

# 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:  $\lambda_{\text{dom}} = 536 \text{ nm}$  (● true green)
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

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## Ordering Information

Type	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ $I_v$	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. max.	-40 °C 85 °C
Storage Temperature	$T_{stg}$	min. max.	-40 °C 85 °C
Junction Temperature	$T_j$	max.	125 °C
Forward current $T_s = 25\text{ °C}$	$I_F$	min. max.	2.5 mA 140 mA
Surge Current $t \leq 10\ \mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	500 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	$V_{ESD}$		8 kV
Reverse current <sup>2)</sup>	$I_R$	max.	200 mA

## Characteristics

$I_F = 20 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

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

## Brightness Groups

Group	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ min. $I_v$	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ max. $I_v$	Luminous Flux <sup>6)</sup> $I_F = 20 \text{ mA}$ 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 <sup>4)</sup> $I_F = 20 \text{ mA}$ min. $V_F$	Forward Voltage <sup>4)</sup> $I_F = 20 \text{ mA}$ 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 <sup>3)</sup> $I_F = 20 \text{ mA}$ min. $\lambda_{\text{dom}}$	Dominant Wavelength <sup>3)</sup> $I_F = 20 \text{ mA}$ max. $\lambda_{\text{dom}}$
5	526 nm	535 nm
6	535 nm	544 nm

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## Group Name on Label

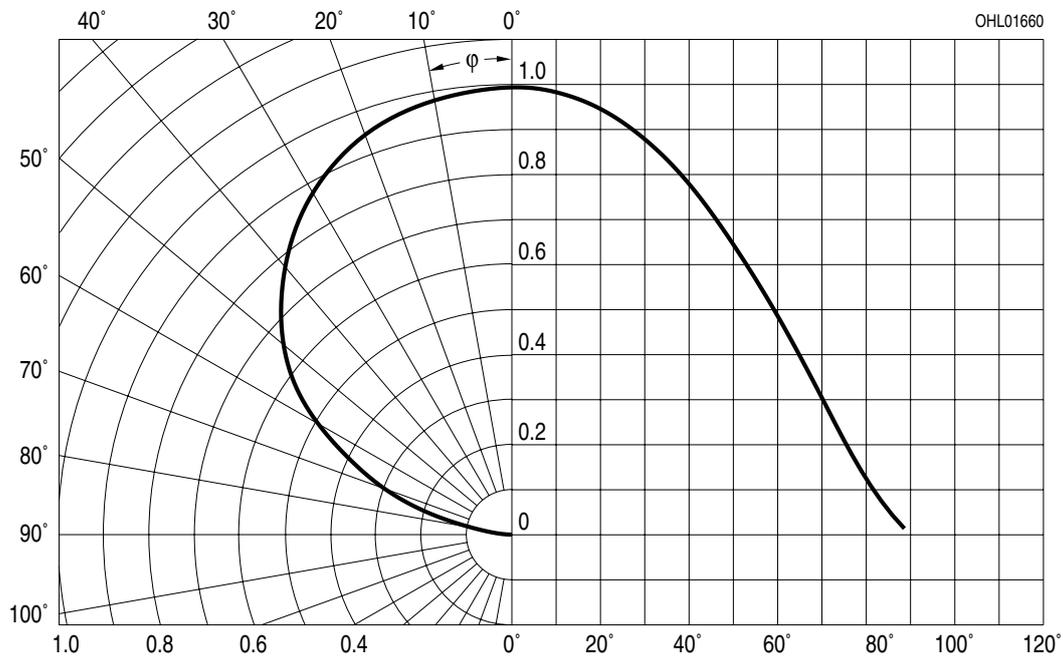
**Example: 5D-5-J6**

Brightness	Wavelength	Forward Voltage
5D	5	J6

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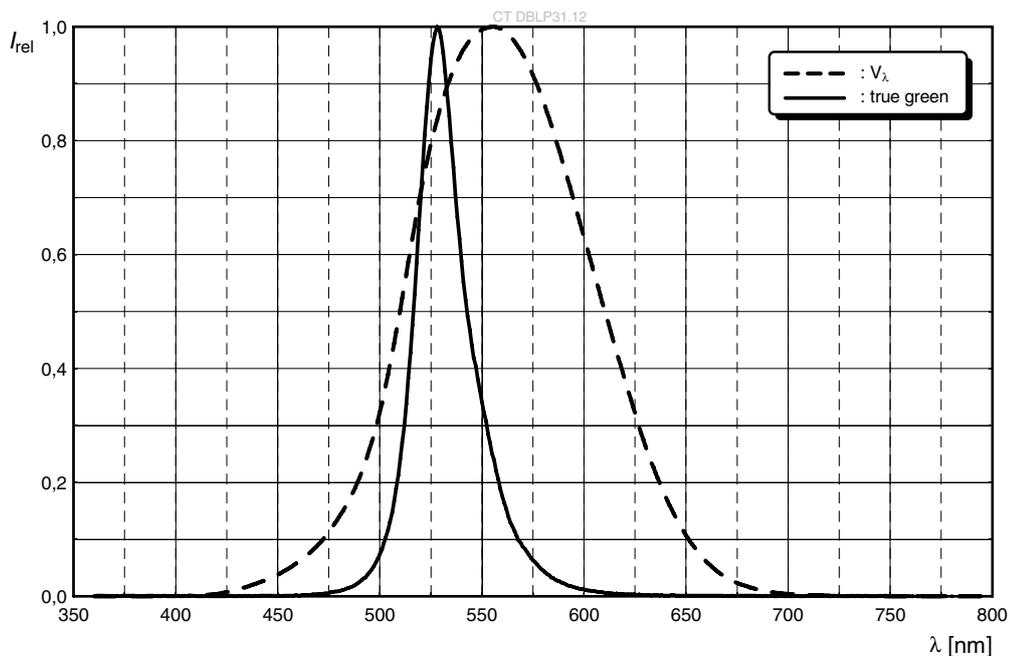
### Radiation Characteristics <sup>6), 7)</sup>

