

# KY DMLS31.FY

## SYNIOS® P2720

This compact LED device is part of the SYNIOS P2720 family. Given the scalability of this product family, it provides full performance and flexibility with just one footprint.

The KY DMLS31.FY product is meant to provide superior light quality in 1 mm<sup>2</sup> chip size class.



## Applications

- Signalling

## Features:

- Package: SMD epoxy package
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.57, Cy = 0.42 acc. to CIE 1931 (● converted yellow)
- Corrosion Robustness Class: 3B
- Qualifications: The product qualification test plan is based on the guidelines of IEC60810, Lamps for road vehicles – Performance requirements – Requirements and test conditions for LED packages.
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

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## Ordering Information

Type	Luminous Flux <sup>1)</sup> $I_F = 600 \text{ mA}$ $\Phi_V$	Ordering Code
KY DMLS31.FY-Z8KF6-5F-8E8G	106 ... 159 lm	Q65112A3956

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## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min.	-40 °C
		max.	125 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	125 °C
Junction Temperature	$T_j$	max.	150 °C
Junction Temperature for short time applications*	$T_j$	max.	175 °C
Forward Current	$I_F$	min.	20 mA
$T_s = 25\text{ °C}$		max.	700 mA
Surge Current	$I_{FS}$	max.	2500 mA
$t \leq 10\text{ }\mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$			
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

\*The median lifetime (L70/B50) for  $T_j = 175\text{ °C}$  is 100h.

## Characteristics

$I_F = 600 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	C <sub>x</sub>	typ.	0.57
	C <sub>y</sub>	typ.	0.42
Viewing angle at 50 % I <sub>v</sub>	2φ	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 600 \text{ mA}$	V <sub>F</sub>	min.	2.75 V
		typ.	2.95 V
		max.	3.50 V
Reverse voltage (ESD device)	V <sub>R ESD</sub>	min.	45 V
Reverse voltage <sup>2)</sup> $I_R = 20 \text{ mA}$	V <sub>R</sub>	max.	1.2 V
Real thermal resistance junction/solderpoint <sup>5)</sup>	R <sub>thJS real</sub>	typ.	7.0 K / W
		max.	9.0 K / W
Electrical thermal resistance junction/solderpoint <sup>5)</sup> with efficiency $\eta_e = 20 \text{ %}$	R <sub>thJS elec.</sub>	typ.	5.6 K / W
		max.	7.2 K / W

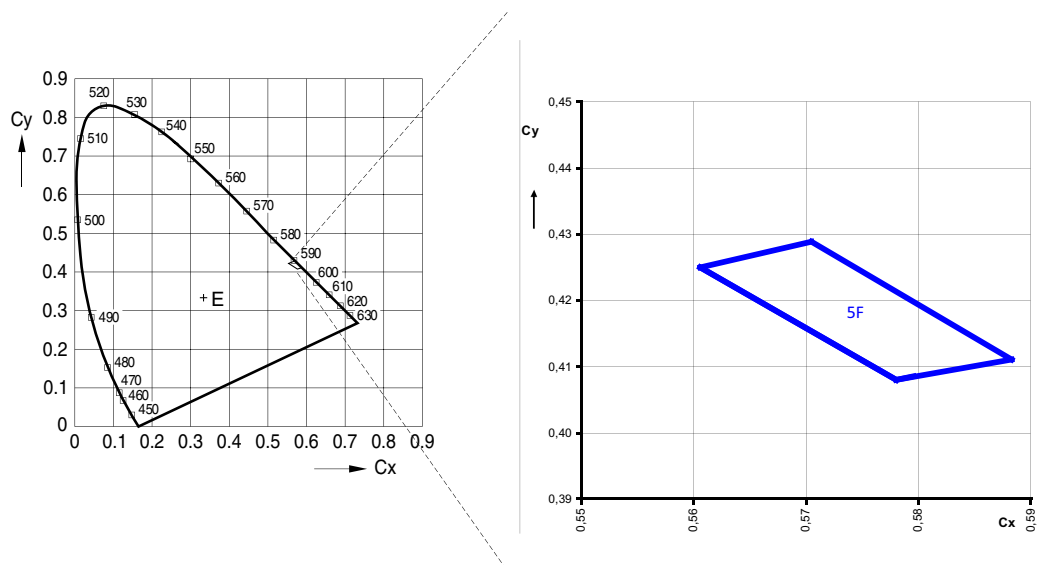
## Brightness Groups

Group	Luminous Flux <sup>1)</sup> $I_F = 600 \text{ mA}$ min. $\Phi_V$	Luminous Flux <sup>1)</sup> $I_F = 600 \text{ mA}$ max. $\Phi_V$	Luminous Intensity <sup>6)</sup> $I_F = 600 \text{ mA}$ typ. $I_v$
8KF	106 lm	118 lm	37 cd
5L	112 lm	125 lm	39 cd
5LF	118 lm	132 lm	41 cd
6L	125 lm	140 lm	44 cd
6LF	132 lm	149 lm	46 cd
7L	140 lm	159 lm	49 cd

