

# OSRAM KW DNLS31.RA

## Datasheet

Published by **ams-OSRAM AG**

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SYNIOS® E2314

# KW DNLS31.RA

The footprint of the SYNIOS E2314 is optimized for backlighting lightguides with small widths. The combination of volume casting and volume emitter LED chip offers a very homogenous radiation in the mid power class.



## Applications

- Display Backlighting

## Features

- Package: SMD epoxy package, colored silicone resin
- Chip technology: InGaN on Sapphire
- Typ. Radiation: 120° (Lambertian emitter)
- Color:  $C_x = 0.305$ ,  $C_y = 0.295$  acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 1B
- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

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## Ordering Information

| Type                          | Luminous Flux <sup>1)</sup><br>$I_F = 80 \text{ mA}$<br>$\Phi_V$ | Ordering Code |
|-------------------------------|--|---------------|
| KW DNLS31.RA-6G7H-FK0PM0-22C2 | 20.1 ... 40.0 lm   | Q65111A9004   |

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## Maximum Ratings

| Parameter  | Symbol    |      | Values                             |
|--|-----------|------|------------------------------------|
| Operating Temperature  | $T_{op}$  | min. | -40 °C                             |
|  |           | max. | 100 °C                             |
| Storage Temperature  | $T_{stg}$ | min. | -40 °C                             |
|  |           | max. | 100 °C                             |
| Junction Temperature   | $T_j$     | max. | 125 °C                             |
| Forward current<br>$T_s = 25\text{ °C}$                                | $I_F$     | min. | 3 mA                               |
|  |           | max. | 120 mA                             |
| ESD withstand voltage<br>acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2) | $V_{ESD}$ |      | 2 kV                               |
| Reverse voltage <sup>2)</sup>  | $V_R$     |      | Not designed for reverse operation |

## Characteristics

$I_F = 80 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

| Parameter  | Symbol                   |      | Values                             |
|--|--------------------------|------|------------------------------------|
| Chromaticity Coordinate <sup>3)</sup>  | $C_x$                    | typ. | 0.305                              |
|  | $C_y$                    | typ. | 0.295                              |
| Viewing angle at 50% $I_V$   | $2\phi$                  | typ. | 120 °                              |
| Forward Voltage <sup>4)</sup><br>$I_F = 80 \text{ mA}$   | $V_F$                    | min. | 2.80 V                             |
|  |                          | typ. | 3.05 V                             |
|  |                          | max. | 3.40 V                             |
| Reverse current <sup>2)</sup>  | $I_R$                    |      | Not designed for reverse operation |
| Real thermal resistance junction/solderpoint <sup>5)</sup>   | $R_{thJS \text{ real}}$  | typ. | 80 K / W                           |
|  |                          | max. | 96 K / W                           |
| Electrical thermal resistance junction/solderpoint <sup>5)</sup><br>with efficiency $\eta_e = 34 \%$ | $R_{thJS \text{ elec.}}$ | typ. | 53 K / W                           |
|  |                          | max. | 63 K / W                           |

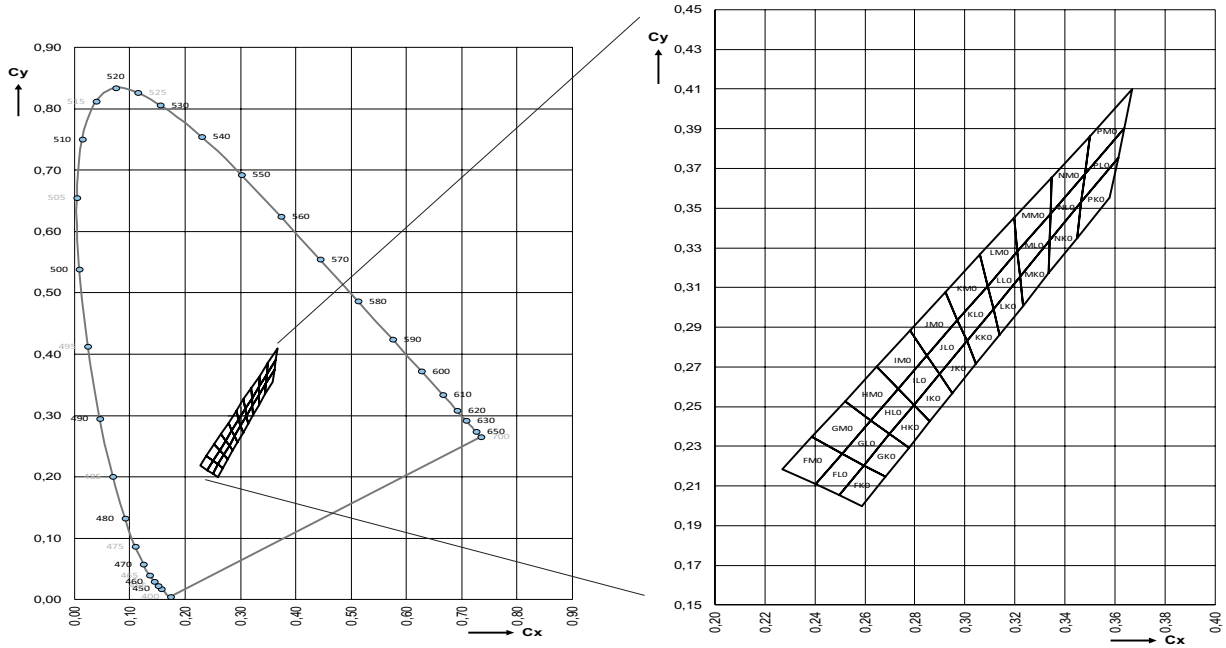
## Brightness Groups

| Group | Luminous Flux <sup>1)</sup><br>$I_F = 80 \text{ mA}$<br>min.<br>$\Phi_V$ | Luminous Flux <sup>1)</sup><br>$I_F = 80 \text{ mA}$<br>max.<br>$\Phi_V$ | Luminous Intensity <sup>6)</sup><br>$I_F = 80 \text{ mA}$<br>typ.<br>$I_v$ |
|-------|--|--|--|
| 6G    | 20.1 lm  | 22.4 lm  | 7.0 cd   |
| 7G    | 22.4 lm  | 25.0 lm  | 7.8 cd   |
| 8G    | 25.0 lm  | 28.0 lm  | 8.7 cd   |
| 5H    | 28.0 lm  | 31.5 lm  | 9.8 cd   |
| 6H    | 31.5 lm  | 35.5 lm  | 11.1 cd  |
| 7H    | 35.5 lm  | 40.0 lm  | 12.5 cd  |

