

OSRAM KW HKL531.TE

Datasheet

Published by **ams-OSRAM AG**

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OSLON™ Black Flat S

KW HKL531.TE

OSLON Black Flat S is able to meet a wide range of requirements. The SMT device is very stable, durable and can be used with standard processes. A new solder pad layout allows for high reliability and improved thermal management. The compact chips not only deliver high light output, they are also individually addressable with an ensured chip-to-chip contrast which makes this LED an ideal solution for Adaptive Driving Beam (ADB).



Applications

- Static Forward Lighting

Features

- Package: SMD epoxy package
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.322, Cy = 0.334 acc. to CIE 1931 (● ultra white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

Ordering Information

| Type | Luminous Flux ¹⁾ I _F = 1000 mA Φ _V | Ordering Code |
|-----------------------------------|---|---------------|
| KW HKL531.TE-F0F8-ebvFfcbB46-4LZL | 1310 ... 1760 lm | Q65112A8333 |

Maximum Ratings

| Parameter | Symbol | | Values |
|--|-----------|------|---------|
| Operating Temperature | T_{op} | min. | -40 °C |
| | | max. | 125 °C |
| Storage Temperature | T_{stg} | min. | -40 °C |
| | | max. | 125 °C |
| Junction Temperature | T_j | max. | 150 °C |
| Junction Temperature for short time applications* | T_j | max. | 175 °C |
| Forward current $T_s = 25\text{ °C}$ | I_F | min. | 50 mA |
| | | max. | 1500 mA |
| Surge current $t \leq 10\text{ }\mu\text{s}$; $D = 0.005$; $T_s = 25\text{ °C}$ | I_{FS} | max. | 3000 mA |
| ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B) | V_{ESD} | | 8 kV |
| Reverse current ²⁾ | I_R | max. | 200 mA |

* The median lifetime (L70/B50) for $T_j = 175\text{ °C}$ is 100h.

Characteristics

$I_F = 1000 \text{ mA}$; $T_S = 25 \text{ °C}$

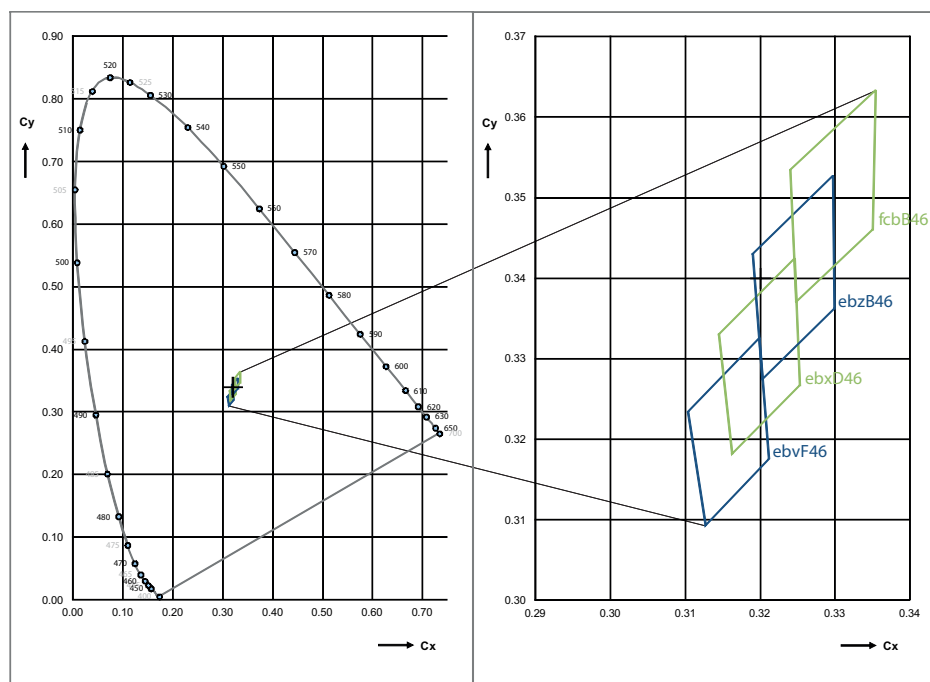
| Parameter | Symbol | | Values |
|---|-------------------------|------|---------------------|
| Chromaticity Coordinate ³⁾ | Cx | typ. | 0.322 |
| | Cy | typ. | 0.334 |
| Viewing angle at 50% I_V | 2ϕ | typ. | 120 ° |
| Radiating surface | A_{color} | typ. | 4,4 mm ² |
| Forward Voltage ⁴⁾ $I_F = 1000 \text{ mA}$ | V_F | min. | 10.90 V |
| | | typ. | 12.05 V |
| | | max. | 14.90 V |
| Reverse voltage (ESD device) | $V_{R \text{ ESD}}$ | min. | 45 V |
| Reverse voltage ²⁾ $I_R = 20 \text{ mA}$ | V_R | max. | 1.2 V |
| | | | |
| Chip to Chip Contrast | - | typ. | 1:200 |
| Real thermal resistance junction/solderpoint ⁵⁾ | $R_{\text{thJS real}}$ | typ. | 1.00 K / W |
| | | max. | 1.20 K / W |
| Electrical thermal resistance junction/solderpoint ⁵⁾ with efficiency $\eta_e = 38 \text{ %}$ | $R_{\text{thJS elec.}}$ | typ. | 0.62 K / W |
| | | max. | 0.74 K / W |

