# CT DBLP31.12

## FIREFLY®

The FIREFLY E2218 family expands OSRAM Opto Semiconductors' portfolio of visible products for use in mobile devices like fitness tracking or health monitoring. It offers the highest efficiency output and lowest forward Voltage (Vf) operation, for longer battery life in portable applications. The compact size of only 1.8 mm x 2.2 mm x 0.6 mm allows customers the benefit of more flexible product designs. The true green CT DBLP31.12 is specially designed for Heart Rate Monitor applications. It features a very high luminous intensity to ideally match these applications.

## Applications

- Health Monitoring (Heart Rate Monitoring, Pulse Oximetry)

## Features:

- Package: white SMT package
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: $\lambda_{dom}$ = 536 nm (● true green)
- Corrosion Robustness Class: 1A
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

## Ordering Information

| Type | Luminous Intensity [1] $I_F$ = 20 mA $I_v$ | Ordering Code |
|---|---|---|
| CT DBLP31.12-6C5D-56-J6Q4 | 3150 ... 5000 mcd | Q65112A4607 |
| CT DBLP31.12-6C5D-56-J6U6 | 3150 ... 5000 mcd | Q65112A6091 |

## Maximum Ratings

| Parameter | Symbol | | Values |
|---|---|---|---|
| Operating Temperature | $T_{op}$ | min.<br>max. | -40 °C<br>85 °C |
| Storage Temperature | $T_{stg}$ | min.<br>max. | -40 °C<br>85 °C |
| Junction Temperature | $T_j$ | max. | 125 °C |
| Forward current<br>$T_S$ = 25 °C | $I_F$ | min.<br>max. | 2.5 mA<br>140 mA |
| Surge Current<br>t ≤ 10 µs; D = 0.005 ; $T_S$ = 25 °C | $I_{FS}$ | max. | 500 mA |
| ESD withstand voltage<br>acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B) | $V_{ESD}$ | | 8 kV |
| Reverse current [2)] | $I_R$ | max. | 200 mA |

## Characteristics

$I_F$ = 20 mA; $T_S$ = 25 °C

| Parameter | Symbol | | Values |
|---|---|---|---|
| Peak Wavelength | $\lambda_{peak}$ | typ. | 536 nm |
| Dominant Wavelength [3)]<br>$I_F$ = 20 mA | $\lambda_{dom}$ | min.<br>typ.<br>max. | 526 nm<br>536 nm<br>544 nm |
| Viewing angle at 50% $I_V$ | 2φ | typ. | 120 ° |
| Forward Voltage [4)]<br>$I_F$ = 20 mA | $V_F$ | min.<br>typ.<br>max. | 2.00 V<br>2.30 V<br>2.80 V |
| Reverse voltage (ESD device) | $V_{R\ ESD}$ | min. | 45 V |
| Reverse voltage [2)]<br>$I_R$ = 20 mA | $V_R$ | max. | 1.2 V |
| Real thermal resistance junction/solderpoint [5)] | $R_{thJS\ real}$ | typ.<br>max. | 15 K / W<br>18 K / W |



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## Brightness Groups

| Group | Luminous Intensity [1] $I_F$ = 20 mA min. $I_v$ | Luminous Intensity. [1] $I_F$ = 20 mA max. $I_v$ | Luminous Flux [6] $I_F$ = 20 mA typ. $\Phi_V$ |
|---|---|---|---|
| 6C | 3150 mcd | 3550 mcd | 10100 mlm |
| 7C | 3550 mcd | 4000 mcd | 11300 mlm |
| 8C | 4000 mcd | 4500 mcd | 12800 mlm |
| 5D | 4500 mcd | 5000 mcd | 14300 mlm |

## Forward Voltage Groups

| Group | Forward Voltage [4] $I_F$ = 20 mA min. $V_F$ | Forward Voltage [4] $I_F$ = 20 mA max. $V_F$ |
|---|---|---|
| J6 | 2.00 V | 2.30 V |
| Q4 | 2.30 V | 2.50 V |
| U6 | 2.50 V | 2.80 V |

## Wavelength Groups

| Group | Dominant Wavelength [3] $I_F$ = 20 mA min. $\lambda_{dom}$ | Dominant Wavelength [3] $I_F$ = 20 mA max. $\lambda_{dom}$ |
|---|---|---|
| 5 | 526 nm | 535 nm |
| 6 | 535 nm | 544 nm |