## Forward Voltage Groups

Group	Forward Voltage <sup>4)</sup> $I_F = 600 \text{ mA}$ min. $V_F$	Forward Voltage <sup>4)</sup> $I_F = 600 \text{ mA}$ max. $V_F$
8E	2.75 V	3.00 V
8F	3.00 V	3.25 V
8G	3.25 V	3.50 V

## Chromaticity Coordinate Groups <sup>7)</sup>



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

Group	Cx	Cy	Group	Cx	Cy
5F	0.5606	0.4250		0.5780	0.4080
	0.5705	0.4289			
	0.5883	0.4111			

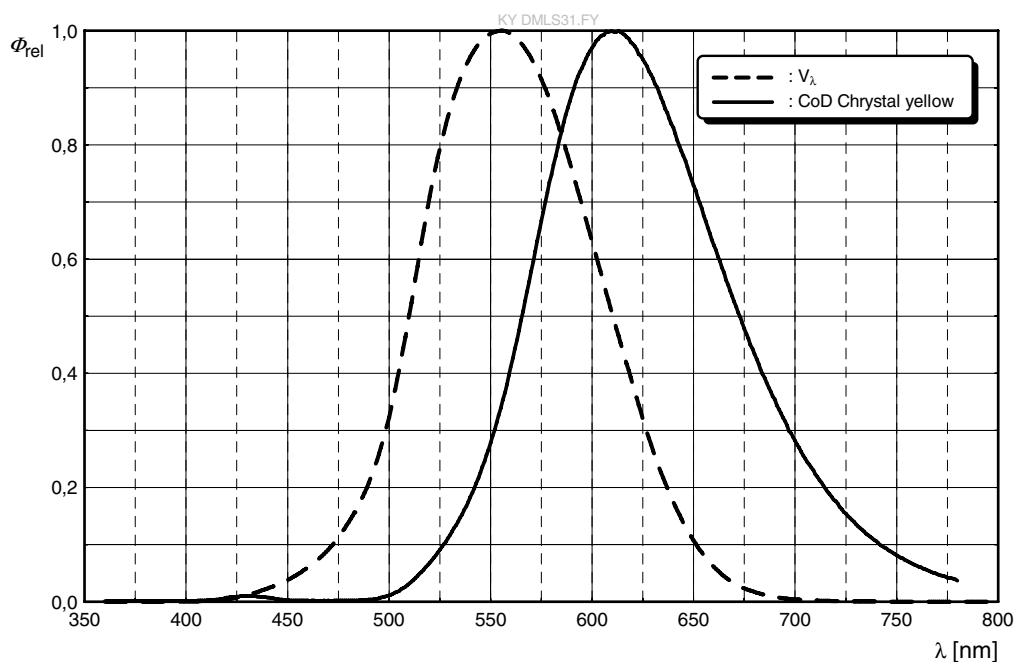
Group Name on Label

Example: 5L-5F-8E

Brightness	Color chromaticity	Forward Voltage
5L	5F	8E

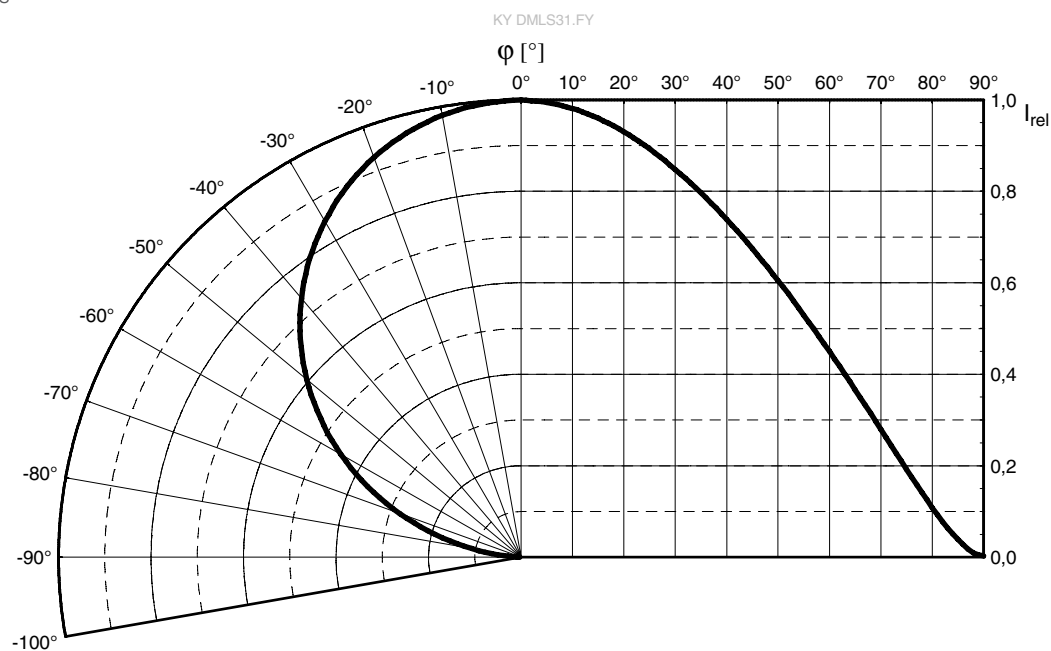
## Relative Spectral Emission <sup>6)</sup>

$$\Phi_{\text{rel}} = f(\lambda); I_F = 600 \text{ mA}; T_S = 25^\circ \text{C}$$