Brightness Groups

| Group | Luminous Flux ¹⁾ $I_F = 1000 \text{ mA}$ min. Φ_V | Luminous Flux ¹⁾ $I_F = 1000 \text{ mA}$ max. Φ_V | Luminous Intensity ⁶⁾ $I_F = 1000 \text{ mA}$ typ. I_v |
|-------|--|--|--|
| F0 | 1310 lm | 1355 lm | 440 cd |
| F1 | 1355 lm | 1400 lm | 450 cd |
| F2 | 1400 lm | 1450 lm | 470 cd |
| F3 | 1450 lm | 1500 lm | 490 cd |
| F4 | 1500 lm | 1550 lm | 500 cd |
| F5 | 1550 lm | 1600 lm | 520 cd |
| F6 | 1600 lm | 1650 lm | 540 cd |
| F7 | 1650 lm | 1700 lm | 550 cd |
| F8 | 1700 lm | 1760 lm | 570 cd |

Forward Voltage Groups

| Group | Forward Voltage ⁴⁾ $I_F = 1000 \text{ mA}$ min. V_F | Forward Voltage ⁴⁾ $I_F = 1000 \text{ mA}$ max. V_F |
|-------|---|---|
| 4L | 10.90 V | 11.90 V |
| QL | 11.90 V | 12.90 V |
| ML | 12.90 V | 13.90 V |
| ZL | 13.90 V | 14.90 V |

Chromaticity Coordinate Groups ³⁾Chromaticity Coordinate Groups ³⁾

| Group | Cx | Cy | Group | Cx | Cy |
|--------|--------|--------|--------|--------|--------|
| ebvF46 | 0.3104 | 0.3234 | ebzB46 | 0.3190 | 0.3430 |
| | 0.3199 | 0.3325 | | 0.3298 | 0.3526 |
| | 0.3212 | 0.3175 | | 0.3299 | 0.3361 |
| | 0.3127 | 0.3093 | | 0.3203 | 0.3274 |
| ebxD46 | 0.3145 | 0.3330 | fcbB46 | 0.3241 | 0.3534 |
| | 0.3246 | 0.3424 | | 0.3355 | 0.3633 |
| | 0.3253 | 0.3266 | | 0.3350 | 0.3460 |
| | 0.3163 | 0.3181 | | 0.3248 | 0.3370 |

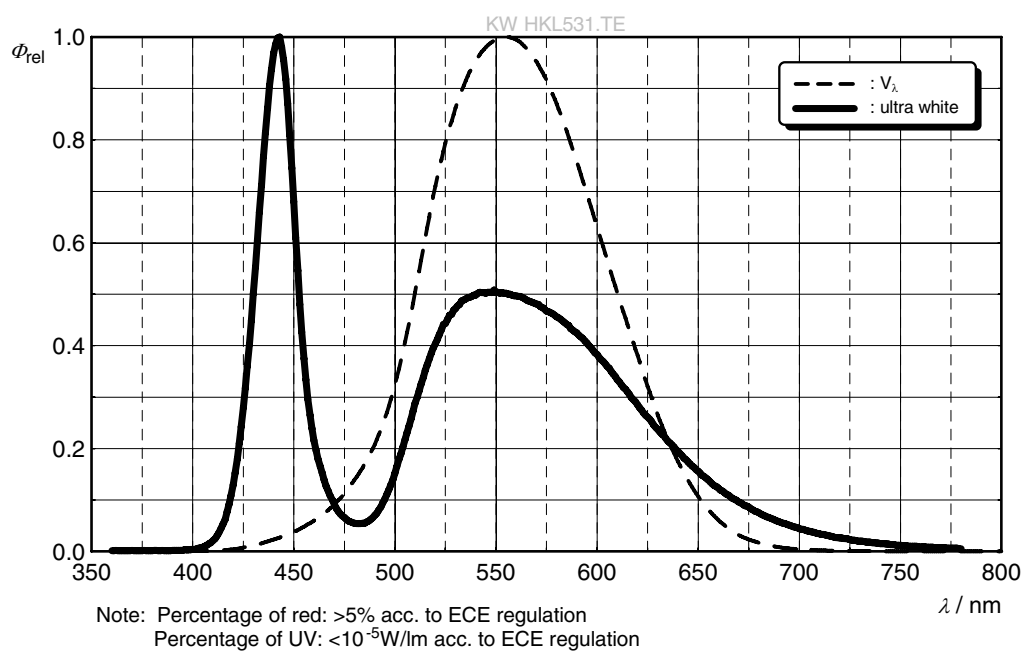
Group Name on Label

Example: F0-ebvF46-4L

| Brightness | Color Chromaticity | Forward Voltage |
|------------|--------------------|-----------------|
| F0 | ebvF46 | 4L |