## Forward Voltage Groups

| Group | Forward Voltage <sup>4)</sup><br>$I_F = 80 \text{ mA}$<br>min.<br>$V_F$ | Forward Voltage <sup>4)</sup><br>$I_F = 80 \text{ mA}$<br>max.<br>$V_F$ |
|-------|---|---|
| 22    | 2.80 V  | 2.90 V  |
| 42    | 2.90 V  | 3.00 V  |
| 62    | 3.00 V  | 3.10 V  |
| 82    | 3.10 V  | 3.20 V  |
| A2    | 3.20 V  | 3.30 V  |
| C2    | 3.30 V  | 3.40 V  |

### Chromaticity Coordinate Groups <sup>3)</sup>



### Chromaticity Coordinate Groups <sup>3)</sup>

| Group | Cx     | Cy     | Group | Cx     | Cy     | Group | Cx     | Cy     |
|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| FK0   | 0.2498 | 0.2053 | GL0   | 0.2509 | 0.2264 | HM0   | 0.2520 | 0.2527 |
|       | 0.2597 | 0.2204 |       | 0.2624 | 0.2431 |       | 0.2646 | 0.2700 |
|       | 0.2682 | 0.2146 |       | 0.2700 | 0.2361 |       | 0.2733 | 0.2590 |
|       | 0.2589 | 0.2000 |       | 0.2597 | 0.2204 |       | 0.2624 | 0.2431 |
| FL0   | 0.2402 | 0.2108 | GM0   | 0.2388 | 0.2348 | IK0   | 0.2797 | 0.2509 |
|       | 0.2509 | 0.2264 |       | 0.2520 | 0.2527 |       | 0.2898 | 0.2664 |
|       | 0.2597 | 0.2204 |       | 0.2624 | 0.2431 |       | 0.2950 | 0.2568 |
|       | 0.2498 | 0.2053 |       | 0.2509 | 0.2264 |       | 0.2861 | 0.2427 |
| FM0   | 0.2269 | 0.2185 | HK0   | 0.2700 | 0.2361 | ILO   | 0.2733 | 0.2590 |
|       | 0.2388 | 0.2348 |       | 0.2797 | 0.2509 |       | 0.2848 | 0.2757 |
|       | 0.2509 | 0.2264 |       | 0.2861 | 0.2427 |       | 0.2898 | 0.2664 |
|       | 0.2402 | 0.2108 |       | 0.2775 | 0.2292 |       | 0.2797 | 0.2509 |
| GK0   | 0.2597 | 0.2204 | HLO   | 0.2624 | 0.2431 | IMO   | 0.2646 | 0.2700 |
|       | 0.2700 | 0.2361 |       | 0.2733 | 0.2590 |       | 0.2780 | 0.2883 |
|       | 0.2775 | 0.2292 |       | 0.2797 | 0.2509 |       | 0.2848 | 0.2757 |
|       | 0.2682 | 0.2146 |       | 0.2700 | 0.2361 |       | 0.2733 | 0.2590 |

| Group | Cx     | Cy     | Group | Cx     | Cy     | Group | Cx     | Cy     |
|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| JK0   | 0.2898 | 0.2664 | LK0   | 0.3113 | 0.2992 | NK0   | 0.3339 | 0.3336 |
|       | 0.3007 | 0.2830 |       | 0.3219 | 0.3154 |       | 0.3465 | 0.3530 |
|       | 0.3045 | 0.2717 |       | 0.3231 | 0.3008 |       | 0.3447 | 0.3347 |
|       | 0.2950 | 0.2568 |       | 0.3138 | 0.2862 |       | 0.3335 | 0.3172 |
| JL0   | 0.2848 | 0.2757 | LLO   | 0.3090 | 0.3108 | NLO   | 0.3341 | 0.3472 |
|       | 0.2971 | 0.2935 |       | 0.3209 | 0.3281 |       | 0.3479 | 0.3673 |
|       | 0.3007 | 0.2830 |       | 0.3219 | 0.3154 |       | 0.3465 | 0.3530 |
|       | 0.2898 | 0.2664 |       | 0.3113 | 0.2992 |       | 0.3339 | 0.3336 |
| JM0   | 0.2780 | 0.2883 | LMO   | 0.3060 | 0.3266 | NMO   | 0.3345 | 0.3654 |
|       | 0.2922 | 0.3077 |       | 0.3196 | 0.3451 |       | 0.3498 | 0.3863 |
|       | 0.2971 | 0.2935 |       | 0.3209 | 0.3281 |       | 0.3479 | 0.3673 |
|       | 0.2848 | 0.2757 |       | 0.3090 | 0.3108 |       | 0.3341 | 0.3472 |
| KK0   | 0.3007 | 0.2830 | MK0   | 0.3219 | 0.3154 | PK0   | 0.3465 | 0.3530 |
|       | 0.3113 | 0.2992 |       | 0.3339 | 0.3336 |       | 0.3599 | 0.3735 |
|       | 0.3138 | 0.2862 |       | 0.3335 | 0.3172 |       | 0.3567 | 0.3535 |
|       | 0.3045 | 0.2717 |       | 0.3231 | 0.3008 |       | 0.3447 | 0.3347 |
| KLO   | 0.2971 | 0.2935 | MLO   | 0.3209 | 0.3281 | PLO   | 0.3479 | 0.3673 |
|       | 0.3090 | 0.3108 |       | 0.3341 | 0.3472 |       | 0.3623 | 0.3882 |
|       | 0.3113 | 0.2992 |       | 0.3339 | 0.3336 |       | 0.3599 | 0.3735 |
|       | 0.3007 | 0.2830 |       | 0.3219 | 0.3154 |       | 0.3465 | 0.3530 |
| KM0   | 0.2922 | 0.3077 | MM0   | 0.3196 | 0.3451 | PM0   | 0.3498 | 0.3863 |
|       | 0.3060 | 0.3266 |       | 0.3345 | 0.3654 |       | 0.3655 | 0.4079 |
|       | 0.3090 | 0.3108 |       | 0.3341 | 0.3472 |       | 0.3623 | 0.3882 |
|       | 0.2971 | 0.2935 |       | 0.3209 | 0.3281 |       | 0.3479 | 0.3673 |



