# LS E65F

## Power TOPLED® Lens

PowerTOPLED with lens, a powerful member of the TOPLED family. Thanks to their high luminous efficacy, the LEDs are ideal for rear light clusters and indicators on vehicles and for display panels for traffic control systems.

## Applications

- Interior Illumination (e.g. Ambient Map)
- Signalling
- Traffic Lights

## Features:

- Package: white PLCC-4 package, colorless clear resin
- Chip technology: Thinfilm
- Typ. Radiation: 60°
- Color: $\lambda_{dom}$ = 633 nm (● super red)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

## Ordering Information

| Type | Luminous Intensity [1] $I_F$ = 50 mA $I_v$ | Ordering Code |
|---|---|---|
| LS E65F-CADB-1-1-L | 2800 ... 7100 mcd | Q65111A6076 |

## Maximum Ratings

| Parameter | Symbol | | Values |
|---|---|---|---|
| Operating Temperature | $T_{op}$ | min.<br>max. | -40 °C<br>100 °C |
| Storage Temperature | $T_{stg}$ | min.<br>max. | -40 °C<br>100 °C |
| Junction Temperature | $T_j$ | max. | 125 °C |
| Forward current<br>$T_S$ = 25 °C | $I_F$ | max. | 70 mA |
| Surge Current<br>t ≤ 10 µs; D = 0.005 ; $T_S$ = 25 °C | $I_{FS}$ | max. | 100 mA |
| Reverse voltage [2)]<br>$T_S$ = 25 °C | $V_R$ | max. | 12 V |
| ESD withstand voltage<br>acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2) | $V_{ESD}$ | | 2 kV |

## Characteristics

$I_F$ = 50 mA; $T_S$ = 25 °C

| Parameter | Symbol | | Values |
|---|---|---|---|
| Peak Wavelength | $\lambda_{peak}$ | typ. | 645 nm |
| Dominant Wavelength [3]<br>$I_F$ = 50 mA | $\lambda_{dom}$ | min.<br>typ.<br>max. | 627 nm<br>633 nm<br>639 nm |
| Spectral Bandwidth at 50% $I_{rel,max}$ | $\Delta\lambda$ | typ. | 16 nm |
| Viewing angle at 50% $I_V$ | $2\varphi$ | typ. | 60 ° |
| Forward Voltage [4]<br>$I_F$ = 50 mA | $V_F$ | min.<br>typ.<br>max. | 1.90 V<br>2.15 V<br>2.50 V |
| Reverse current [2]<br>$V_R$ = 12 V | $I_R$ | typ.<br>max. | 0.01 µA<br>10 µA |
| Temperature Coefficient of Peak Wavelength<br>-10°C ≤ T ≤ 100°C | $TC_{\lambda peak}$ | typ. | 0.15 nm / K |
| Real thermal resistance junction/solderpoint [5] | $R_{thJS\ real}$ | typ.<br>max. | 110 K / W<br>130 K / W |
| Electrical thermal resistance junction/solderpoint [5]<br>with efficiency $\eta_e$ = 32 % | $R_{thJS\ elec.}$ | typ.<br>max. | 75 K / W<br>88 K / W |

## Brightness Groups

| Group | Luminous Intensity [1] $I_F$ = 50 mA min. $I_v$ | Luminous Intensity. [1] $I_F$ = 50 mA max. $I_v$ | Luminous Flux [6] $I_F$ = 50 mA typ. $\Phi_V$ |
|---|---|---|---|
| CA | 2800 mcd | 3550 mcd | 3520 mlm |
| CB | 3550 mcd | 4500 mcd | 4470 mlm |
| DA | 4500 mcd | 5600 mcd | 5610 mlm |
| DB | 5600 mcd | 7100 mcd | 7050 mlm |

## Forward Voltage Groups

| Group | Forward Voltage [4] $I_F$ = 50 mA min. $V_F$ | Forward Voltage [4] $I_F$ = 50 mA max. $V_F$ |
|---|---|---|
| 3A | 1.90 V | 2.05 V |
| 3B | 2.05 V | 2.20 V |
| 4A | 2.20 V | 2.35 V |
| 4B | 2.35 V | 2.50 V |