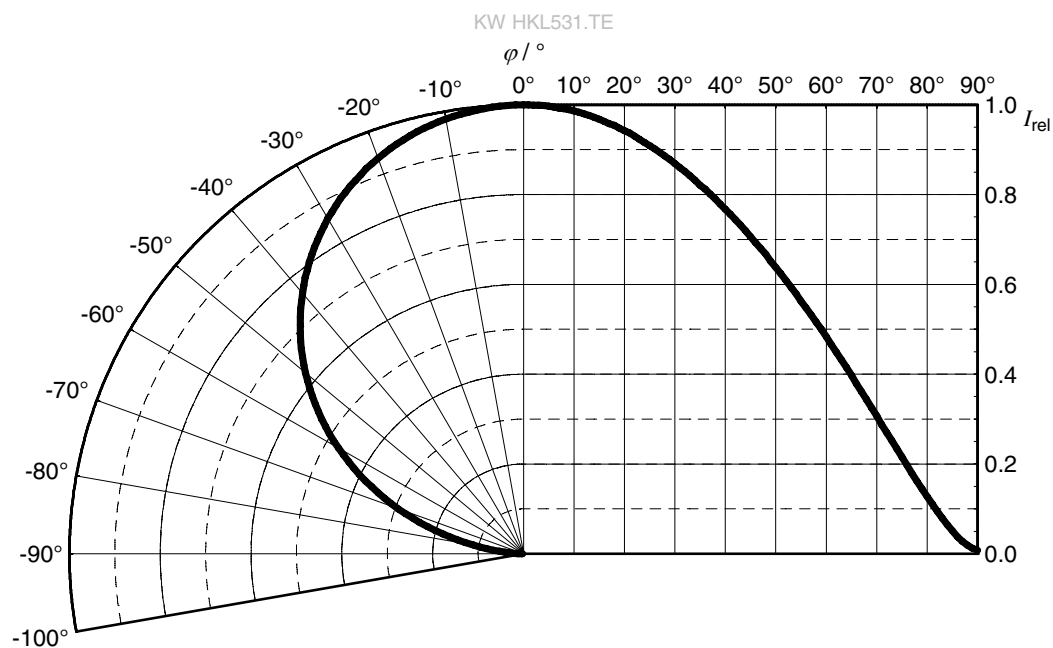
Relative Spectral Emission ⁶⁾

$$\Phi_{\text{rel}} = f(\lambda); I_F = 1000 \text{ mA}; T_S = 25 \text{ }^{\circ}\text{C}$$



