

# LW P4SG binning FK0PN0

## PointLED®

With a diameter of just 2 mm, the PointLED is one of the smallest packages in its class and achieves high luminous efficacies.

Due to its round and flat package, measuring only 0.775 mm high, it is ideal for application where space is a sensitive issue.



## Applications

- Cluster, Button Backlighting
- Electronic Equipment
- Gaming, Amusement, Gambling
- Interior Illumination (e.g. Ambient Map)
- Transportation, Plane, Ship
- White Goods

## Features:

- Package: white SMT 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)

## Ordering Information

Type	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ $I_v$	Ordering Code
LW P4SG-V2AB-FK0PN0-45	900 ... 1800 mcd	Q65113A0987
LW P4SG-V2AB-FK0PN0-45-F	900 ... 1800 mcd	Q65113A0989

## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min.	-40 °C
		max.	100 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	100 °C
Junction Temperature	$T_j$	max.	125 °C
Forward Current $T_s = 25\text{ °C}$	$I_F$	min.	3 mA
		max.	20 mA
Surge Current $t \leq 10\text{ }\mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	200 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.	400 K / W
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{thJS \text{ real}}$	max.	240 K / W

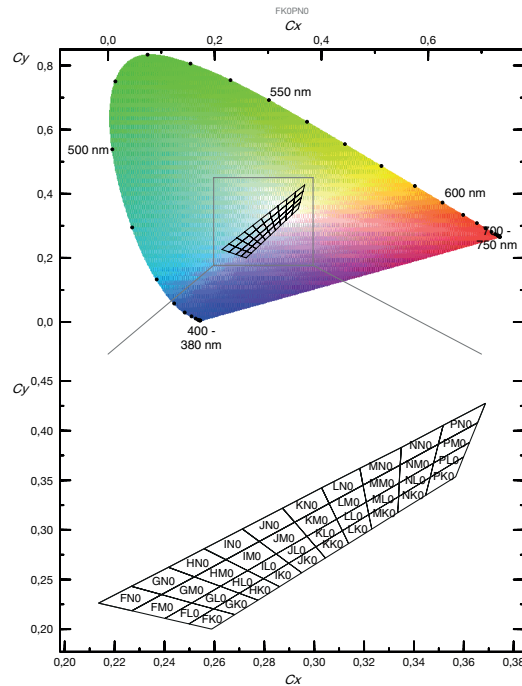
## Brightness Groups

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. $\Phi_v$
V2	900 mcd	1120 mcd	3030 mlm
AA	1120 mcd	1400 mcd	3780 mlm
AB	1400 mcd	1800 mcd	4800 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. $V_F$
4	2.90 V	3.20 V
5	3.20 V	3.50 V

## Chromaticity Coordinate Groups



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

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FK0	0.2498	0.2053	GK0	0.2597	0.2204	HK0	0.2700	0.2361
	0.2597	0.2204		0.2700	0.2361		0.2797	0.2509
	0.2682	0.2146		0.2775	0.2292		0.2861	0.2427
	0.2589	0.2000		0.2682	0.2146		0.2775	0.2292
FL0	0.2402	0.2108	GL0	0.2509	0.2264	HL0	0.2624	0.2431
	0.2509	0.2264		0.2624	0.2431		0.2733	0.2590
	0.2597	0.2204		0.2700	0.2361		0.2797	0.2509
	0.2498	0.2053		0.2597	0.2204		0.2700	0.2361
FM0	0.2269	0.2185	GM0	0.2388	0.2348	HM0	0.2520	0.2527
	0.2388	0.2348		0.2520	0.2527		0.2646	0.2700
	0.2509	0.2264		0.2624	0.2431		0.2733	0.2590
	0.2402	0.2108		0.2509	0.2264		0.2624	0.2431
FN0	0.2136	0.2262	GN0	0.2267	0.2432	HN0	0.2416	0.2623
	0.2267	0.2432		0.2416	0.2623		0.2559	0.2810
	0.2388	0.2348		0.2520	0.2527		0.2646	0.2700
	0.2269	0.2185		0.2388	0.2348		0.2520	0.2527