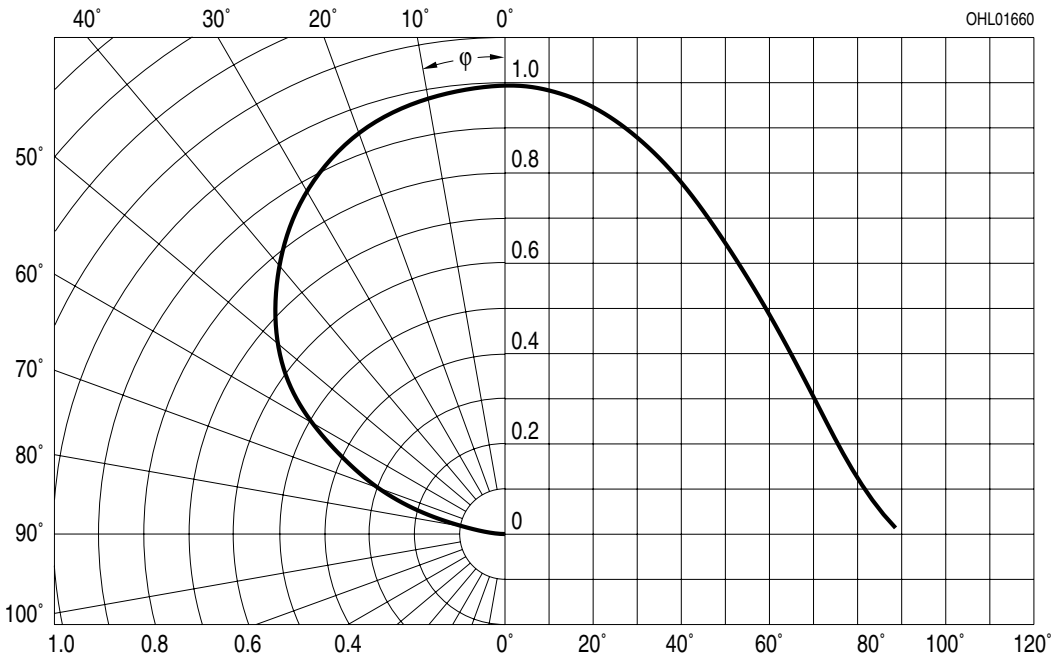
## Group Name on Label

**Example: 5D-5-J6**

| Brightness | Wavelength | Forward Voltage |
|---|---|---|
| 5D | 5 | J6 |

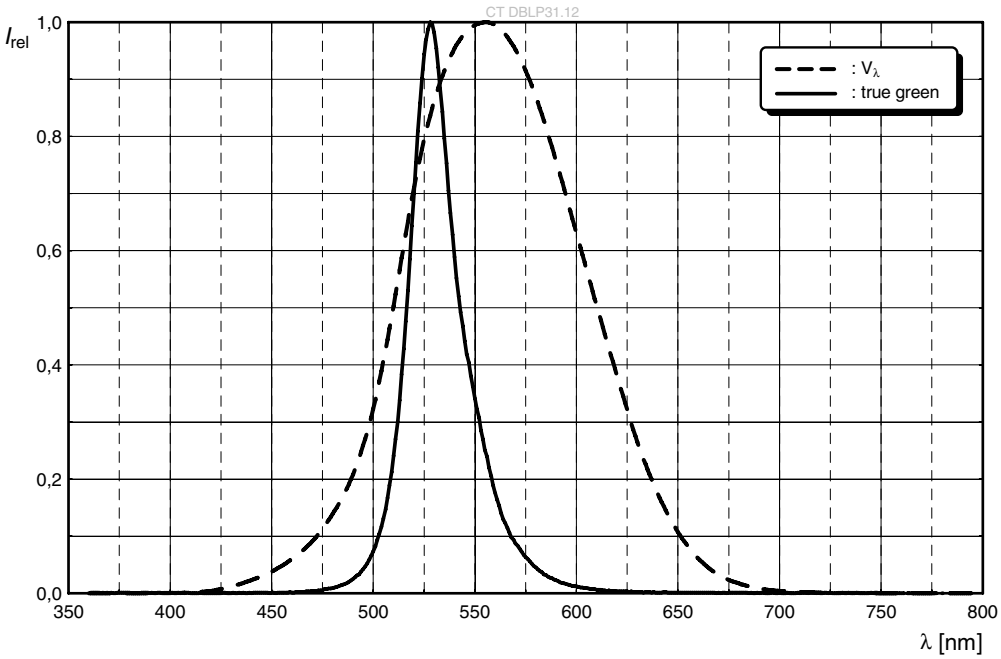
## Radiation Characteristics [6), 7)]

$I_{rel} = f(\phi)$; $T_S = 25\ °C$




## Relative Spectral Emission [6)]

$I_{rel} = f(\lambda)$; $I_F = 20\ mA$; $T_S = 25\ °C$



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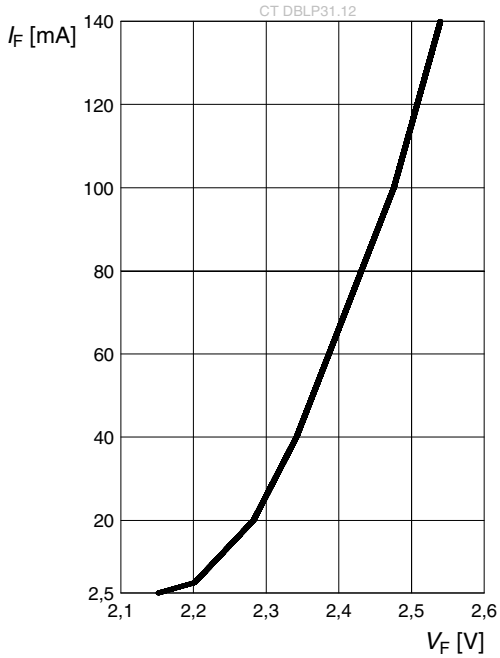
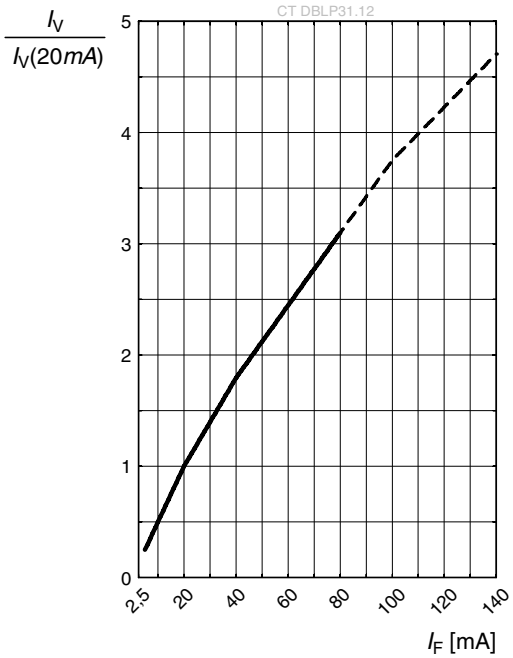
## Forward current [6), 8)]