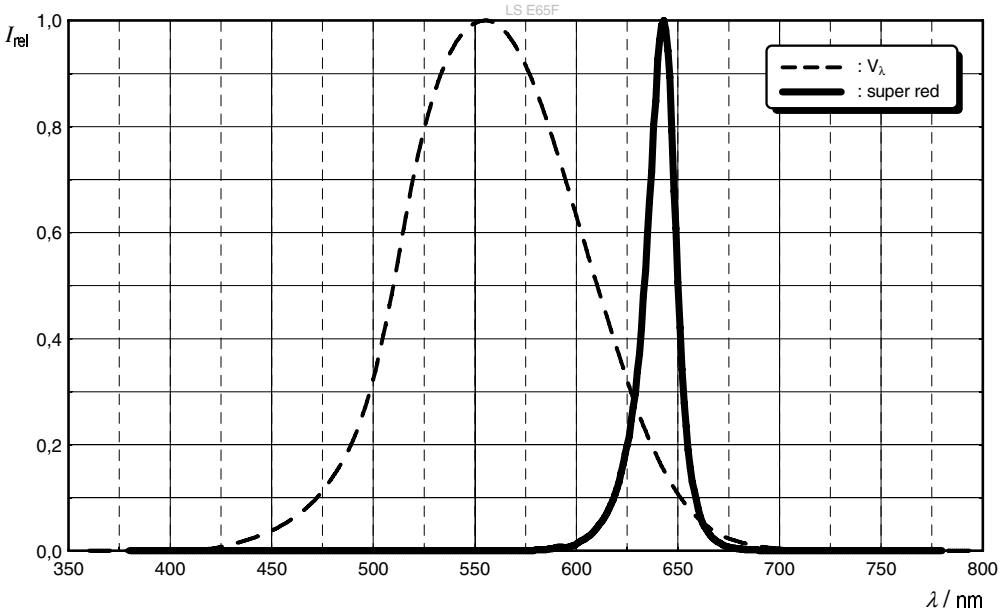
## Group Name on Label

**Example: CA-1-3A**

| Brightness | Wavelength | Forward Voltage |
|---|---|---|
| CA | 1 | 3A |

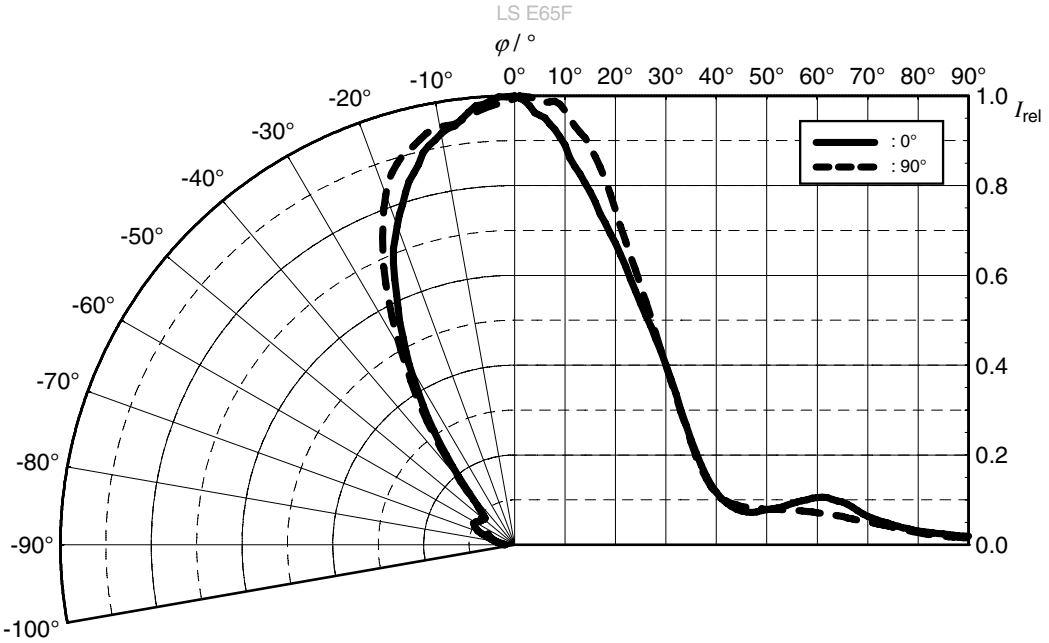
## Relative Spectral Emission [6]

$I_{rel} = f(\lambda)$; $I_F = 50$ mA; $T_S = 25$ °C




## Radiation Characteristics [6]

$I_{rel} = f(\phi)$; $T_S = 25$ °C



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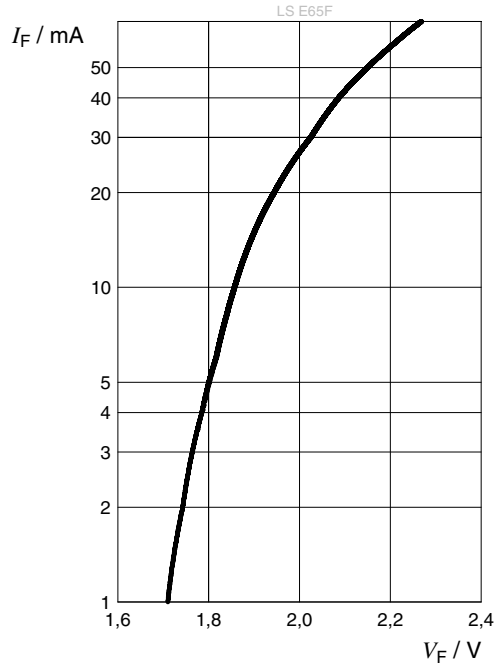
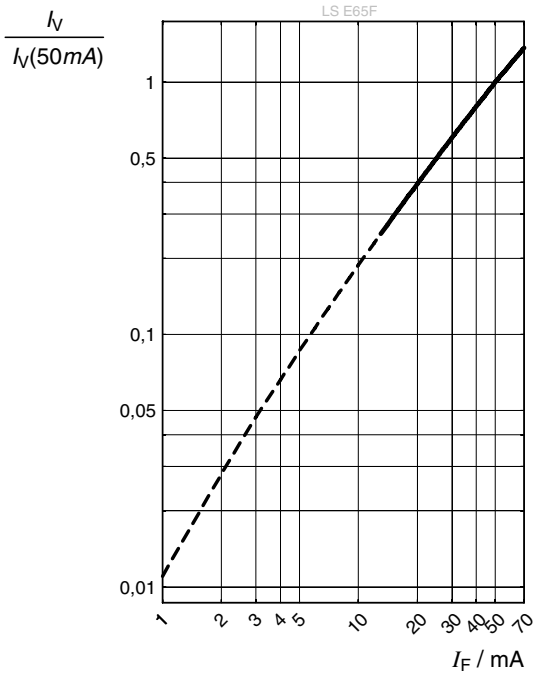
## Forward current 6), 7)

