# LA ETSF - Dual Binning

## Power TOPLED®

PowerTOPLED, 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.

## Applications

- Signalling

## Features:

- Package: white PLCC-4 package, colorless clear resin
- Chip technology: Thinfilm
- Typ. Radiation: 120° (Lambertian emitter)
- Color: $\lambda_{dom}$ = 617 nm (● amber)
- Corrosion Robustness Class: 3B
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)

## Ordering Information

| Type | Luminous Intensity [1] $I_F$ = 4 mA $I_v$ | Luminous Intensity [1] $I_F$ = 50 mA $I_v$ | Ordering Code |
|---|---|---|---|
| LA ETSF-R1T1-1-2A2B+BBCB-24-3A4B | 112 ... 355 mcd | 2240 ... 4500 mcd | Q65112A1811 |

## Maximum Ratings

| Parameter | Symbol | | Values |
|---|---|---|---|
| Operating Temperature | $T_{op}$ | min.<br>max. | -40 °C<br>110 °C |
| Storage Temperature | $T_{stg}$ | min.<br>max. | -40 °C<br>110 °C |
| Junction Temperature | $T_j$ | max. | 125 °C |
| Junction Temperature for short time applications* | $T_j$ | max. | 150 °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) | $V_{ESD}$ | | 2 kV |

*The median lifetime (L70/B50) for Tj =150°C is 100h.

## Characteristics

$I_F$ = 50 mA; $T_S$ = 25 °C

| Parameter | Symbol | | Values |
|---|---|---|---|
| Peak Wavelength [3] | $\lambda_{peak}$ | typ. | 624 nm |
| Dominant Wavelength [3]<br>$I_F$ = 50 mA | $\lambda_{dom}$ | min.<br>typ.<br>max. | 612 nm<br>617 nm<br>624 nm |
| Spectral Bandwidth at 50% $I_{rel,max}$ | $\Delta\lambda$ | typ. | 18 nm |
| Viewing angle at 50 % $I_V$ | $2\varphi$ | typ. | 120 ° |
| 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. | 0.14 nm / K |
| Real thermal resistance junction/solderpoint [5] | $R_{thJS\ real}$ | typ.<br>max. | 70 K / W<br>95 K / W |
| Electrical thermal resistance junction/solderpoint [5]<br>with efficiency $\eta_e$ = 29 % | $R_{thJS\ elec.}$ | typ.<br>max. | 50 K / W<br>67 K / W |

## Brightness Groups

| Group | Luminous Intensity [1] $I_F$ = 4 mA min. $I_v$ | Luminous Intensity. [1] $I_F$ = 4 mA max. $I_v$ | Luminous Flux [6] $I_F$ = 4 mA typ. $\Phi_V$ |
|---|---|---|---|
| R1 | 112 mcd | 140 mcd | 380 mlm |
| R2 | 140 mcd | 180 mcd | 480 mlm |
| S1 | 180 mcd | 224 mcd | 610 mlm |
| S2 | 224 mcd | 280 mcd | 760 mlm |
| T1 | 280 mcd | 355 mcd | 950 mlm |

## 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. $\Phi_V$ |
|---|---|---|---|
| BB | 2240 mcd | 2800 mcd | 7560 mlm |
| CA | 2800 mcd | 3550 mcd | 9530 mlm |
| CB | 3550 mcd | 4500 mcd | 12080 mlm |

## Forward Voltage Groups

| Group | Forward Voltage [4] $I_F$ = 4 mA min. $V_F$ | Forward Voltage [4] $I_F$ = 4 mA max. $V_F$ |
|---|---|---|
| 2A | 1.65 V | 1.80 V |
| 2B | 1.80 V | 1.95 V |

## 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 |

## Wavelength Groups

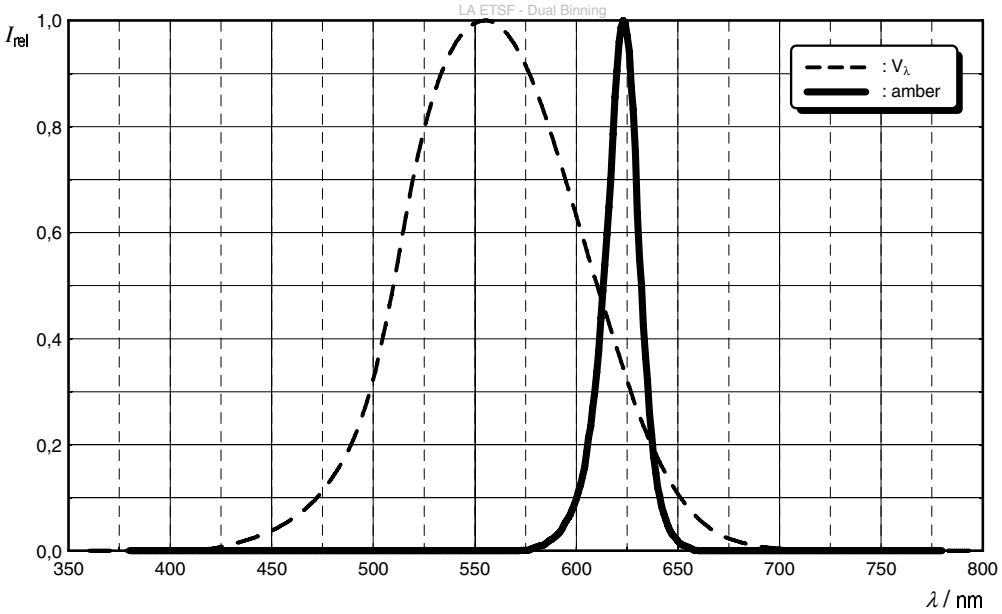
| Group | Dominant Wavelength [3] $I_F$ = 4 mA min. $\lambda_{dom}$ | Dominant Wavelength [3] $I_F$ = 4 mA max. $\lambda_{dom}$ |
|---|---|---|
| 1 | 611 nm | 624 nm |