$I_F = f(V_F)$; $T_S$ = 25 °C



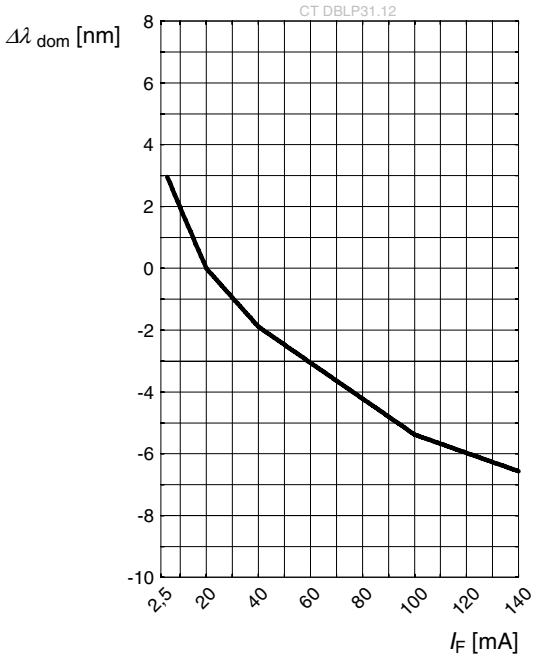

## Relative Luminous Flux [6), 8)]

$I_v/I_v(20\ mA) = f(I_F)$; $T_S$ = 25 °C




## Dominant Wavelength [6)]

$\Delta\lambda_{dom} = f(I_F)$; $T_S$ = 25 °C



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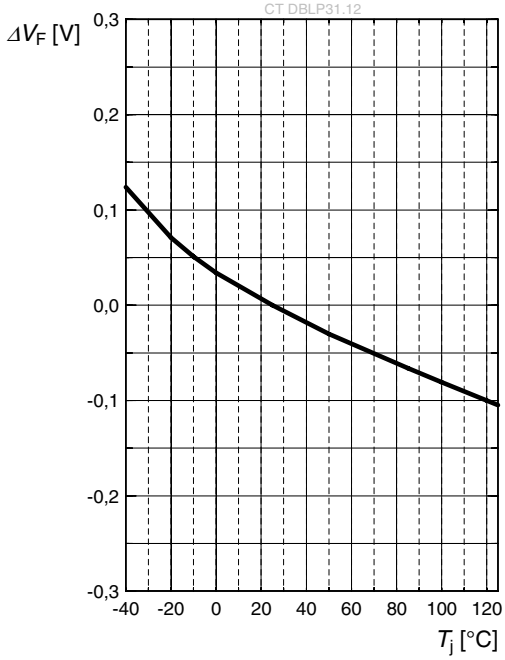
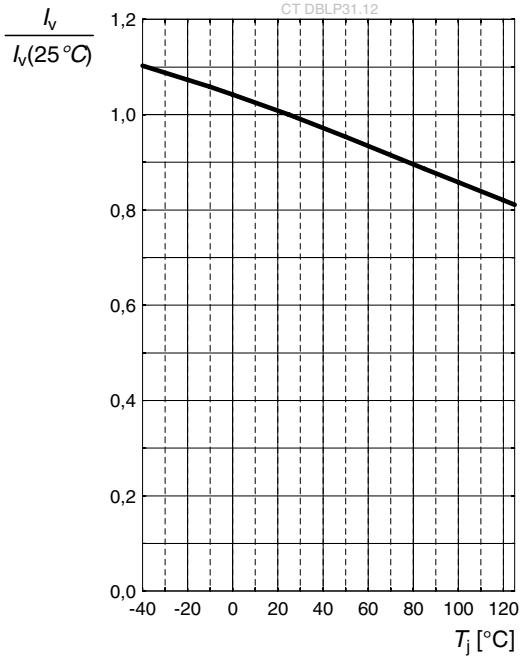
## Forward Voltage [6)]

$\Delta V_F = V_F - V_F(25\ °C) = f(T_j)$; $I_F = 20$ mA



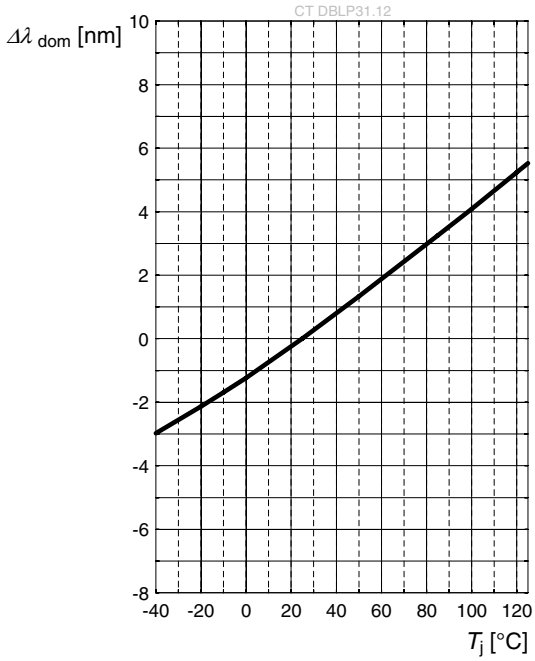

## Relative Luminous Intensity [6)]

$I_v/I_v(25\ °C) = f(T_j)$; $I_F = 20$ mA




## Dominant Wavelength [6)]

$\Delta\lambda_{dom} = \lambda_{dom} - \lambda_{dom}(25\ °C) = f(T_j)$; $I_F = 20$ mA



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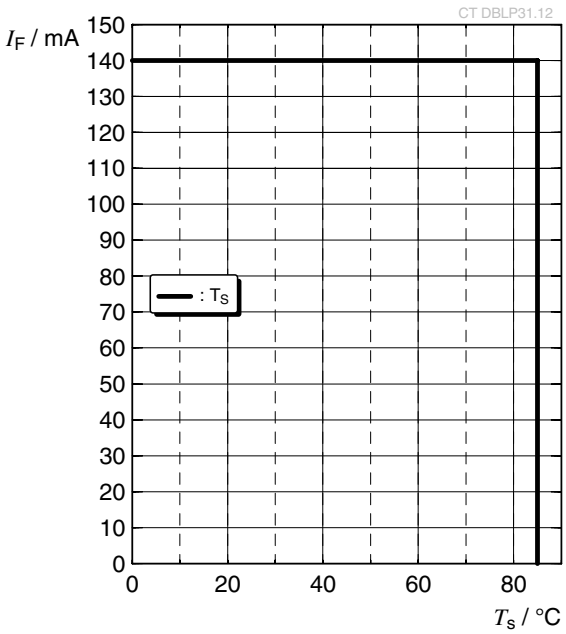
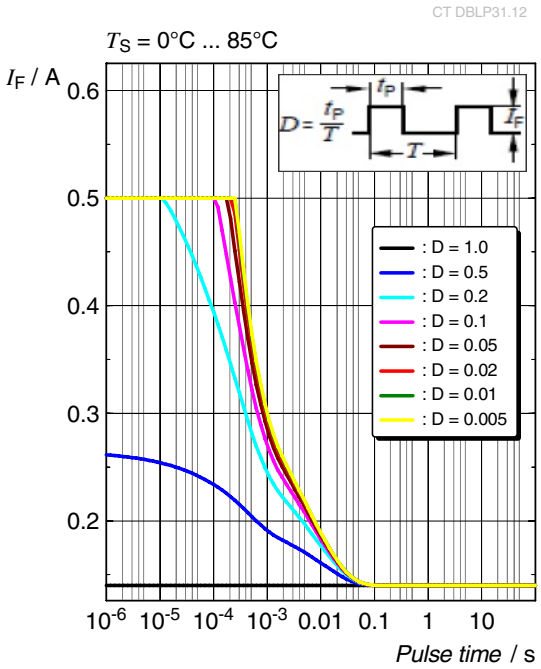
## Max. Permissible Forward Current

