

# OSRAM KW2 HML631.TK

## Datasheet

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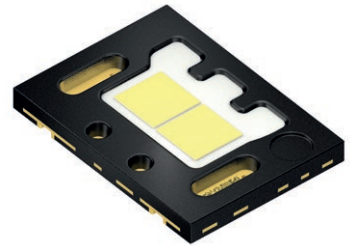
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## OSLON® Black Flat X

# KW2 HML631.TK

The OSLON Black Flat X product family offers LED devices with the highest efficiency in the Osram portfolio. This feature makes it the perfect light source for standard forward lighting applications with a high focus on system cost. The SMT device is very stable, durable and can be used with standard processes. The pad geometry of the widely used OSLON Black Flat product platform was further optimized to allow for excellent thermal conditions, while the already known, outstanding contrast of the package concept is kept on the familiar level.



## Applications

- Headlamps, LED & Laser & Night Vision

## Features

- Package: SMD epoxy package
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.321, Cy = 0.339 acc. to CIE 1931 (● ultra white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)
- Color over angle: Better than passus 3.7.2.1 of supplement proposal 7 to ECE reg. 128

## Ordering Information

Type	Luminous Flux <sup>1)</sup> $I_F = 1000 \text{ mA}$ $\Phi_V$	Ordering Code
KW2 HML631.TK-6DT1-4L05M0-SC6B	820 ... 1060 lm	Q65113A1243
KW2 HML631.TK-6DT2-4L07M0-SC6B	820 ... 1100 lm	Q65113A4584
KW2 HML631.TK-7DT2-6L07M0-SC6B	860 ... 1100 lm	Q65113A1298

During ramp up a smaller amount of pcs are taped on one reel.

## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature <sup>2)</sup>	$T_{op}$	min.	-40 °C
		max.	135 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	135 °C
Junction Temperature	$T_j$	max.	150 °C
Junction Temperature for short time applications*	$T_j$	max.	175 °C
Forward current $T_s = 25\text{ °C}$	$I_F$	min.	50 mA
		max.	1500 mA
Forward current pulsed $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{F\ pulse}$	max.	1500 mA
Surge current $t \leq 50\text{ }\mu\text{s}$ ; $D = 0.025$ ; $T_j = 150\text{ °C}$	$I_{FS}$	max.	2000 mA
Surge current $t \leq 10\text{ }\mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	2500 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	$V_{ESD}$		8 kV
Reverse current <sup>3)</sup>	$I_R$	max.	200 mA

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

## Characteristics

$I_F = 1000 \text{ mA}$ ;  $T_S = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate <sup>4)</sup>	Cx	typ.	0.321
	Cy	typ.	0.339
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>5)</sup> $I_F = 1000 \text{ mA}$	$V_F$	min.	5.60 V
		typ.	6.41 V
		max.	6.75 V
Reverse voltage (ESD device)	$V_{R \text{ ESD}}$	min.	45 V
Reverse voltage <sup>3)</sup> $I_R = 20 \text{ mA}$	$V_R$	max.	1.2 V
Real thermal resistance junction/solderpoint <sup>6)</sup>	$R_{thJS \text{ real}}$	typ.	1.7 K / W
		max.	2.0 K / W
Electrical thermal resistance junction/solderpoint <sup>6)</sup> with efficiency $\eta_e = 39 \text{ %}$	$R_{thJS \text{ elec.}}$	typ.	1.0 K / W
		max.	1.2 K / W

