

# LW T6SG binning FK0PN0

## TOPLED®

TOPLED, SMT LED with integrated reflector. With our great experience in SMT LED we are able to offer a high quality product for all kind of applications.



## Applications

- Interior Illumination (e.g. Ambient Map)

## Features:

- Package: white PLCC-2 package, colored diffused silicone resin
- Chip technology: ThinGaN
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.33, Cy = 0.33 acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 1B
- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

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## Ordering Information

Type	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ $I_v$	Mounting methode	Ordering Code
LW T6SG-V1BA-FK0PN0	710 ... 2240 mcd	Top	Q65113A1045

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## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min.	-40 °C
		max.	110 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	110 °C
Junction Temperature	$T_j$	max.	125 °C
Forward Current $T_s = 25\text{ °C}$	$I_F$	min.	5 mA
		max.	50 mA
Surge Current $t \leq 10\text{ }\mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	300 mA
Reverse voltage <sup>2)</sup> $T_s = 25\text{ °C}$	$V_R$	max.	5 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	$V_{ESD}$		2 kV

## Characteristics

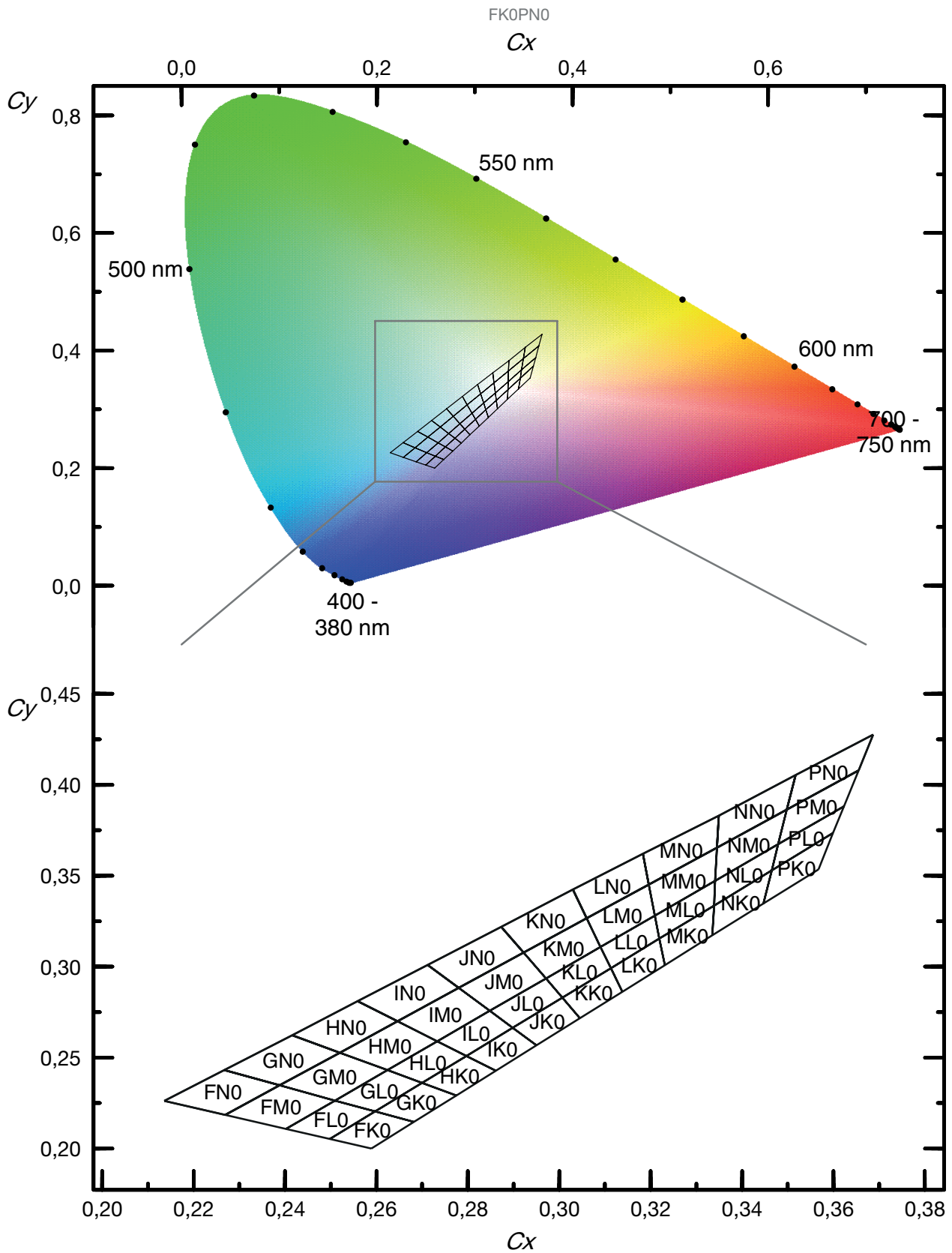
$I_F = 20 \text{ mA}$ ;  $T_S = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	$C_x$	typ.	0.33
	$C_y$	typ.	0.33
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 20 \text{ mA}$	$V_F$	min.	2.90 V
		typ.	3.00 V
		max.	3.50 V
Reverse current <sup>2)</sup> $V_R = 5 \text{ V}$	$I_R$	typ.	0.01 $\mu\text{A}$
		max.	10 $\mu\text{A}$
Real thermal resistance junction/ambient <sup>5)6)</sup>	$R_{thJA \text{ real}}$	max.	340 K / W
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{thJS \text{ real}}$	max.	180 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>7)</sup> $I_F = 20 \text{ mA}$ typ. $\Phi_v$
V1	710 mcd	900 mcd	2415 mlm
V2	900 mcd	1120 mcd	3030 mlm
AA	1120 mcd	1400 mcd	3780 mlm
AB	1400 mcd	1800 mcd	4800 mlm
BA	1800 mcd	2240 mcd	6060 mlm

