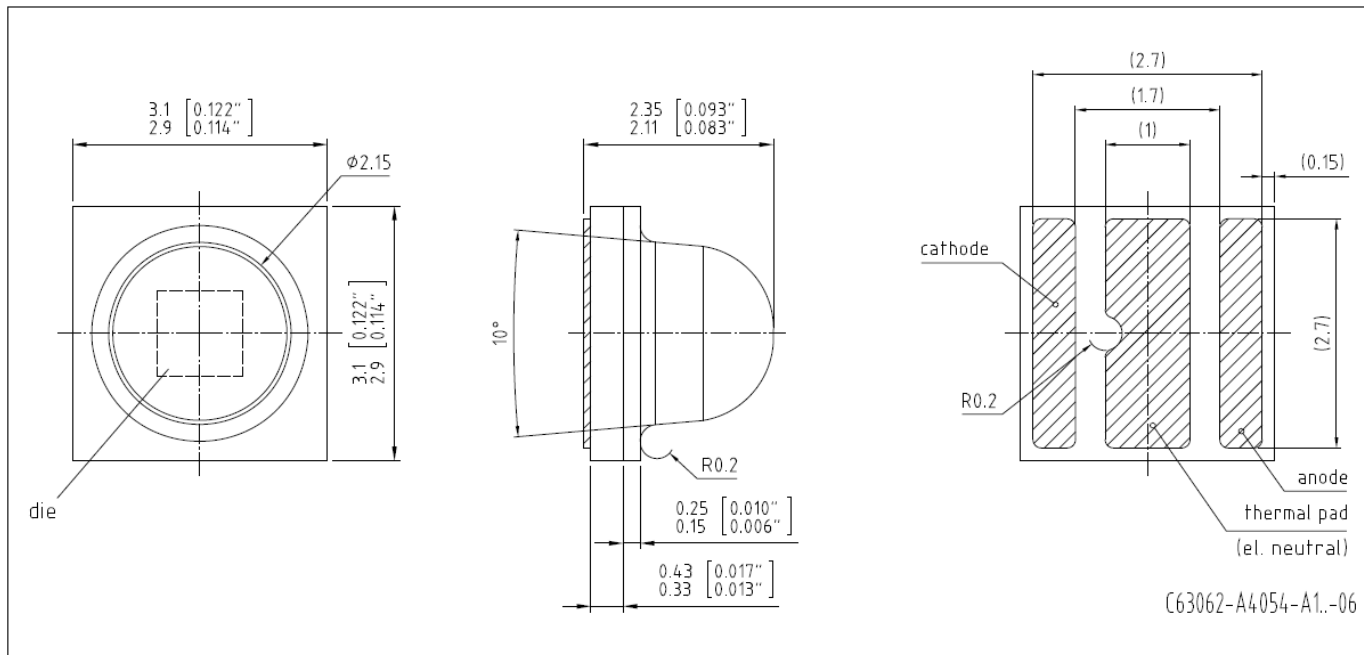
占空比 $D =$ 参数, $T_S = 85^\circ\text{C}$

Duty cycle $D =$ parameter, $T_S = 85^\circ\text{C}$



封装略图 第20页 5)

Package Outlines⁵⁾ page 20



注释: LED 受与 LED 芯片并联的 ESD 装置保护。

Note: LED is protected by ESD device which is connected in parallel to LED-Chip.

注释: 此封装不适宜超声波清洗

Note: Package not suitable for ultra sonic cleaning

耐腐蚀性优于 EN 60068-2-60 (方法 4) :

经强化腐蚀试验: 40°C / 90%rh / 15ppm H₂S / 336h

Corrosion robustness better than EN 60068-2-60 (method 4):

with enhanced corrosion test: 40°C / 90%rh / 15ppm H₂S / 336h

阴极标记:

Cathode mark:

参考重量/ Approx. weight:

标记

mark

25 mg

耐潮湿性 / Humidity Robustness

测试 / Test	条件 / Conditions	时长 / Duration	失效标准 / Failure criteria
潮湿高温工作寿命测试 (WHTOL) / Wet High Temperature Operating Life Test (WHTOL)	85°C/85%RH, I _F = 50 mA	>500 h	-ΔPhiV > 30% -灾难性故障 / catastrophic failure