$I_F = f(T)$




## Permissible Pulse Handling Capability

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



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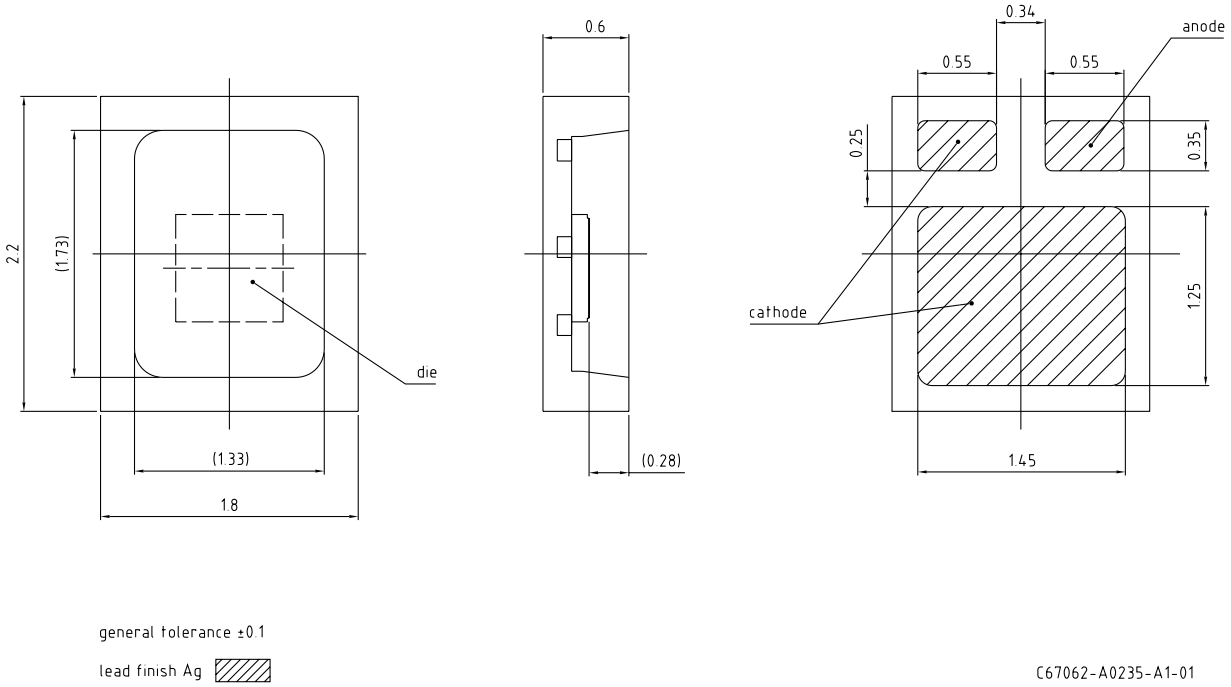
## Dimensional Drawing [9)]