## Chromaticity Coordinate Groups



**Chromaticity Coordinate Groups** <sup>3)</sup>

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FK0	0.2498	0.2053	HK0	0.2700	0.2361	JK0	0.2898	0.2664
	0.2597	0.2204		0.2797	0.2509		0.3007	0.2830
	0.2682	0.2146		0.2861	0.2427		0.3045	0.2717
	0.2589	0.2000		0.2775	0.2292		0.2950	0.2568
FL0	0.2402	0.2108	HLO	0.2624	0.2431	JLO	0.2848	0.2757
	0.2509	0.2264		0.2733	0.2590		0.2971	0.2935
	0.2597	0.2204		0.2797	0.2509		0.3007	0.2830
	0.2498	0.2053		0.2700	0.2361		0.2898	0.2664
FM0	0.2269	0.2185	HMO	0.2520	0.2527	JMO	0.2780	0.2883
	0.2388	0.2348		0.2646	0.2700		0.2922	0.3077
	0.2509	0.2264		0.2733	0.2590		0.2971	0.2935
	0.2402	0.2108		0.2624	0.2431		0.2848	0.2757
FN0	0.2136	0.2262	HNO	0.2416	0.2623	JNO	0.2712	0.3009
	0.2267	0.2432		0.2559	0.2810		0.2873	0.3219
	0.2388	0.2348		0.2646	0.2700		0.2922	0.3077
	0.2269	0.2185		0.2520	0.2527		0.2780	0.2883
GK0	0.2597	0.2204	IK0	0.2797	0.2509	KK0	0.3007	0.2830
	0.2700	0.2361		0.2898	0.2664		0.3113	0.2992
	0.2775	0.2292		0.2950	0.2568		0.3138	0.2862
	0.2682	0.2146		0.2861	0.2427		0.3045	0.2717
GL0	0.2509	0.2264	ILO	0.2733	0.2590	KLO	0.2971	0.2935
	0.2624	0.2431		0.2848	0.2757		0.3090	0.3108
	0.2700	0.2361		0.2898	0.2664		0.3113	0.2992
	0.2597	0.2204		0.2797	0.2509		0.3007	0.2830
GM0	0.2388	0.2348	IMO	0.2646	0.2700	KMO	0.2922	0.3077
	0.2520	0.2527		0.2780	0.2883		0.3060	0.3266
	0.2624	0.2431		0.2848	0.2757		0.3090	0.3108
	0.2509	0.2264		0.2733	0.2590		0.2971	0.2935
GN0	0.2267	0.2432	INO	0.2559	0.2810	KNO	0.2873	0.3219
	0.2416	0.2623		0.2712	0.3009		0.3030	0.3424
	0.2520	0.2527		0.2780	0.2883		0.3060	0.3266
	0.2388	0.2348		0.2646	0.2700		0.2922	0.3077

## LW T6SG binning FK0PN0

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
LK0	0.3113	0.2992	MM0	0.3196	0.3451	PK0	0.3465	0.3530
	0.3219	0.3154		0.3345	0.3654		0.3599	0.3735
	0.3231	0.3008		0.3341	0.3472		0.3567	0.3535
	0.3138	0.2862		0.3209	0.3281		0.3447	0.3347
LLO	0.3090	0.3108	MNO	0.3183	0.3621	PLO	0.3479	0.3673
	0.3209	0.3281		0.3349	0.3830		0.3623	0.3882
	0.3219	0.3154		0.3345	0.3654		0.3599	0.3735
	0.3113	0.2992		0.3196	0.3451		0.3465	0.3530
LMO	0.3060	0.3266	NKO	0.3339	0.3336	PM0	0.3498	0.3863
	0.3196	0.3451		0.3465	0.3530		0.3655	0.4079
	0.3209	0.3281		0.3447	0.3347		0.3623	0.3882
	0.3090	0.3108		0.3335	0.3172		0.3479	0.3673
LNO	0.3030	0.3424	NLO	0.3341	0.3472	PNO	0.3517	0.4053
	0.3183	0.3621		0.3479	0.3673		0.3687	0.4276
	0.3196	0.3451		0.3465	0.3530		0.3655	0.4079
	0.3060	0.3266		0.3339	0.3336		0.3498	0.3863
MK0	0.3219	0.3154	NMO	0.3345	0.3654			
	0.3339	0.3336		0.3498	0.3863			
	0.3335	0.3172		0.3479	0.3673			
	0.3231	0.3008		0.3341	0.3472			
MLO	0.3209	0.3281	NNO	0.3349	0.3830			
	0.3341	0.3472		0.3517	0.4053			
	0.3339	0.3336		0.3498	0.3863			
	0.3219	0.3154		0.3345	0.3654			



## Group Name on Label

**Example: AA-FK0**

Brightness

Color Chromaticity

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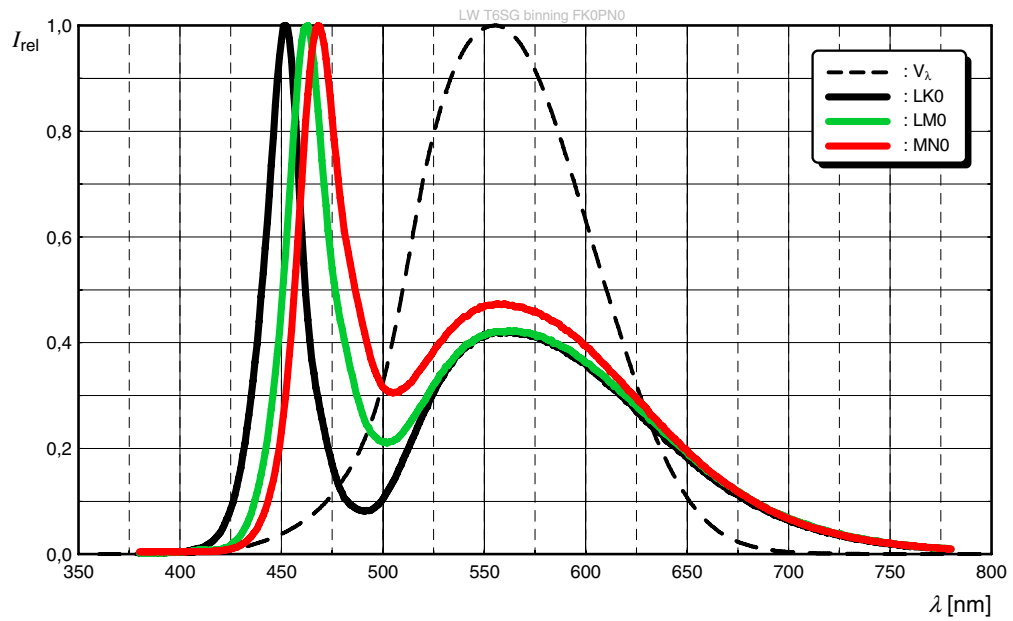
AA