注释: 在室外应用中可能会出现高湿环境, 制造商不对高湿环境中的应用负责。

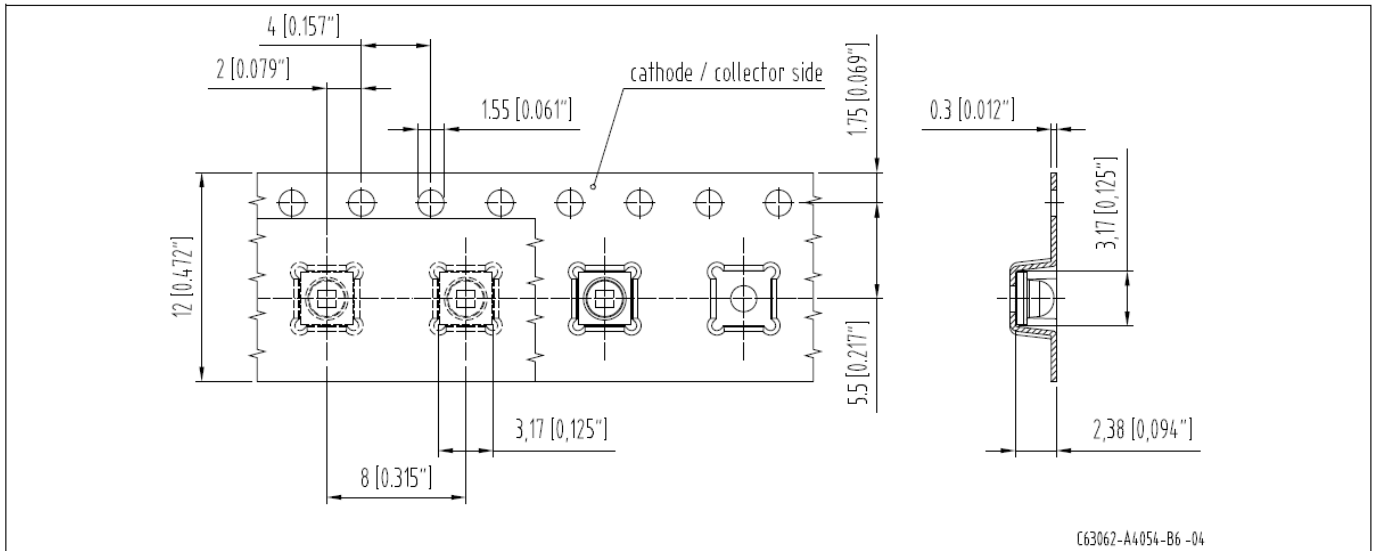
Note: Manufacturer disclaims all liability for applications in high humidity levels as it may appear in outdoor applications

2010-10-27

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卷带封装方式/极性和方向 第20页 5)
Method of Taping / Polarity and Orientation^{5) page 20}