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



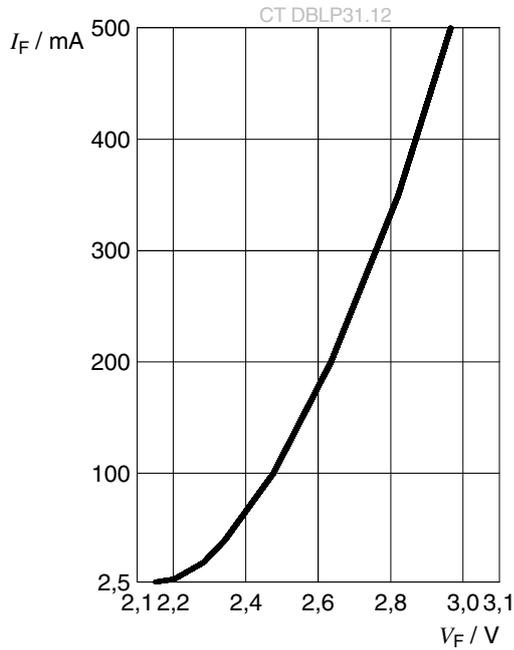
### Relative Spectral Emission <sup>6)</sup>

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



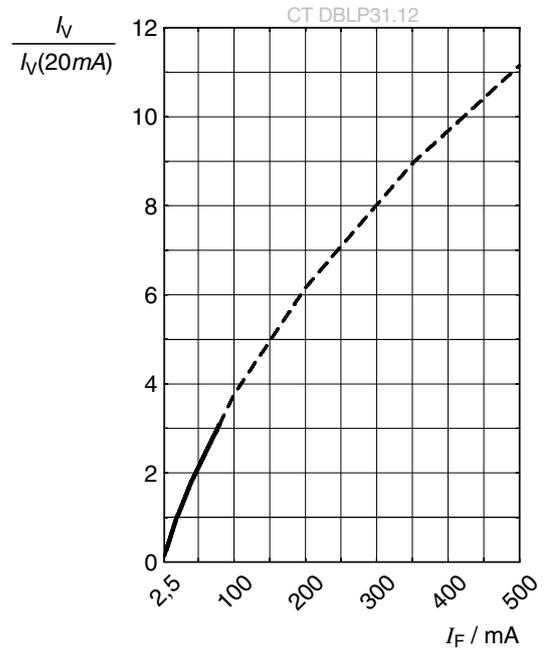
**Forward current** (6), 8)

$I_F = f(V_F); T_S = 25\text{ }^\circ\text{C}$



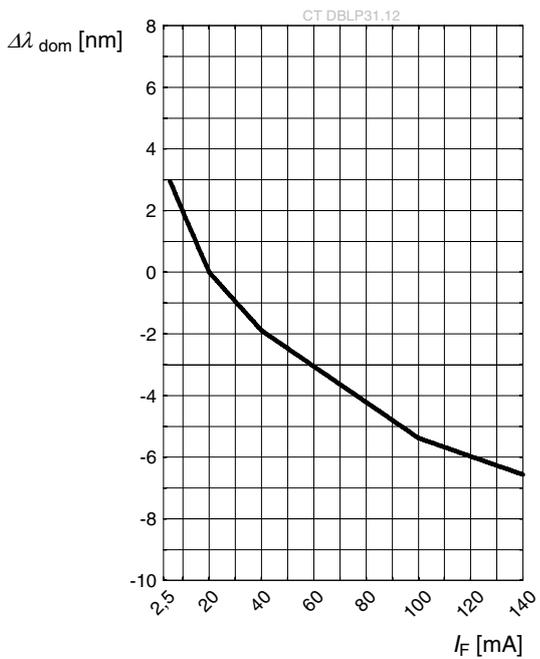
**Relative Luminous Flux** (6), 8)