FK0

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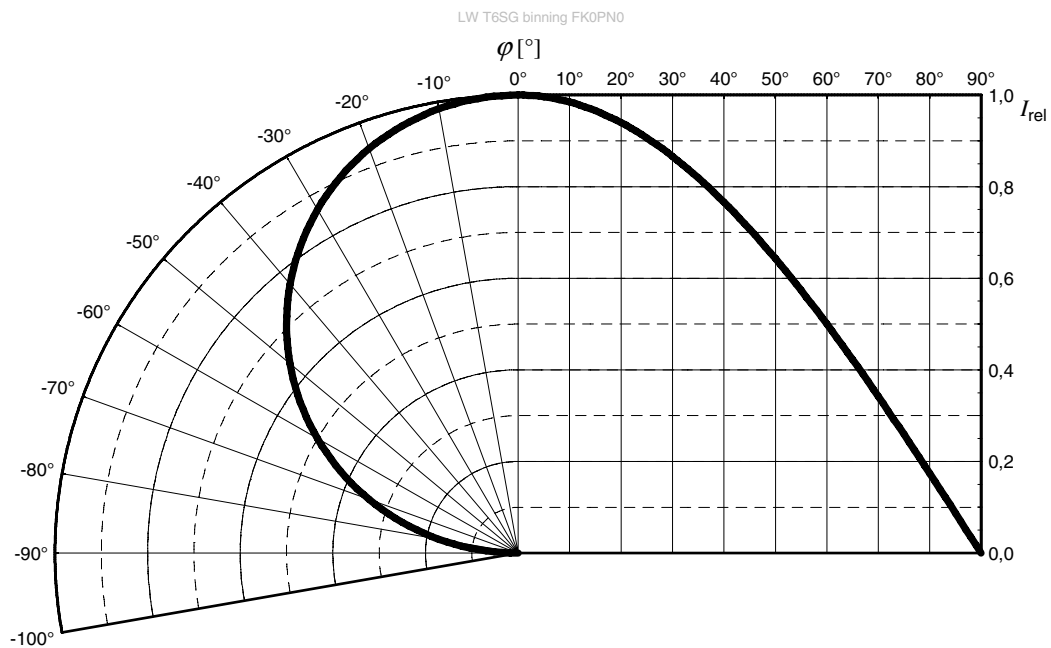
### Relative Spectral Emission <sup>7)</sup>

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



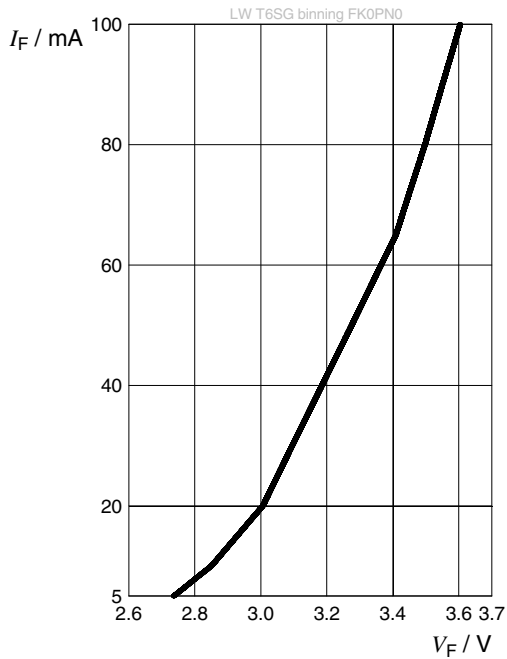
### Radiation Characteristics <sup>7)</sup>

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



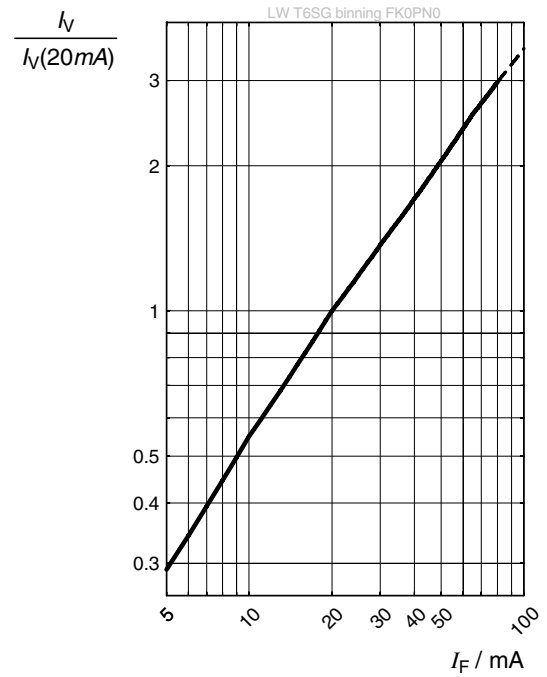
### Forward current <sup>7)</sup>

$$I_F = f(V_F); T_s = 25\text{ °C}$$



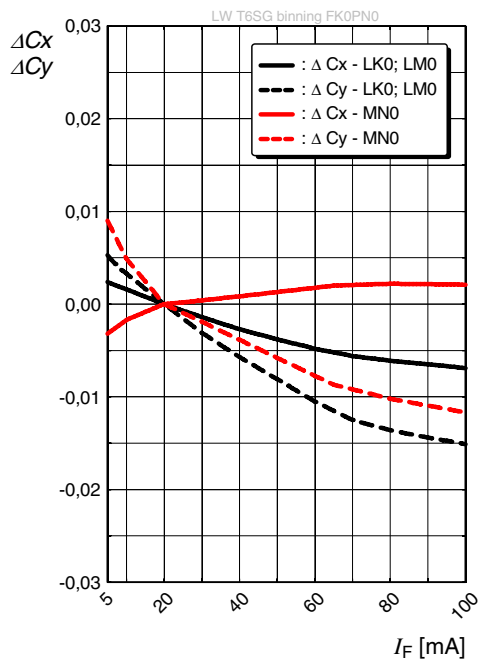
### Relative Luminous Intensity <sup>7), 8)</sup>