包装单元 600/卷, $\varnothing 180$ mm
 Packing unit 600/reel, $\varnothing 180$ mm



焊接条件

Soldering Conditions

无铅焊接的回流焊接温度曲线简图

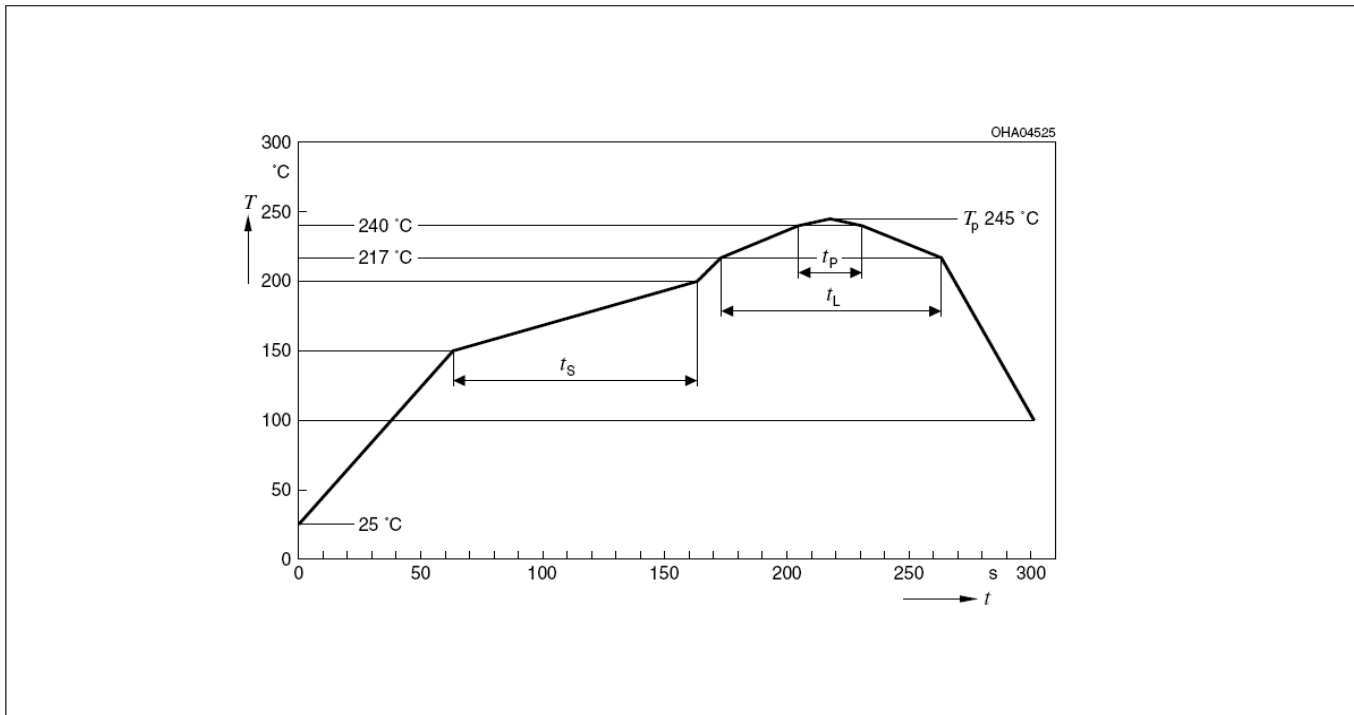
Reflow Soldering Profile for lead free soldering

预处理符合 JEDEC 2 级标准

Preconditioning acc. to JEDEC Level 2

(符合 J-STD-020D.01 标准)

(acc. to J-STD-020D.01)



曲线轮廓特征 / Profile Feature	无铅 (锡银铜) 组件 / Pb-Free (SnAgCu) Assembly	
	推荐值 / Recommendation	最大额定值 / Max. Ratings
预热前的升温速度 / Ramp-up Rate to Preheat*) 从 25°C 升至 150°C / 25°C to 150°C	2°C/秒 / 2°C/sec	3°C/秒 / 3°C/sec
从 T _S 最小值升至 T _S 最大值的时间 t _s / Time t _s from T _{Smin} to T _{Smax} (从 150°C 升至 200°C / 150°C to 200°C)	100 秒 / 100 s	最小值 60 秒, 最大值 120 秒 min. 60 sec max. 120 sec
到达峰值前的升温速度 / Ramp-up Rate to Peak*) 从 180°C 升至 T _P / 180°C to T _P	2°C/秒 / 2°C/sec	3°C/秒 / 3°C/sec
液相线温度 T _L / Liquidus Temperature T _L	217°C	
温度高于 T _L 的时间 t _L / Time t _L above T _L	80 秒 / 80 sec	最大值 100 秒 / max. 100 sec
峰值温度 T _P / Peak Temperature T _P	245°C	最大值 260°C / max. 260°C
温度保持在指定峰值温度 T _P - 5K 的 5°C 范围内的时间 t _p / Time t _p within 5°C of the specified peak temperature T _P - 5K	20 秒 / 20 sec	最小值 10 秒, 最大值 30 秒 / min. 10 sec max. 30 sec
降温速度 / Ramp-down Rate* 从 T _P 降至 100°C / T _P to 100°C	3°K/秒 / 3°K/sec	最大值 6°K/秒 / 6°K/sec maximum
从 25°C 升至峰值温度的时间 / Time 25°C to Peak temperature		最大值 8 分钟