$I_V / I_V(20\text{ mA}) = f(I_F); T_S = 25\text{ }^\circ\text{C}$



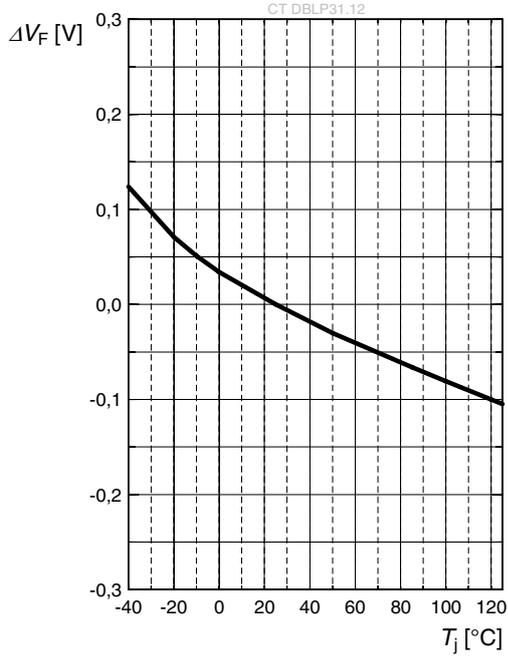
**Dominant Wavelength** (6)

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



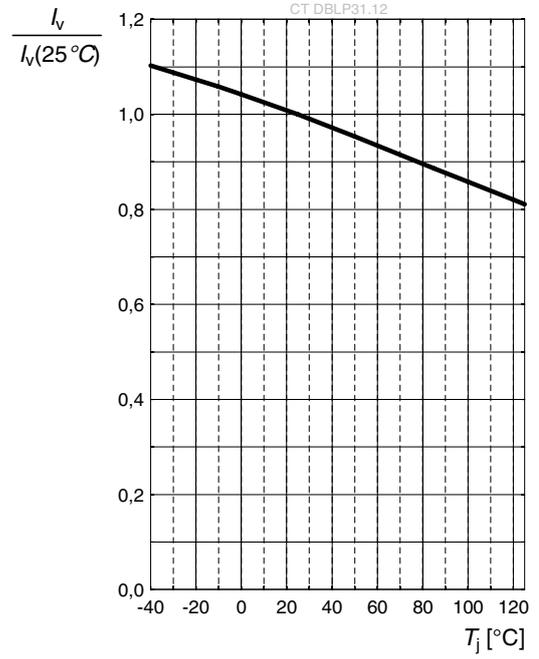
**Forward Voltage** <sup>6)</sup>

$$\Delta V_F = V_F - V_F(25\text{ }^\circ\text{C}) = f(T_j); I_F = 20\text{ mA}$$



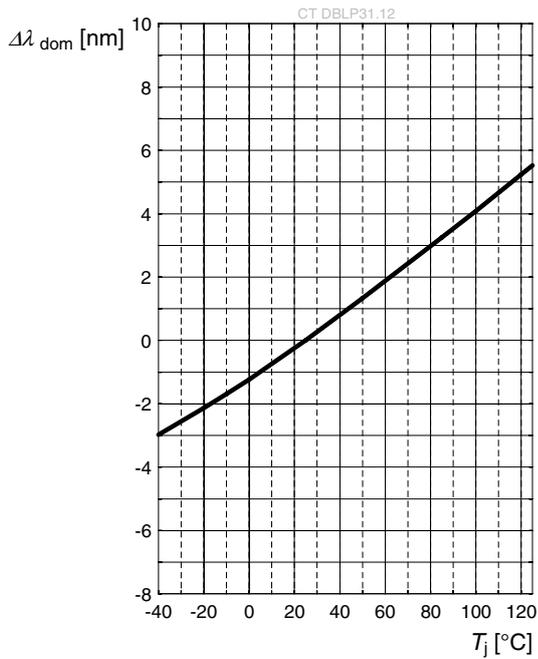
**Relative Luminous Intensity** <sup>6)</sup>