$$I_V/I_V(20\text{ mA}) = f(I_F); T_s = 25\text{ °C}$$



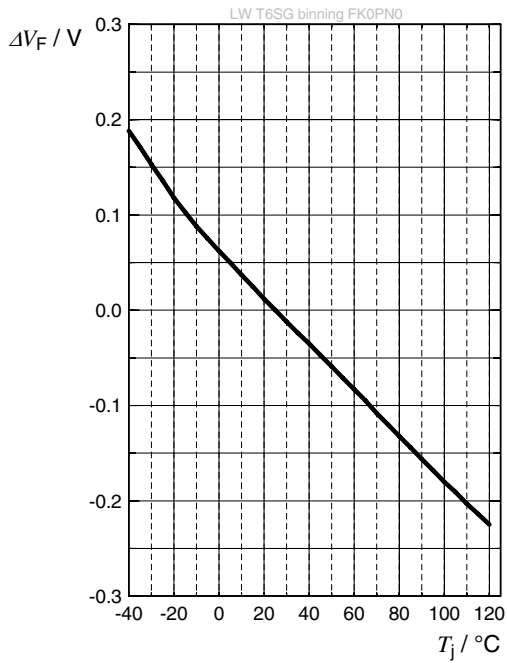
### Chromaticity Coordinate Shift <sup>7)</sup>

$$\Delta Cx, \Delta Cy = f(I_F); T_s = 25\text{ °C}$$



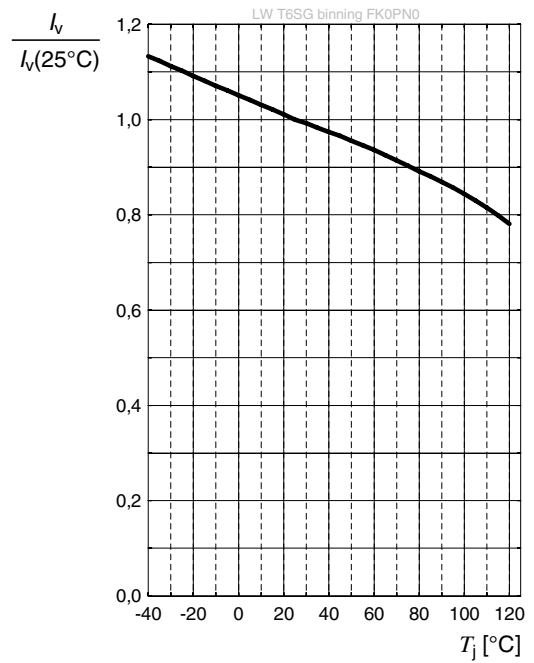
### Forward Voltage <sup>7)</sup>

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



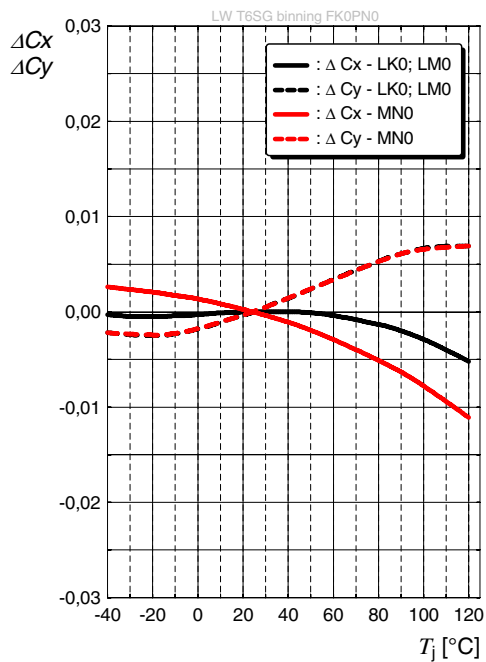
### Relative Luminous Intensity <sup>7)</sup>

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



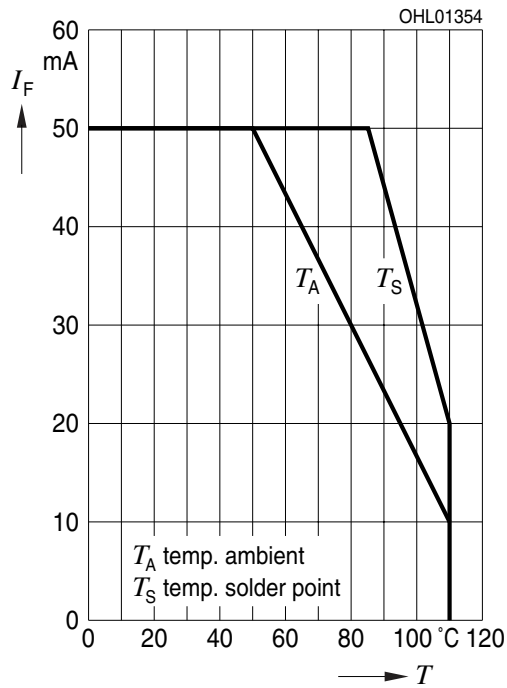
### Chromaticity Coordinate Shift <sup>7)</sup>