## Wavelength Groups

| Group | Dominant Wavelength [3] $I_F$ = 50 mA min. $\lambda_{dom}$ | Dominant Wavelength [3] $I_F$ = 50 mA max. $\lambda_{dom}$ |
|---|---|---|
| 2 | 612 nm | 616 nm |
| 3 | 616 nm | 620 nm |
| 4 | 620 nm | 624 nm |

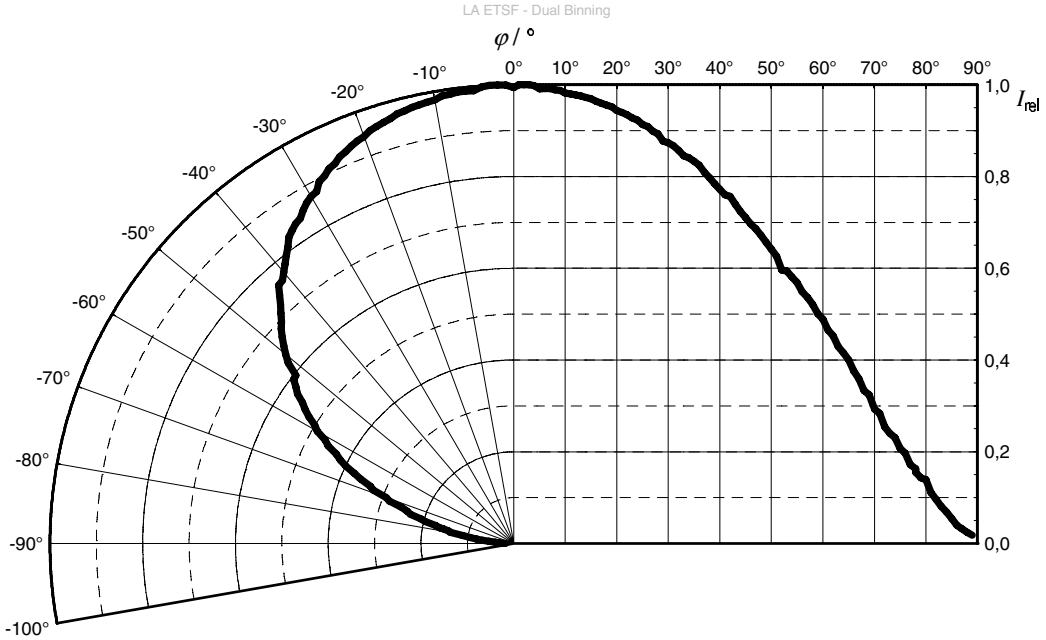
## Relative Spectral Emission [6)]

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



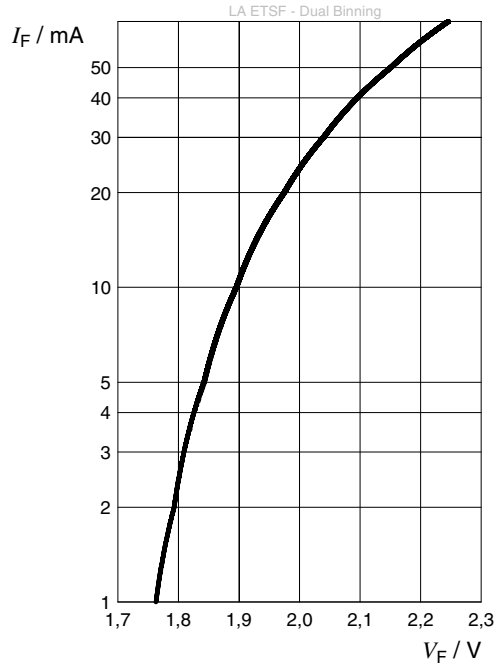

## Radiation Characteristics [6)]

$I_{rel} = f(\phi)$; $T_S = 25$ °C



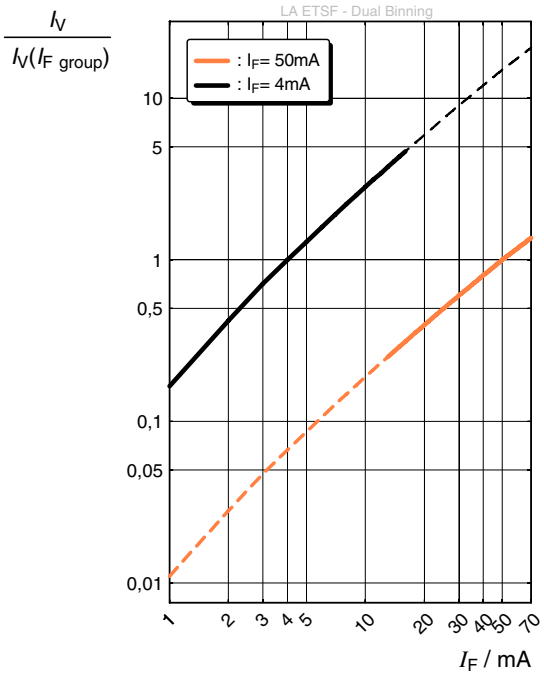
## Forward current 6), 7)