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
IK0	0.2797	0.2509	KK0	0.3007	0.2830	MK0	0.3219	0.3154
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
	0.2950	0.2568		0.3138	0.2862		0.3335	0.3172
	0.2861	0.2427		0.3045	0.2717		0.3231	0.3008
ILO	0.2733	0.2590	KLO	0.2971	0.2935	MLO	0.3209	0.3281
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
	0.2797	0.2509		0.3007	0.2830		0.3219	0.3154
IMO	0.2646	0.2700	KMO	0.2922	0.3077	MM0	0.3196	0.3451
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
	0.2733	0.2590		0.2971	0.2935		0.3209	0.3281
INO	0.2559	0.2810	KNO	0.2873	0.3219	MNO	0.3183	0.3621
	0.2712	0.3009		0.3030	0.3424		0.3349	0.3830
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654
	0.2646	0.2700		0.2922	0.3077		0.3196	0.3451
JK0	0.2898	0.2664	LKO	0.3113	0.2992	NKO	0.3339	0.3336
	0.3007	0.2830		0.3219	0.3154		0.3465	0.3530
	0.3045	0.2717		0.3231	0.3008		0.3447	0.3347
	0.2950	0.2568		0.3138	0.2862		0.3335	0.3172
JLO	0.2848	0.2757	LLO	0.3090	0.3108	NLO	0.3341	0.3472
	0.2971	0.2935		0.3209	0.3281		0.3479	0.3673
	0.3007	0.2830		0.3219	0.3154		0.3465	0.3530
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
JMO	0.2780	0.2883	LMO	0.3060	0.3266	NMO	0.3345	0.3654
	0.2922	0.3077		0.3196	0.3451		0.3498	0.3863
	0.2971	0.2935		0.3209	0.3281		0.3479	0.3673
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
JNO	0.2712	0.3009	LNO	0.3030	0.3424	NNO	0.3349	0.3830
	0.2873	0.3219		0.3183	0.3621		0.3517	0.4053
	0.2922	0.3077		0.3196	0.3451		0.3498	0.3863
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654

## LW P4SG binning FK0PN0

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Group	Cx	Cy	Group	Cx	Cy
PK0	0.3465	0.3530	PM0	0.3498	0.3863
	0.3599	0.3735		0.3655	0.4079
	0.3567	0.3535		0.3623	0.3882
	0.3447	0.3347		0.3479	0.3673
PL0	0.3479	0.3673	PN0	0.3517	0.4053
	0.3623	0.3882		0.3687	0.4276
	0.3599	0.3735		0.3655	0.4079
	0.3465	0.3530		0.3498	0.3863