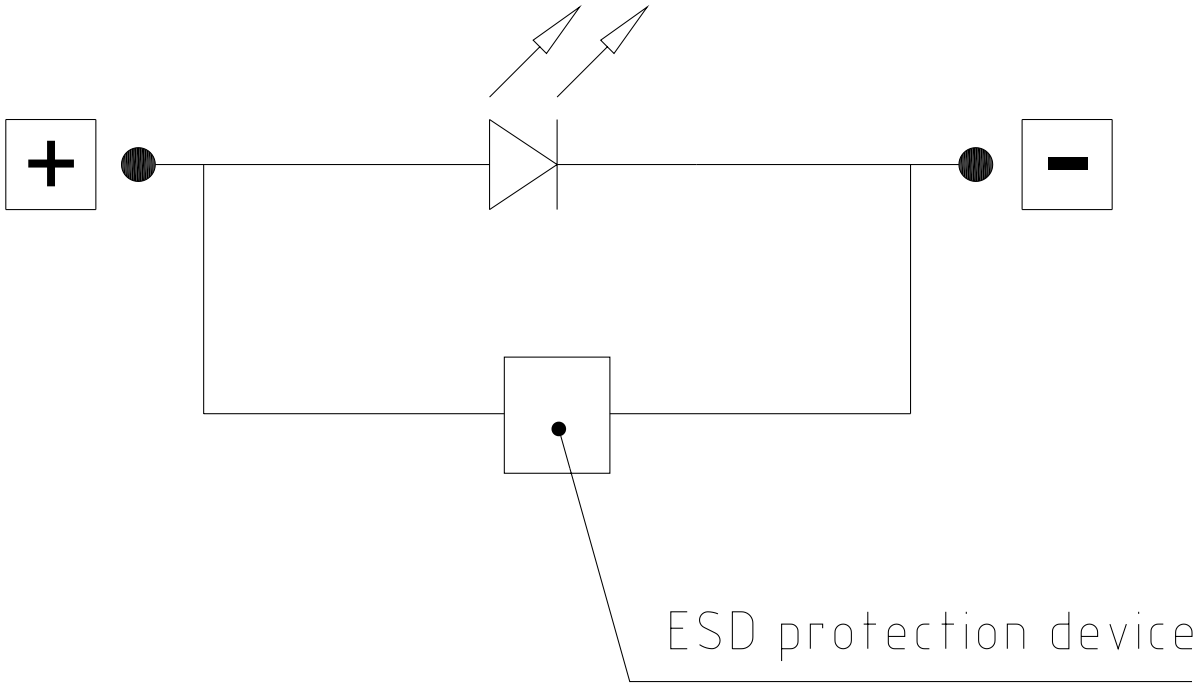

## Further Information

**Approximate Weight:** 6.0 mg

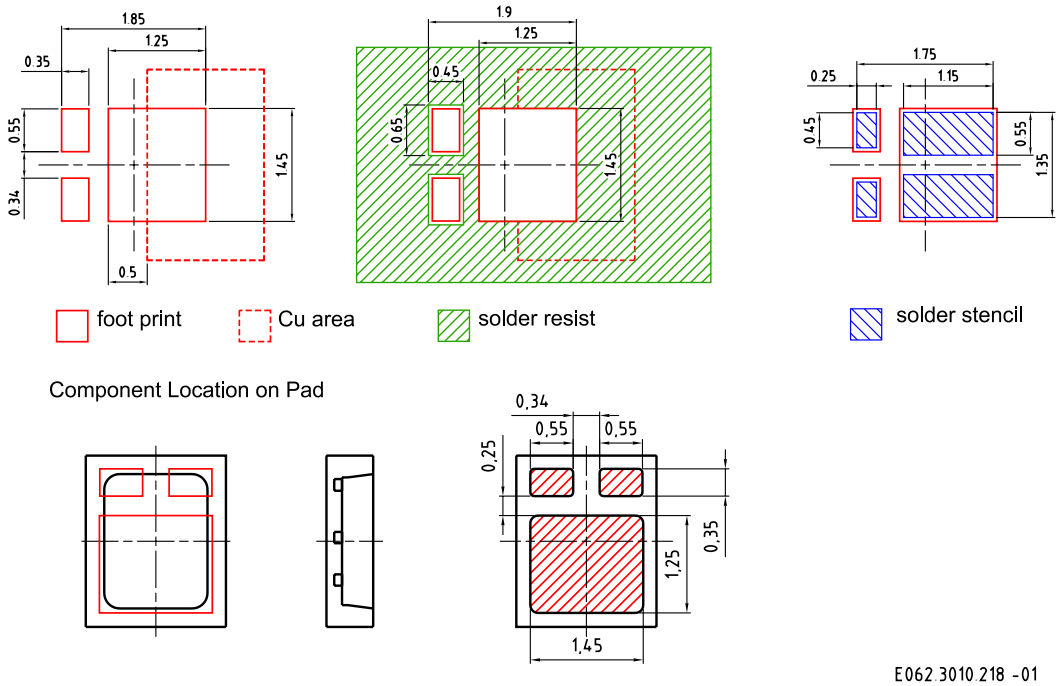
**Corrosion test:** Class: 1A
Test condition: 25°C / 75 % RH / 200ppb $SO_2$, 200ppb $NO_2$, 10ppb $H_2S$, 10ppb $Cl_2$ / 21 days (EN 60068-2-60 (Method 4))