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 20\text{ mA}$$



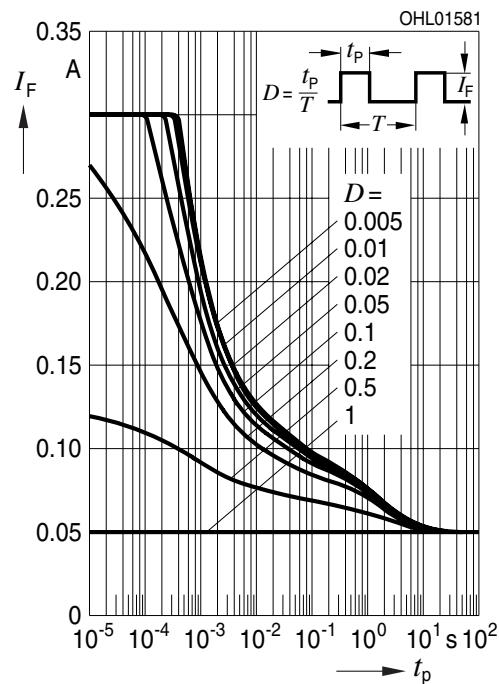
### Max. Permissible Forward Current

$I_F = f(T)$



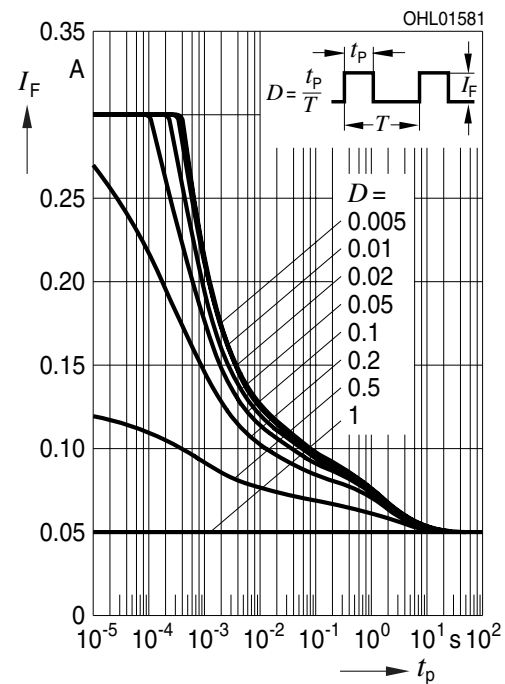
### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle;  $T_S = 25\text{ °C}$

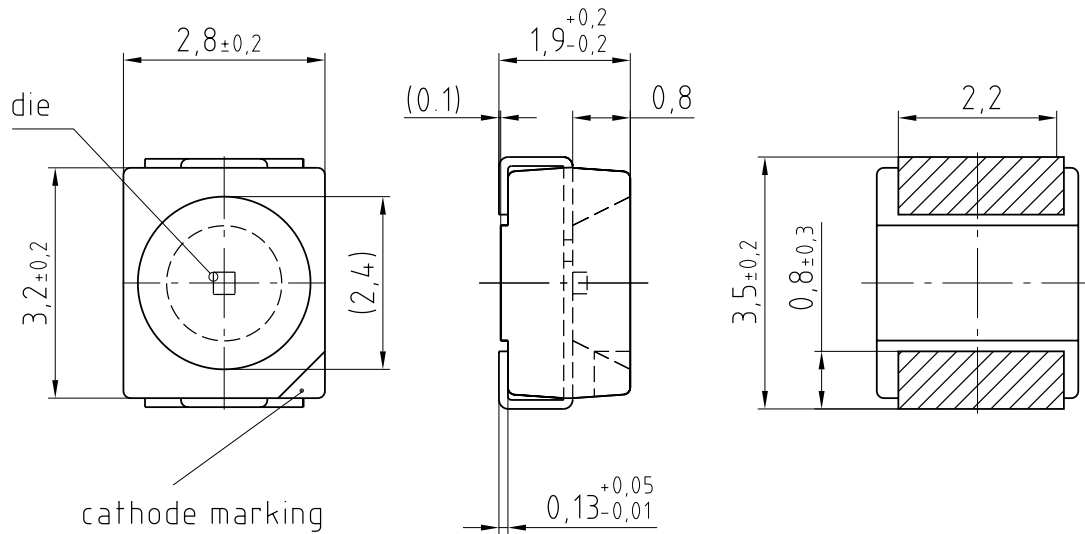


### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle;  $T_S = 85\text{ °C}$



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



general tolerance  $\pm 0.1$

lead finish Sn 

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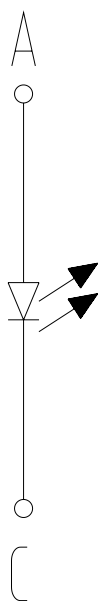
## Further Information:

**Approximate Weight:** 34.0 mg

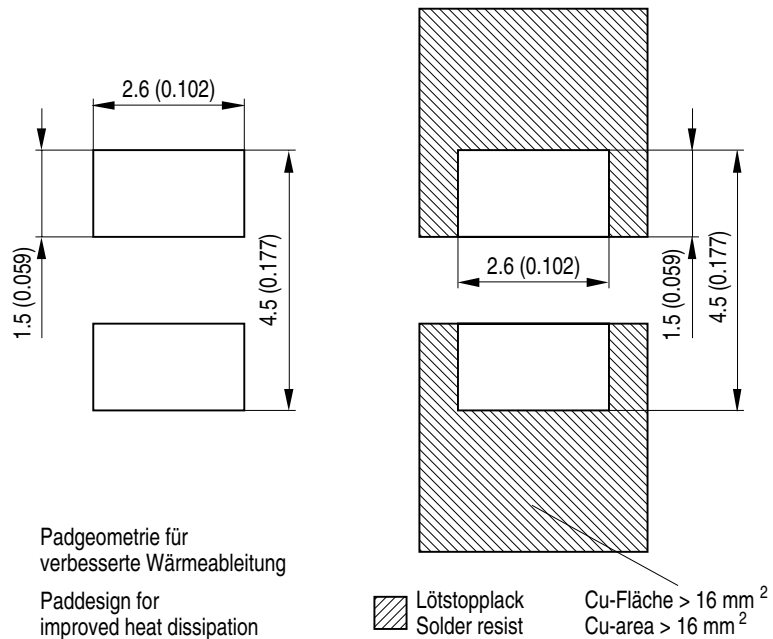
**Corrosion test:** Class: 1B  
 Test condition: 25°C / 75 % RH / 200ppb SO<sub>2</sub>, 200ppb NO<sub>2</sub>, 10ppb H<sub>2</sub>S,  
 10ppb Cl<sub>2</sub> / 21 days (EN 60068-2-60 (Method 4))