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

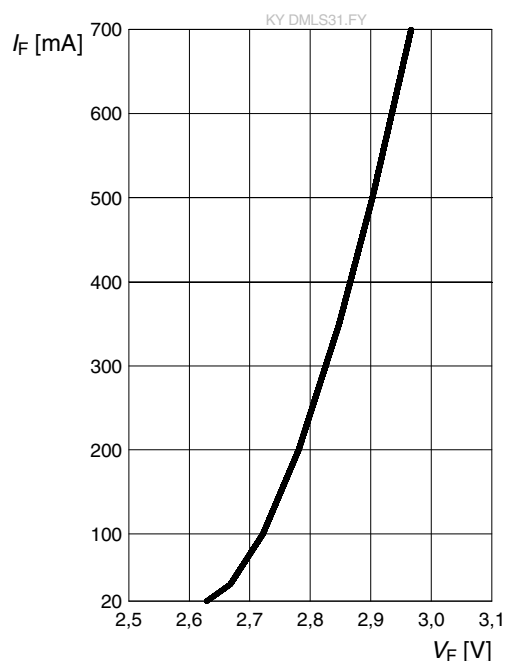
$$I_{\text{rel}} = f(\phi); T_S = 25^\circ \text{C}$$



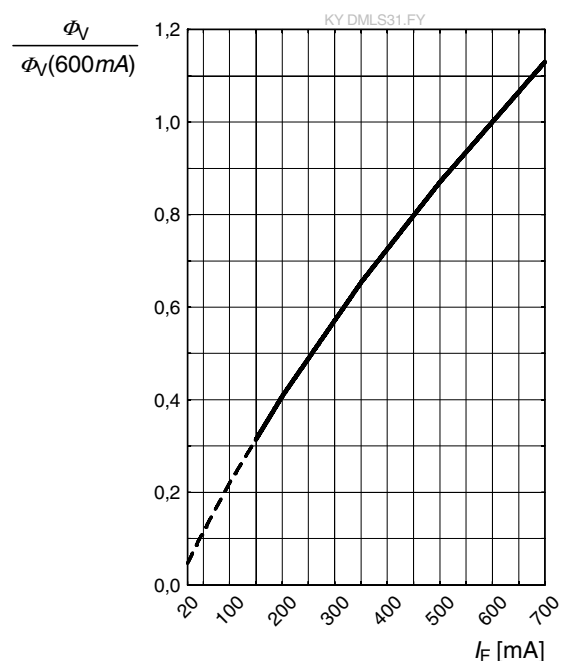


**Forward current** <sup>6), 8)</sup>

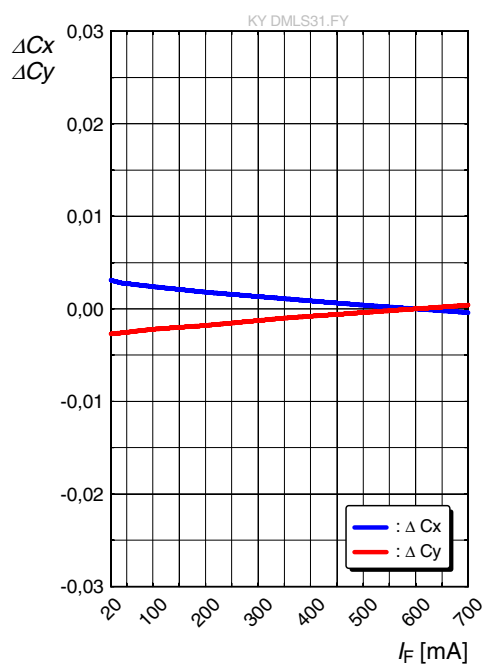
$$I_F = f(V_F); T_S = 25\text{ °C}$$

**Relative Luminous Flux** <sup>6), 8)</sup>

$$\Phi_V / \Phi_V(600\text{ mA}) = f(I_F); T_S = 25\text{ °C}$$

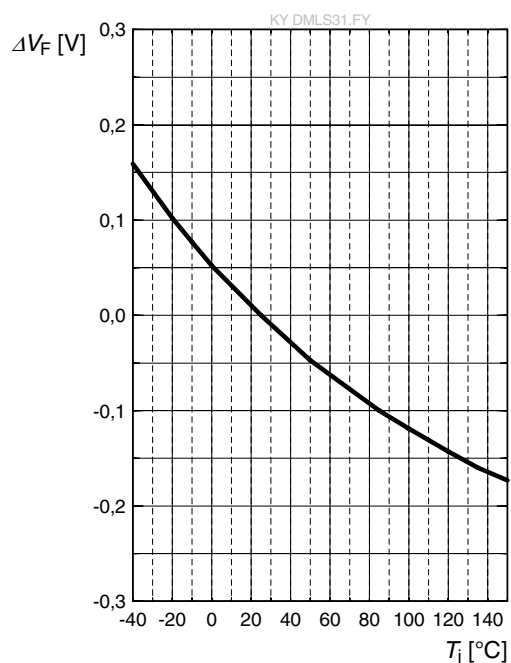
**Chromaticity Coordinate Shift** <sup>6)</sup>