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

## Electrical Internal Circuit



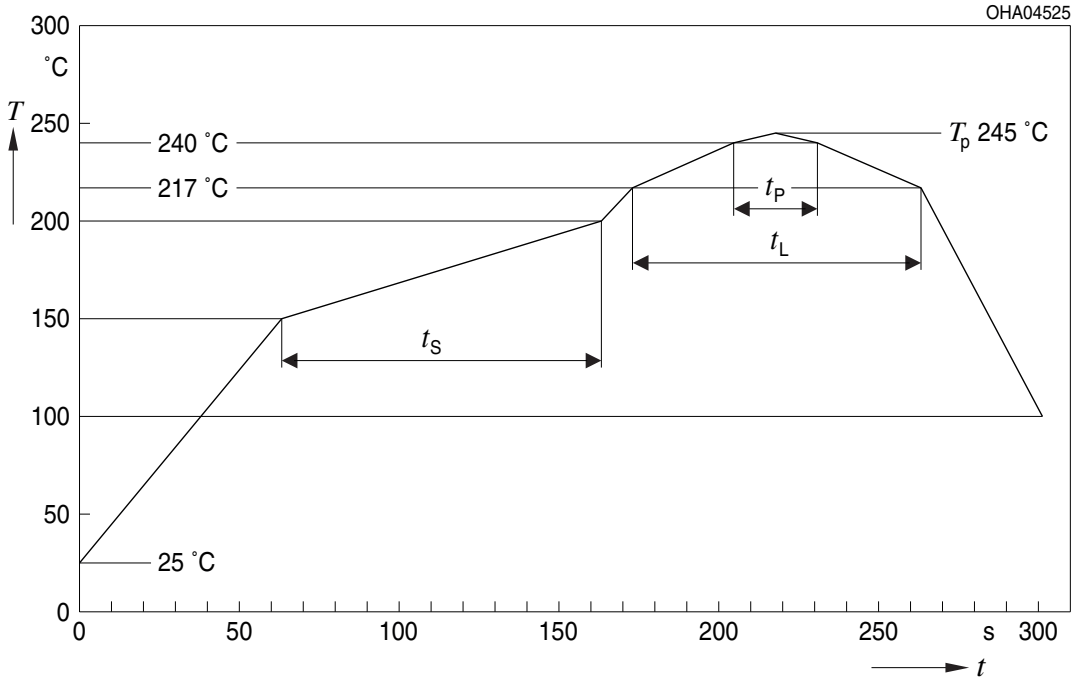

## Recommended Solder Pad [9)]




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

## Reflow Soldering Profile

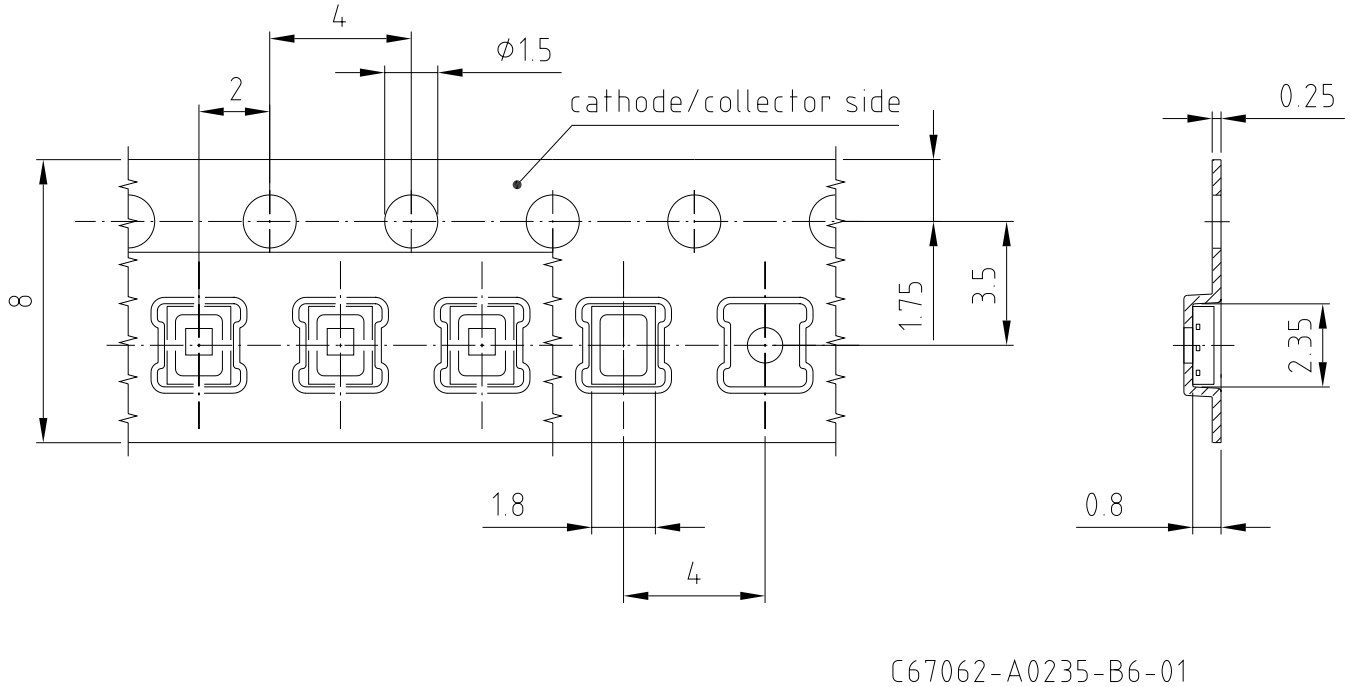
Product complies to MSL Level 3 acc. to JEDEC J-STD-020E



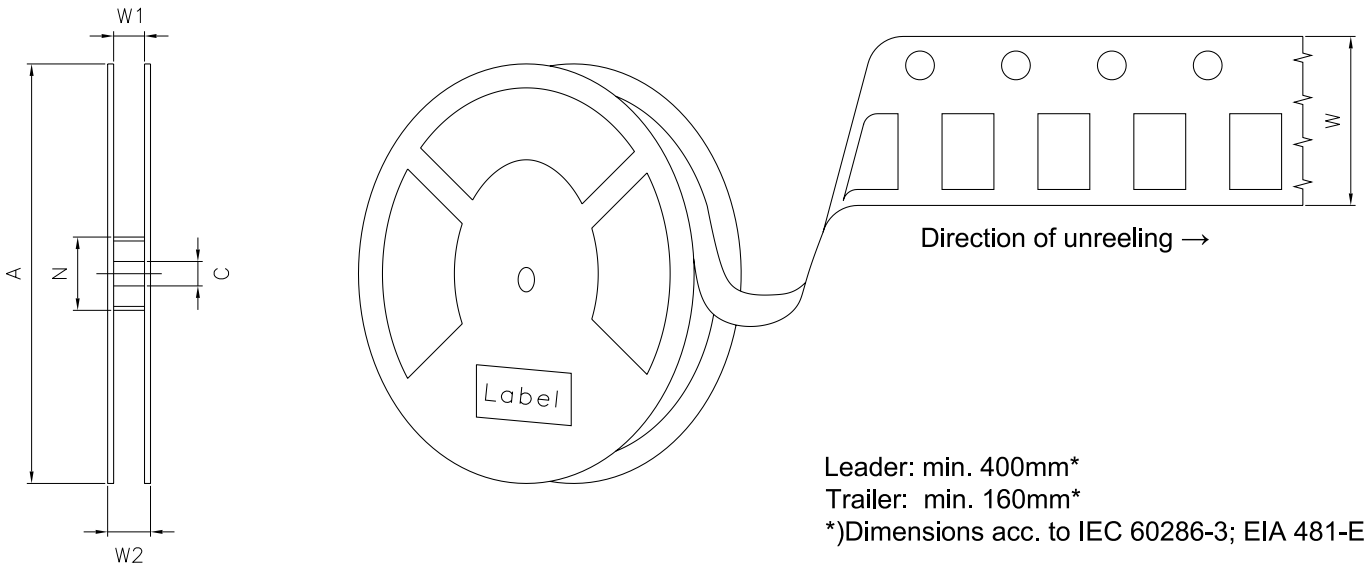

| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|---|---|---|---|---|---|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat*) 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time $t_S$ $T_{Smin}$ to $T_{Smax}$ | $t_S$ | 60 | 100 | 120 | s |
| Ramp-up rate to peak*) $T_{Smax}$ 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 [9]


4
Ø1.5
2
cathode/collector side
0.25
8
1.75
3.5
2.35
1.8
0.8
4
C67062-A0235-B6-01

## Tape and Reel [10)]




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 |
|---|---|---|---|---|---|
| 180 mm | 8 + 0.3 / - 0.1 mm | 60 mm | 8.4 + 2 mm | 14.4 mm | 4000 |