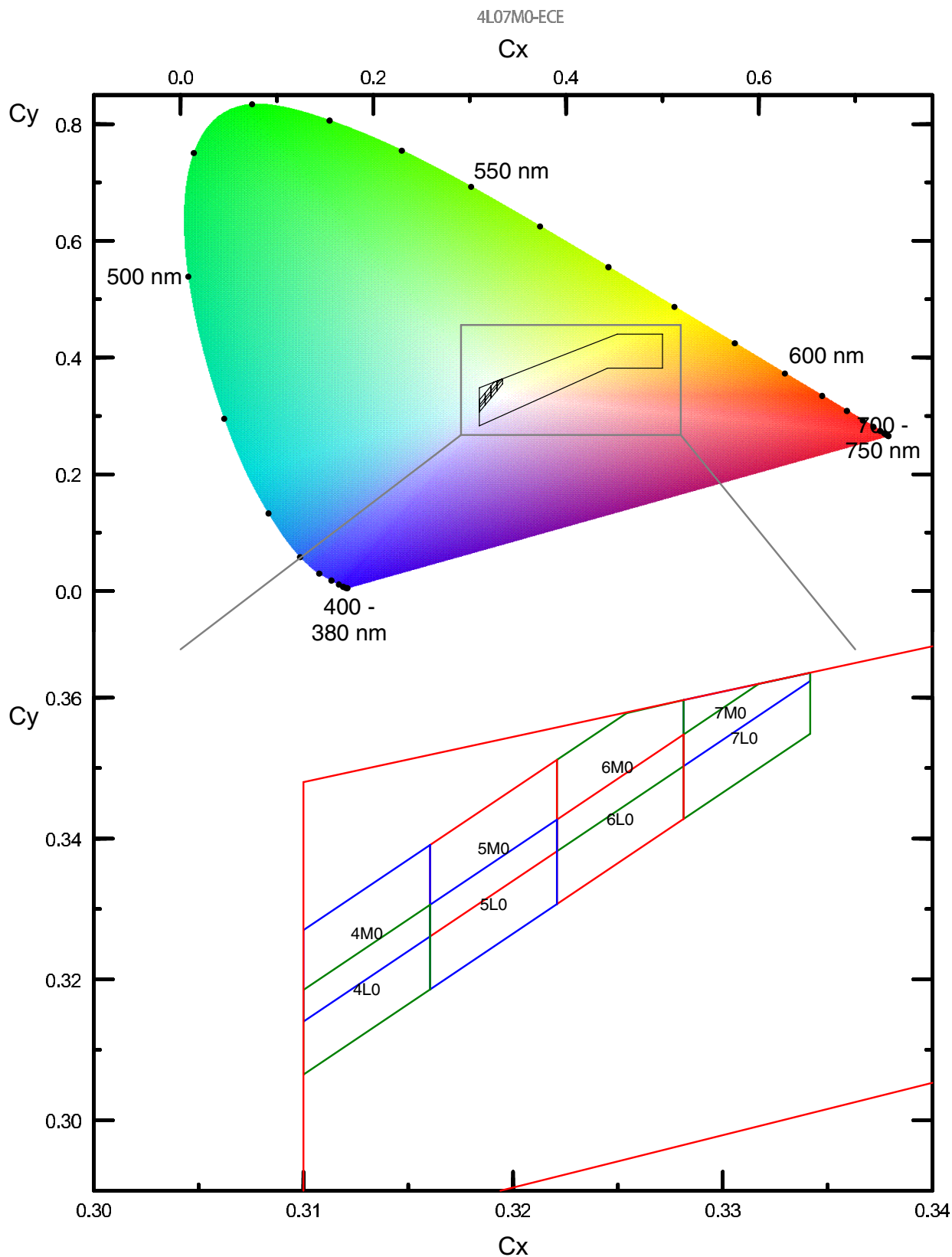
## Brightness Groups

Group	Luminous Flux <sup>1)</sup> $I_F = 1000 \text{ mA}$ min. $\Phi_V$	Luminous Flux <sup>1)</sup> $I_F = 1000 \text{ mA}$ max. $\Phi_V$
6D	820 lm	860 lm
7D	860 lm	900 lm
D8	900 lm	940 lm
D9	940 lm	980 lm
T0	980 lm	1020 lm
T1	1020 lm	1060 lm
T2	1060 lm	1100 lm

## Forward Voltage Groups

Group	Forward Voltage <sup>5)</sup> $I_F = 1000 \text{ mA}$ min. $V_F$	Forward Voltage <sup>5)</sup> $I_F = 1000 \text{ mA}$ max. $V_F$
SC	5.60 V	6.20 V
6B	6.20 V	6.75 V

## Chromaticity Coordinate Groups



**Chromaticity Coordinate Groups** <sup>4)</sup>

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
4L0	0.3100	0.3065	5M0	0.3160	0.3261	7L0	0.3281	0.3428
	0.3100	0.3185		0.3160	0.3391		0.3281	0.3548
	0.3160	0.3306		0.3221	0.3512		0.3317	0.3620
	0.3160	0.3186		0.3221	0.3382		0.3342	0.3635
4M0	0.3100	0.3140	6L0	0.3221	0.3307	7M0	0.3281	0.3503
	0.3100	0.3270		0.3221	0.3427		0.3281	0.3597
	0.3160	0.3391		0.3281	0.3548		0.3342	0.3635
	0.3160	0.3261		0.3281	0.3428		0.3342	0.3624
5L0	0.3160	0.3186	6M0	0.3221	0.3382			
	0.3160	0.3306		0.3221	0.3512			
	0.3221	0.3427		0.3254	0.3578			
	0.3221	0.3307		0.3281	0.3597			
				0.3281	0.3503			