$I_F = f(V_F)$; $T_S$ = 25 °C



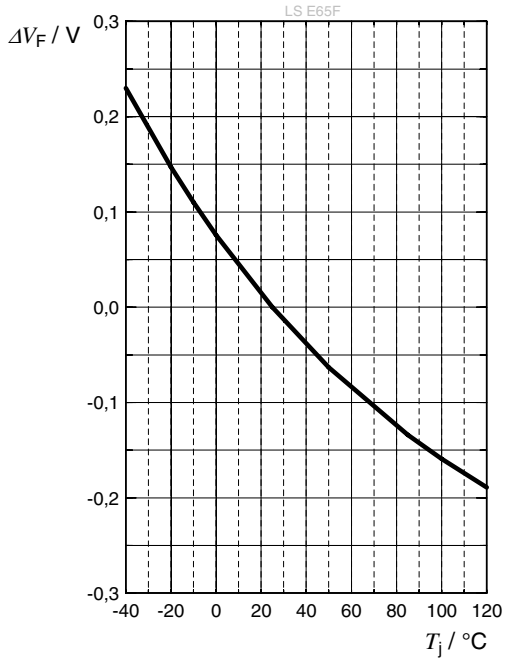

## Relative Luminous Intensity 6), 7)

$I_v/I_v(50\ mA) = f(I_F)$; $T_S$ = 25 °C



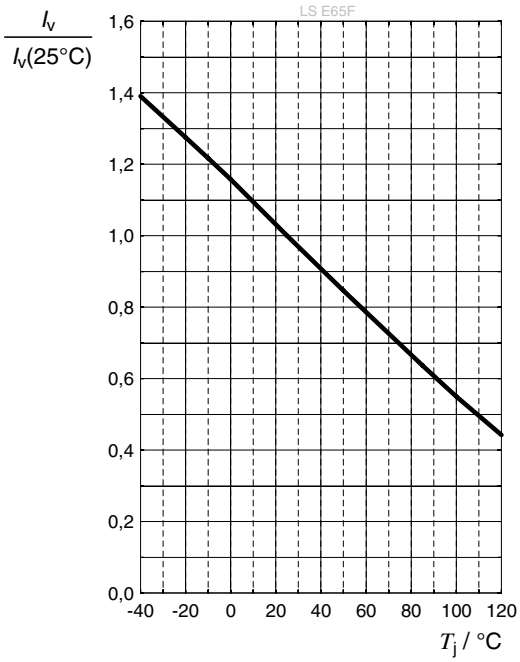
## Forward Voltage [6)]