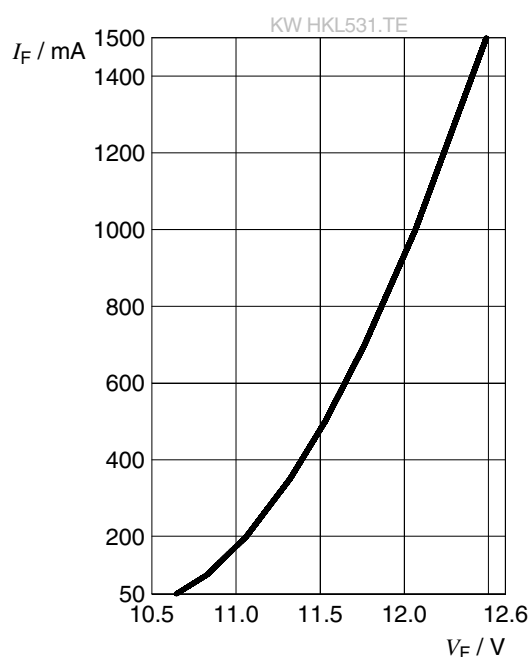
Radiation Characteristics ⁶⁾

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



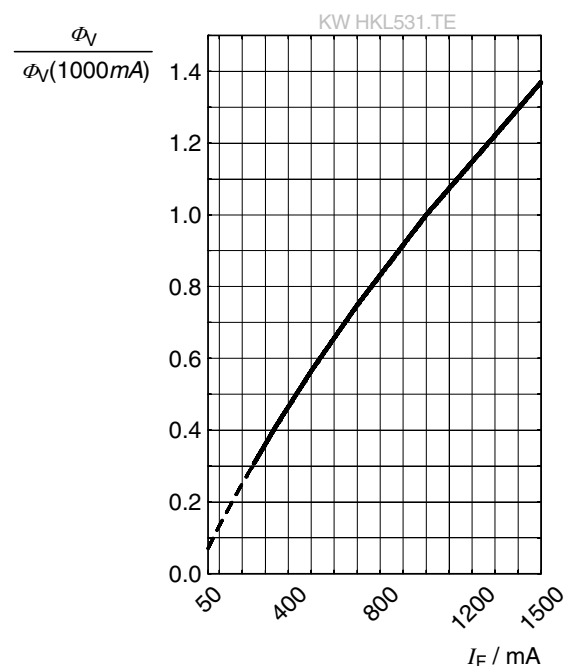
Forward current ^{6), 7)}

$$I_F = f(V_F); T_S = 25\text{ °C}$$



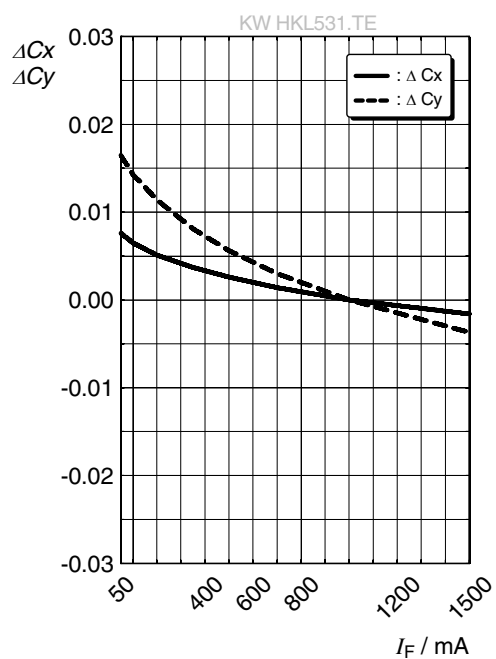
Relative Luminous Flux ^{6), 7)}

$$\Phi_V / \Phi_V(1000\text{ mA}) = f(I_F); T_S = 25\text{ °C}$$



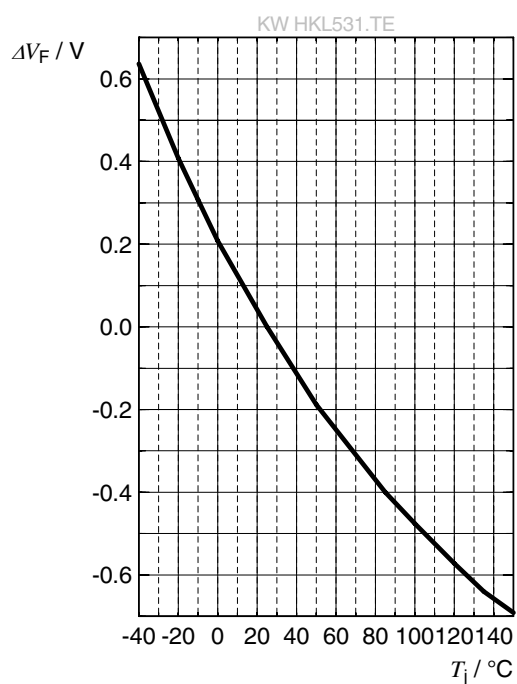
Chromaticity Coordinate Shift ⁶⁾

$$\Delta C_x, \Delta C_y = f(I_F); T_S = 25\text{ °C}$$

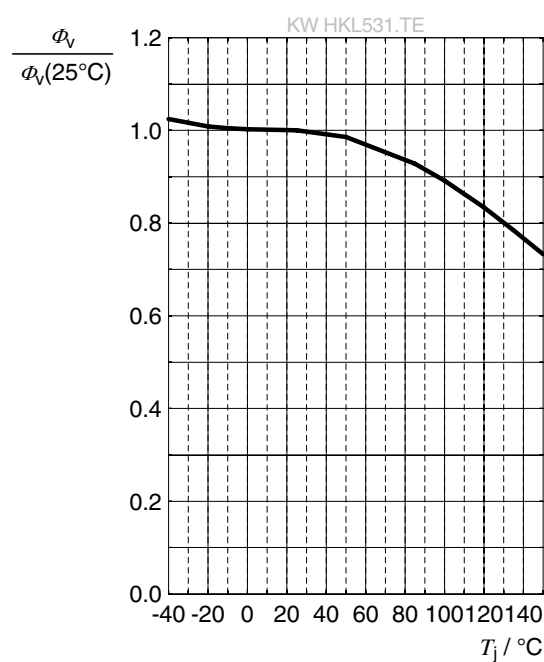


Forward Voltage ⁶⁾

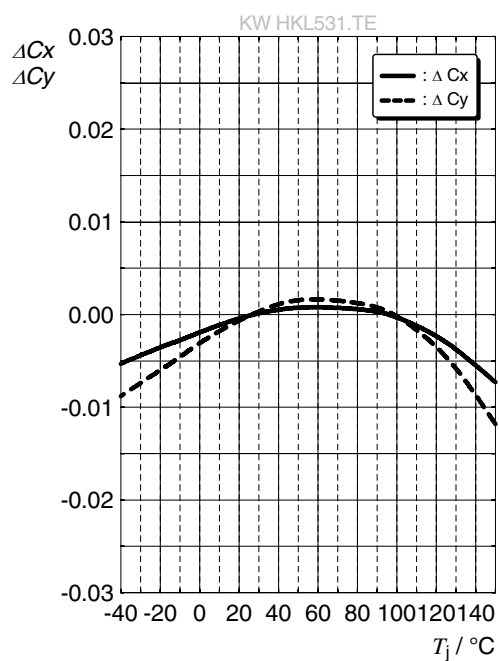
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 1000 \text{ mA}$$