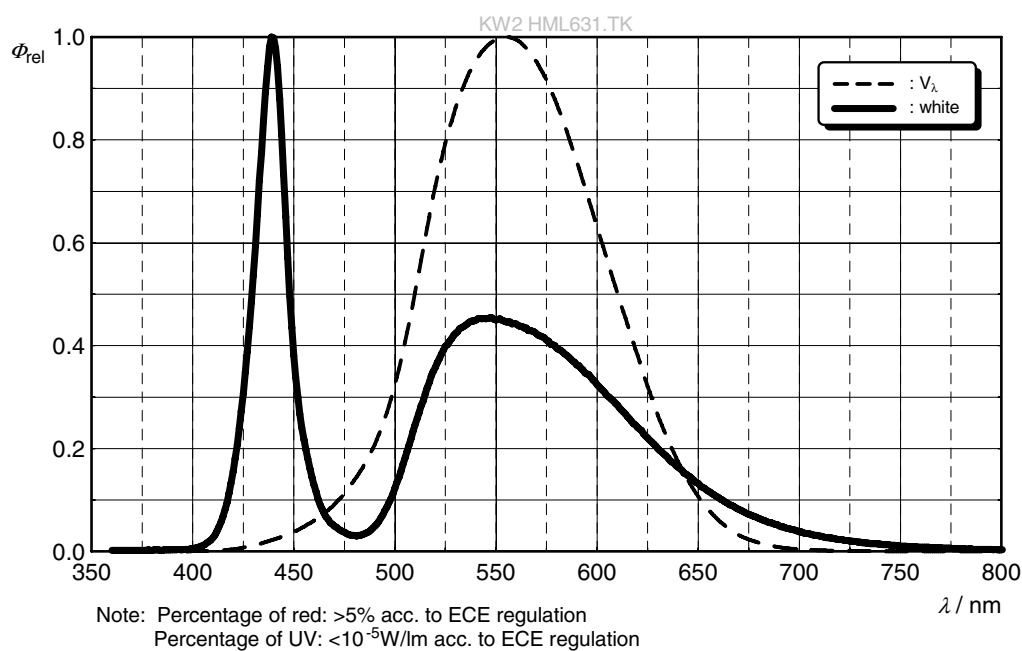
Group Name on Label

Example: 6D-4L0-6B

Brightness	Color Chromaticity	Forward Voltage
6D	4L0	6B

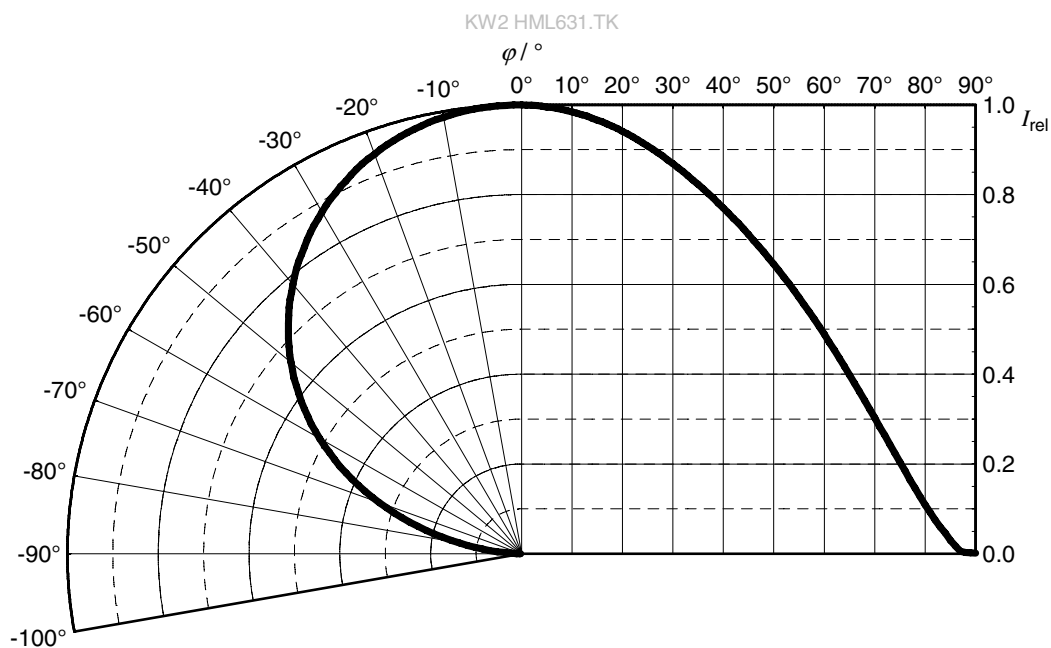
## Relative Spectral Emission <sup>7)</sup>