$$I_V/I_V(25\text{ }^\circ\text{C}) = f(T_j); I_F = 20\text{ mA}$$



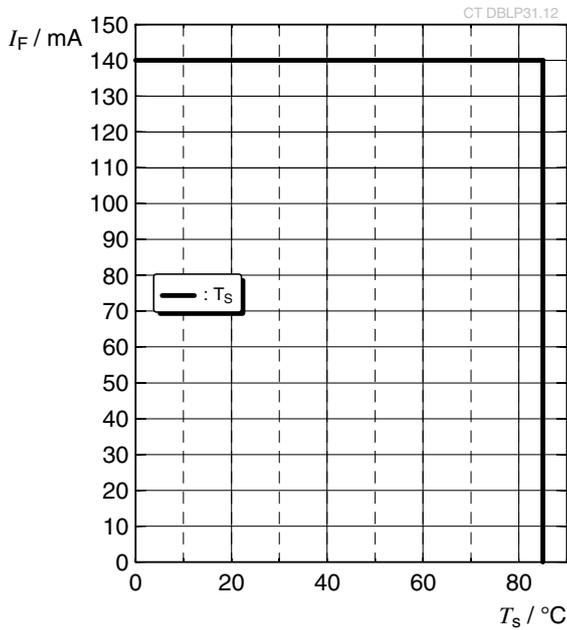
**Dominant Wavelength** <sup>6)</sup>

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



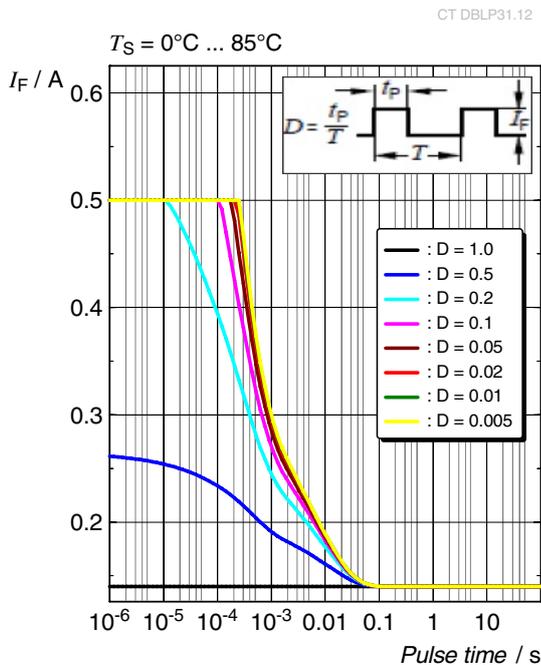
## Max. Permissible Forward Current

$$I_F = f(T)$$

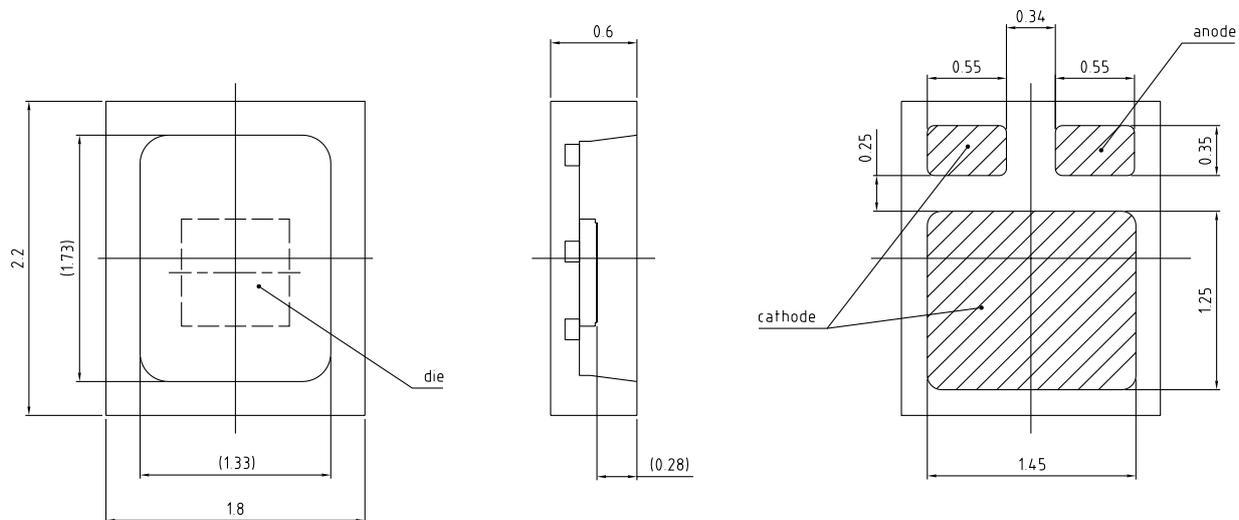