$I_F = f(V_F)$; $T_S$ = 25 °C




## Relative Luminous Intensity 6), 7)

$I_v/I_v(I_{F\ group}) = f(I_F)$; $T_S$ = 25 °C



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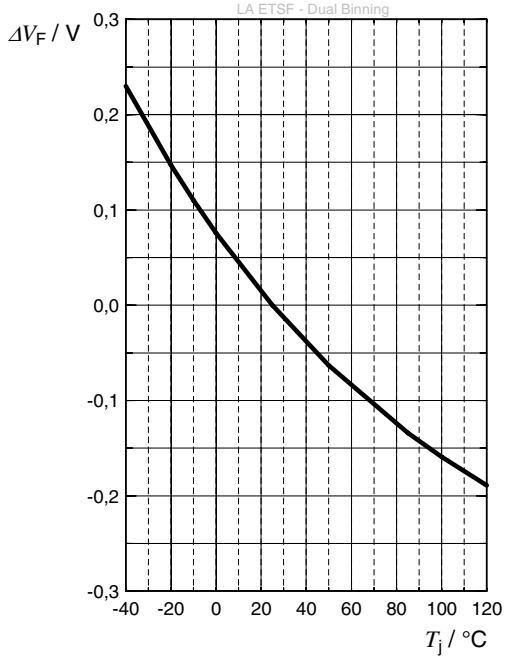
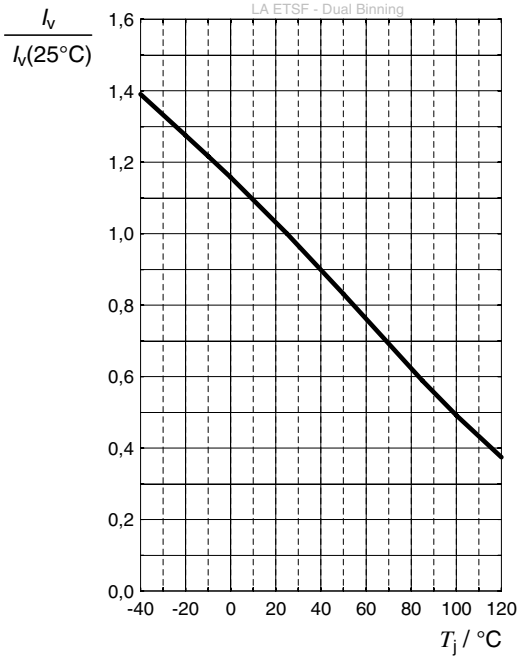
## Forward Voltage [6)]

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



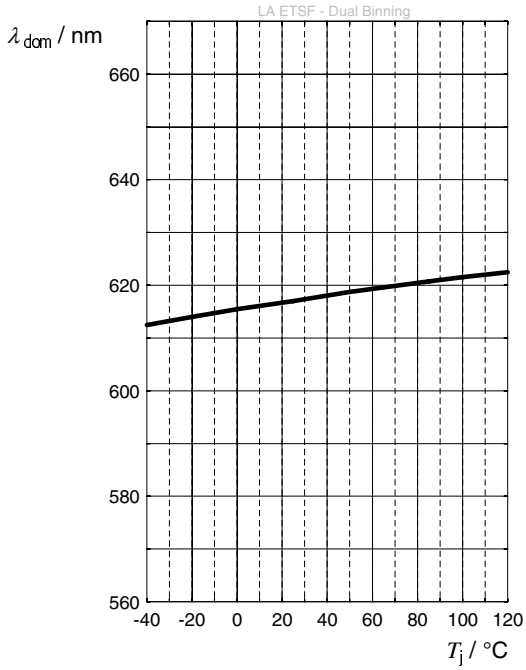

## Relative Luminous Intensity [6)]

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




## Dominant Wavelength [6)]

$\Delta\lambda_{dom} = \lambda_{dom} - \lambda_{dom}(25\ °C) = f(T_j);\ I_F = 50\ mA$



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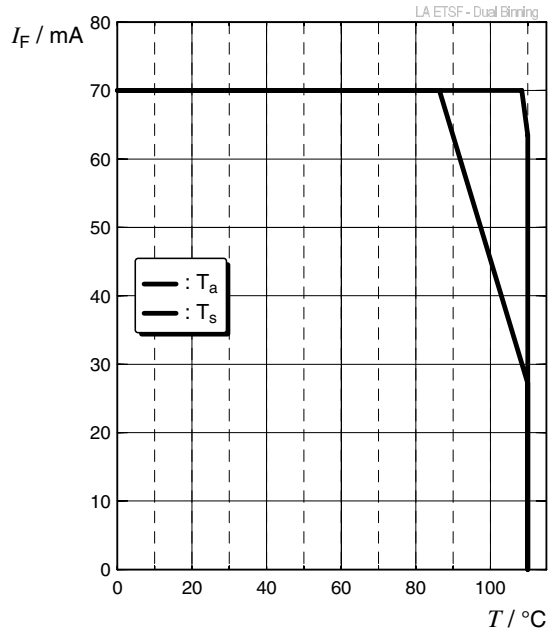
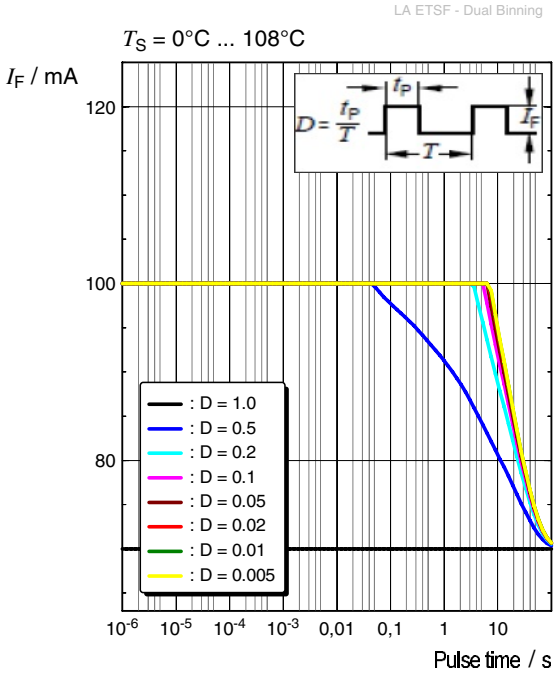
## Max. Permissible Forward Current