所有温度均指从元件顶部测得的封装中心温度

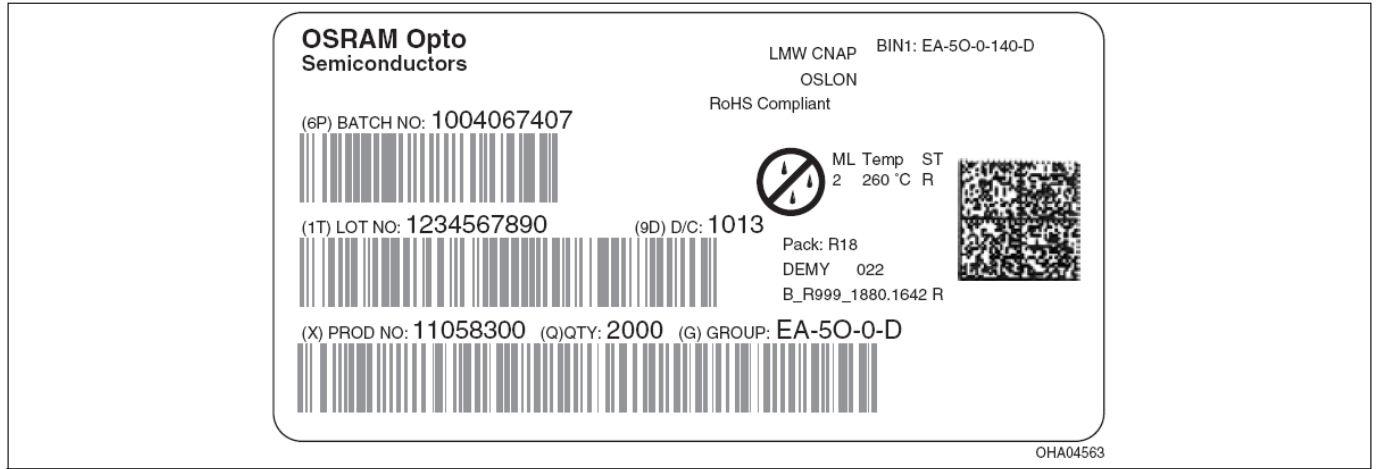
* 斜率计算 $\Delta T/\Delta t$: Δt 最大值为 5 秒; 涵盖整个 T 范围

All temperatures refer to the center of the package, measured on the top of the component

* slope calculation $\Delta T/\Delta t$: Δt max. 5 sec; fulfillment for the whole T-range

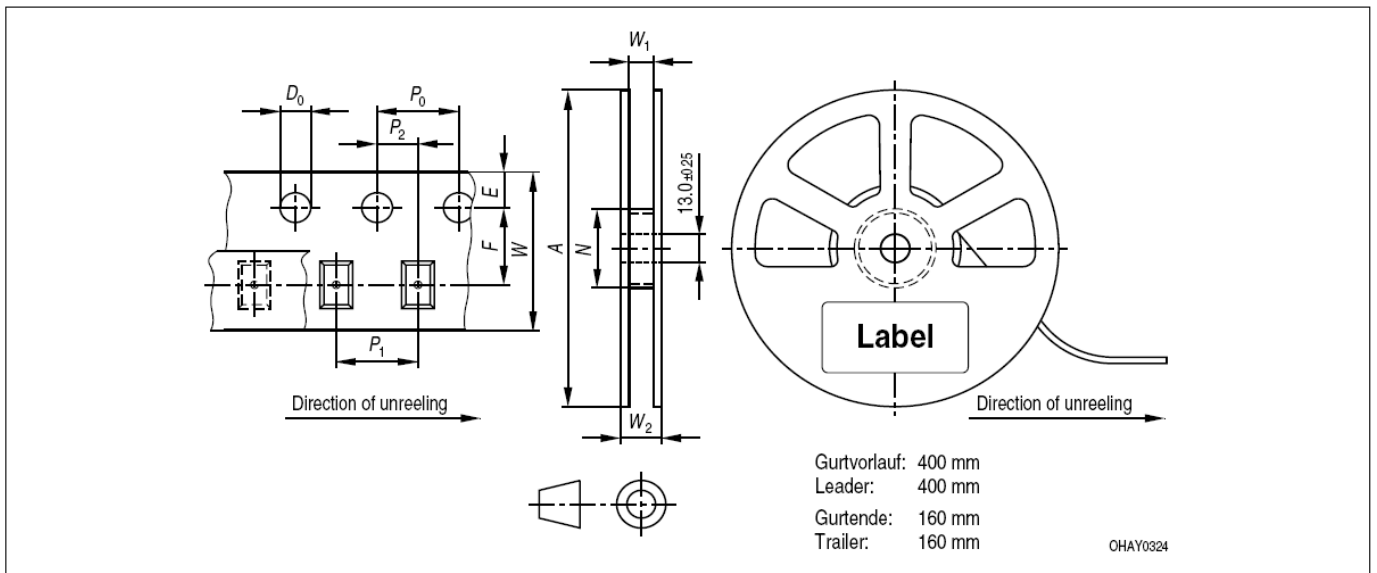
条形码——产品标签 (BPL)