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## Group Name on Label

**Example: AA-FK0-4**

Brightness

Color Chromaticity

Forward Voltage

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AA

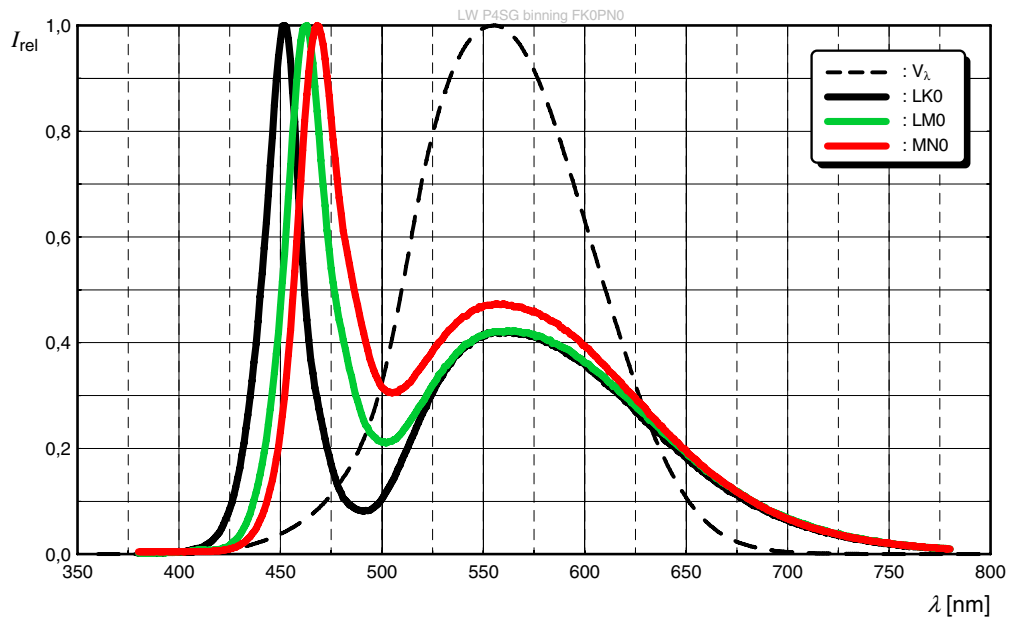
FK0

4

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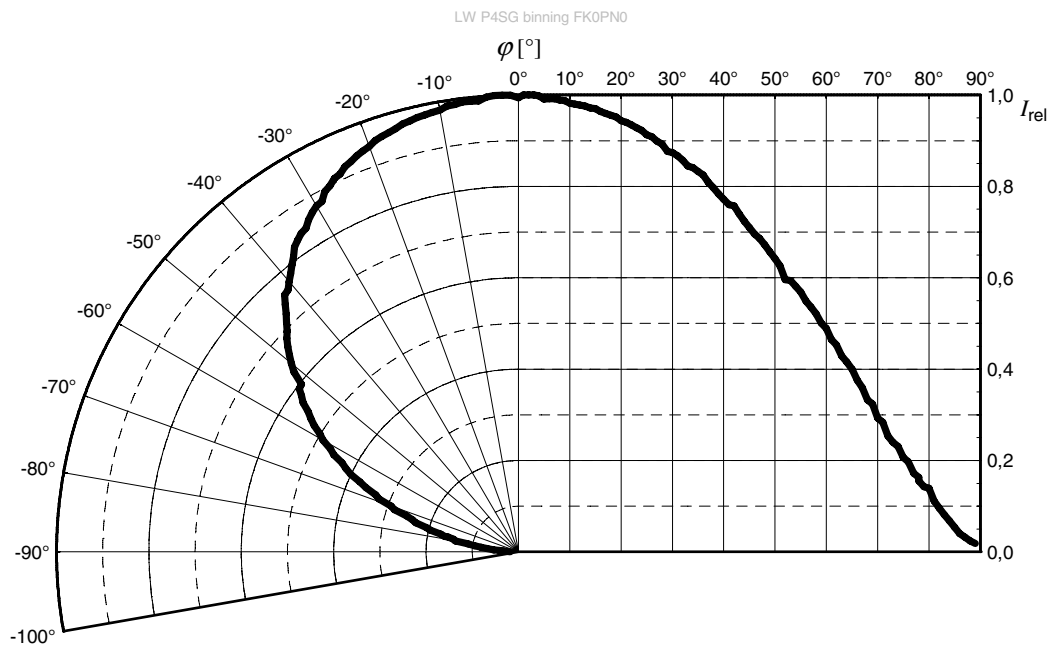
### Relative Spectral Emission <sup>7)</sup>

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



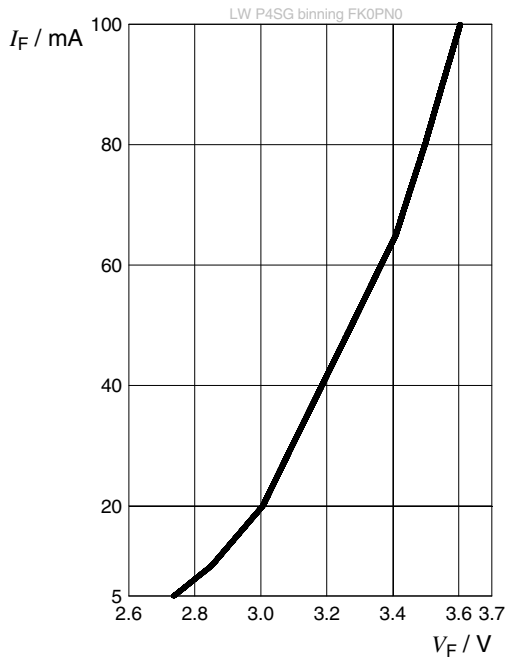
### Radiation Characteristics <sup>7)</sup>