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## Group Name on Label

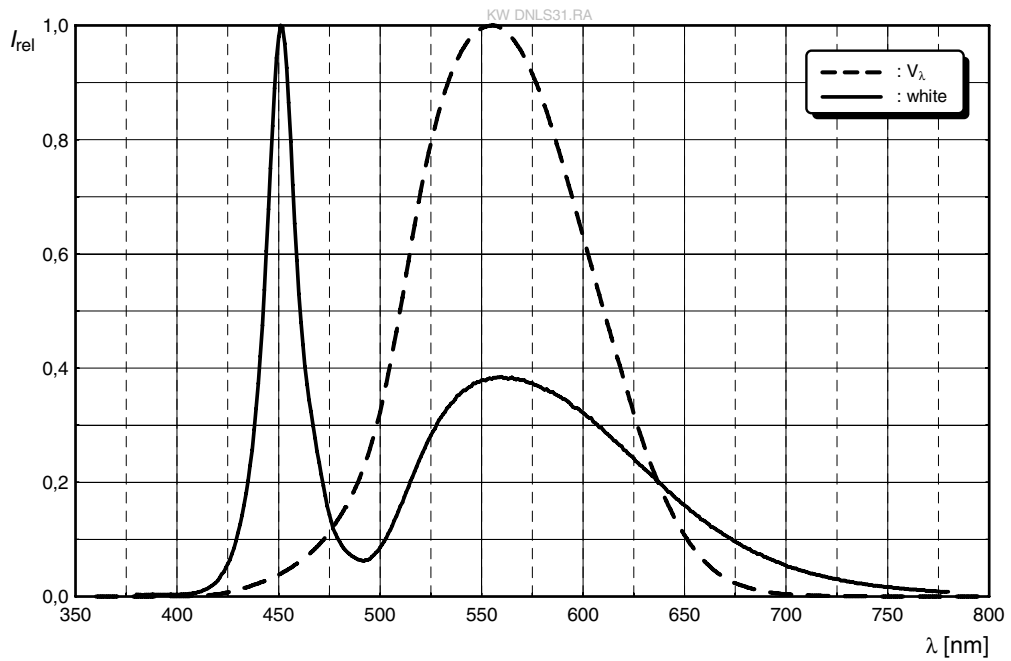
**Example: 5H-FK0-22**

| Brightness | Color Chromaticity | Forward Voltage |
|------------|--------------------|-----------------|
| 5H         | FK0                | 22              |

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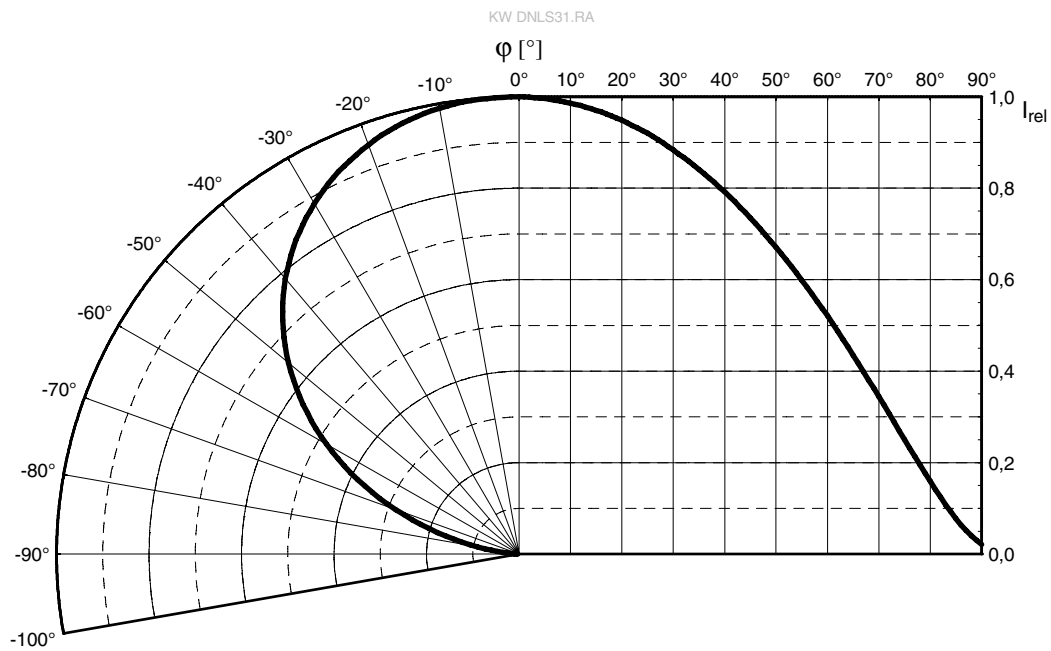
### Relative Spectral Emission <sup>6)</sup>