## Permissible Pulse Handling Capability

$$I_F = f(t_p); D: \text{Duty cycle}$$



## Dimensional Drawing <sup>9)</sup>



general tolerance  $\pm 0.1$

lead finish Ag 

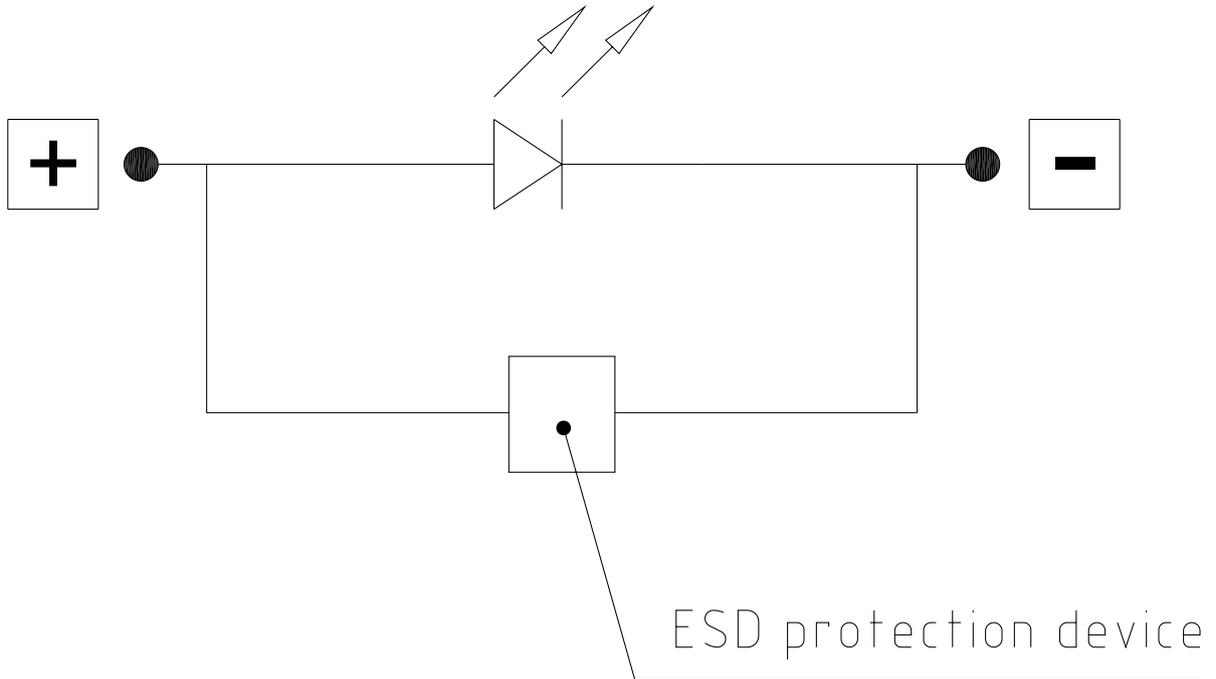
C67062-A0235-A1-01

### Further Information:

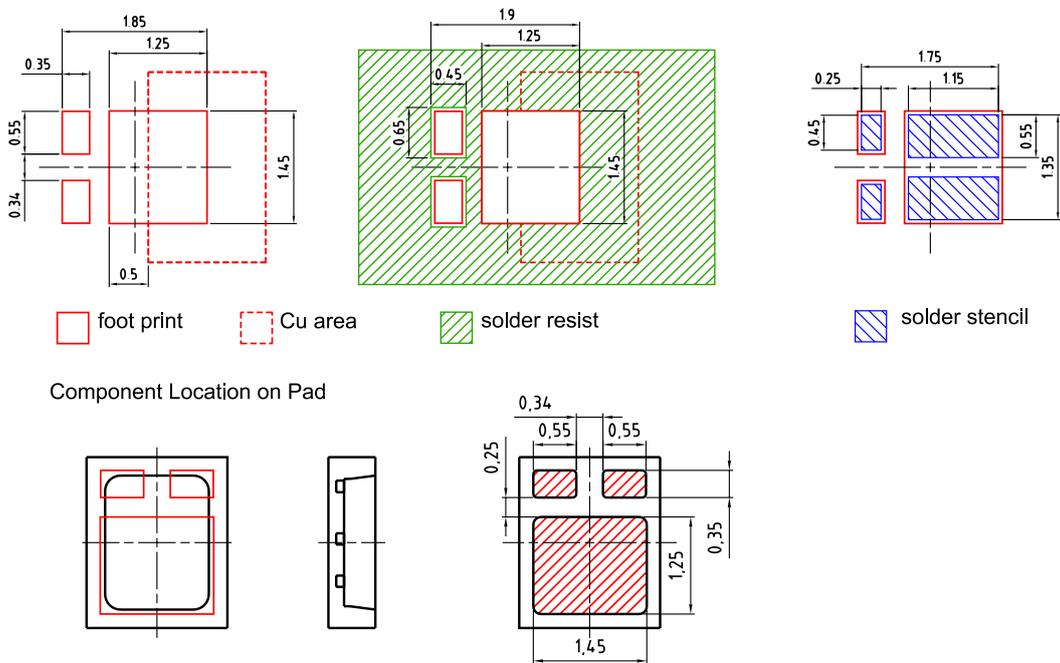
**Approximate Weight:** 6.0 mg

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