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



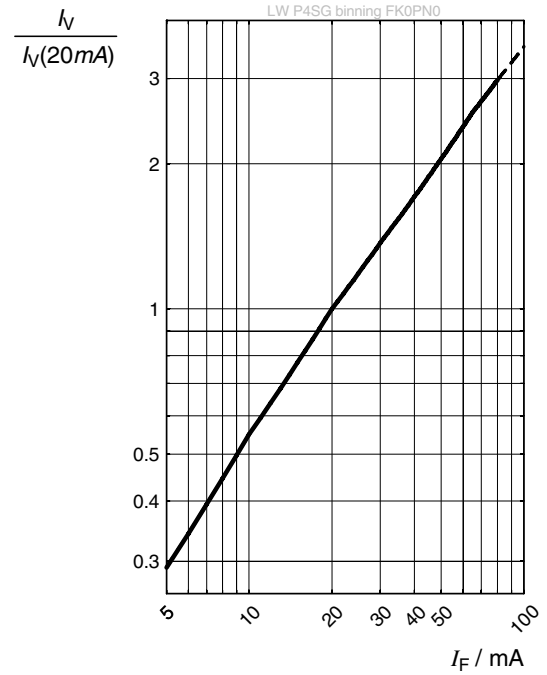
### Forward current <sup>7)</sup>

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



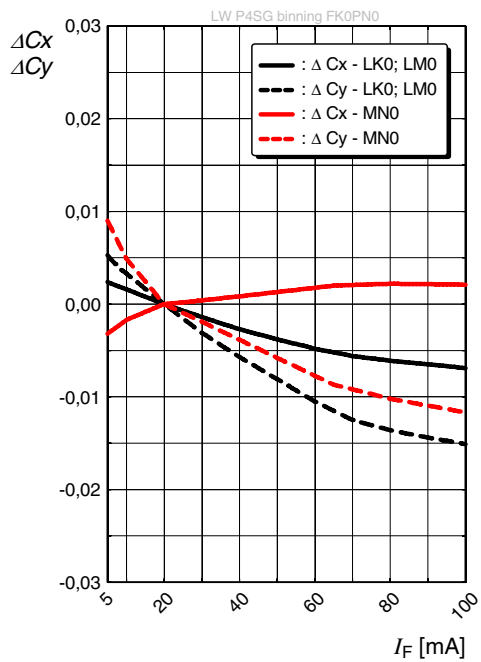
### Relative Luminous Intensity <sup>7), 8)</sup>

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



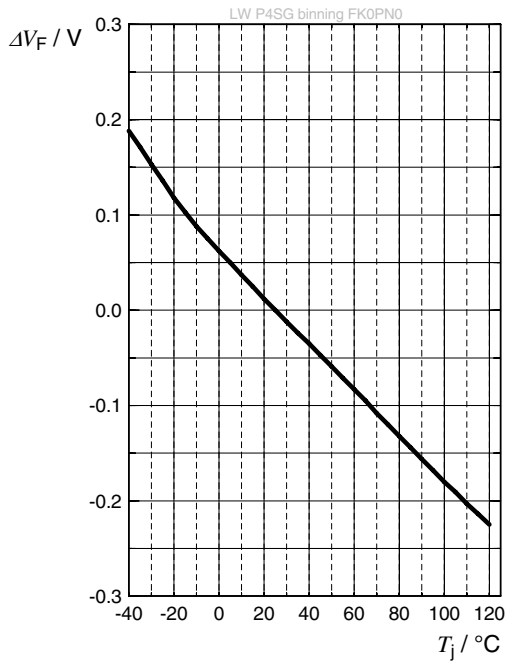
### Chromaticity Coordinate Shift <sup>7)</sup>