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



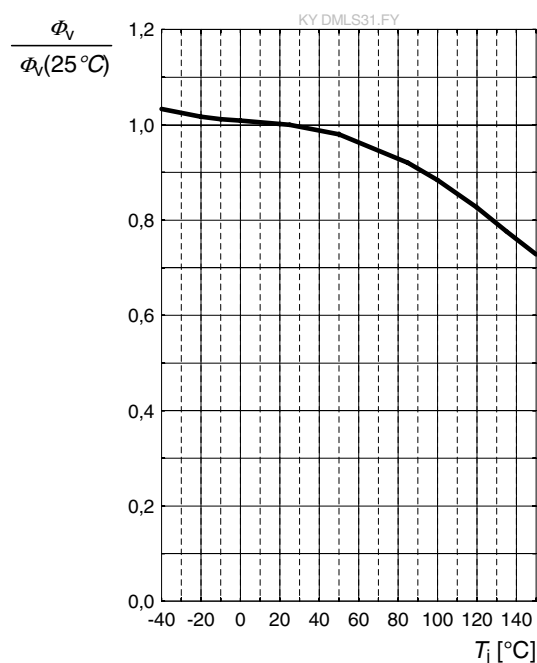
## Forward Voltage <sup>6)</sup>

$$\Delta V_F = V_F - V_F(25\text{ °C}) = f(T_j); I_F = 600\text{ mA}$$



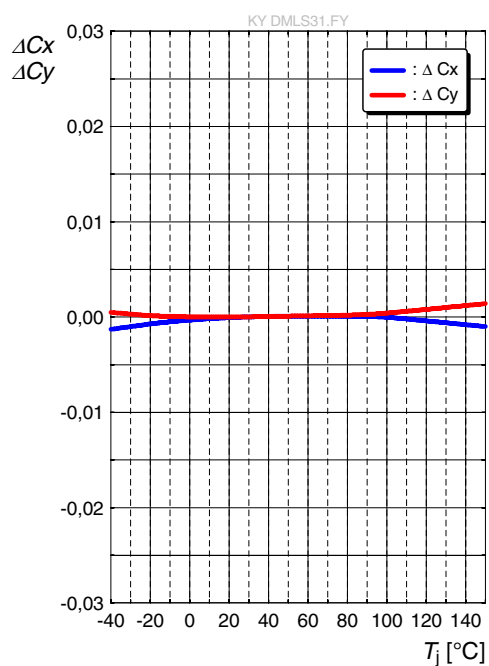
## Relative Luminous Flux <sup>6)</sup>

$$\Phi_V / \Phi_V(25\text{ °C}) = f(T_j); I_F = 600\text{ mA}$$



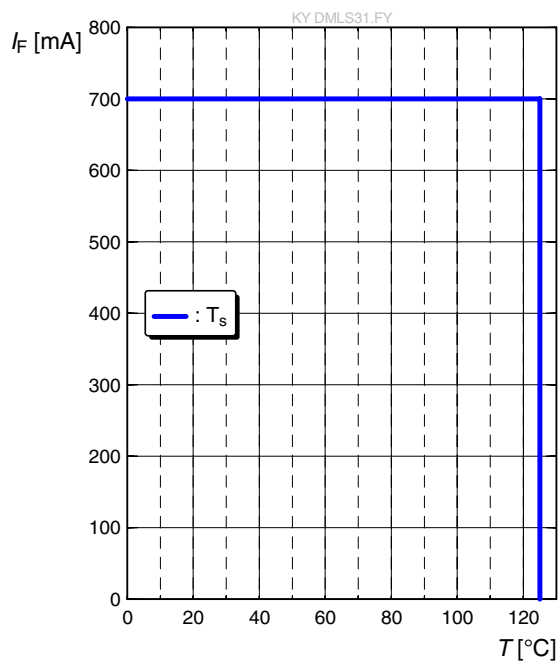
## Chromaticity Coordinate Shift <sup>6)</sup>