$\Delta V_F = V_F - V_F(25\ °C) = f(T_j);\ I_F = 50\ mA$



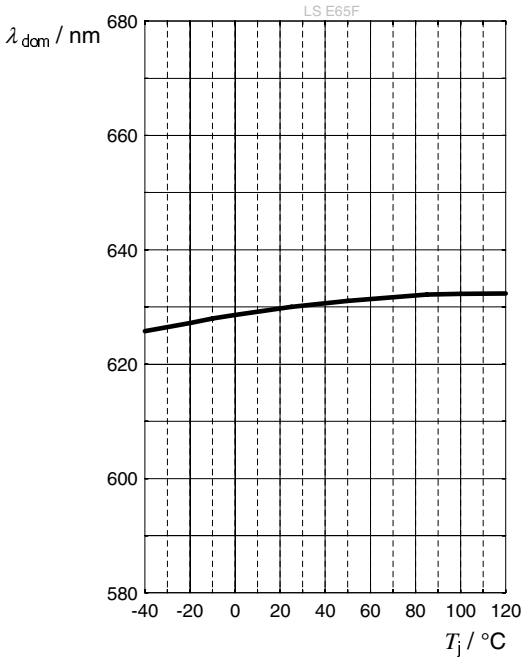

## Relative Luminous Intensity [6)]

$I_v/I_v(25\ °C) = f(T_j);\ I_F = 50\ mA$




## Dominant Wavelength [6)]

$\lambda_{dom} = f(T_j);\ I_F = 50\ mA$



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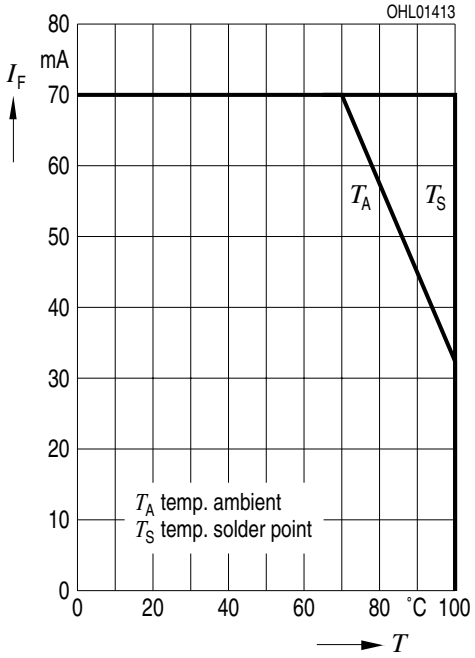
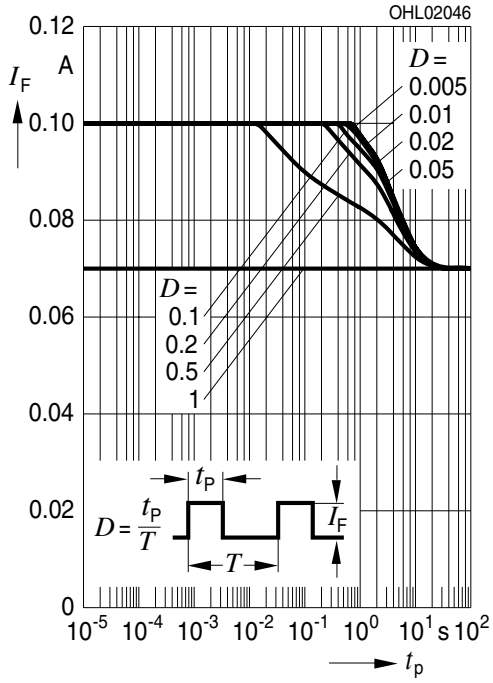
## Max. Permissible Forward Current

$I_F = f(T)$



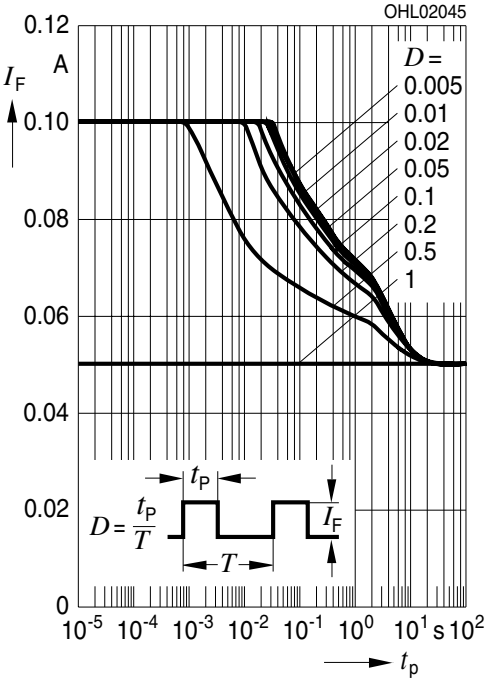

## Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle; $T_A$ = 25 °C




## Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle; $T_A$ = 85 °C



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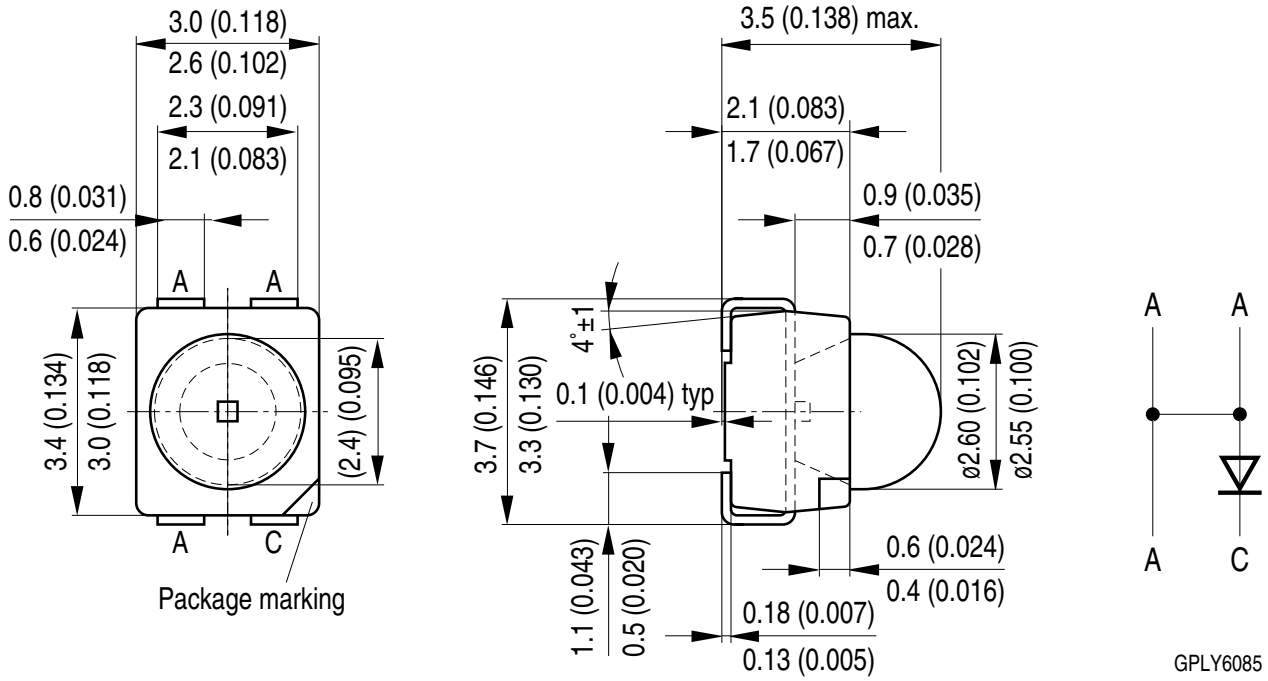
## Dimensional Drawing [8)]