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



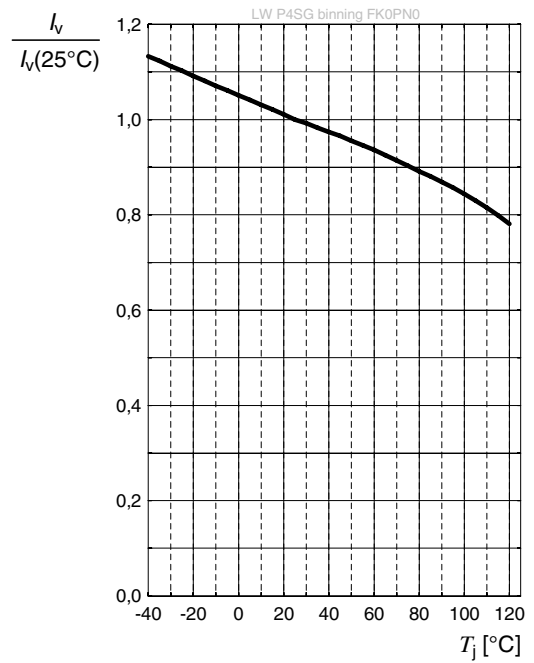
### Forward Voltage <sup>7)</sup>

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



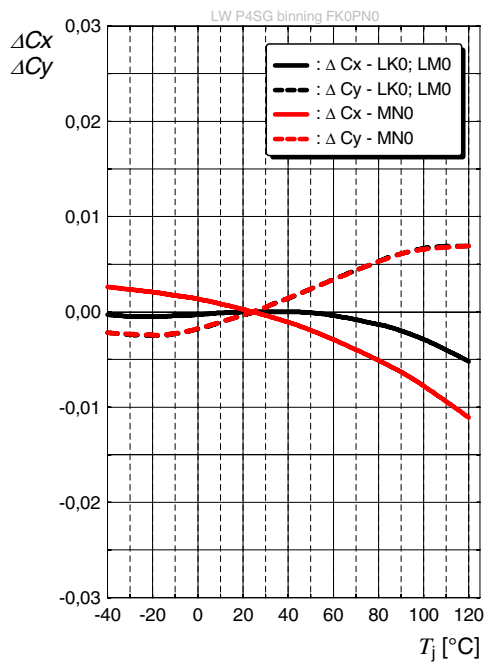
### Relative Luminous Intensity <sup>7)</sup>

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



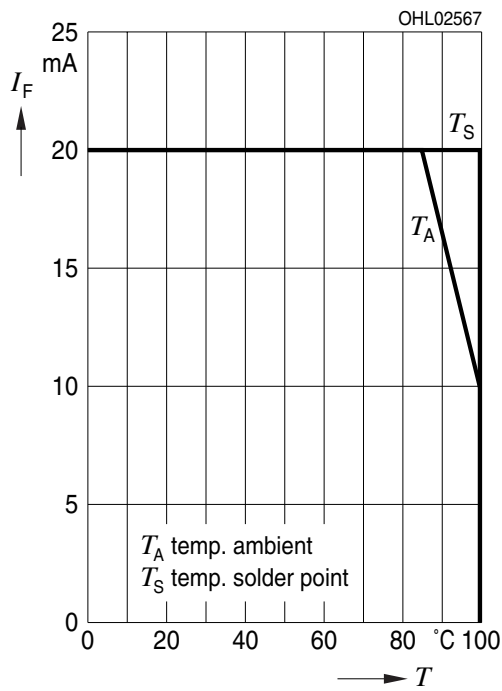
### Chromaticity Coordinate Shift <sup>7)</sup>

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



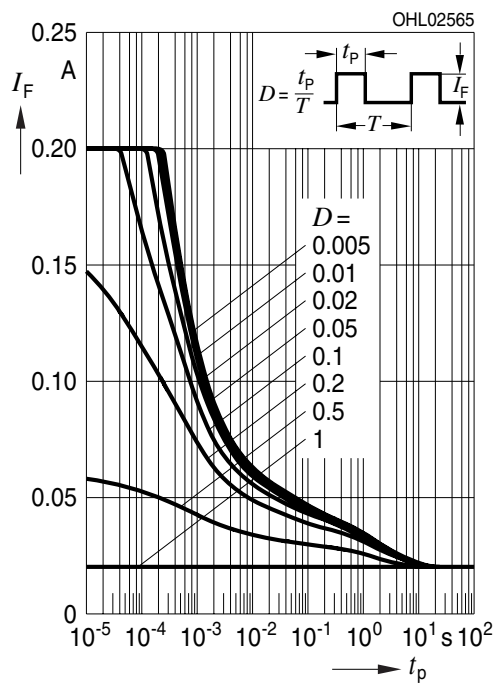
## Max. Permissible Forward Current

$I_F = f(T)$



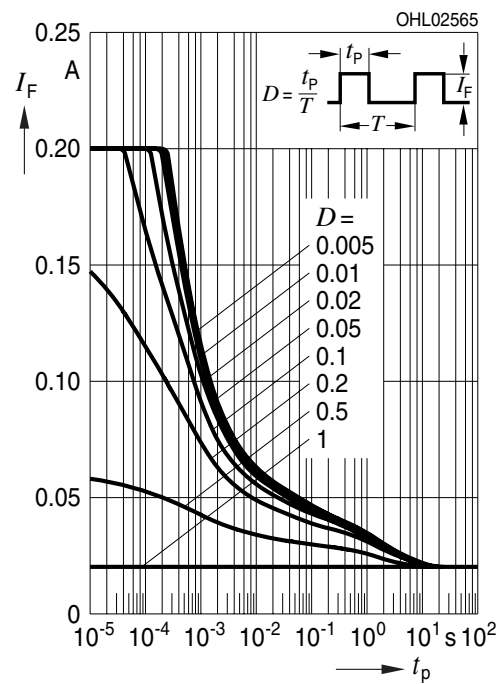
## Permissible Pulse Handling Capability