Barcode-Product-Label (BPL)



卷带和卷盘

Tape and Reel



卷带尺寸 (单位: mm (英寸)) / Tape dimensions in mm (inch)

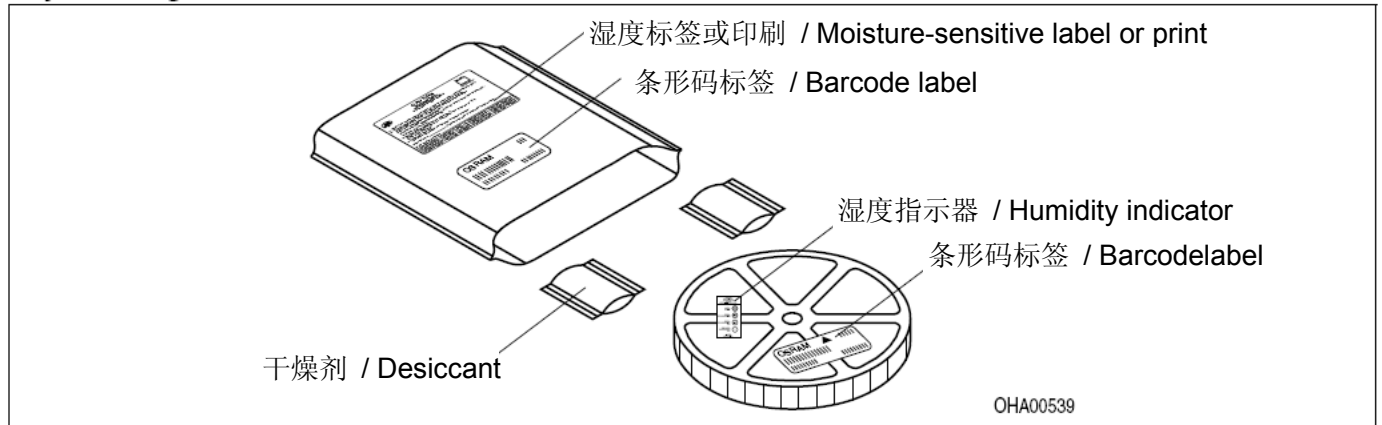
W	P_0	P_1	P_2	D_0	E	F
$8^{+0.3}_{-0.1}$	4 ± 0.1 (0.157 ± 0.004)	4 ± 0.1 (0.157 ± 0.004)	2 ± 0.05 (0.079 ± 0.002)	1.5 ± 0.1 (0.059 ± 0.004)	1.75 ± 0.1 (0.069 ± 0.004)	3.5 ± 0.05 (0.138 ± 0.002)

卷盘尺寸 (单位: mm (英寸)) / Reel dimensions in mm (inch)

A	W	N_{min}	W_1	W_2_{max}
180 (7)	8 (0.315)	60 (2.362)	$8.4 + 2$ ($0.331 + 0.079$)	14.4 (0.567)