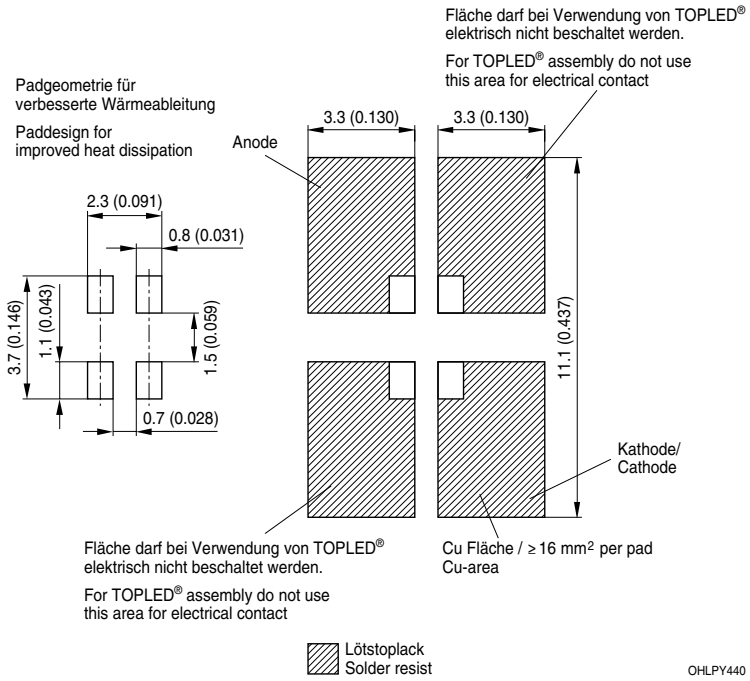

## Further Information:

**Approximate Weight:** 38.0 mg

**Package marking:** Cathode

**Corrosion test:** Class: 3B
Test condition: 40°C / 90 % RH / 15 ppm $H_2S$ / 14 days (stricter than IEC 60068-2-43)

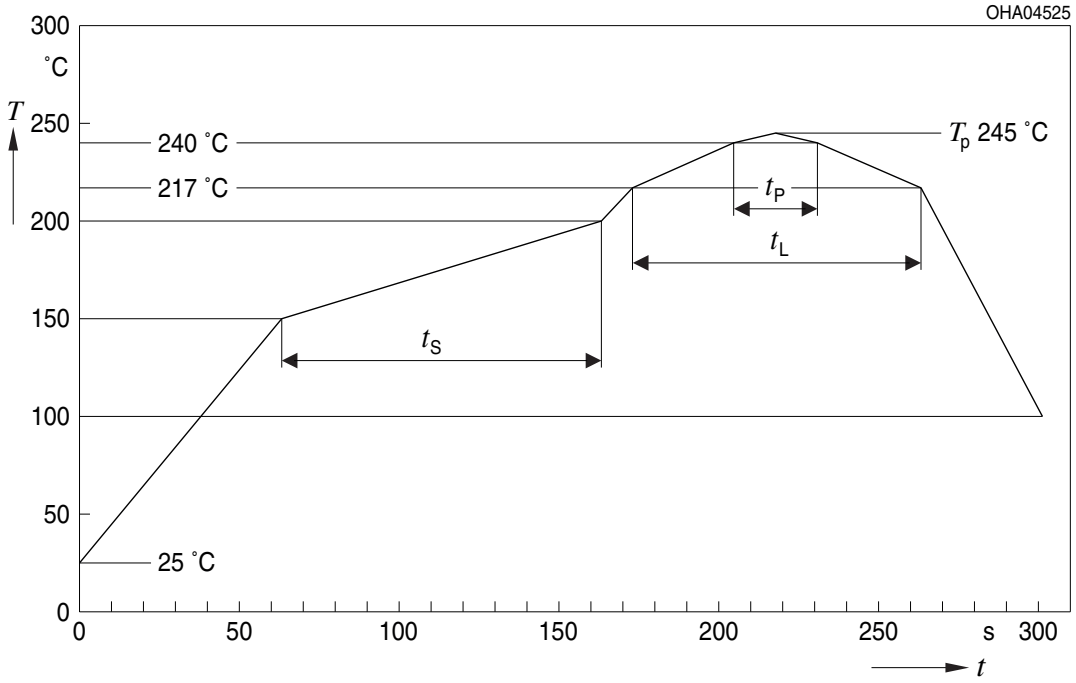
## Recommended Solder Pad [8)]