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

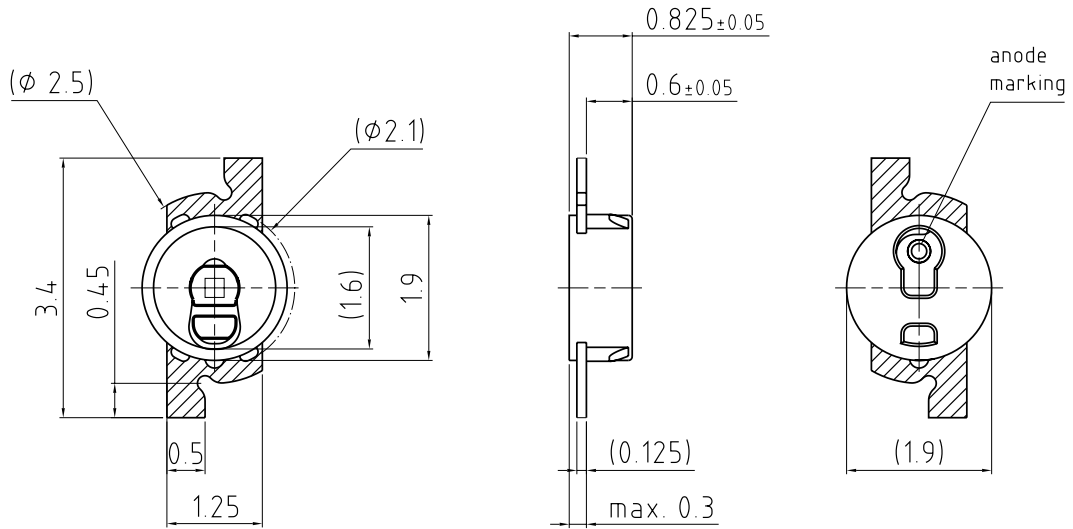


## Permissible Pulse Handling Capability

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



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



general tolerance  $\pm 0.1$   
 lead finish Sn 