$\Phi_{\text{rel}} = f(\lambda)$ ;  $I_F = 1000 \text{ mA}$ ;  $T_J = 25 \text{ }^\circ\text{C}$



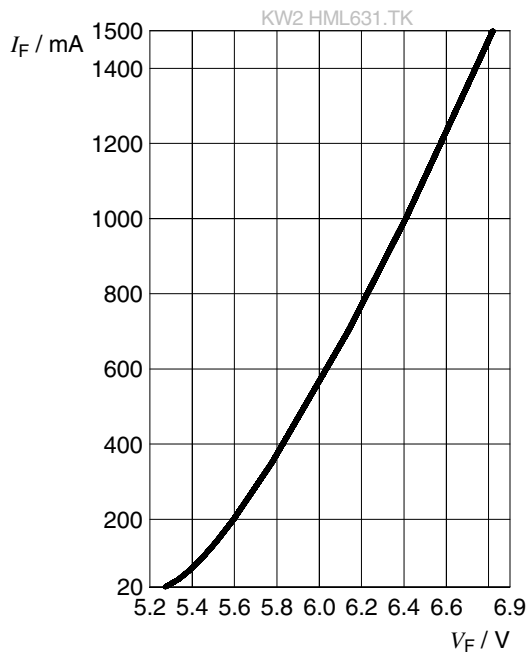
## Radiation Characteristics <sup>7)</sup>

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



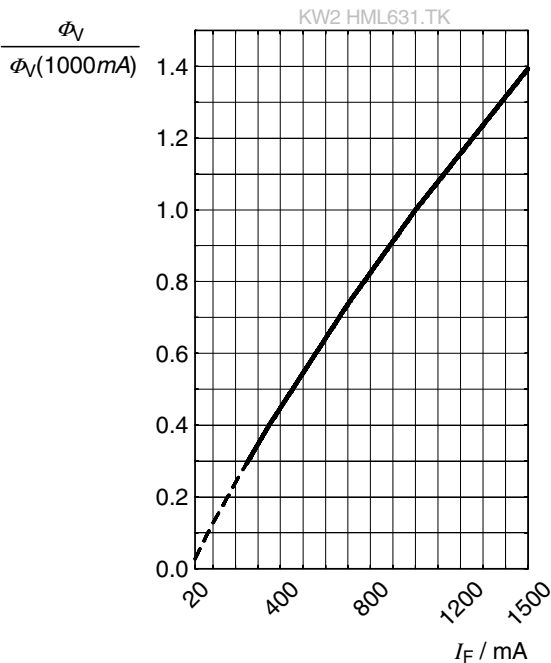
### Forward current <sup>7)</sup>

$I_F = f(V_F); T_J = 25\text{ °C}$



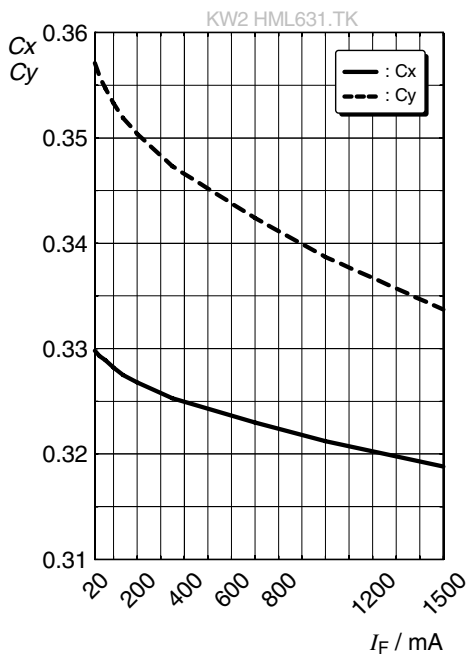
### Relative Luminous Flux <sup>7), 8)</sup>

$\Phi_V / \Phi_V(1000\text{ mA}) = f(I_F); T_J = 25\text{ °C}$



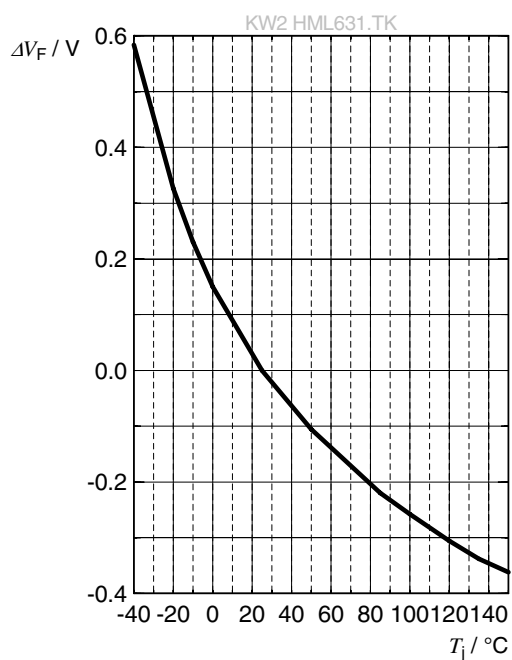
### Chromaticity Coordinate Shift <sup>7)</sup>