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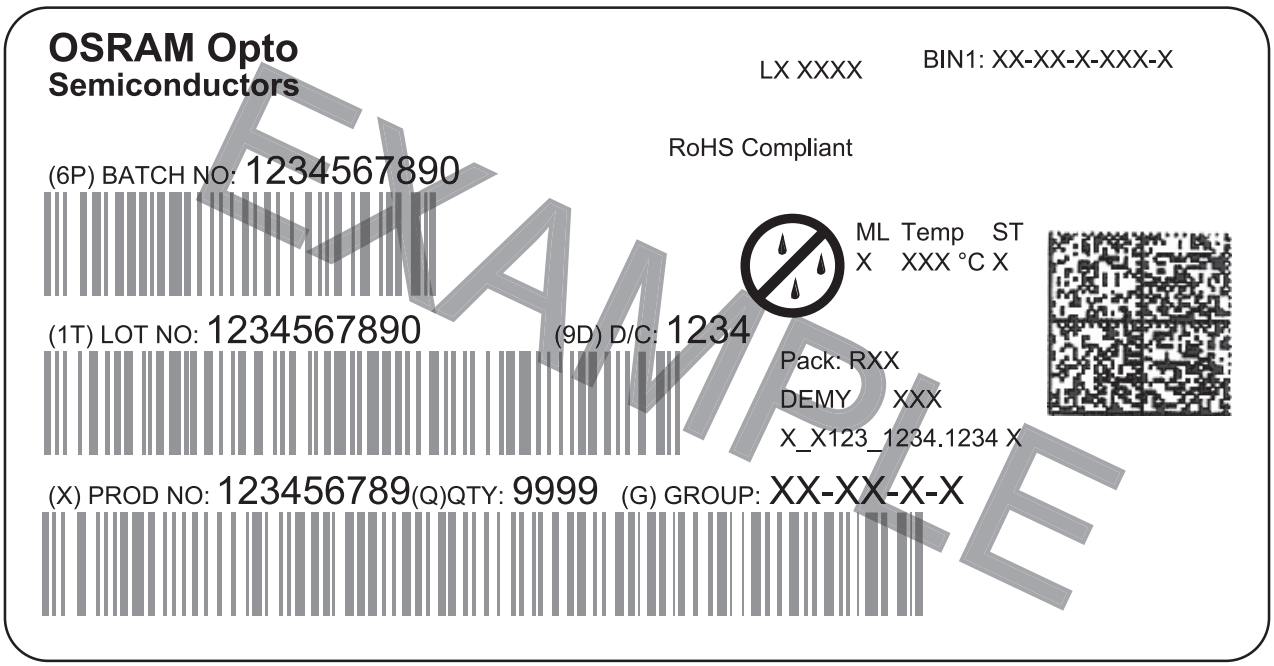
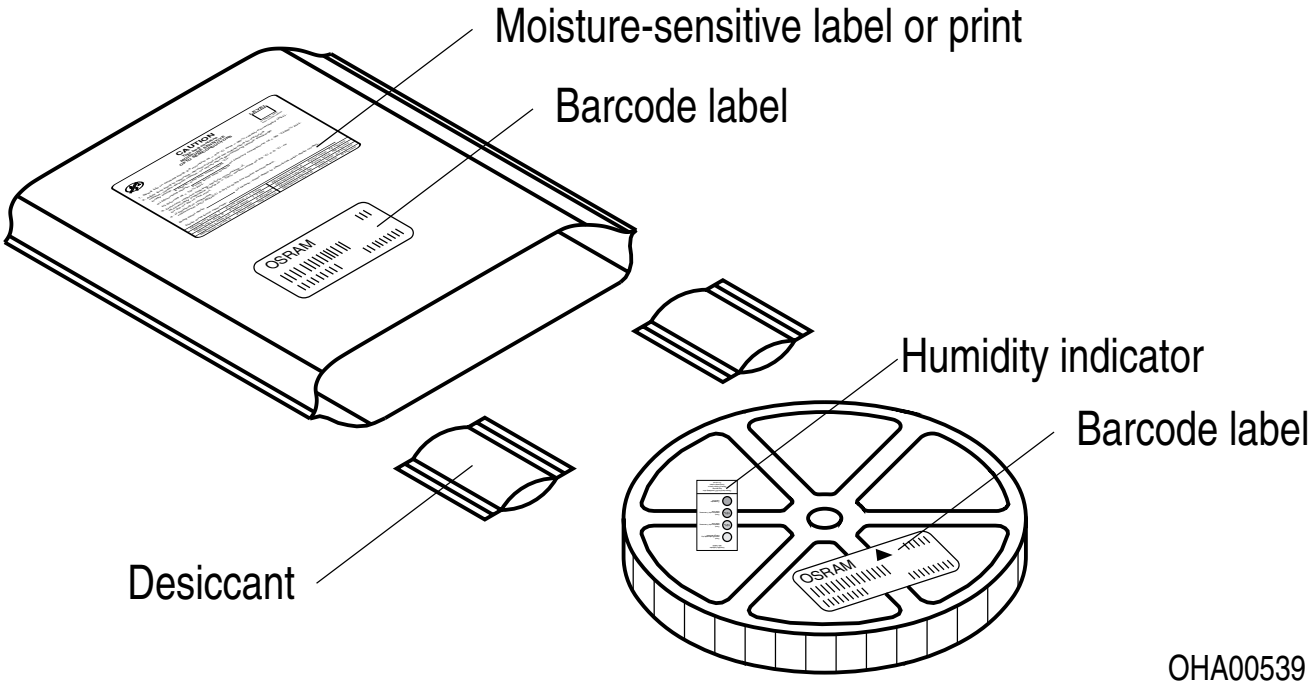
## Barcode-Product-Label (BPL)