$I_F = f(T)$



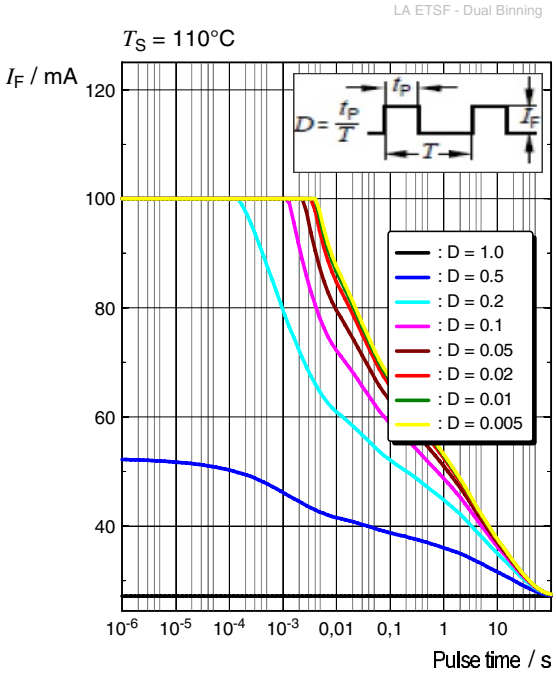

## Permissible Pulse Handling Capability

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




## Permissible Pulse Handling Capability

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



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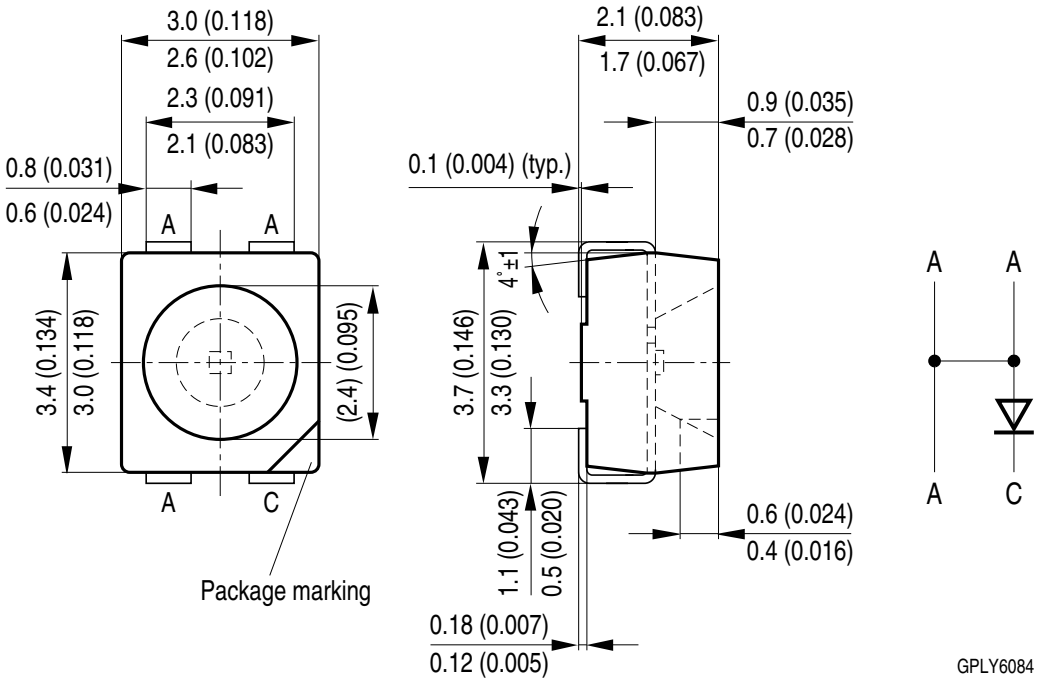
## Dimensional Drawing [8)]