## Electrical Internal Circuit



## Recommended Solder Pad <sup>9)</sup>

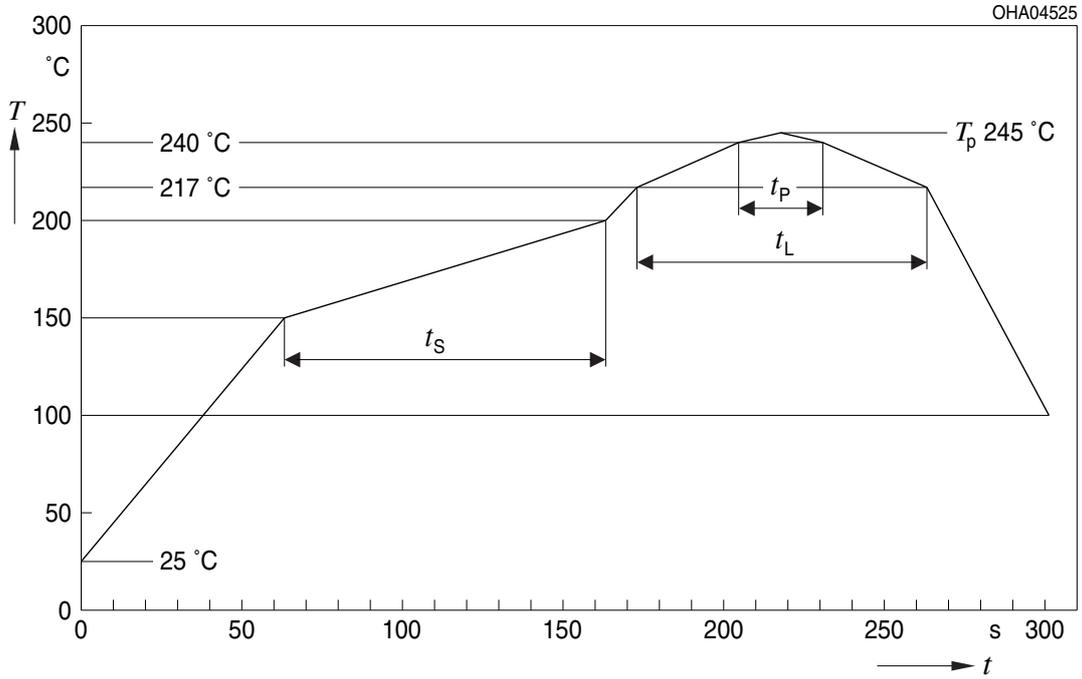


E062 3010.218 -01

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

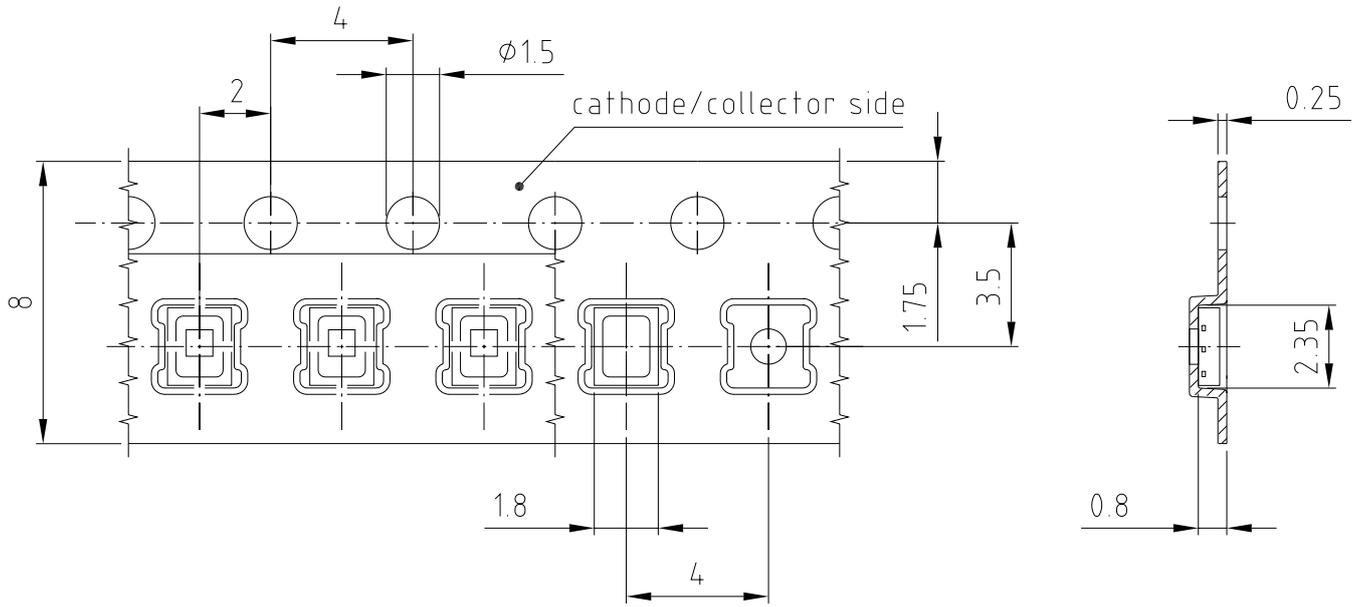


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		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