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

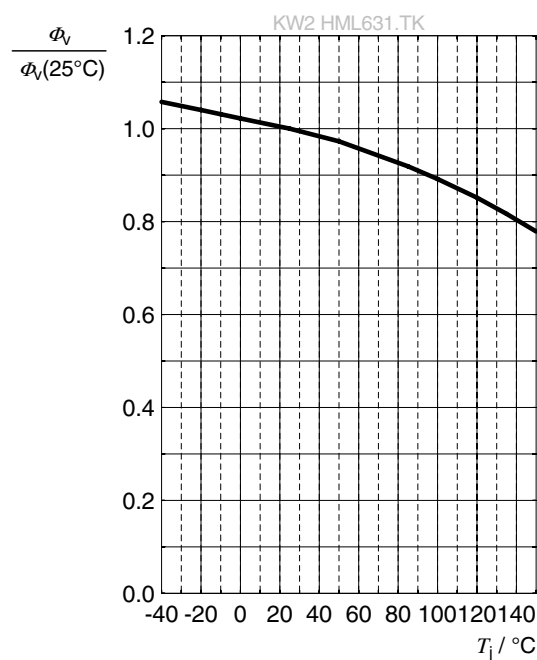


**Forward Voltage** <sup>7)</sup>

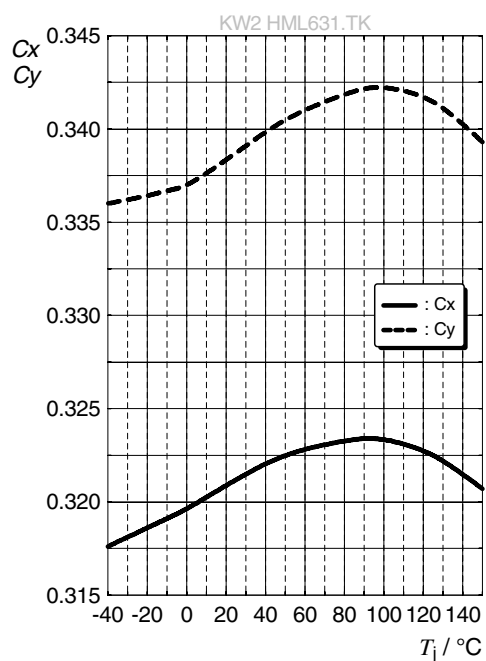
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 1000 \text{ mA}$$

**Relative Luminous Flux** <sup>7)</sup>

$$\Phi_v / \Phi_v(25^\circ\text{C}) = f(T_j); I_F = 1000 \text{ mA}$$

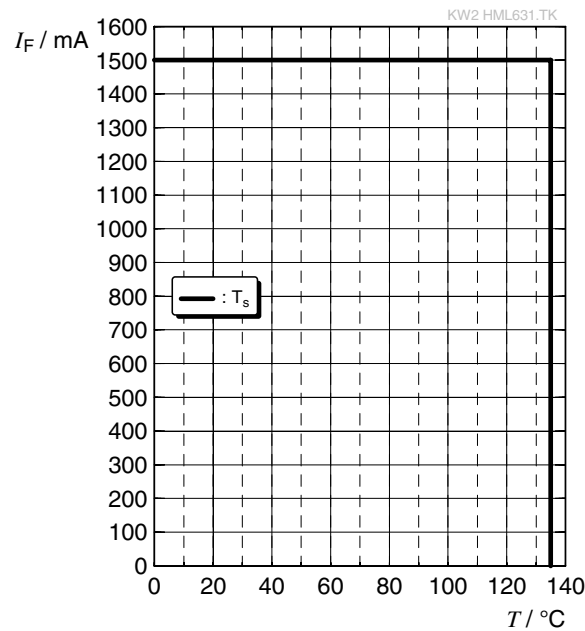
**Chromaticity Coordinate Shift** <sup>7)</sup>