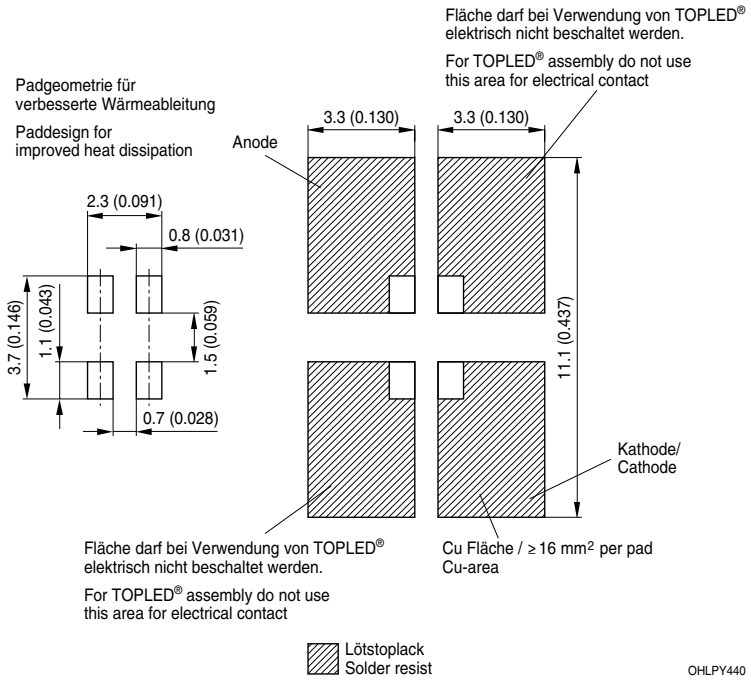



**Approximate Weight:** 30.0 mg

**Package marking:** Cathode

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

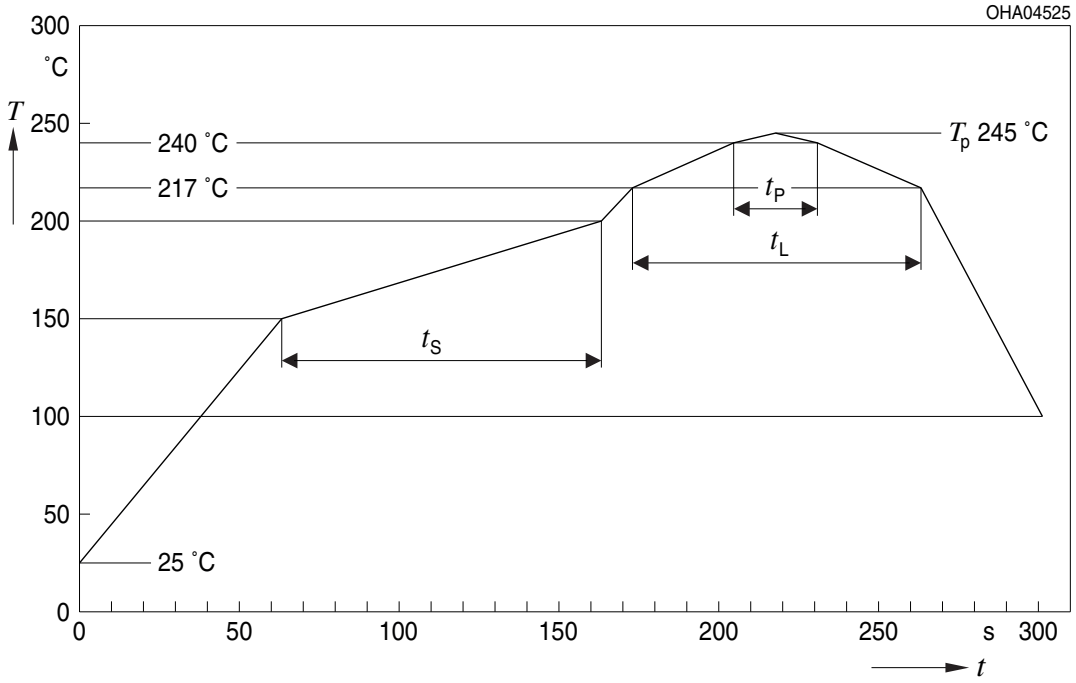
## Recommended Solder Pad [8)]




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

## Reflow Soldering Profile

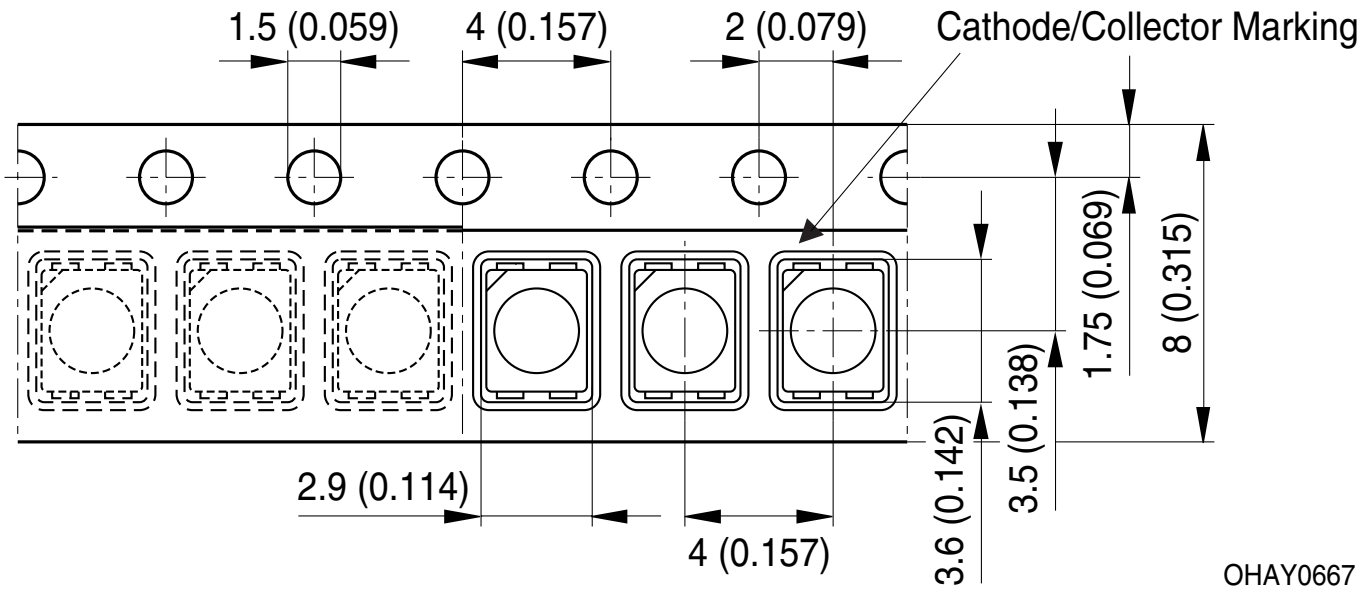
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