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## Electrical Internal Circuit

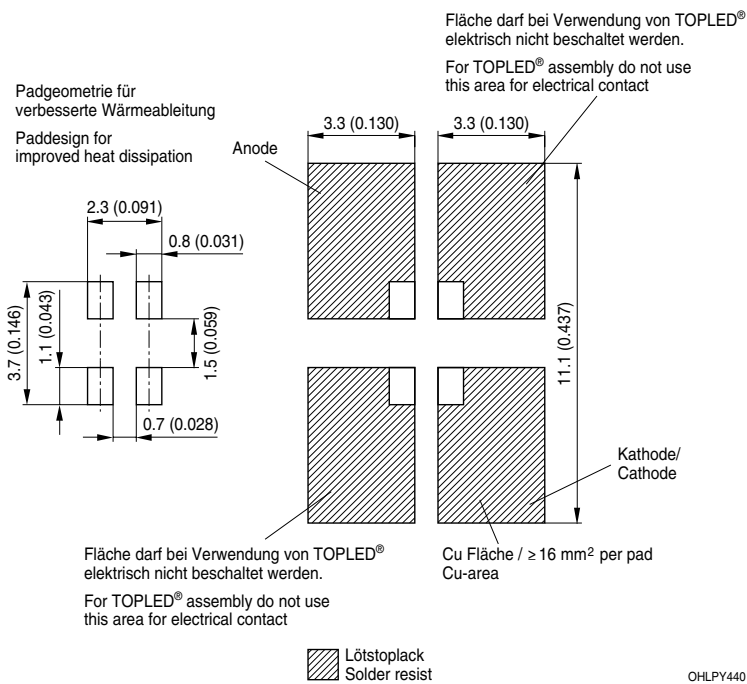


## Recommended Solder Pad <sup>9)</sup>



OHLPY970

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



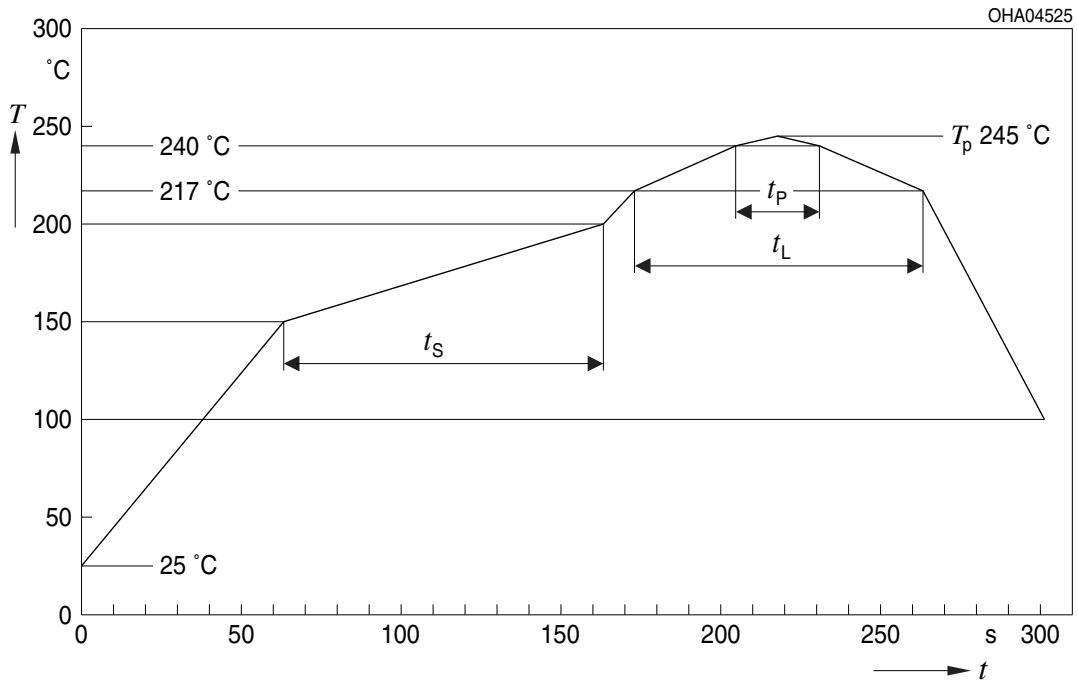
OHLPY440

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

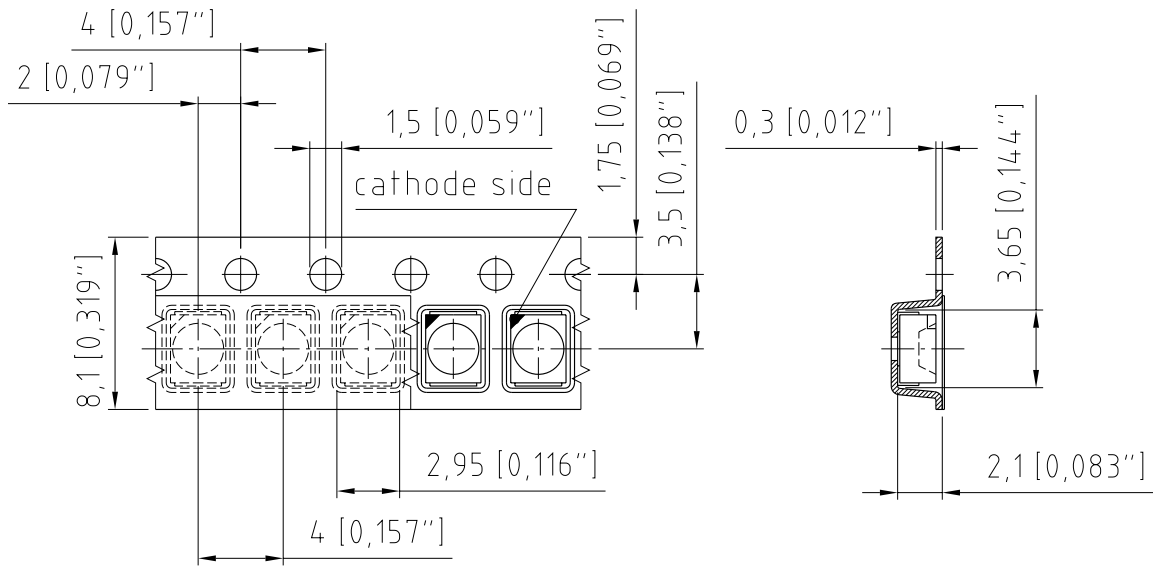