干式充填工艺和材料

Dry Packing Process and Materials



注释： 湿敏产品包装在装有干燥剂和湿度卡的干燥袋子中。

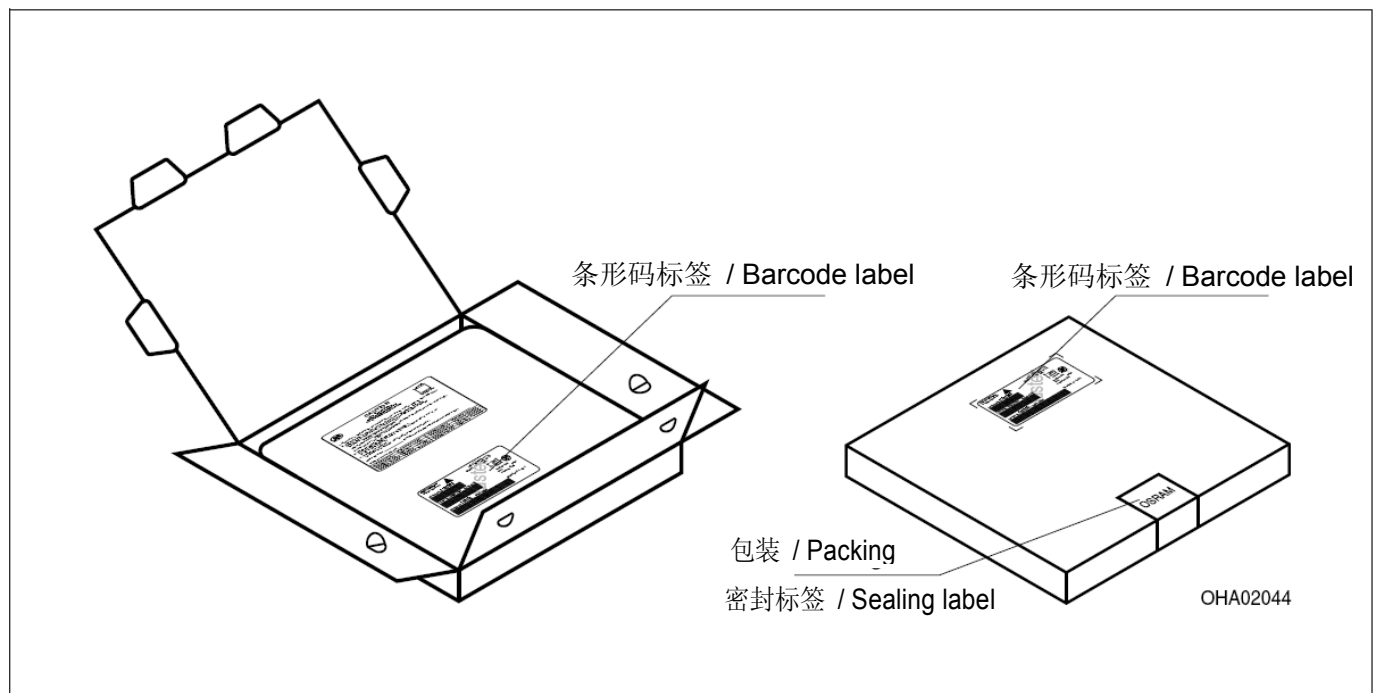
关于干式充填的详细信息，请参阅网站资料和简明版产品目录中“干式充填”标题下的“卷带和卷盘”章节。您还可以找到 JEDEC 等规范性参考。

Note: Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card.

Regarding dry pack you will find further information in the internet and in the Short Form Catalog in chapter "Tape and Reel" under the topic "Dry Pack". Here you will also find the normative references like JEDEC.

运输包装和材料

Transportation Packing and Materials



运输箱尺寸 (单位: mm (英寸)) / Dimensions of transportation box in mm (inch)

宽度 / Width	长度 / length	高度 / height
200 ±5 (7,874 ±0,1968)	200 ±5 (7,874 ±0,1968)	30 ±5 (1,1811 ±0,1968)

由于 IEC 60825 标准取消了 LED 部分，所以本产品根据 IEC 62471:2006 标准（“灯和灯系统的光生物安全性”）进行眼睛安全评估。在该 CIE 标准的风险分组系统中，本数据表中指定的 LED 属于“豁免”组（与接触时间为 10000 秒的可见光谱范围内的装置相关）。在实际环境（包括接触时间、瞳孔、观察距离）中，认为这些装置对人眼没有危害。

但是，作为原则问题，必须提及强烈光源具有致盲效应，因此很可能发生二次曝光。直视其他明亮光源（如车前灯）时也是如此，视敏度可能会暂时下降，也可能出现余像，从而导致困扰、烦恼、视障甚至意外事故，具体取决于当时的情况。

Due to the cancellation of the LED from IEC 60825, the evaluation of eye safety occurs according to the standard IEC 62471:2006 ("photobiological safety of lamps and lamp systems").