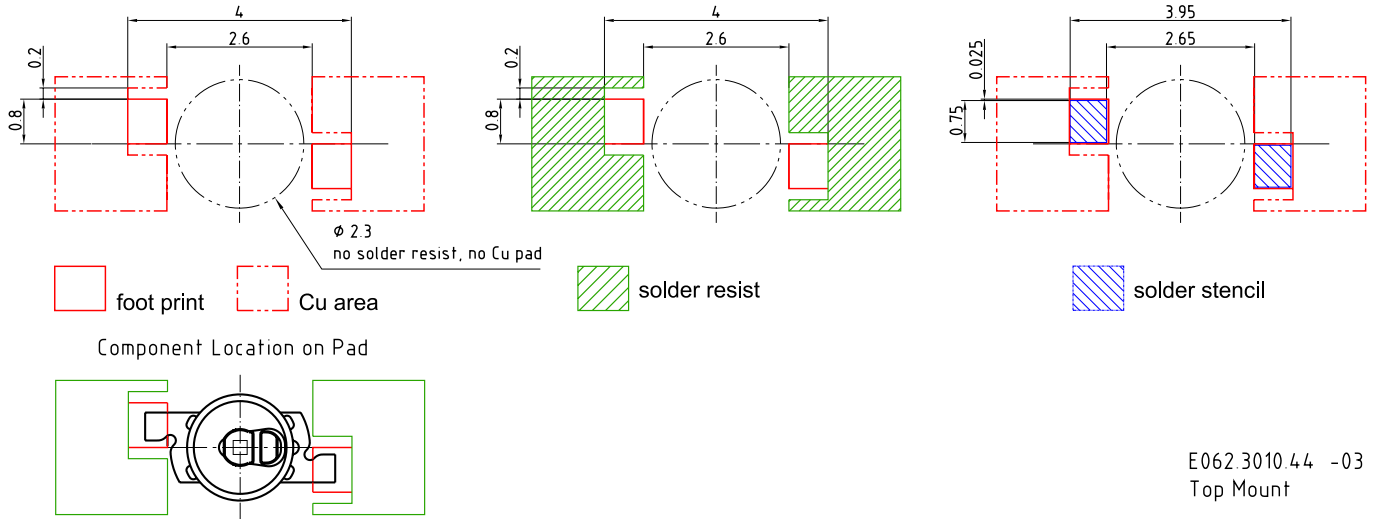
C63062-A3773-A40..-06

## Further Information:

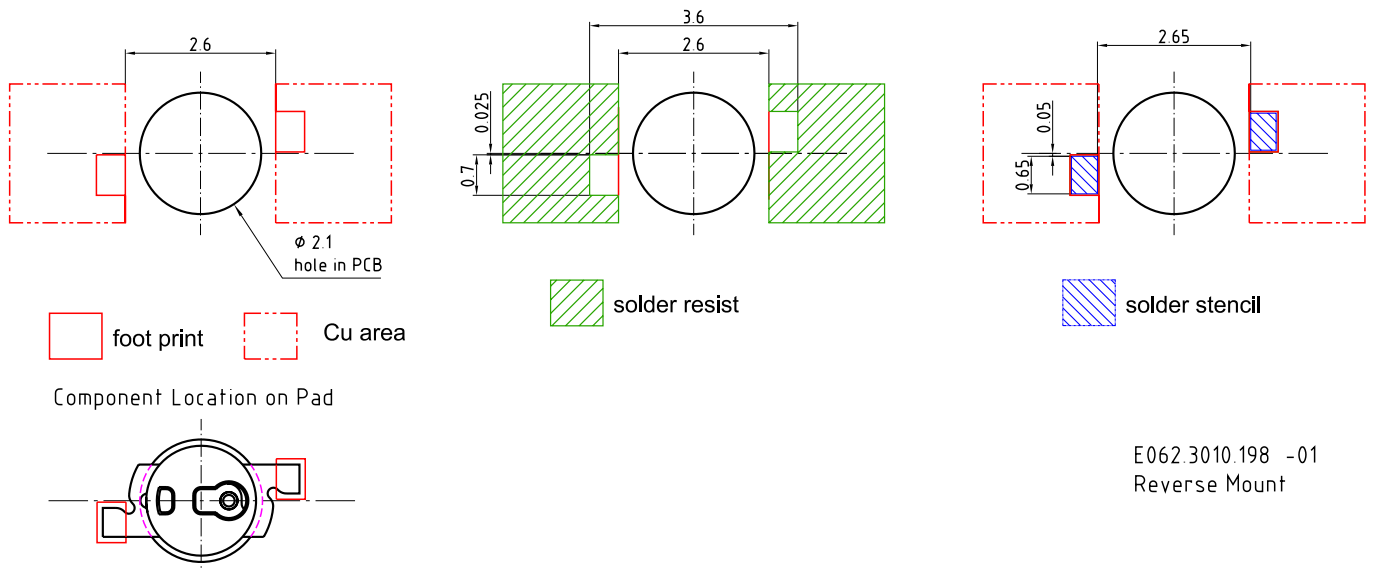
**Approximate Weight:** 6.0 mg

**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))

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



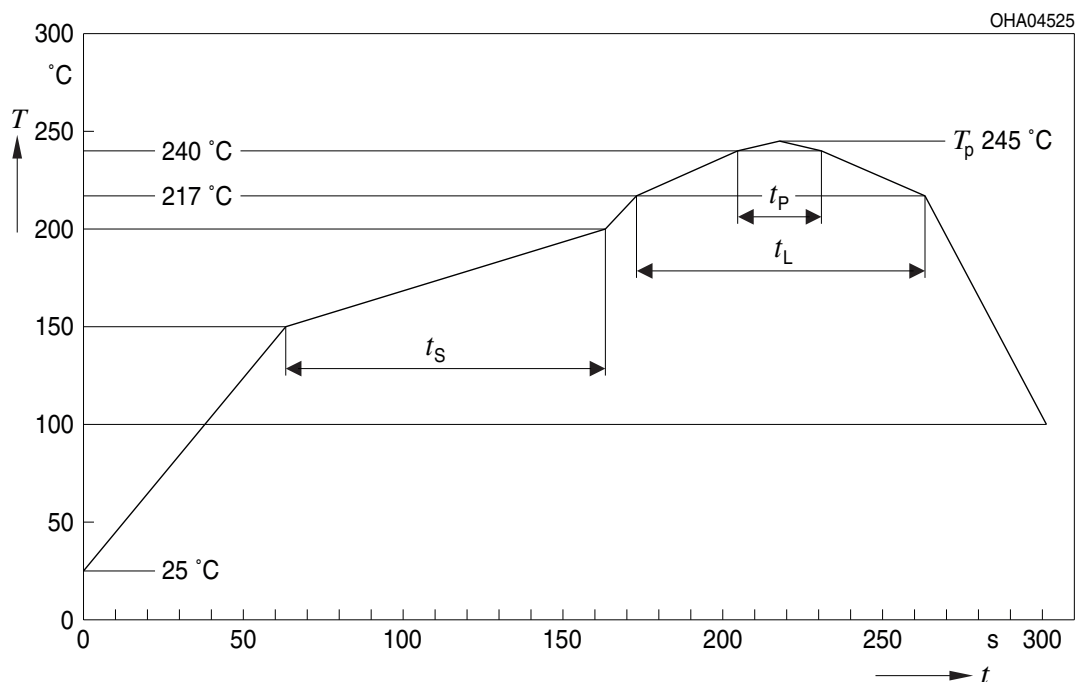