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$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

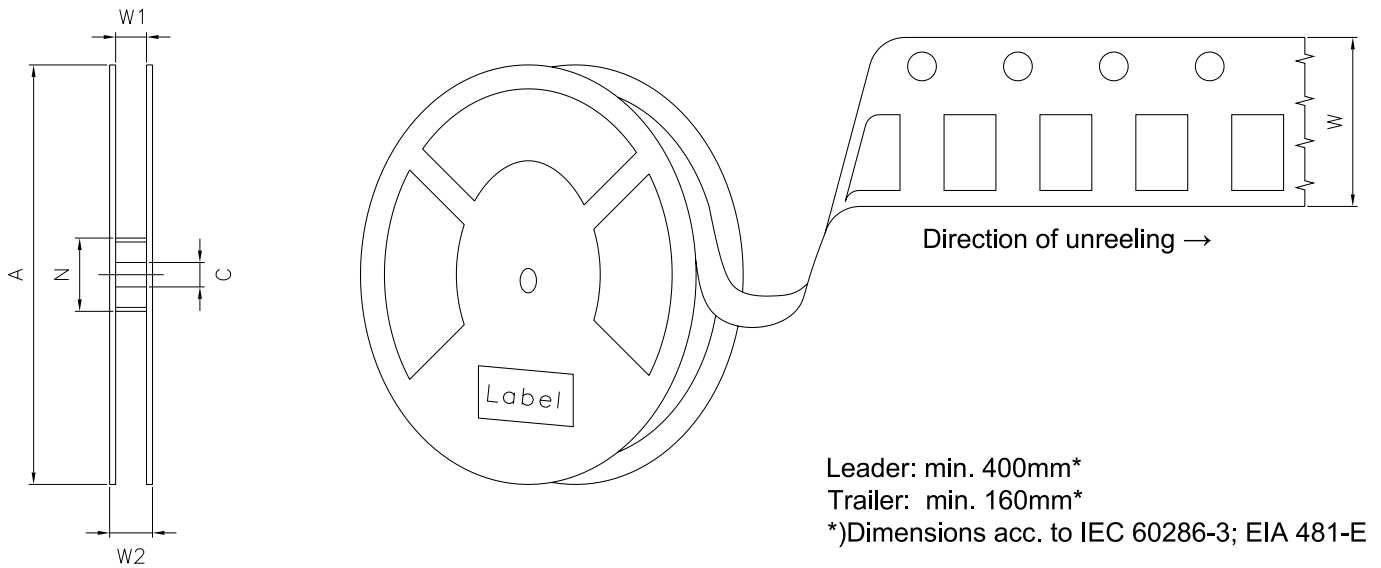
\* slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

**Taping** <sup>9)</sup>



C63062-A3863-B3 -02

## 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	2000
330 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	8000