$$C_x, C_y = f(T_j); I_F = 1000 \text{ mA}$$

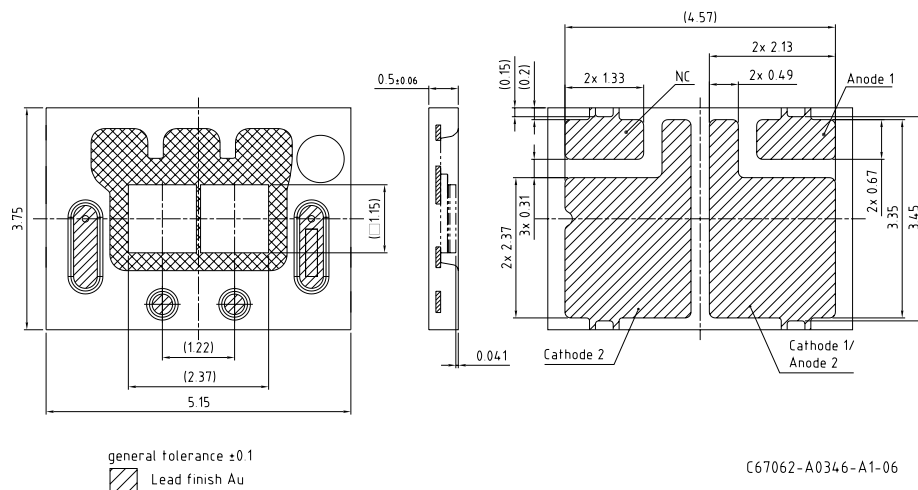


Max. Permissible Forward Current

$I_F = f(T)$



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



## Further Information:

**Approximate Weight:** 28.0 mg

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

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

Anode 1

Cathode 1 /  
Anode 2

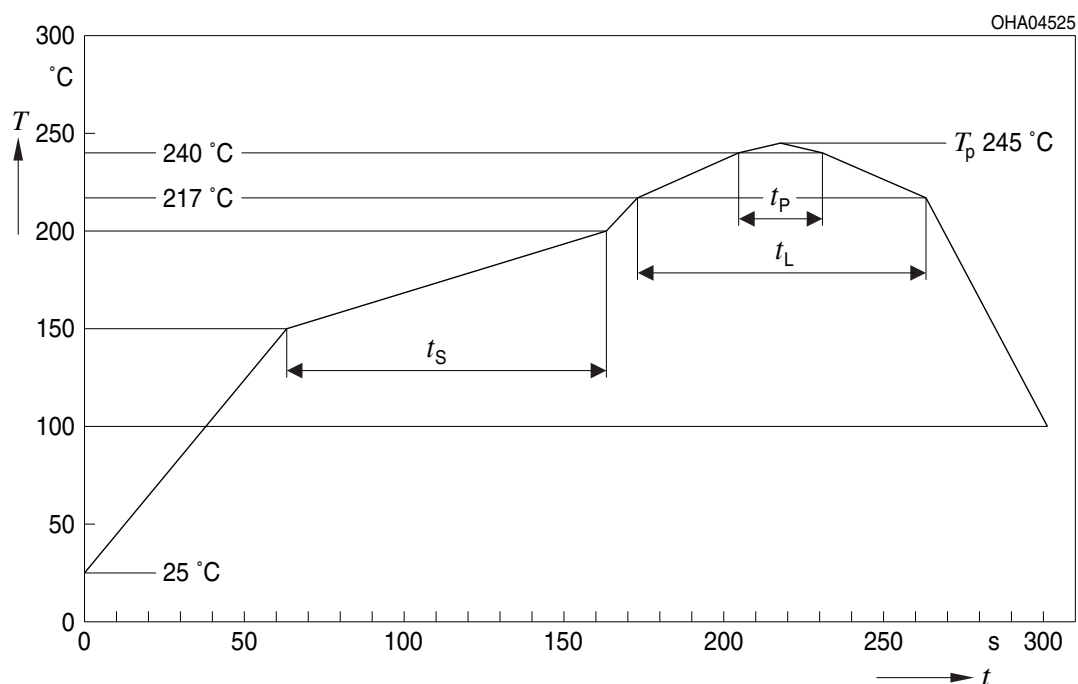
Cathode 2

Diagram illustrating a two-stage vacuum tube amplifier circuit. The circuit consists of two 6X4 vacuum tubes. The first tube is configured as a triode, with its cathode connected to a 100 ohm resistor to ground. The second tube is configured as a diode, with its cathode connected to a 100 ohm resistor to ground. The anodes of both tubes are connected to a common 250V B+ supply. The output of the second stage is taken from the anode. Labels indicate the connections: Anode 1, Cathode 1 / Anode 2, and Cathode 2.