$I_{rel} = f(\lambda); I_F = 80 \text{ mA}; T_S = 25 \text{ }^\circ\text{C}$



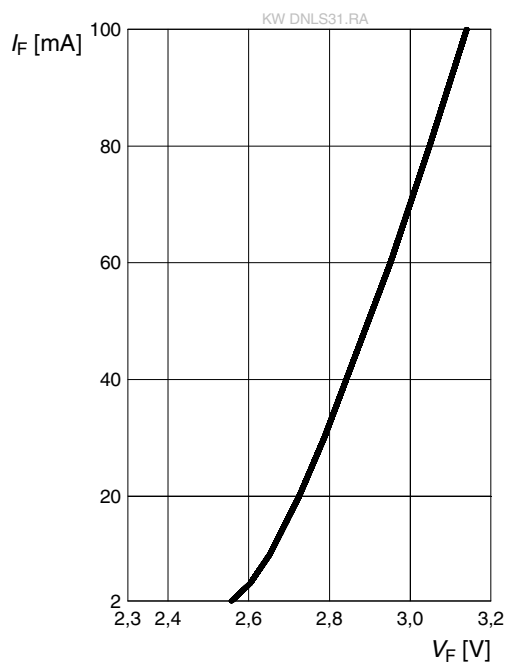
### Radiation Characteristics <sup>6)</sup>

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



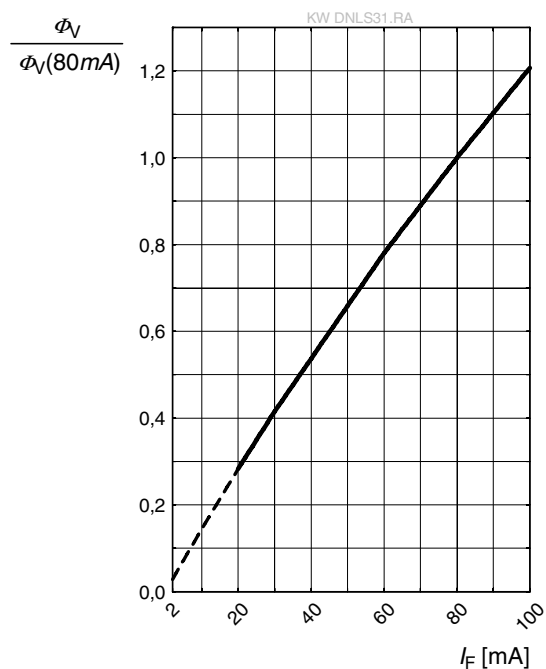
### Forward current <sup>6)</sup>

$$I_F = f(V_F); T_S = 25\text{ °C}$$



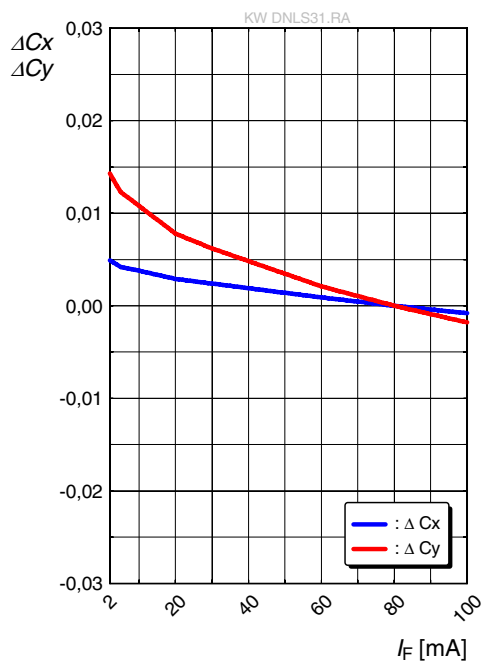
### Relative Luminous Flux <sup>6), 7)</sup>

$$\Phi_V / \Phi_V(80\text{ mA}) = f(I_F); T_S = 25\text{ °C}$$



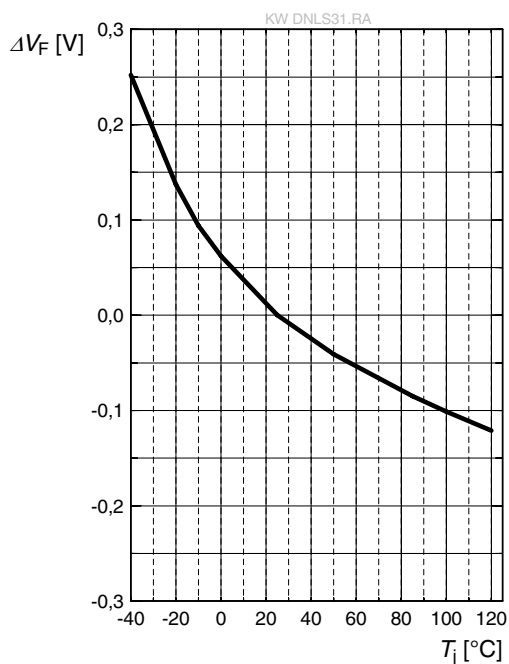
### Chromaticity Coordinate Shift <sup>6)</sup>

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



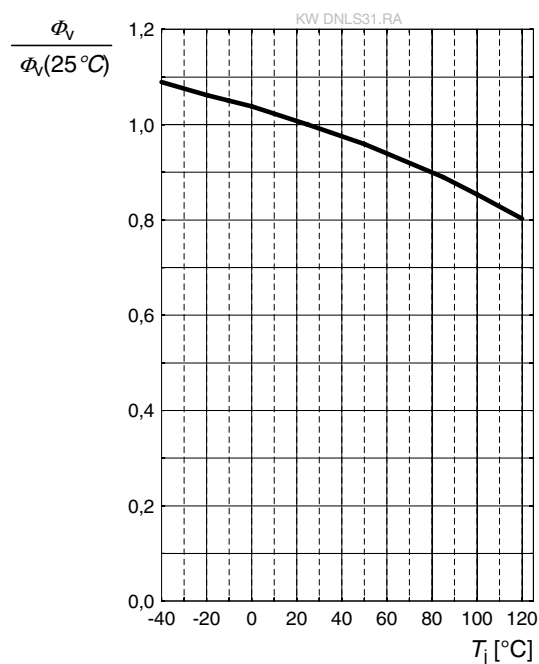
### Forward Voltage <sup>6)</sup>

$$\Delta V_F = V_F - V_F(25\text{ }^\circ\text{C}) = f(T_j); I_F = 80\text{ mA}$$