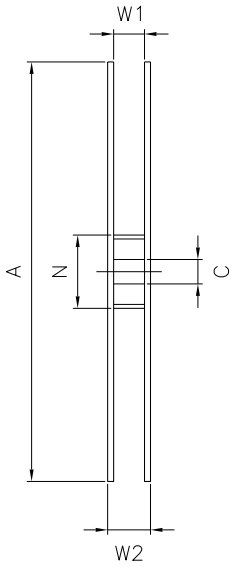

| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|---|---|---|---|---|---|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat*) 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time $t_S$ $T_{Smin}$ to $T_{Smax}$ | $t_S$ | 60 | 100 | 120 | s |
| Ramp-up rate to peak*) $T_{Smax}$ 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 | 260 | °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 | 6 | K/s |
| Time 25 °C to $T_P$ | | | | 480 | s |

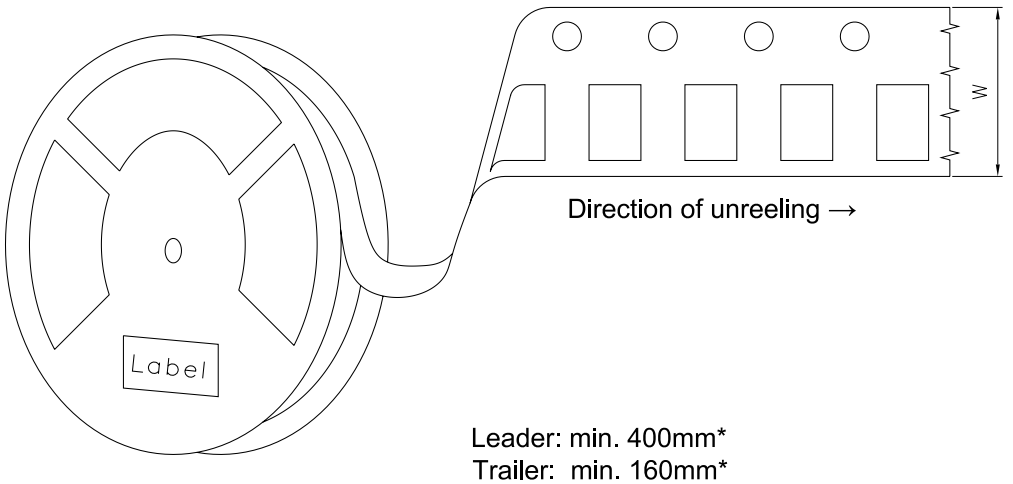
All temperatures refer to the center of the package, measured on the top of the component
* slope calculation DT/Dt: Dt max. 5 s; fulfillment for the whole T-range

## Taping [8)]


1.5 (0.059)
4 (0.157)
2 (0.079)
Cathode/Collector Marking
1.75 (0.069)
8 (0.315)
3.5 (0.138)
3.6 (0.142)
2.9 (0.114)
4 (0.157)
OHAY0667