OHA04563

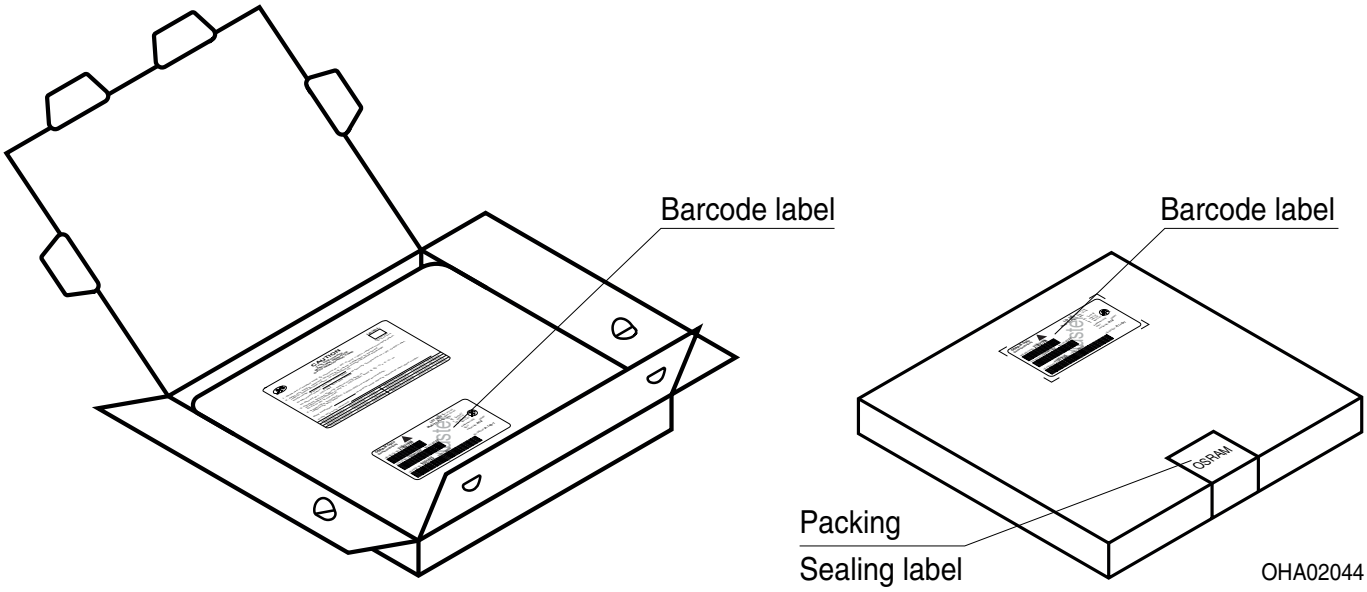
## Dry Packing Process and Materials [9)]




OHA00539

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

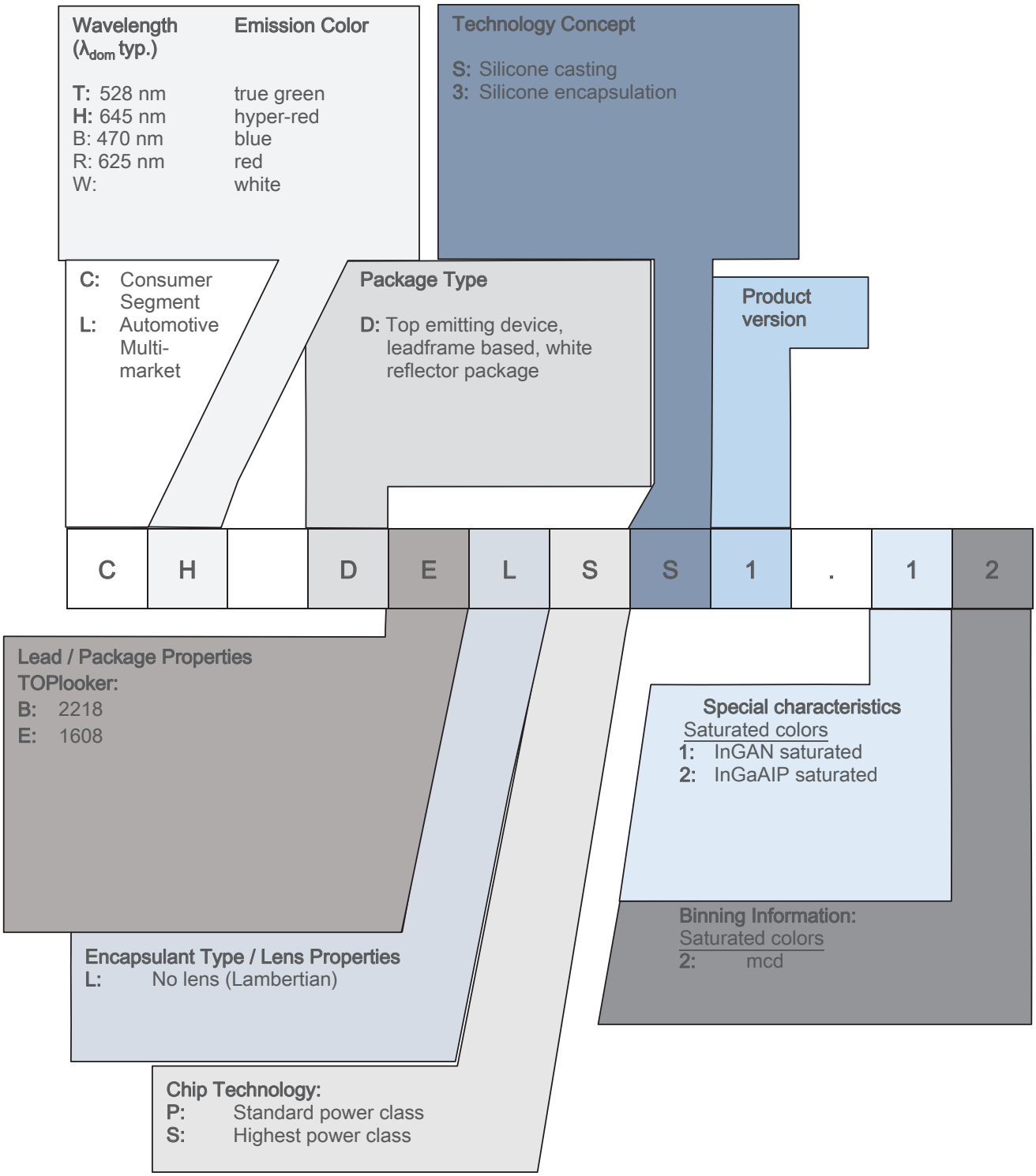
## Schematic Transportation Box [9)]




## Dimensions of Transportation Box

| Width | Length | Height |
|---|---|---|
| 200 ± 5 mm | 195 ± 5 mm | 30 ± 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 **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. 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.

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. 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 the OSRAM OS 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.

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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) **Testing temperature:** TA = 25°C (unless otherwise specified)

8) **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.

9) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ±0.1 and dimensions are specified in mm.

10) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

## Revision History

| Version | Date | Change |
|---|---|---|
| 1.2 | 2019-09-17 | Derating (Diagrams)<br>Maximum Ratings |

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