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 600\text{ mA}$$



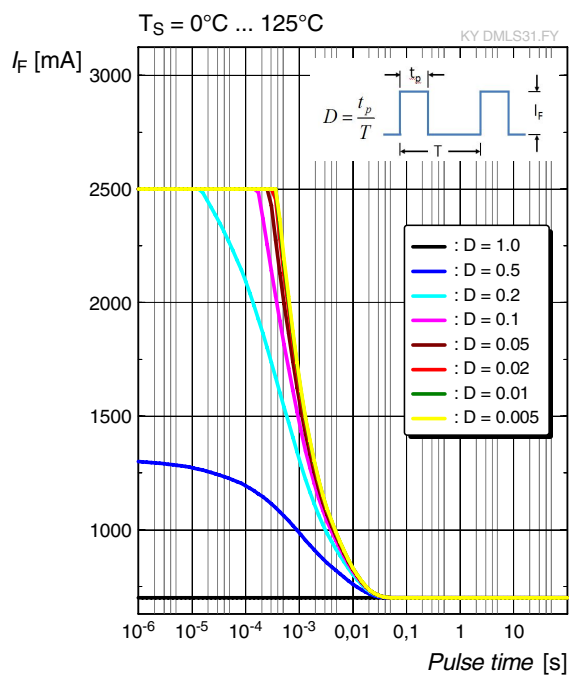
## Max. Permissible Forward Current

$$I_F = f(T)$$

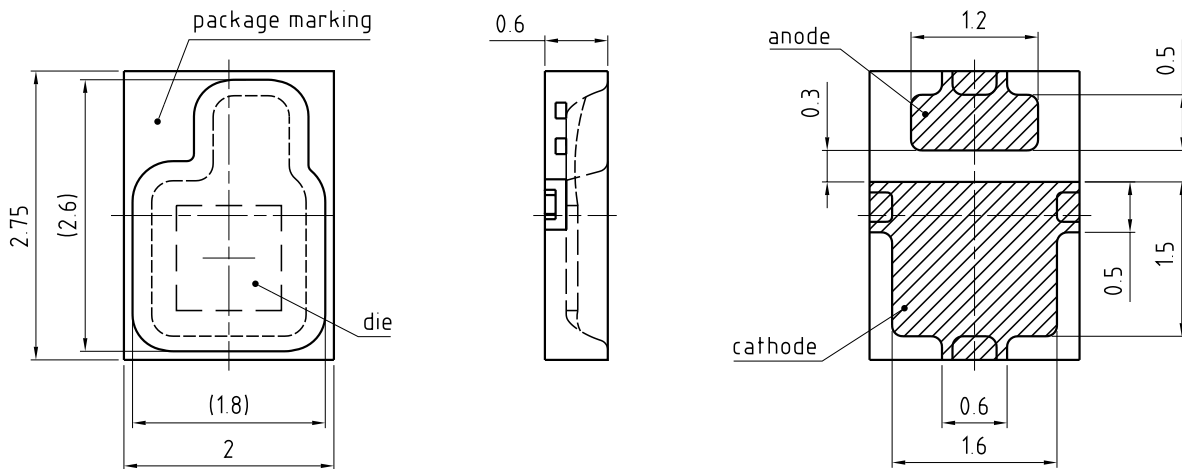


## Permissible Pulse Handling Capability

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



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

General tolerance  $\pm 0.1$ Lead finish Au 

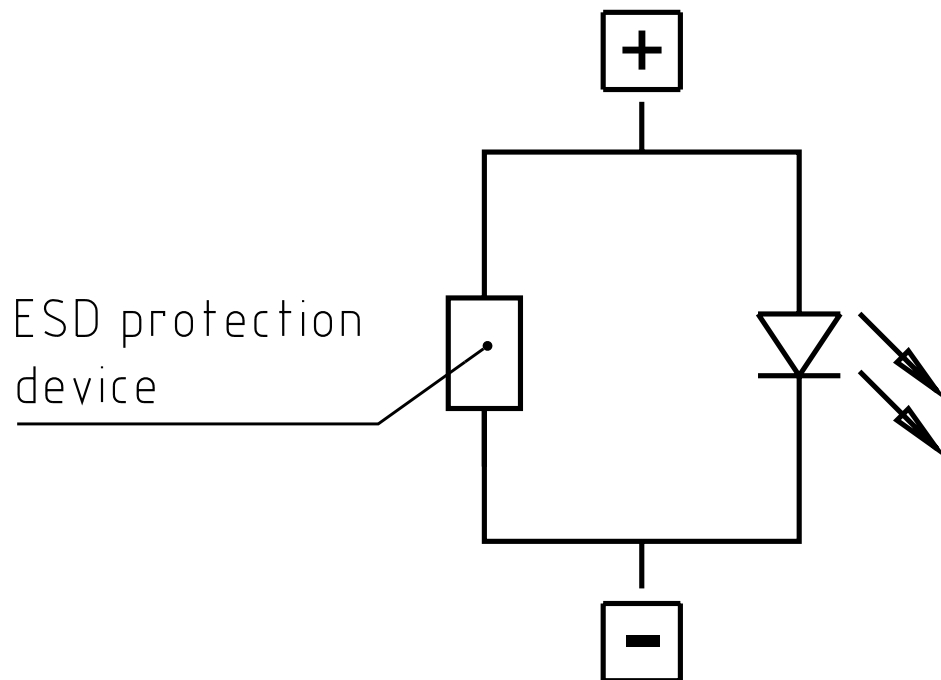
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**Approximate Weight:** 12.0 mg