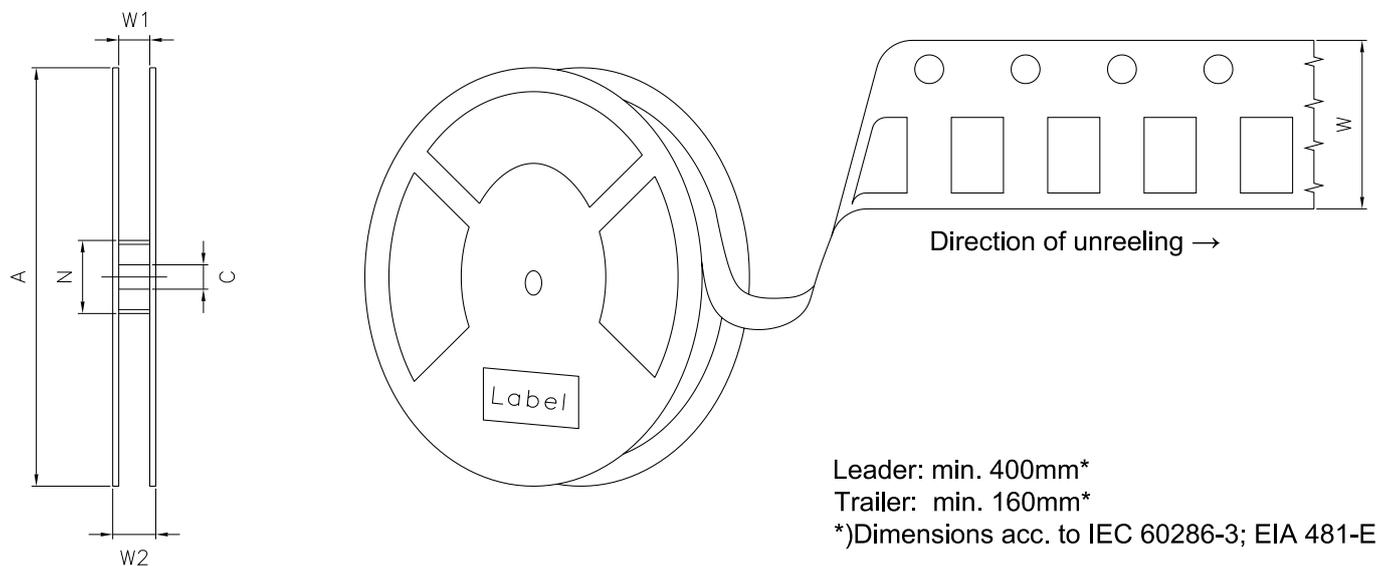
\* slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

Taping <sup>9)</sup>



C67062-A0235-B6-01

## Tape and Reel <sup>10)</sup>



### 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

### 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

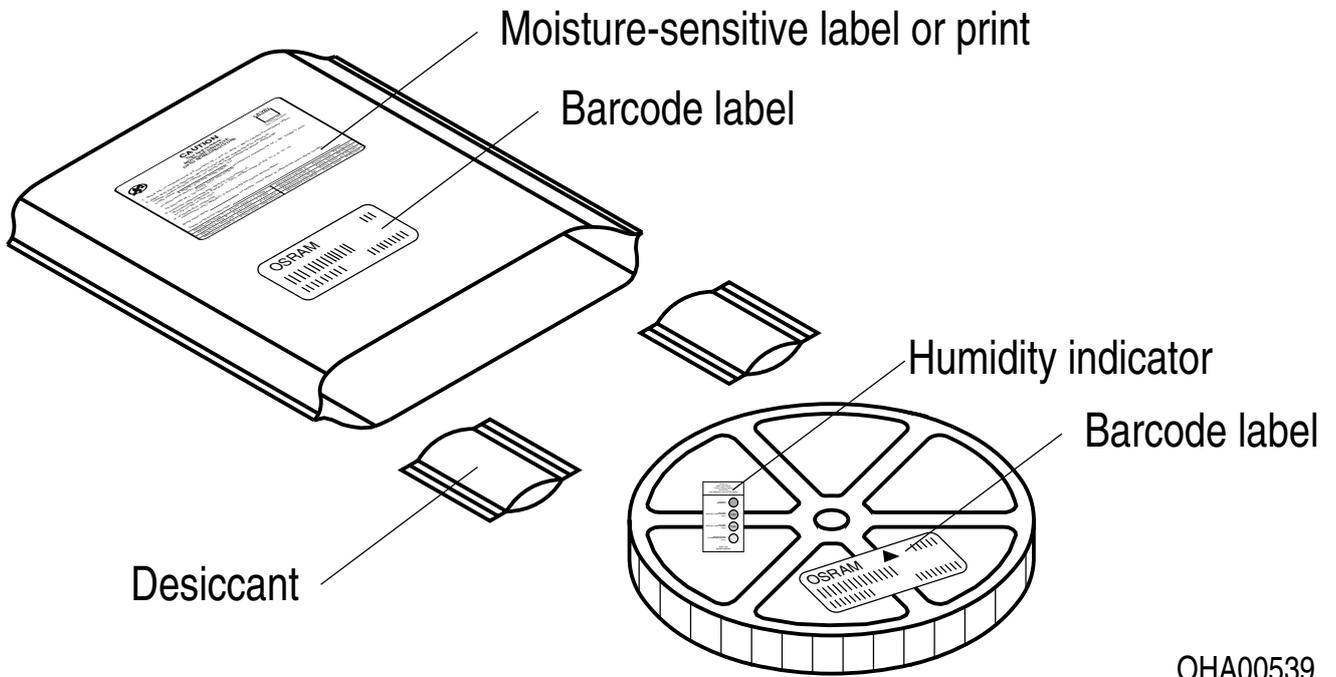
ML Temp ST  
X XXX °C X

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

The diagram shows a rectangular label with rounded corners. It contains the OSRAM logo and product name at the top left. To the right are fields for 'LX XXXX' and 'BIN1: XX-XX-X-XXX-X'. Below the logo is a 'RoHS Compliant' statement. The label features three horizontal barcode sections. The first is labeled '(6P) BATCH NO: 1234567890'. The second is labeled '(1T) LOT NO: 1234567890' and '(9D) D/C: 1234'. The third is labeled '(X) PROD NO: 123456789 (Q) QTY: 9999 (G) GROUP: XX-XX-X-X'. To the right of the second barcode is a 'Moisture Sensitive Device' symbol (a circle with a diagonal line and three droplets) and 'ML Temp ST X XXX °C X'. Below that is a QR code and the text 'Pack: RXX', 'DEMY XXX', and 'X\_X123\_1234.1234 X'.