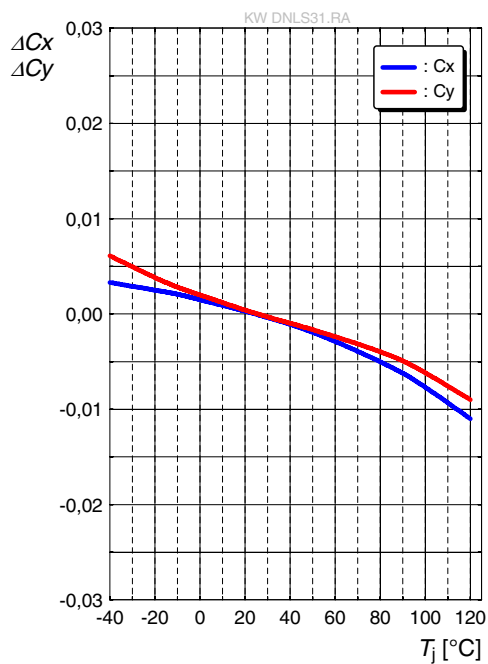
### Relative Luminous Flux <sup>6)</sup>

$$\Phi_V / \Phi_V(25\text{ }^\circ\text{C}) = f(T_j); I_F = 80\text{ mA}$$



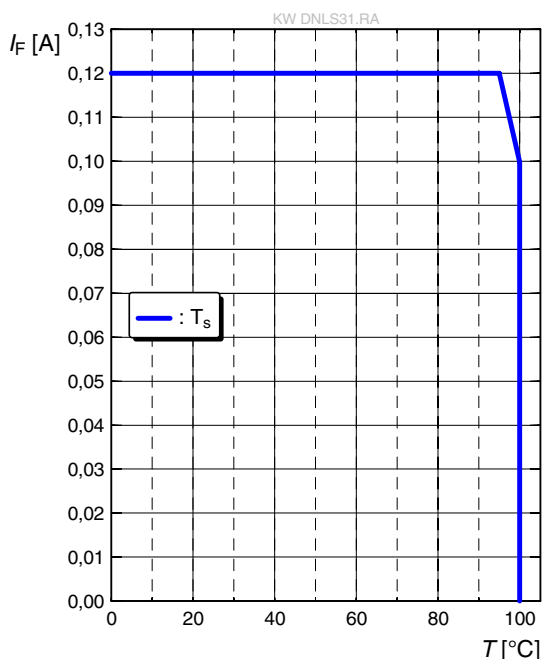
### Chromaticity Coordinate Shift <sup>6)</sup>

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 80\text{ mA}$$



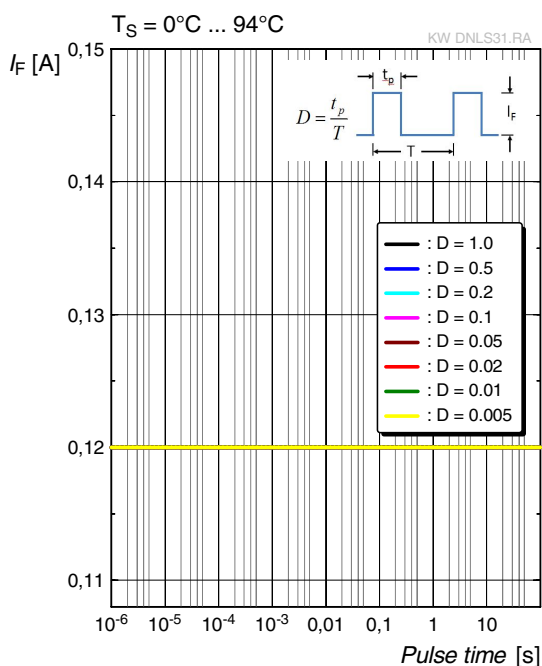
### Max. Permissible Forward Current

$I_F = f(T)$



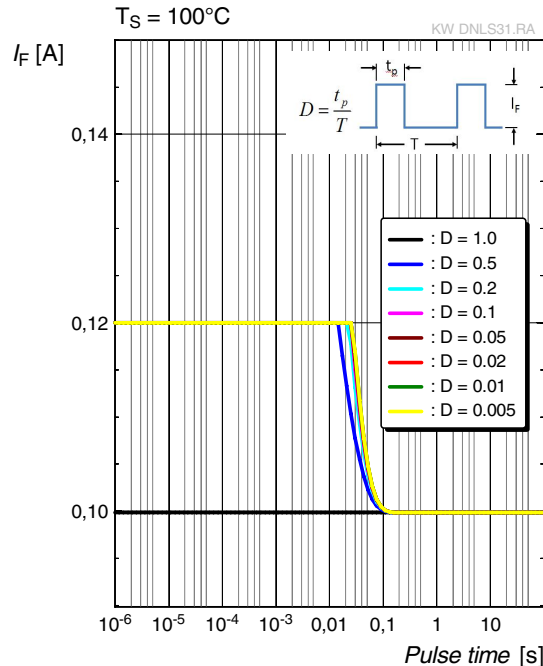
### Permissible Pulse Handling Capability