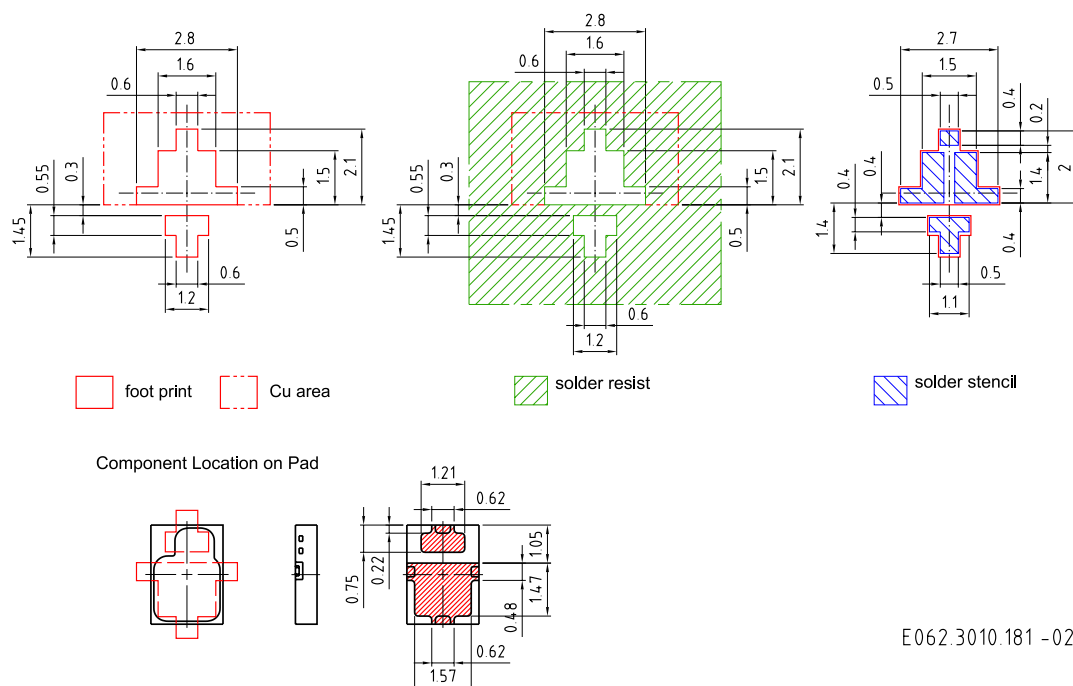
**Corrosion test:** Class: 3B  
 Test condition: 40°C / 90 % RH / 15 ppm H<sub>2</sub>S / 14 days (stricter then IEC 60068-2-43)