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

## Reflow Soldering Profile

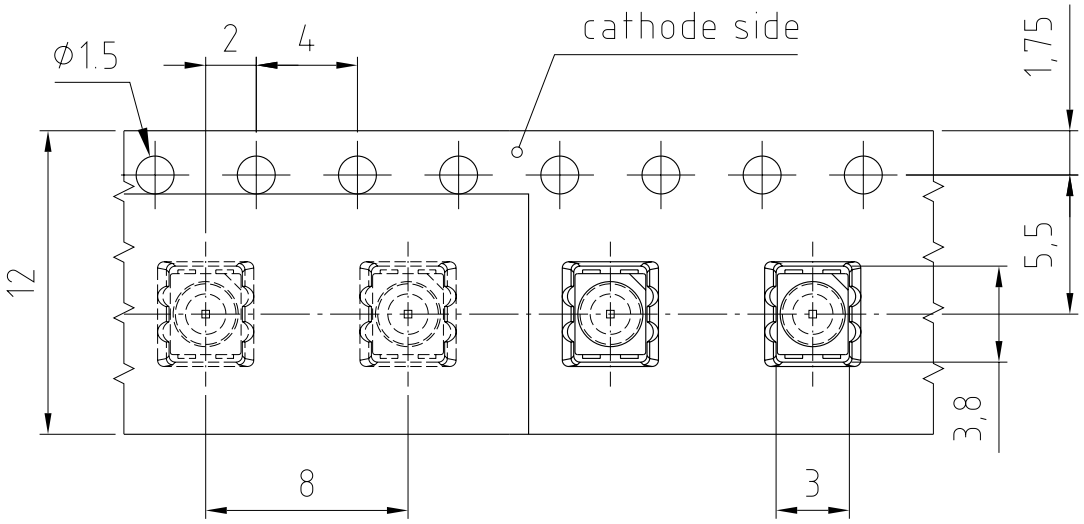
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E




| 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 | | °C |
| Time above liquidus temperature | $t_L$ | | 80 | 100 | s |
| Peak temperature | $T_P$ | | 245 | 250 | °C |
| Time within 5 °C of the specified peak temperature $T_P$ - 5 K | $t_P$ | 10 | 20 | 30 | s |
| Ramp-down rate* $T_P$ to 100 °C | | | 3 | 4 | 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)]

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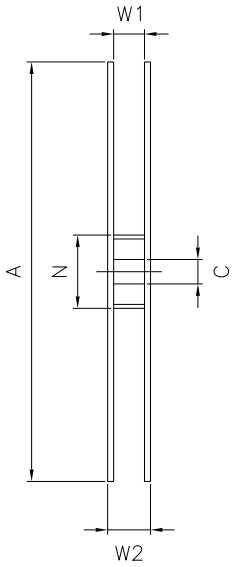
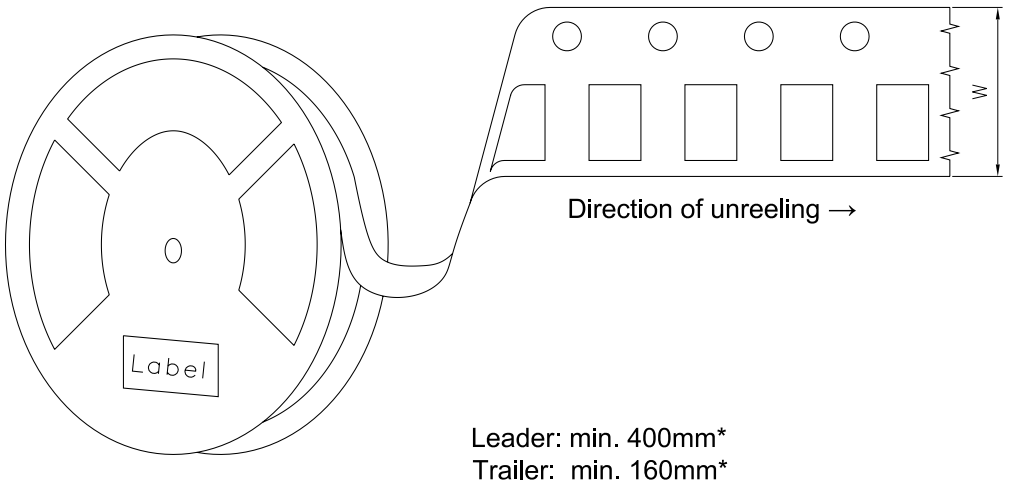
## Tape and Reel [9)]




Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

## Reel Dimensions

| A | W | $N_{min}$ | $W_1$ | $W_{2\,max}$ | Pieces per PU |
|---|---|---|---|---|---|
| 330 mm | 12 + 0.3 / - 0.1 mm | 60 mm | 12.4 + 2 mm | 18.4 mm | 2000 |