**Relative Luminous Flux** ⁶⁾

$$\Phi_V / \Phi_V(25^\circ\text{C}) = f(T_j); I_F = 1000 \text{ mA}$$

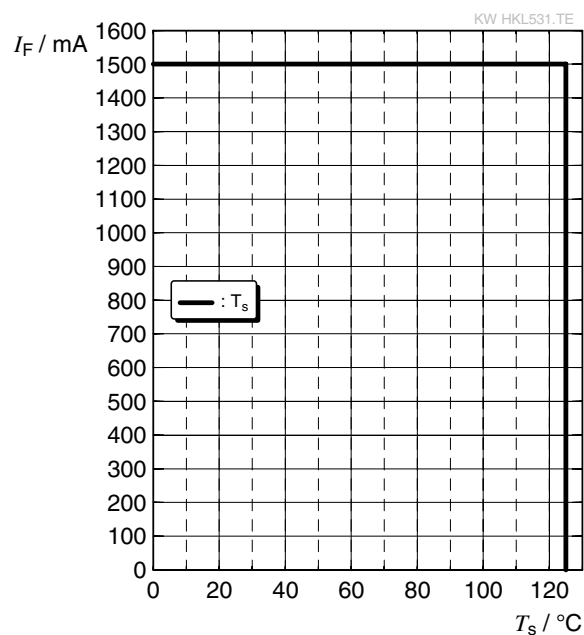
**Chromaticity Coordinate Shift** ⁶⁾

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 1000 \text{ mA}$$



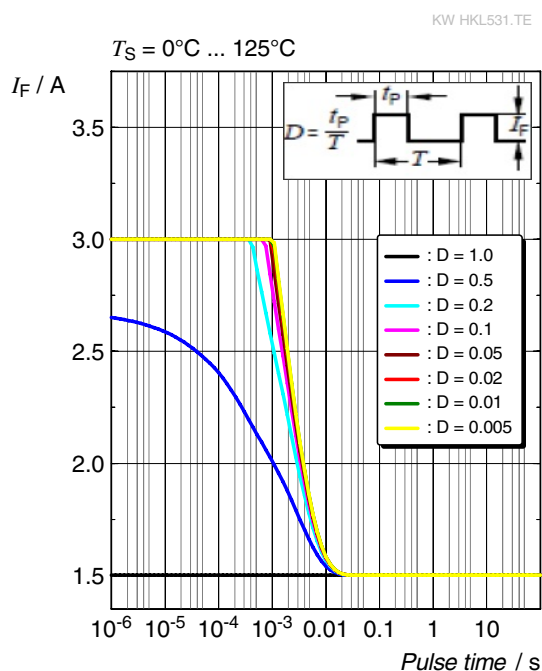
Max. Permissible Forward Current ⁵⁾

$I_F = f(T)$; $0.7 \cdot \Phi_{V \min.}$ of bin F0; $R_{th \text{ real max.}}$

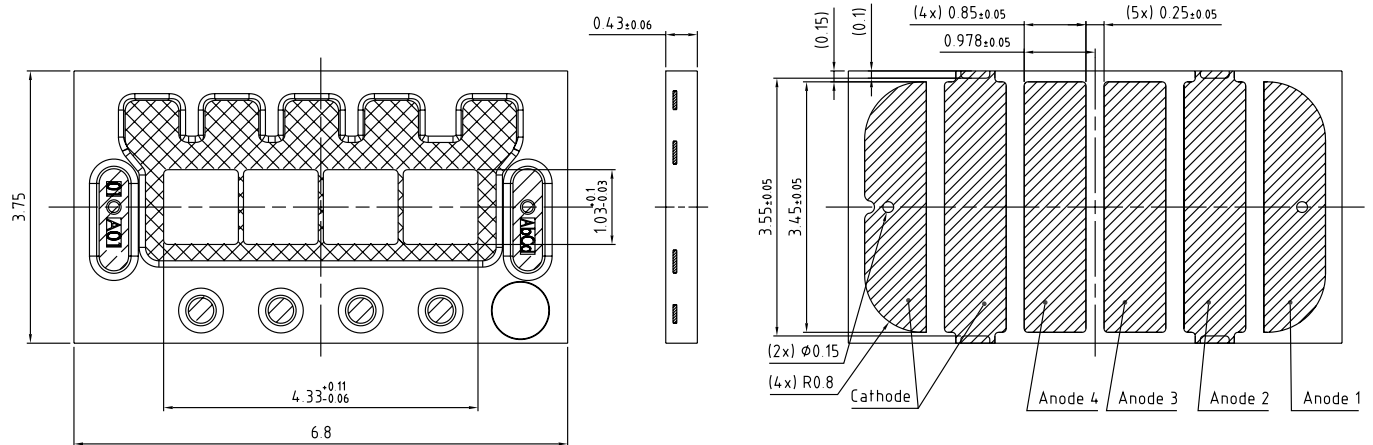


Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle



Dimensional Drawing ⁸⁾



general tolerance ± 0.1

 Lead finish Au

C67062-A0182-A1-04

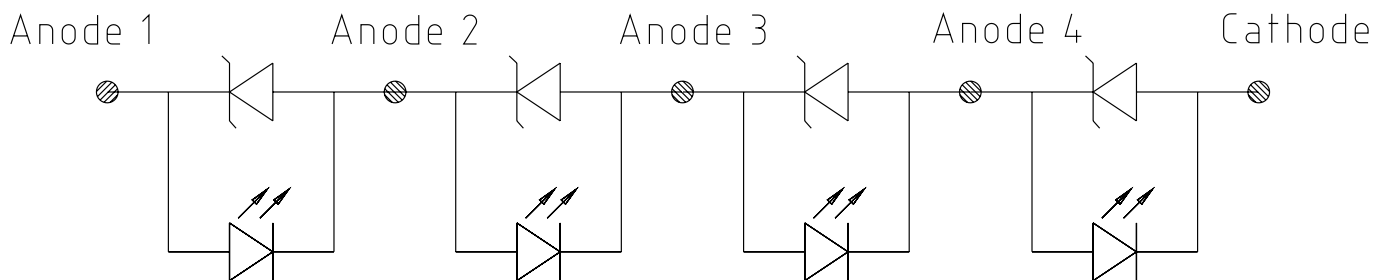