## Tape and Reel [9)]



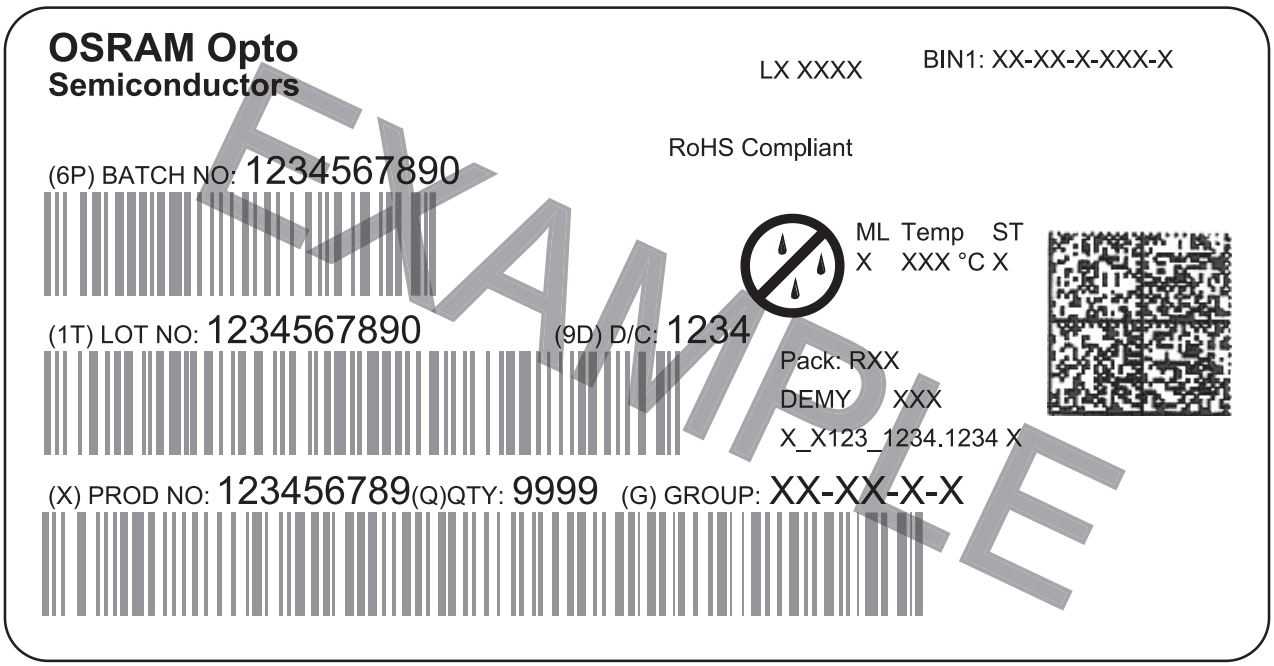




Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

## Reel dimensions [mm]

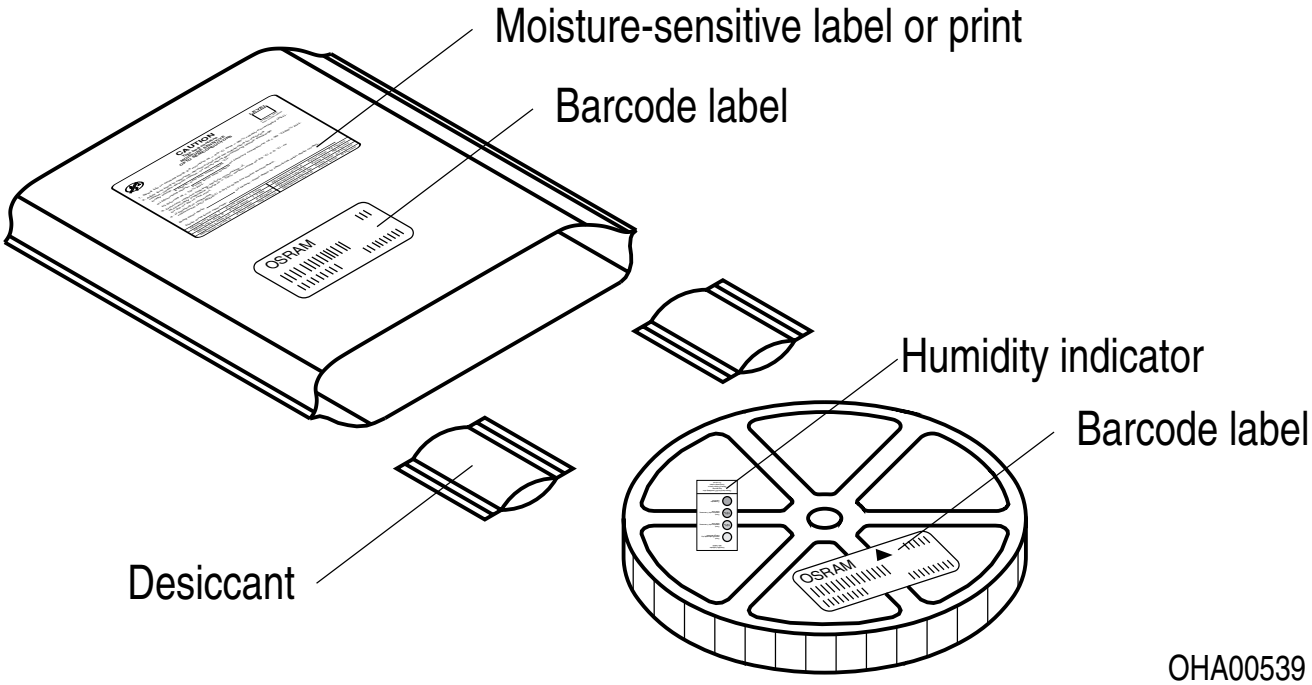
| A | W | $N_{min}$ | $W_1$ | $W_{2\,max}$ | Pieces per PU |
|---|---|---|---|---|---|
| 180 mm | 8 + 0.3 / - 0.1 | 60 | 8.4 + 2 | 14.4 | 2000 |
| 330 mm | 8 + 0.3 / - 0.1 | 60 | 8.4 + 2 | 14.4 | 8000 |

## Barcode-Product-Label (BPL)




OHA04563

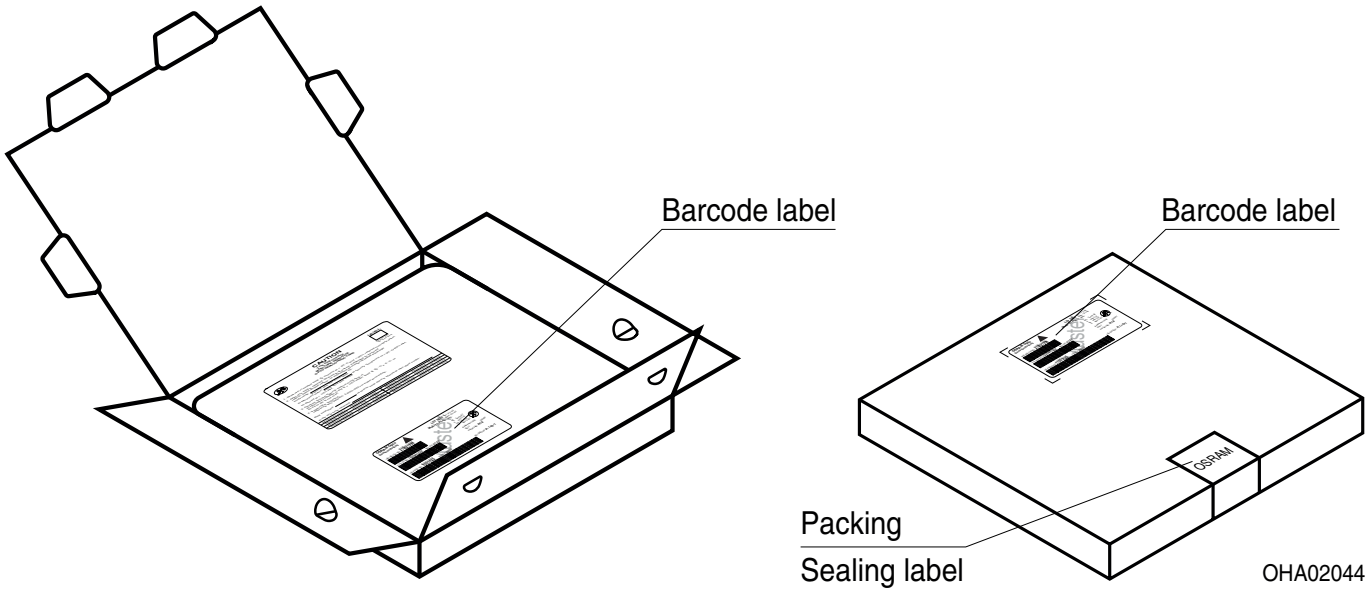
## Dry Packing Process and Materials [8)]