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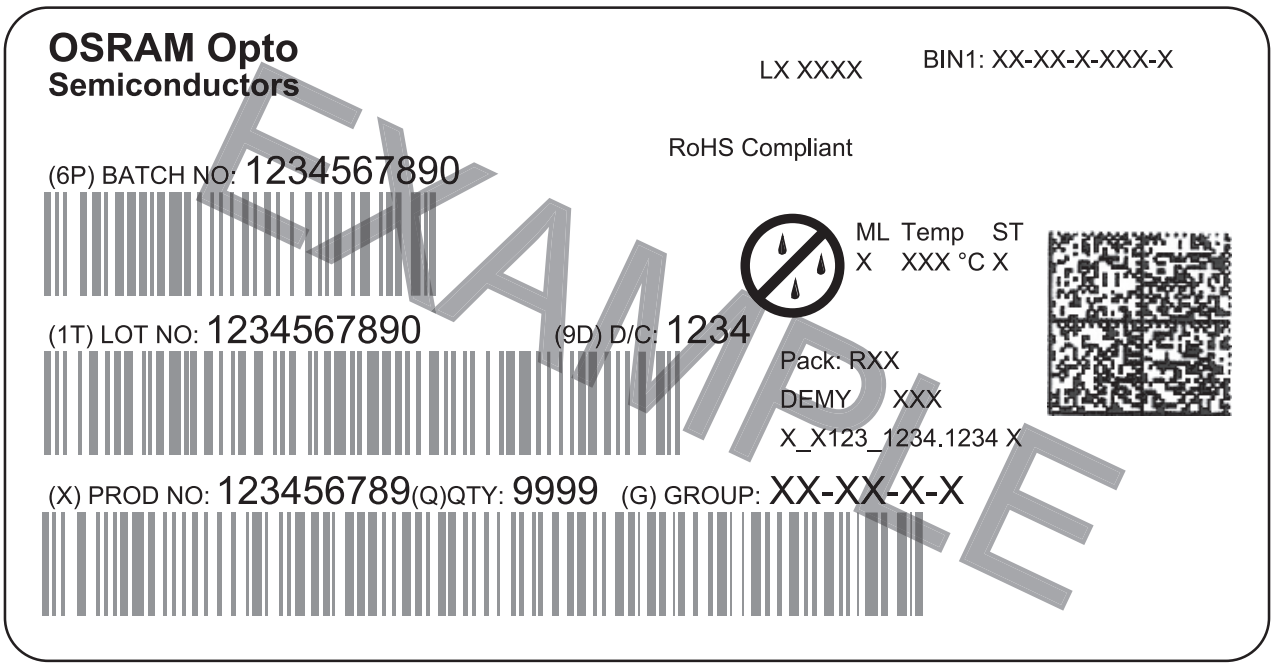
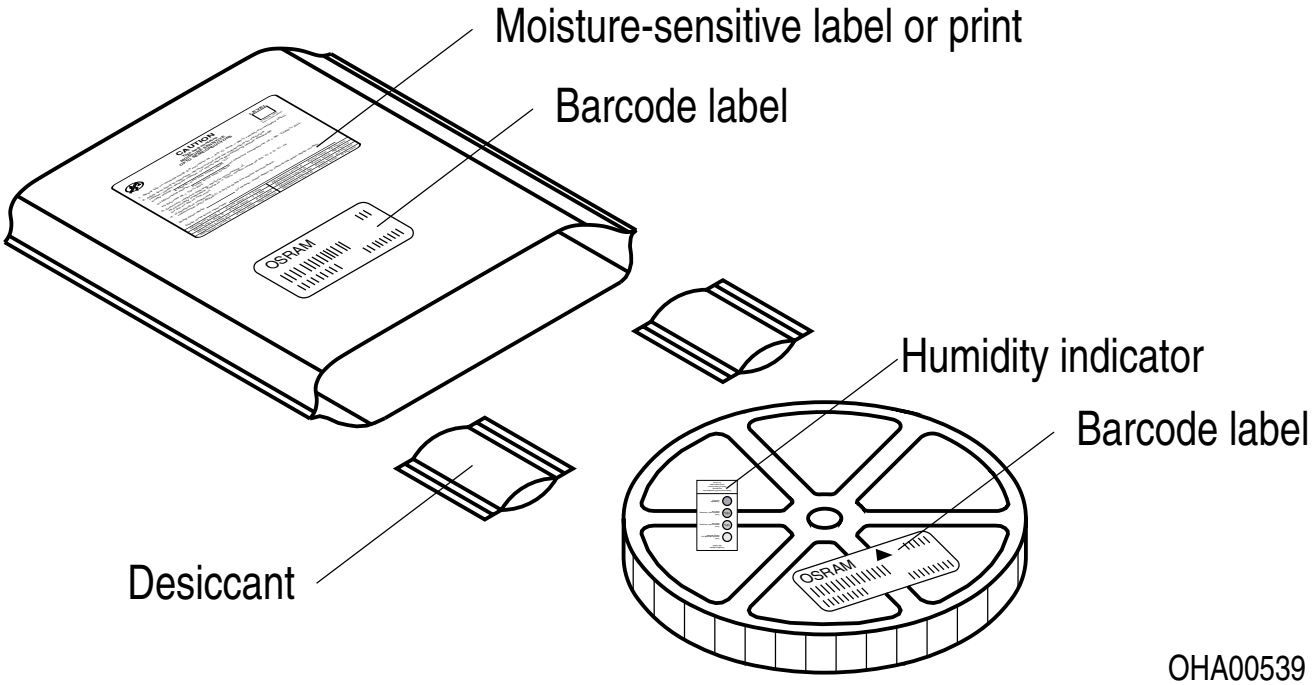
## Barcode-Product-Label (BPL)