OHA04563

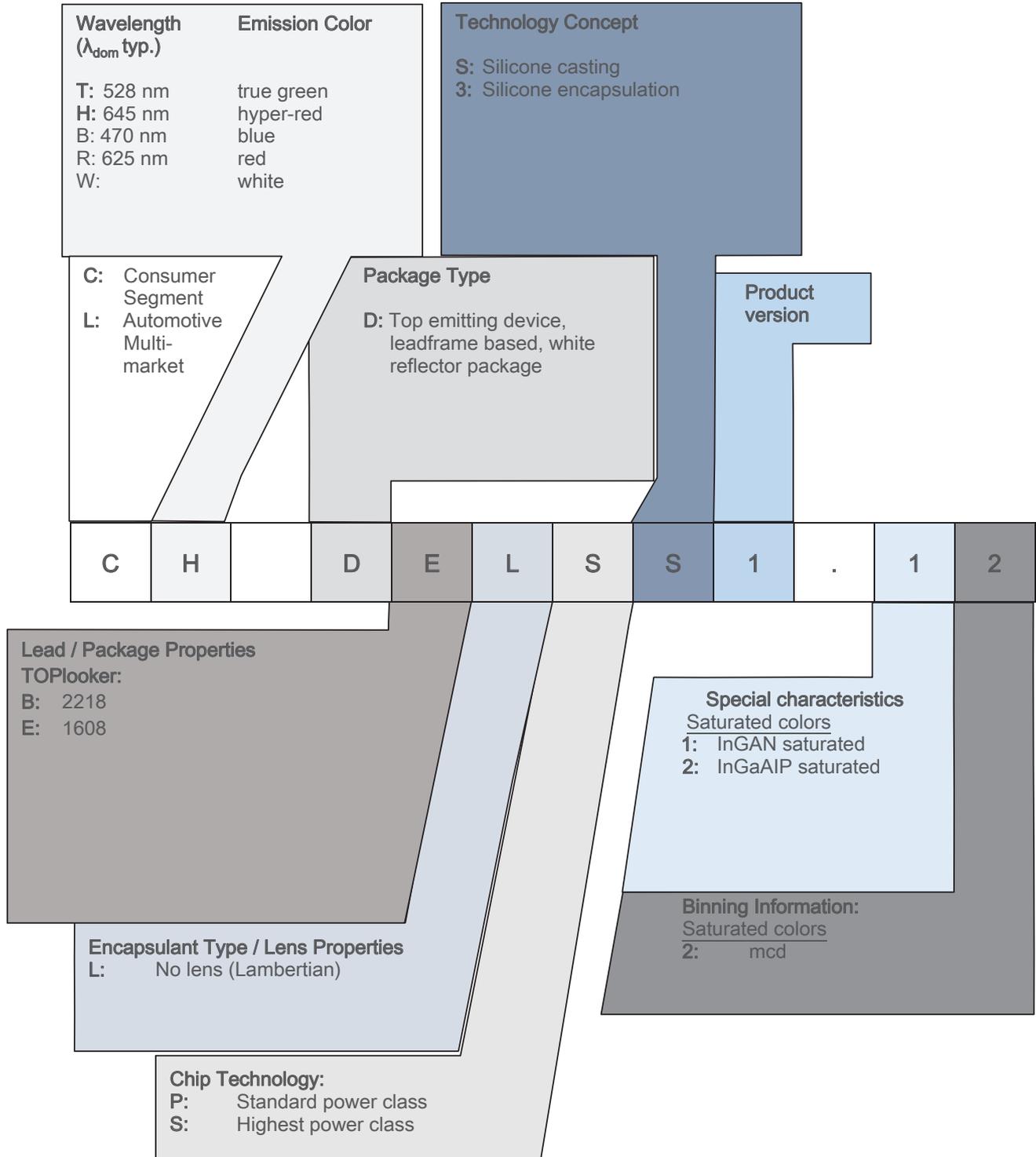
### Dry Packing Process and Materials <sup>9)</sup>



OHA00539

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 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 [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 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.

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

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

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

In case buyer – or customer supplied by buyer – considers using OSRAM OS components in product safety devices/applications or medical devices/applications, buyer and/or customer has to inform the local sales partner of OSRAM OS immediately and OSRAM OS and buyer and /or customer will analyze and coordinate the customer-specific request between OSRAM OS 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:** 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) **Wavelength:** The wavelength is measured at a current pulse of typically 25 ms, with an internal reproducibility of  $\pm 0.5$  nm and an expanded uncertainty of  $\pm 1$  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  $\pm 0.05$  V and an expanded uncertainty of  $\pm 0.1$  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) **Testing temperature:**  $T_A = 25^\circ\text{C}$  (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  $\pm 0.1$  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) Maximum Ratings
1.3	2021-03-29	Electro - Optical Characteristics (Diagrams)

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