Further Information:

Approximate Weight: 42.0 mg

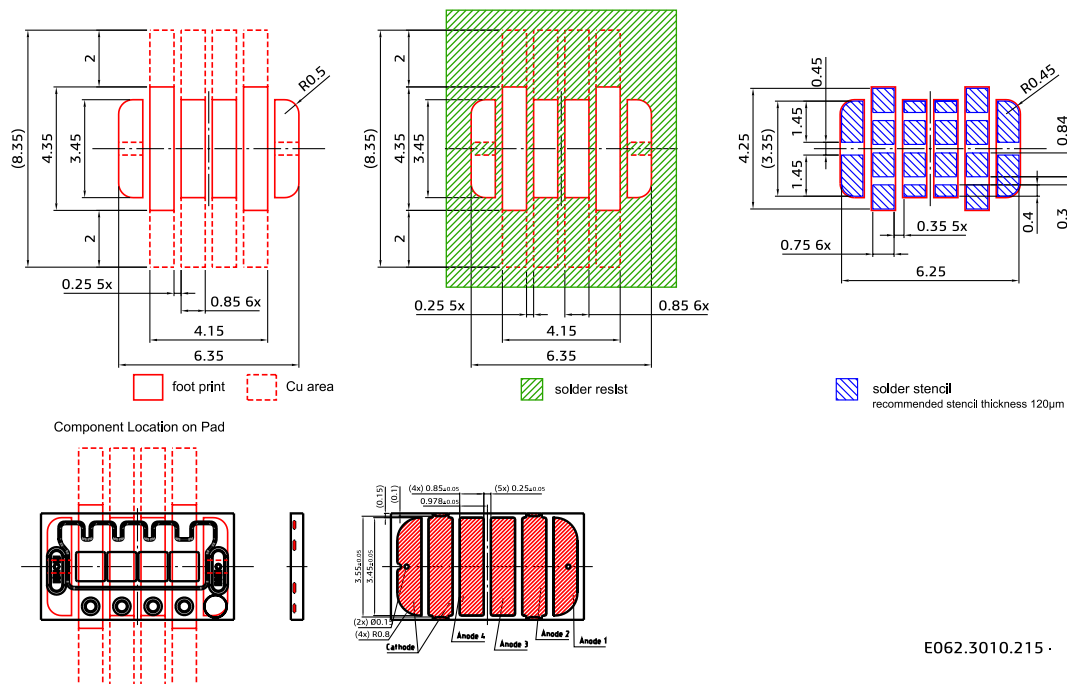
Corrosion test: Class: 3B
Test condition: 40°C / 90 % RH / 15 ppm H₂S / 14 days (stricter than IEC 60068-2-43)

ESD advice: The device is protected by ESD device which is connected in parallel to the Chip.

Electrical Internal Circuit



Recommended Solder Pad ⁸⁾



E062.3010.215

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning. To ensure a high solder joint reliability and to minimize the risk of solder joint cracks, the customer is responsible to evaluate the combination of PCB board and solder paste material for his application.

Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E

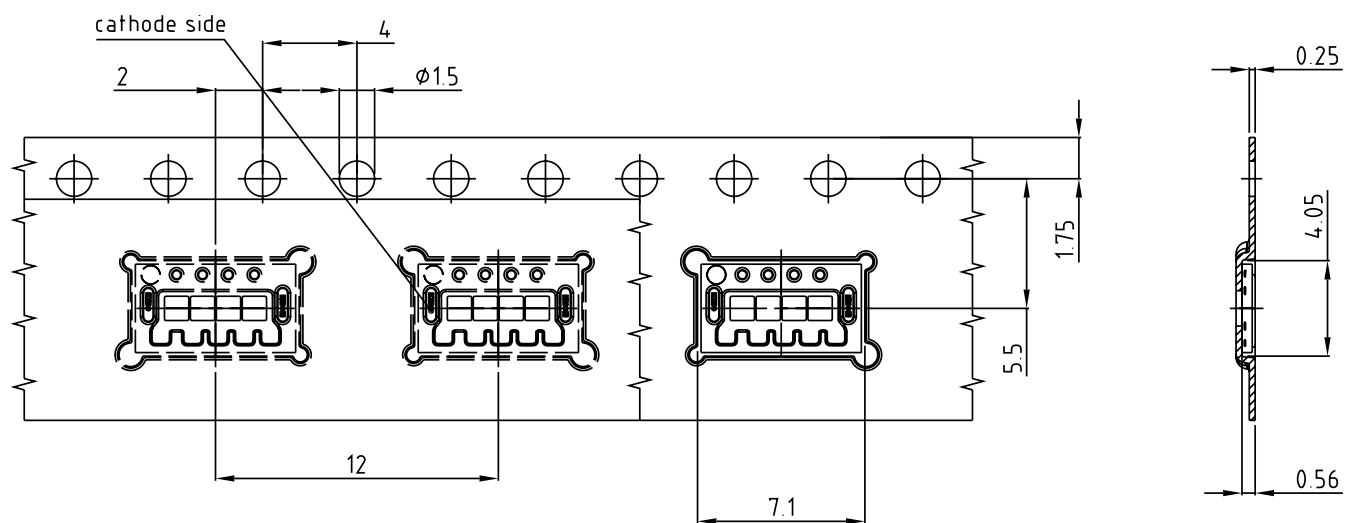


| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|--|--------|---------------------------|----------------|---------|--------------------|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat ^{*)} 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time t_s T_{Smin} to T_{Smax} | t_s | 60 | 100 | 120 | s |
| Ramp-up rate to peak ^{*)} T_{Smax} to T_p | | | 2 | 3 | K/s |
| Liquidus temperature | T_L | | 217 | | $^{\circ}\text{C}$ |
| Time above liquidus temperature | t_L | | 80 | 100 | s |
| Peak temperature | T_p | | 245 | 260 | $^{\circ}\text{C}$ |
| Time within 5 °C of the specified peak temperature $T_p - 5\text{ K}$ | t_p | 10 | 20 | 30 | s |
| Ramp-down rate* T_p to 100 °C | | | 3 | 6 | K/s |
| Time 25 °C to T_p | | | | 480 | s |

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

* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁸⁾



C67062-A0182-B9-04

Tape and Reel ⁹⁾



Reel Dimensions

| A | W | N _{min} | W ₁ | W _{2 max} | Pieces per PU |
|--------|---------------------|------------------|----------------|--------------------|---------------|
| 180 mm | 12 + 0.3 / - 0.1 mm | 60 mm | 12.4 + 2 mm | 18.4 mm | 1500 |

Barcode-Product-Label (BPL)