OHA04563

## Dry Packing Process and Materials [8)]

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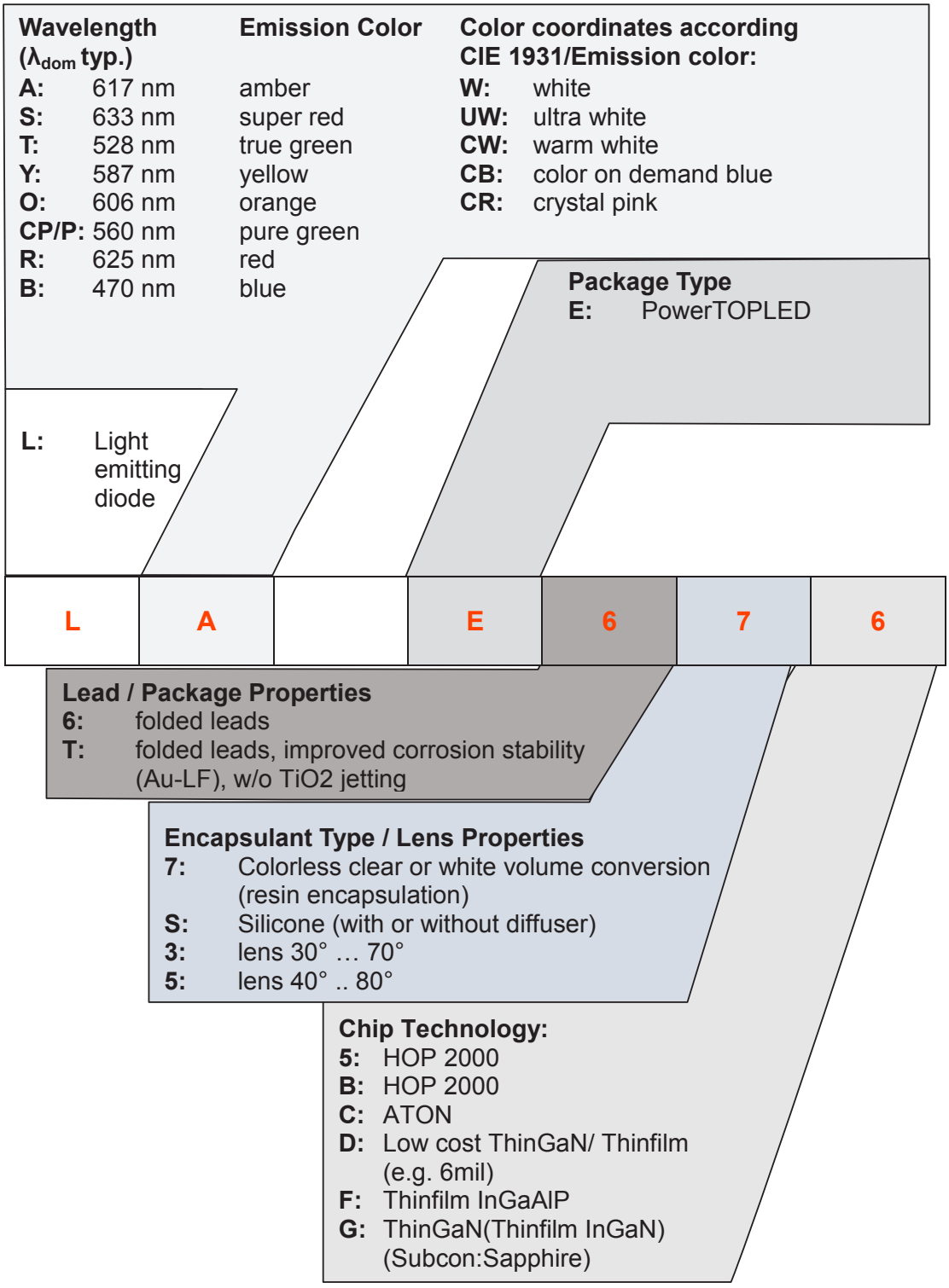
Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

## 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 falls 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

## Disclaimer

**Attention please!**
The information describes the type of component and shall not be considered as assured characteristics.
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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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## Glossary

1) **Brightness:** Brightness values are measured during a current pulse of typically 25 ms, with an internal reproducibility of ±8 % and an expanded uncertainty of ±11 % (acc. to GUM with a coverage factor of k = 3).

2) **Reverse Operation:** Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed.

3) **Wavelength:** The wavelength is measured at a current pulse of typically 25 ms, with an internal reproducibility of ±0.5 nm and an expanded uncertainty of ±1 nm (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:** Rth max is based on statistic values (6σ).

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 |
|---|---|---|
| 1.7 | 2020-01-15 | Brightness Groups<br>Electro - Optical Characteristics (Diagrams)<br>Dimensions of Transportation Box<br>Disclaimer |

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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。

LifeElectronics
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*ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703*

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