Within the risk grouping system of this CIE standard, the LEDs specified in this data sheet fall into the "moderate" group (relating to devices in

the visible spectrum with an exposure time of 0.25 s). Under real circumstances (for exposure time, eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices.

As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. As is also true when viewing other bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

请注意！

元件类型的描述性信息不应被视作对特许的保证。

欧司朗保留交货条件和变更设计的权力。因技术需要，元件可能包含危险物质。如果对相关信息有疑问，请联系我们的销售部门。

如需打印或下载，请到公司网站寻找最新的版本。

封装

请使用您所熟悉的物资回收公司。我们也可以帮助您联系最近的销售办事处。如果您已对包装材料进行分类，我们将根据协议进行回收，所产生的运输费用须由您承担。对于未经分类即退回本公司或我们没有责任接受的包装材料，我们将开具发票由您支付因此产生的一切费用。

生命支持装置或系统所采用的元件必须获取用于该目的明确授权！ 仅当获得欧司朗光电半导体的明确书面许可时，方可将关键元件^{第 20 页 6)}用于生命支持装置或系统^{第 20 页 7)}。

Attention please!

The information describes the type of component and shall not be considered as assured characteristics.

Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances. For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version in the Internet.

Packing

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.

Components used in life-support devices or systems must be expressly authorized for such purpose! Critical components⁶⁾ page 20 may only be used in life-support devices or systems⁷⁾ page 20 with the express written approval of OSRAM OS.

备注:

- 1) 亮度值的测量是当电流脉冲为 25 ms (典型值) 时, 内部重现性为 $\pm 8\%$, 扩展不确定度为 $\pm 11\%$ (依据 GUM, 膨胀系数 $k = 3$)。
- 2) 由于 LED 制造工艺的条件特殊, 典型或计算得出的技术参数数据仅能反映统计数据, 而不等同于各产品的实际参数, 它们可能与典型或计算得出的典型特征线数据不同。如果需要 (如由于技术改进), 这些典型数据将有所变更, 恕不另行通知。
- 3) 色度坐标的测量是当电流脉冲为 25 ms (典型值) 时, 内部重现性为 ± 0.005 , 可扩展不确定度为 ± 0.01 (依据 GUM, 膨胀系数 $k = 3$)。
- 4) 正向电压的测量是当电流脉冲为 8 ms (典型值) 时, 内部重现性为 ± 0.05 V, 可扩展不确定度为 ± 0.1 V (依据 GUM, 膨胀系数 $k = 3$)。
- 5) 尺寸单位指定为: mm (英寸)
- 6) 关键元件指用在生命支持装置或系统中、一旦发生故障即会引起装置或系统故障或影响其安全性或有效性的元件。
- 7) 生命支持装置或系统拟用于 (a) 植入人体或 (b) 支持和/或维持人的生命。
如果发生故障, 即会威胁使用者的健康和生命。

Remarks:

- 1) Brightness values are measured during a current pulse of typical 25 ms, with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (acc. to GUM with a coverage factor of $k = 3$).
- 2) Due to the special conditions of the manufacturing processes of LED, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 3) Chromaticity coordinates are measured during a current pulse of typical 25 ms, with an internal reproducibility of $\pm 0,005$ and an expanded uncertainty of $\pm 0,01$ (acc. to GUM with a coverage factor of $k = 3$).
- 4) The forward voltage is measured during a current pulse of typical 8 ms, with an internal reproducibility of $\pm 0,05$ V and an expanded uncertainty of $\pm 0,1$ V (acc. to GUM with a coverage factor of $k=3$).
- 5) Dimensions are specified as follows: mm (inch).
- 6) 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.
- 7) 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 and the life of the user may be endangered.

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