OSRAM

LX XXXX

BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890

ML Temp ST
X XXX °C X

(1T) LOT NO: 1234567890

(9D) D/C: 1234

Pack: RXX

DEMY XXX

X_X123_1234.1234 X

(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X

OHA04563

Dry Packing Process and Materials ⁸⁾

Moisture-sensitive label or print

Barcode label

Desiccant

Humidity indicator

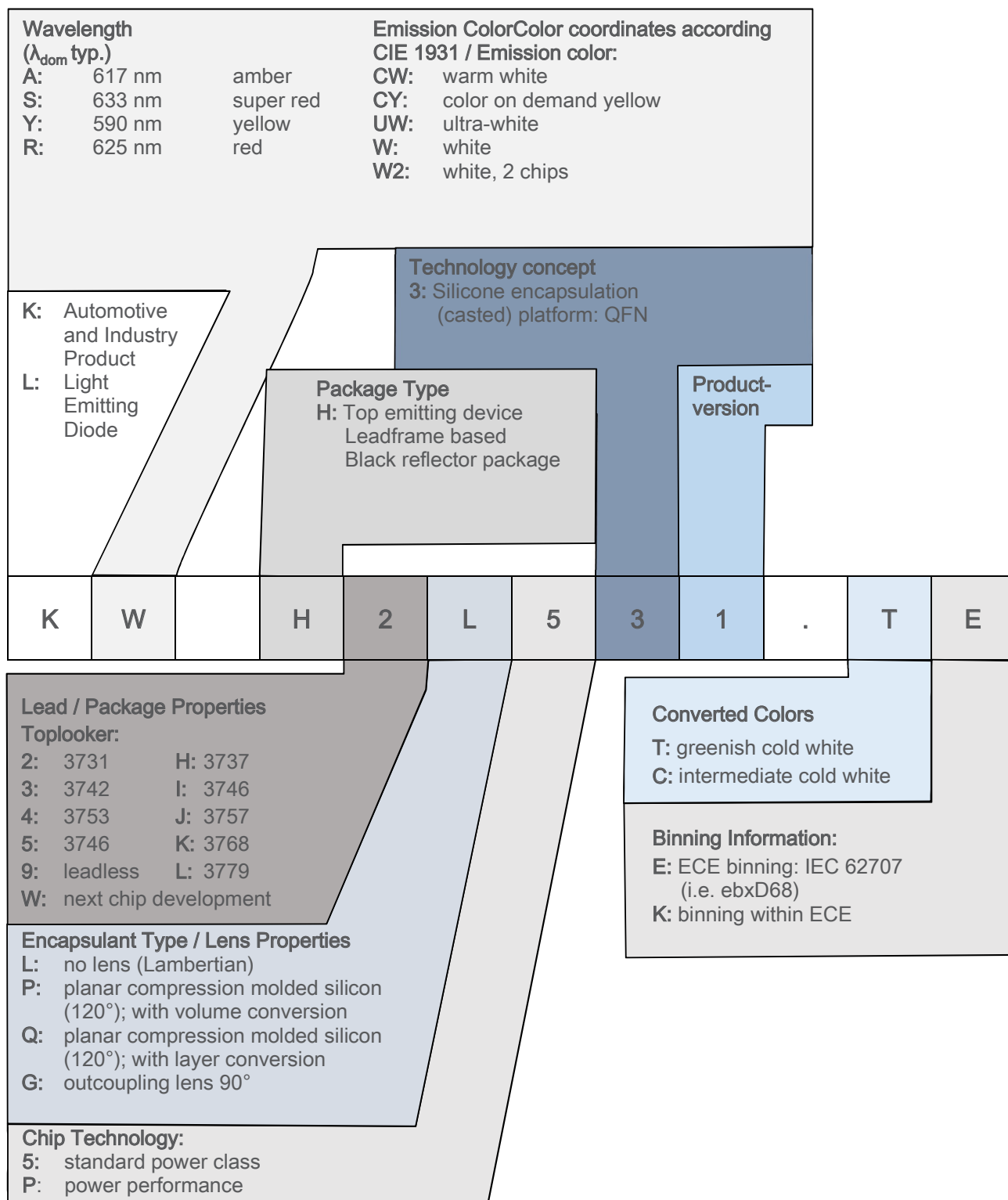
Barcode label

OHA00539

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

18 | Version 1.7 | 2025-07-06

Type Designation System



Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet fall into the class **moderate risk (exposure time 0.25 s)**. Under real circumstances (for exposure time, conditions of the 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. When looking at 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.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit <https://ams-osram.com/support/application-notes>

Disclaimer

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 on our website.

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.

Product and functional safety devices/applications or medical devices/applications

Our components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.

Our products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using our components in product safety devices/ applications or medical devices/applications, buyer and/or customer has to inform our local sales partner immediately and we and buyer and /or customer will analyze and coordinate the customer-specific request between us and buyer and/or customer.

Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 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) **Reverse Operation:** This product is intended to be operated applying a forward current within the specified range. Applying any continuous reverse bias or forward bias below the voltage range of light emission shall be avoided because it may cause migration which can change the electro-optical characteristics or damage the LED.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 25 ms, with an internal reproducibility of ± 0.005 and an expanded uncertainty of ± 0.01 (acc. to GUM with a coverage factor of $k = 3$).
- 4) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of ± 0.05 V and an expanded uncertainty of ± 0.1 V (acc. to GUM with a coverage factor of $k = 3$).
- 5) **Thermal Resistance:** $R_{th\ max}$ is based on statistic values (6σ) used for Derating.
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, 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.
- 7) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Revision History

| Version | Date | Change |
|---------|------------|---|
| 1.3 | 2019-02-12 | Ordering Information Brightness Groups Derating (Diagrams) Type Designation System Notes Disclaimer |
| 1.4 | 2019-08-22 | Ordering Information Characteristics Brightness Groups Group Name on Label Derating (Diagrams) Recommended Solder Pad Notes Disclaimer |
| 1.5 | 2020-01-30 | Features Schematic Transportation Box Dimensions of Transportation Box |
| 1.6 | 2020-10-13 | Further Information Recommended Solder Pad Glossary |
| 1.7 | 2025-07-06 | Characteristics Recommended Solder Pad New Layout |



EU RoHS and China RoHS compliant product

此产品符合欧盟 RoHS 指令的要求；
按照中国的相关法规和标准，
不含有毒有害物质或元素。

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