**ESD advice:** LED is protected by ESD device which is connected in parallel to LED-Chip.

## Electrical internal circuit



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

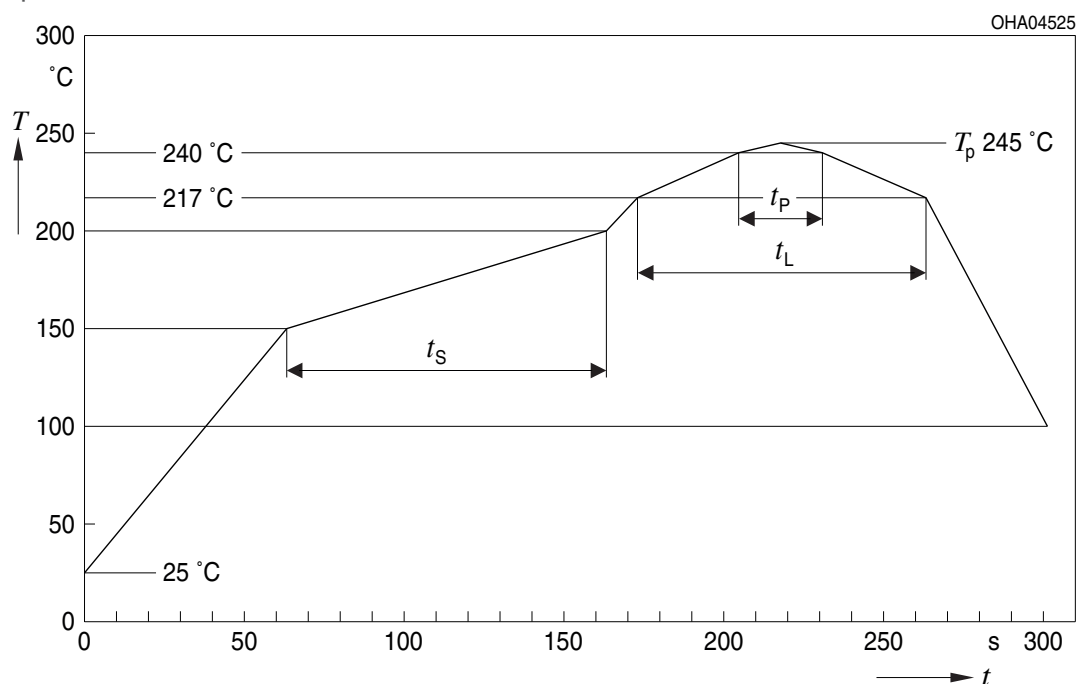


E062.3010.181 -02

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

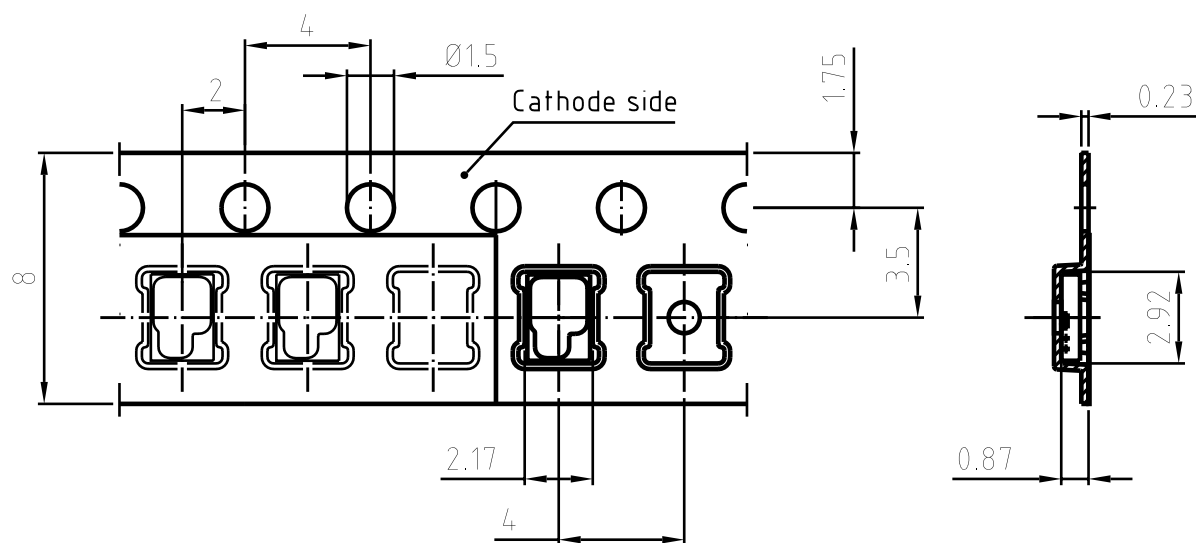


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak*) $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		217		$^{\circ}\text{C}$
Time above liquidus temperature	$t_L$		80	100	s
Peak temperature	$T_p$		245	260	$^{\circ}\text{C}$
Time within 5 °C of the specified peak temperature $T_p - 5\text{ K}$	$t_p$	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

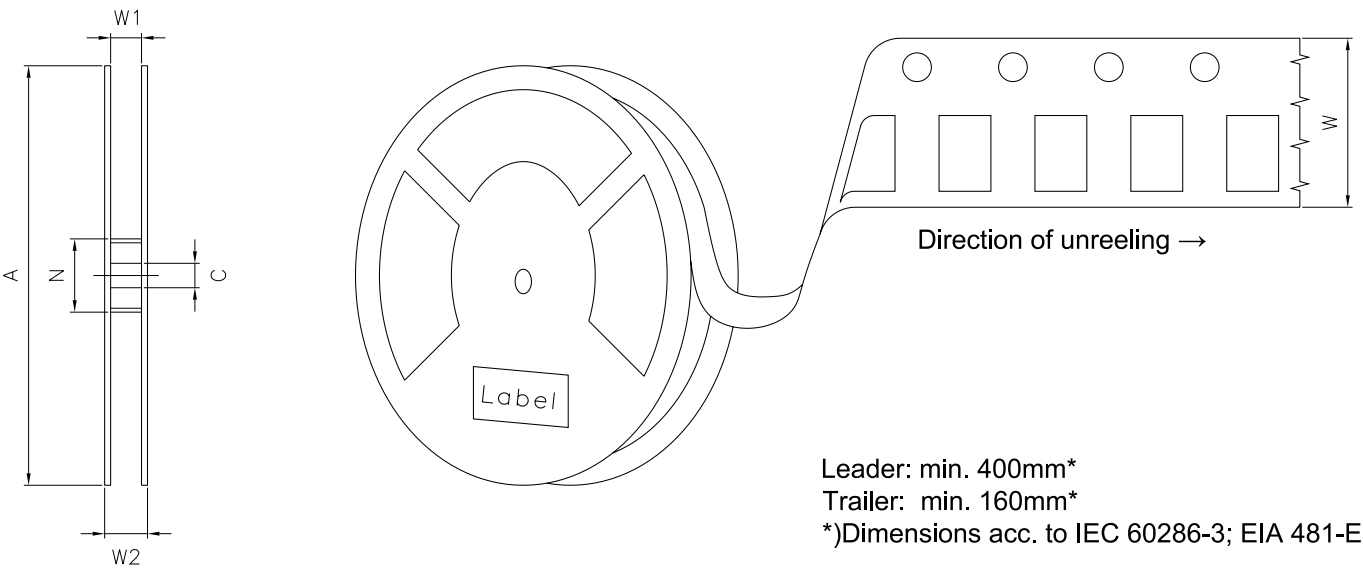
\* slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole  $T$ -range