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

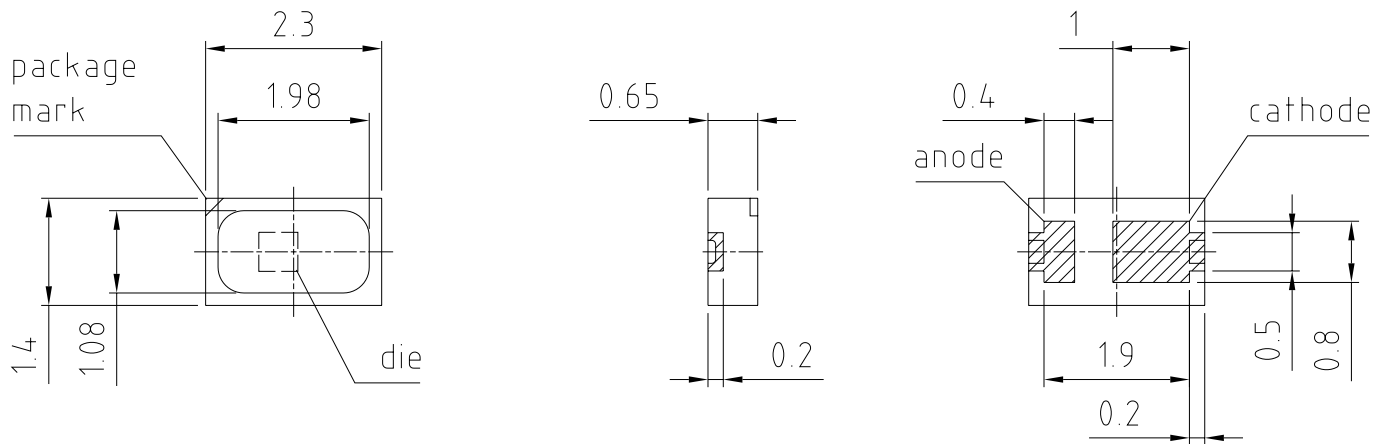


### Permissible Pulse Handling Capability

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



## Dimensional Drawing <sup>8)</sup>



general tolerance  $\pm 0.1$   
lead finish Ag 

C63062-A4305-A1.-03

## Further Information:

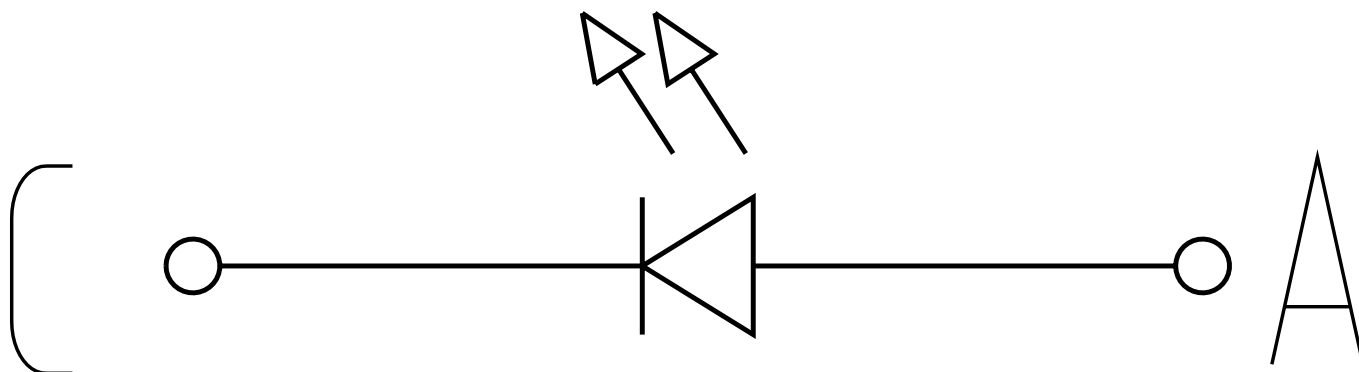
**Approximate Weight:** 6.0 mg

**Package marking:** Cathode

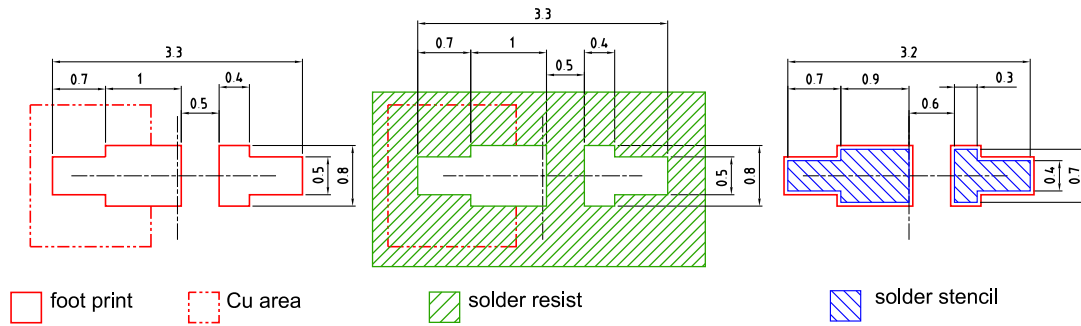
**Corrosion test:** Class: 1B

Test condition: 25°C / 75 % RH / 200ppb SO<sub>2</sub>, 200ppb NO<sub>2</sub>, 10ppb H<sub>2</sub>S,  
10ppb Cl<sub>2</sub> / 21 days (EN 60068-2-60 (Method 4))