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning. To ensure a high solder joint reliability and to minimize the risk of solder joint cracks, the customer is responsible to evaluate the combination of PCB board and solder paste material for his application.

## Reflow Soldering Profile

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



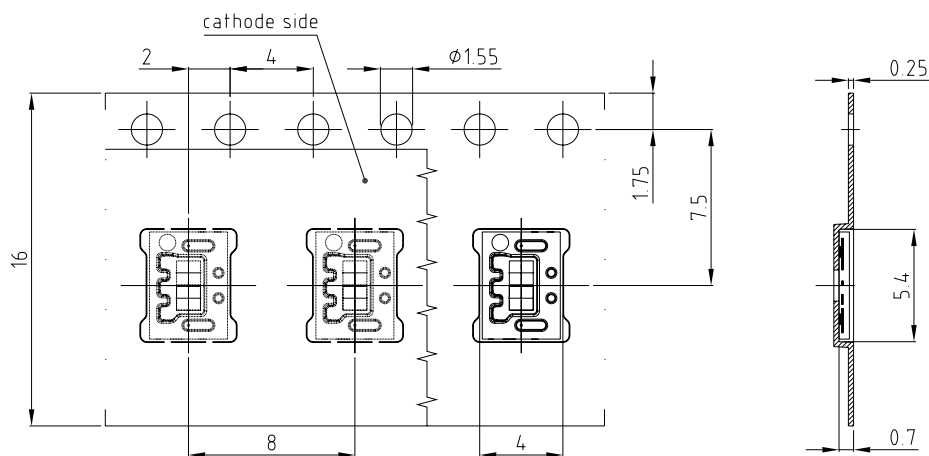
Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		217		$^{\circ}\text{C}$
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

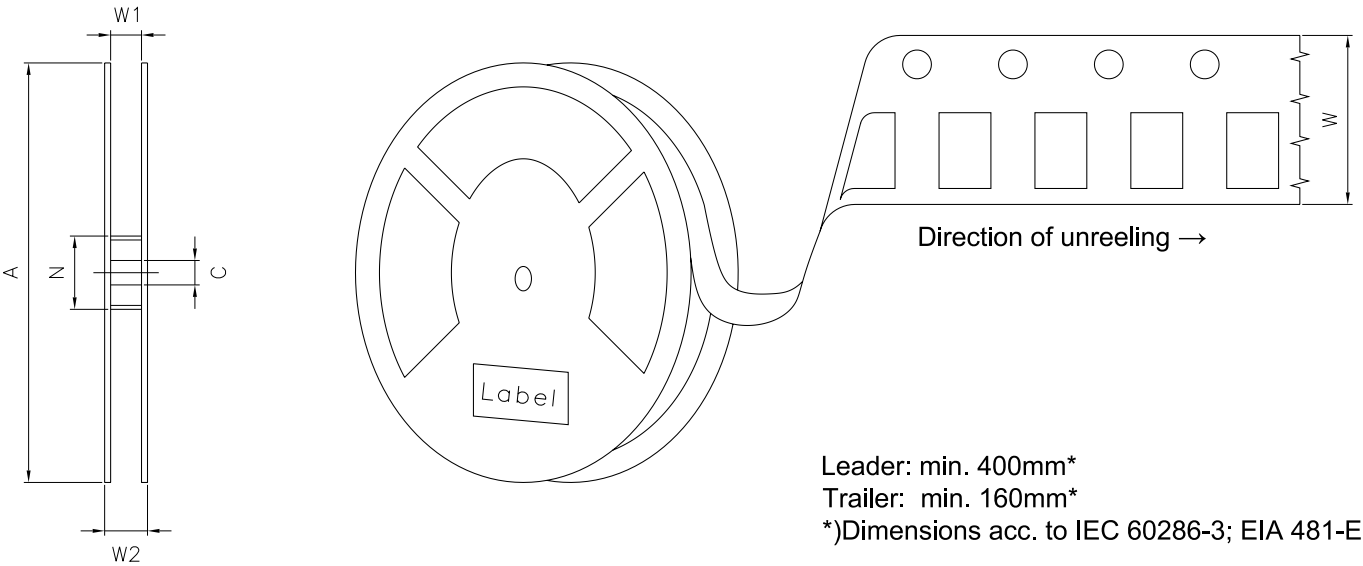


## Taping <sup>9)</sup>



C67062-A0346-B3-07

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



Reel Dimensions

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2max</sub>	Pieces per PU
180 mm	12 + 0.3 / - 0.1 mm	60 mm	12.4 + 2 mm	18.4 mm	2000