## Taping <sup>9)</sup>



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

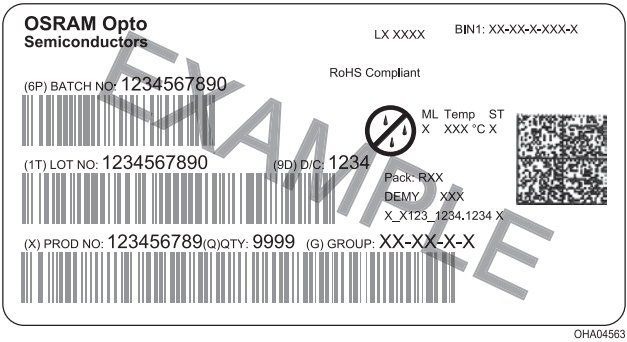


Reel dimensions [mm]

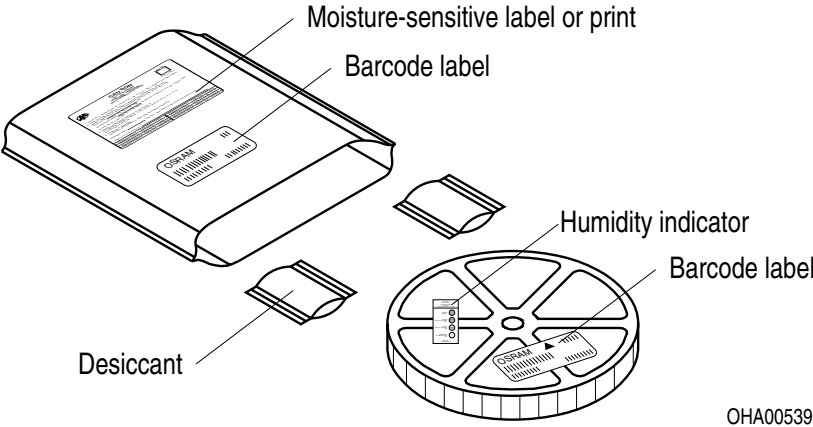
A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2 max</sub>	Pieces per PU
180 mm	8 + 0.3 / - 0.1	60	8.4 + 2	14.4	2000



Barcode-Product-Label (BPL)

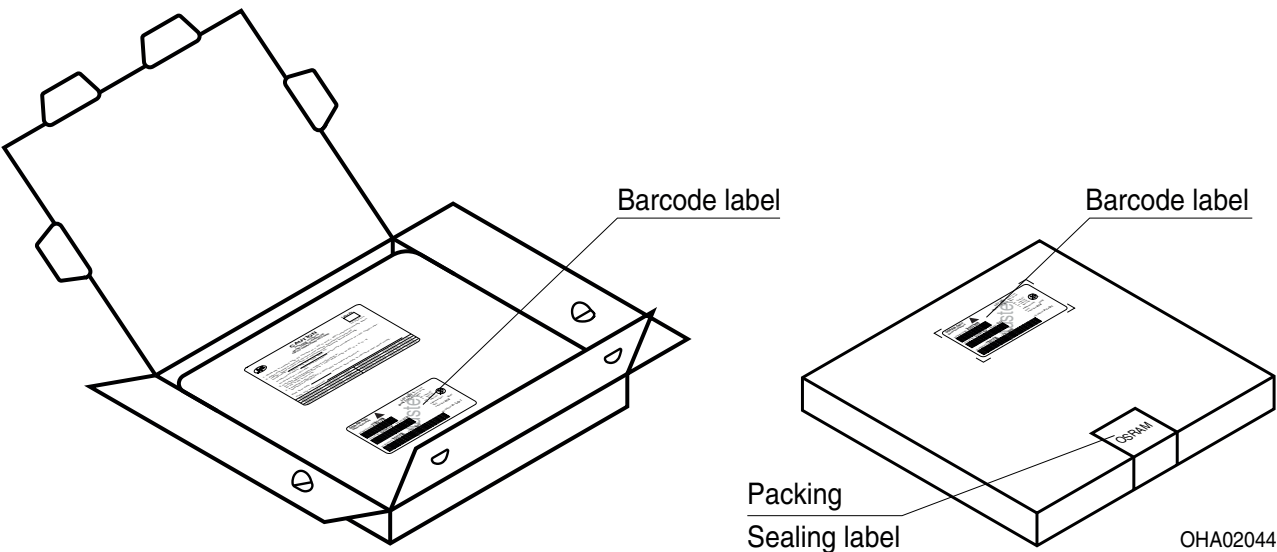


Dry Packing Process and Materials <sup>9)</sup>



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

Transportation Packing and Materials <sup>9)</sup>



Dimensions of transportation box in mm

Width	Length	Height
200 ± 5 mm	195 ± 5 mm	30 ± 5 mm

## 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 LED 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 LED 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 LED exposure to aggressive substances during storage, production, and use. LEDs 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](http://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!

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 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.

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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:** Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typical 25 ms, with an internal reproducibility of  $\pm 0.001$  and an expanded uncertainty of  $\pm 0.004$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 4) **Forward Voltage:** Forward voltages are tested at a current pulse duration of 1 ms and a tolerance 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:**  $R_{th\text{ max}}$  is based on statistic values ( $6\sigma$ ).
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of LED, 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) **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  $k = 3$ ).
- 8) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single LEDs 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.

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