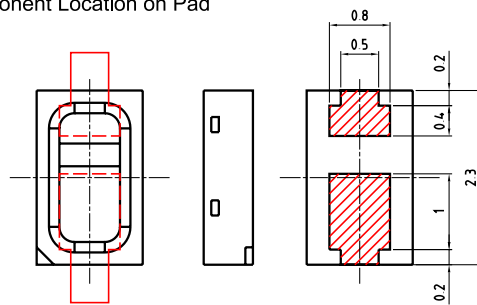
Electrical Internal Circuit



Recommended Solder Pad <sup>8)</sup>



Component Location on Pad



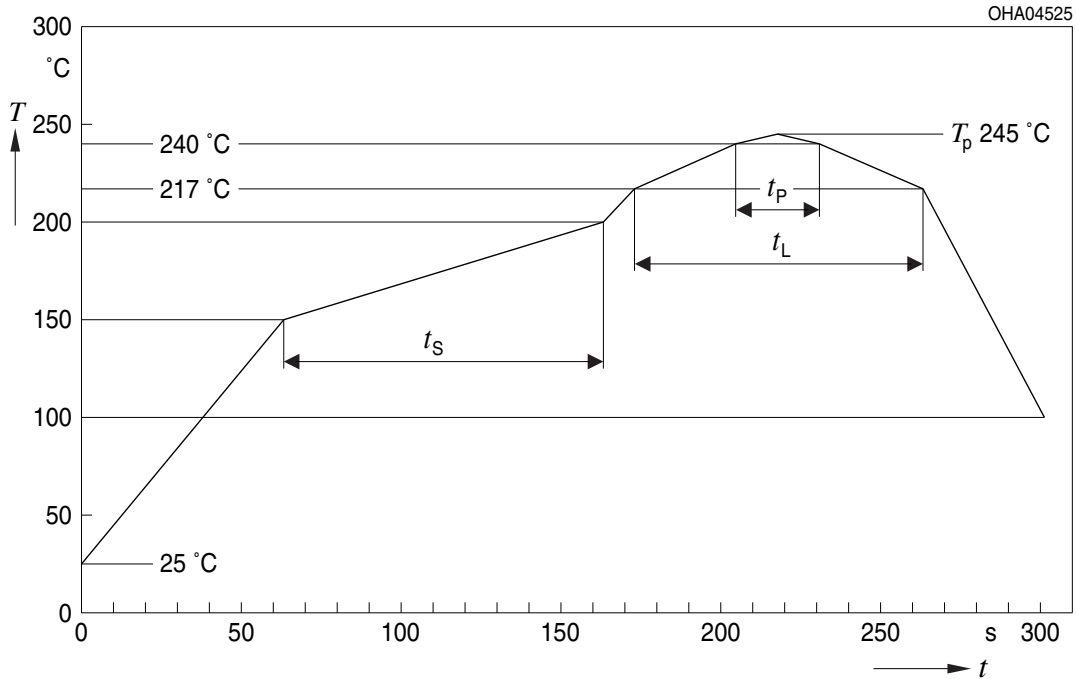
E062.3010.199 -01

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.



## Reflow Soldering Profile

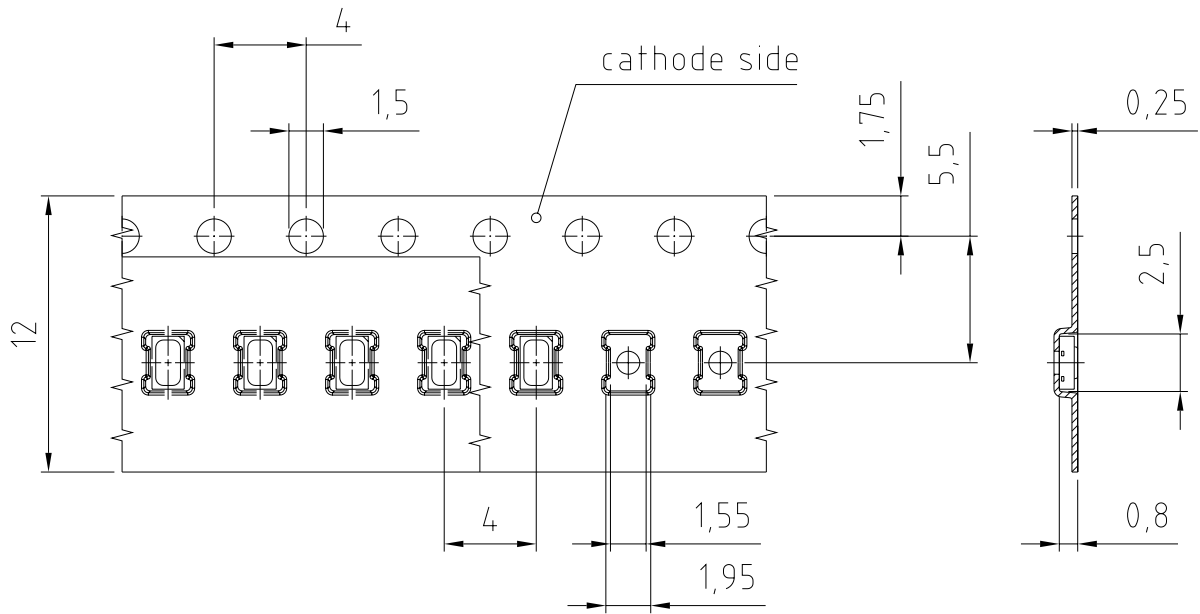
Product complies to MSL Level 3 acc. to JEDEC J-STD-020E



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

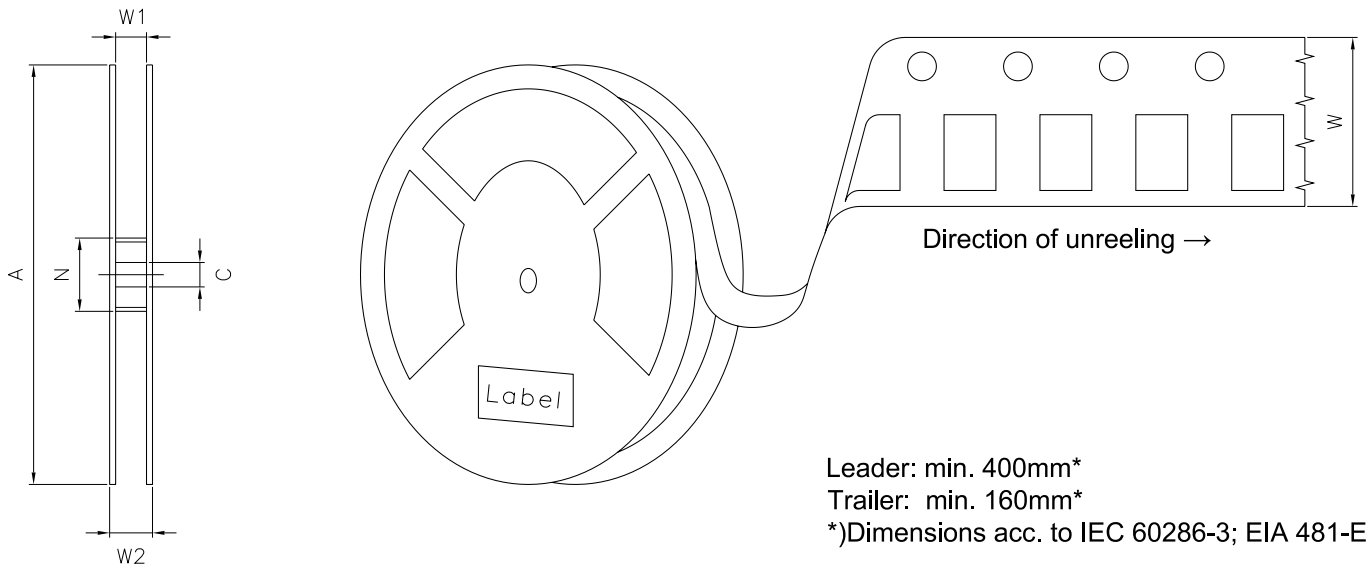
All temperatures refer to the center of the package, measured on the top of the component  
<sup>\*)</sup> slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