OHA00539

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

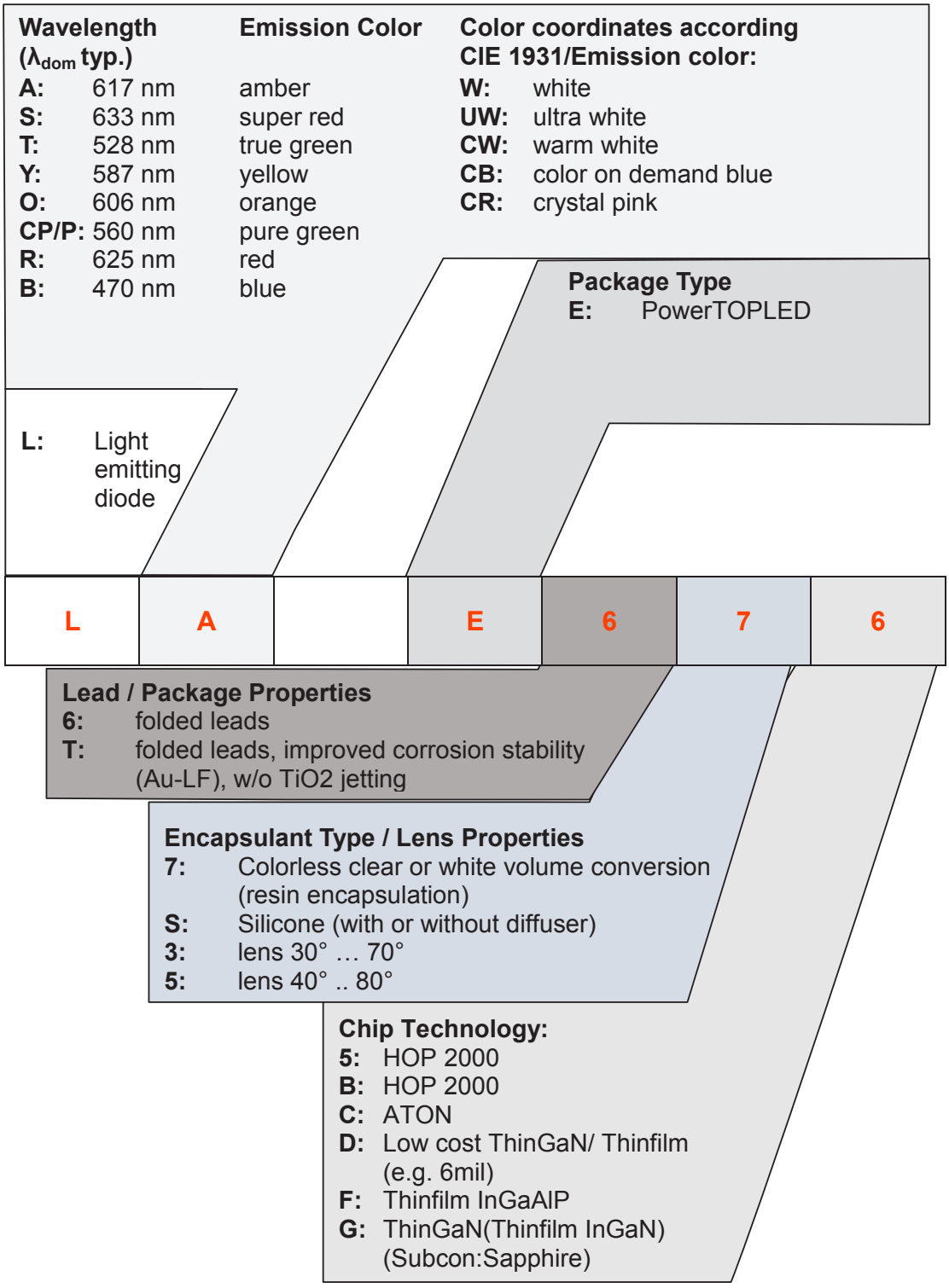
## Transportation Packing and Materials [8)]




## Dimensions of transportation box in mm

| Width | Length | Height |
|---|---|---|
| 200 ± 5 mm | 195 ± 5 mm | 30 ± 5 mm |
| 352 ± 5 mm | 352 ± 5 mm | 33 ± 5 mm |

## 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 informations please visit www.osram-os.com/appnotes

## Disclaimer

**Disclaimer**
Language english will prevail in case of any discrepancies or deviations between the two language wordings.

**Attention please!**
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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.

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**Офис по работе с юридическими лицами:**

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9