## 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

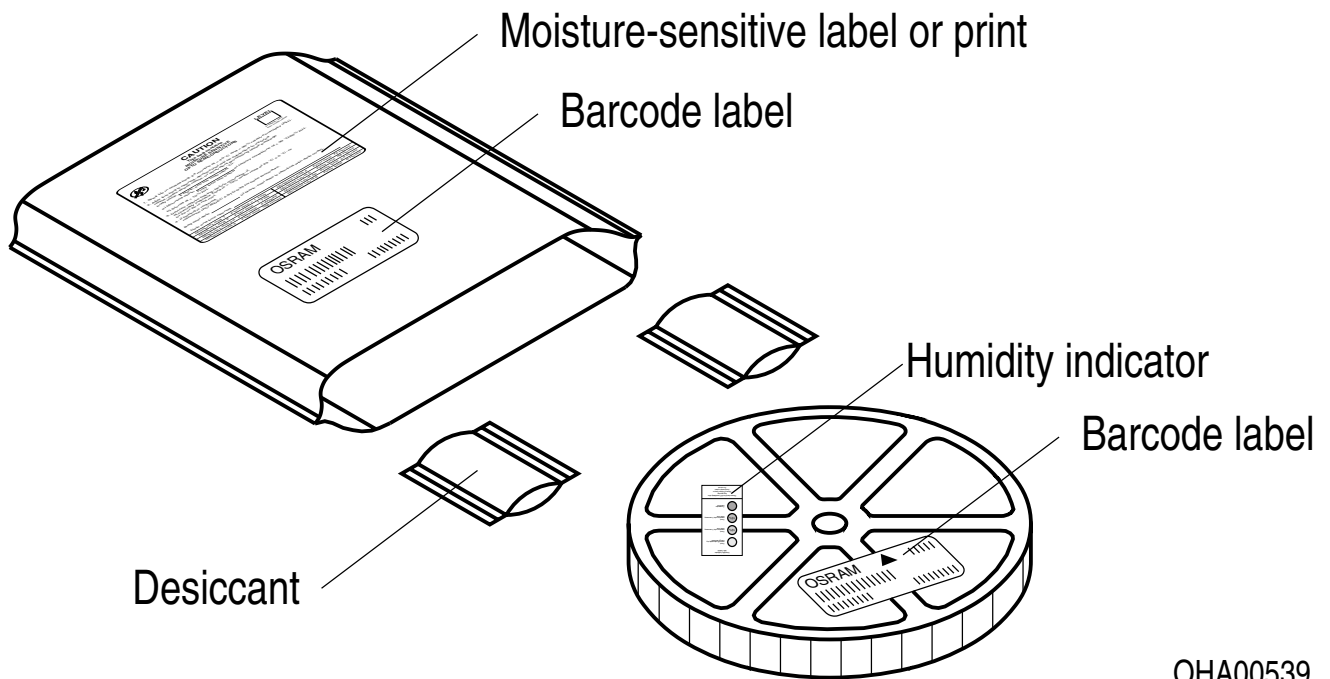
ML Temp ST  
X XXX °C X

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 areas. 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 'no moisture' symbol (a circle with a diagonal line and three droplets) and the text 'ML Temp ST X XXX °C X'. Below this is a square QR code. Further down are the fields 'Pack: RXX', 'DEMY XXX', and 'X\_X123\_1234.1234 X'. A large 'EXAMPLE' watermark is overlaid diagonally across the center of the label.

OHA04563

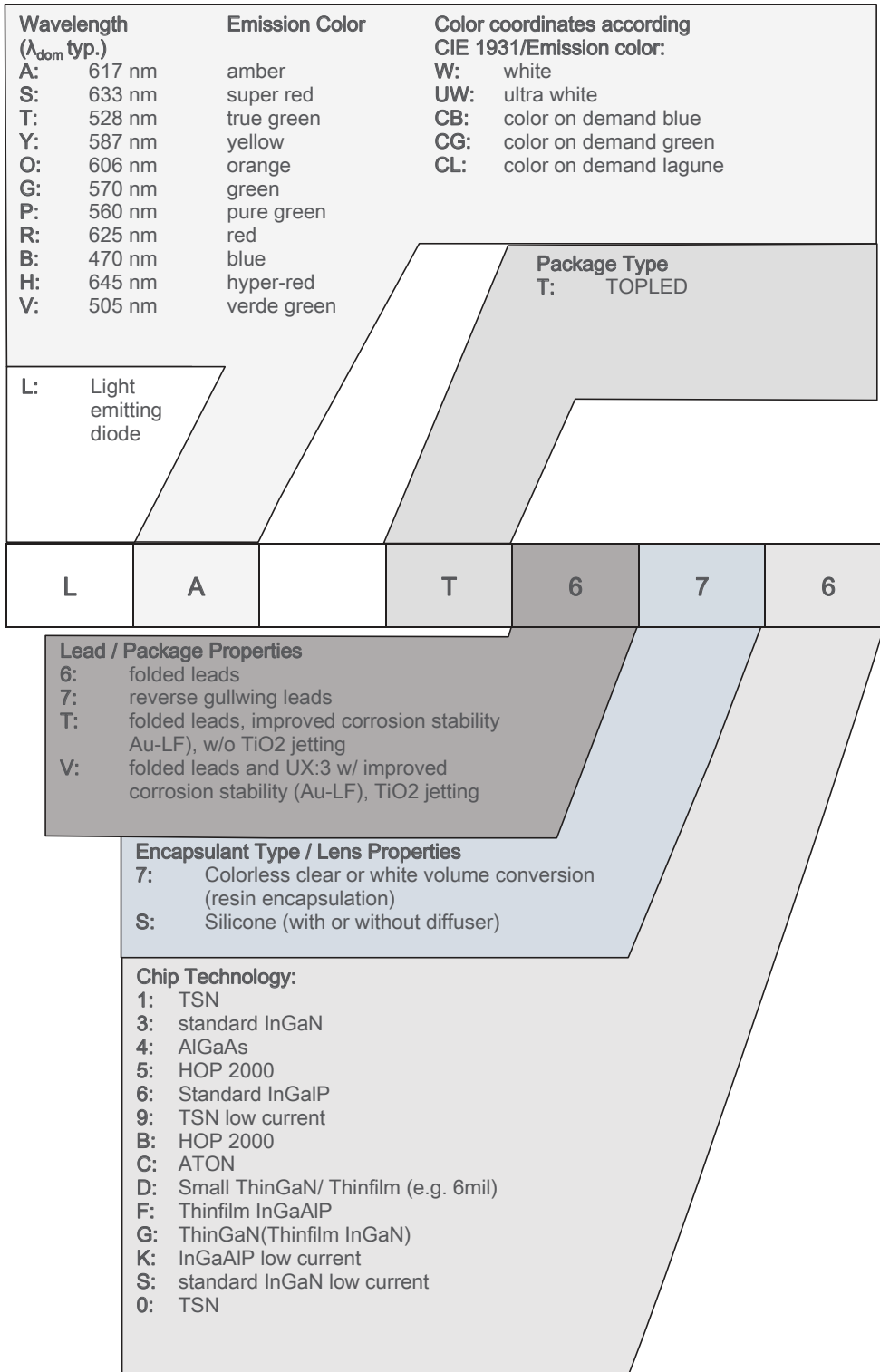
## Dry Packing Process and Materials <sup>9)</sup>



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 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 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.

## 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) **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  $k = 3$ ).
- 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) **Thermal Resistance:**  $R_{thJA}$  results from mounting on PC board FR 4 (pad size 16 mm<sup>2</sup> per pad)
- 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.



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## Revision History

Version	Date	Change
1.1	2019-09-06	Features Disclaimer
1.2	2020-06-03	Ordering Information Maximum Ratings Characteristics Electro - Optical Characteristics (Diagrams) Electrical Internal Circuit Schematic Transportation Box Dimensions of Transportation Box Glossary
1.2	2020-06-04	Characteristics
1.2	2020-06-04	Characteristics

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按照中国的相关法规和标准，不含有毒有害物质或元素。