## Barcode-Product-Label (BPL)

**OSRAM Opto Semiconductors**


LX XXXX
BIN1: XX-XX-X-XXX-X

RoHS Compliant

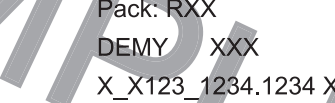
(6P) BATCH NO: 1234567890




(1T) LOT NO: 1234567890





(9D) D/C: 1234



(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X



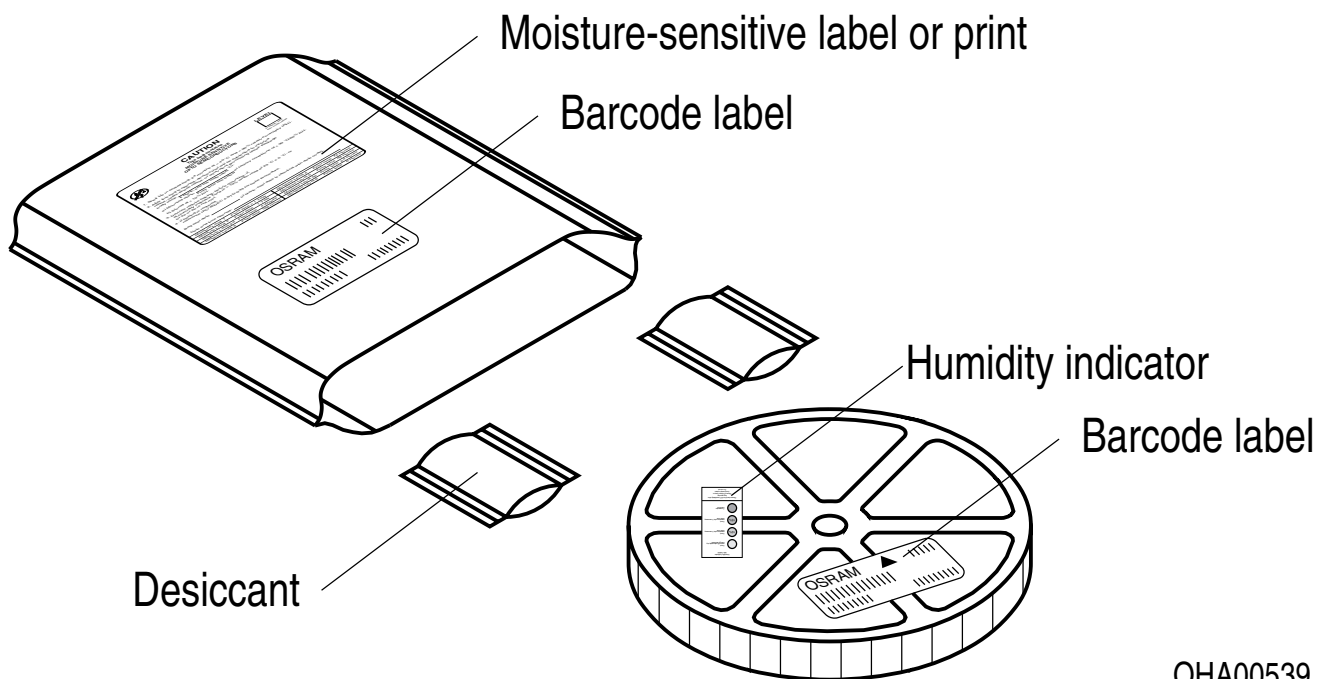

ML Temp ST  
X XXX °C X



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

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.

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## 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)

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## 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 our 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

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

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

In case buyer – or customer supplied by buyer – considers using our components in product safety devices/ applications or medical devices/applications, buyer and/or customer has to inform our local sales partner immediately and we and buyer and /or customer will analyze and coordinate the customer-specific request between us and buyer and/or customer.

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## Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 1 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) **Operating Temperature:** The Operating Temperature  $T_{op}$  is referenced to the Solderpoint  $T_s$  of this device. Proper current derating must be observed to maintain junction temperature below the maximum.
- 3) **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.
- 4) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 1 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  $k = 3$ ).
- 5) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 1 ms, with an internal reproducibility of  $\pm 0.05\text{ V}$  and an expanded uncertainty of  $\pm 0.1\text{ V}$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 6) **Thermal Resistance:**  $R_{th\ max}$  is based on statistic values ( $6\sigma$ ).
- 7) **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.
- 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
1.0	2021-11-15	Initial Version
1.1	2022-01-17	Product Image Dimensional Drawing Taping
1.2	2022-02-22	New Layout Ordering Information



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。

**Published by ams-OSRAM AG**

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