Taping <sup>8)</sup>



C63062-A4305-B6-01

**Tape and Reel** <sup>9)</sup>



**Reel Dimensions**

| A      | W                   | N <sub>min</sub> | W <sub>1</sub> | W <sub>2max</sub> | Pieces per PU |
|--------|---------------------|------------------|----------------|-------------------|---------------|
| 180 mm | 12 + 0.3 / - 0.1 mm | 60 mm            | 12.4 + 2 mm    | 18.4 mm           | 3000          |

### Barcode-Product-Label (BPL)

**OSRAM Opto Semiconductors** LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890

(1T) LOT NO: 1234567890 (9D) D/C: 1234

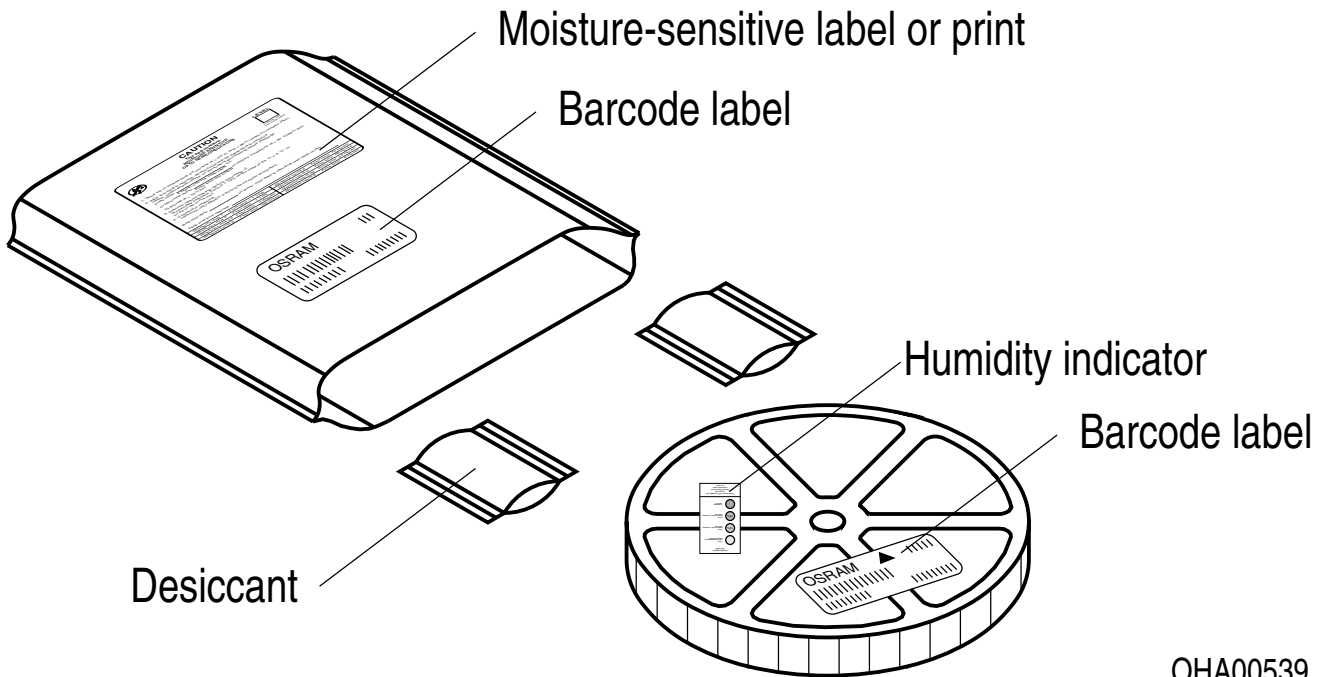
(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X

ML Temp ST  
X XXX °C X

Pack: RXX  
DEMY XXX  
X\_X123\_1234.1234 X

OHA04563

### Dry Packing Process and Materials <sup>8)</sup>



OHA00539

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

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## 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 **exempt group (exposure time 10000 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 [www.osram-os.com/appnotes](http://www.osram-os.com/appnotes)

## 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.

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## 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:** Not designed for reverse operation. Continuous reverse operation can cause migration and damage of the device.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 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) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of  $\pm 0.05\text{ V}$  and an expanded uncertainty of  $\pm 0.1\text{ V}$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 5) **Thermal Resistance:**  $R_{th\ max}$  is based on statistic values ( $6\sigma$ ).
- 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  $\pm 0.1$  and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

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## Revision History

| Version | Date       | Change   |
|---------|------------|--|
| 1.2     | 2020-09-16 | Features<br>Schematic Transportation Box<br>Dimensions of Transportation Box |
| 1.3     | 2022-07-21 | New Layout<br>Applications   |

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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。

**Published by ams-OSRAM AG**

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