## Recommended Solder Pad <sup>9)</sup>



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

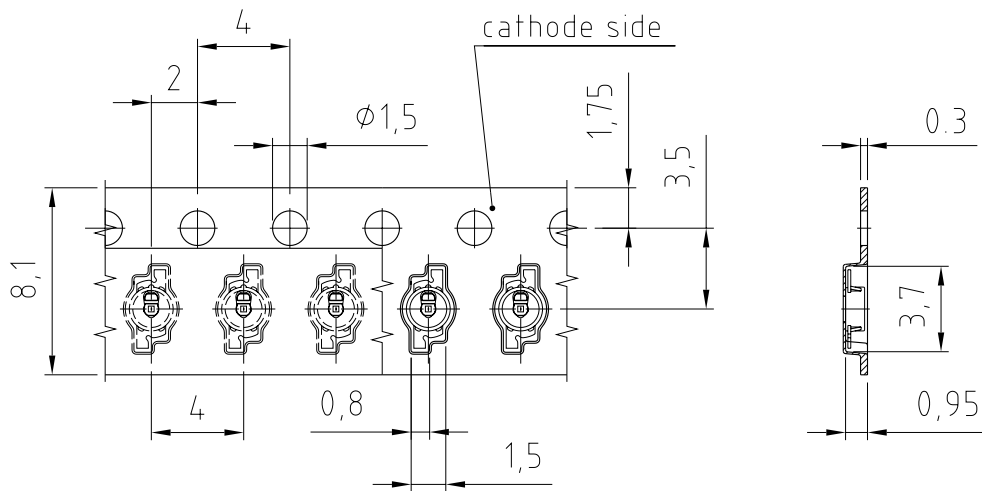


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$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

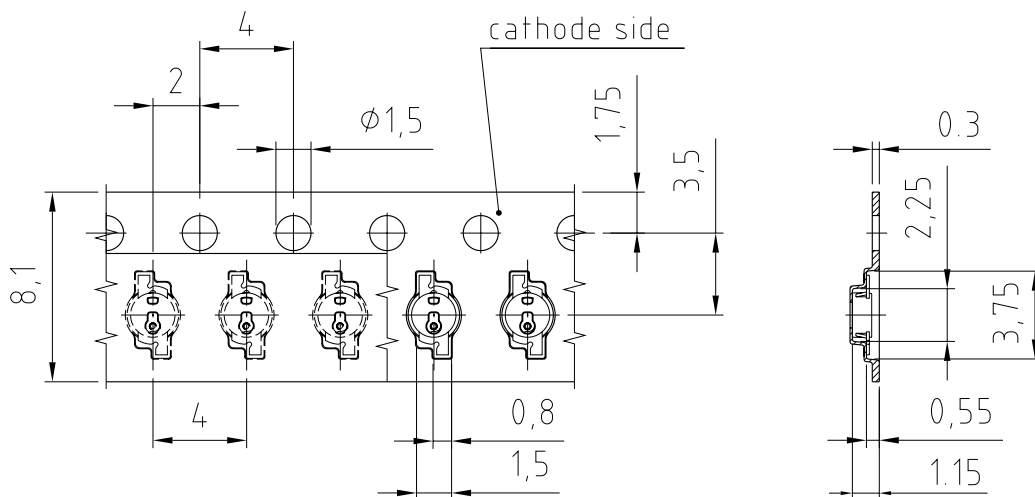


**Taping** <sup>9)</sup>



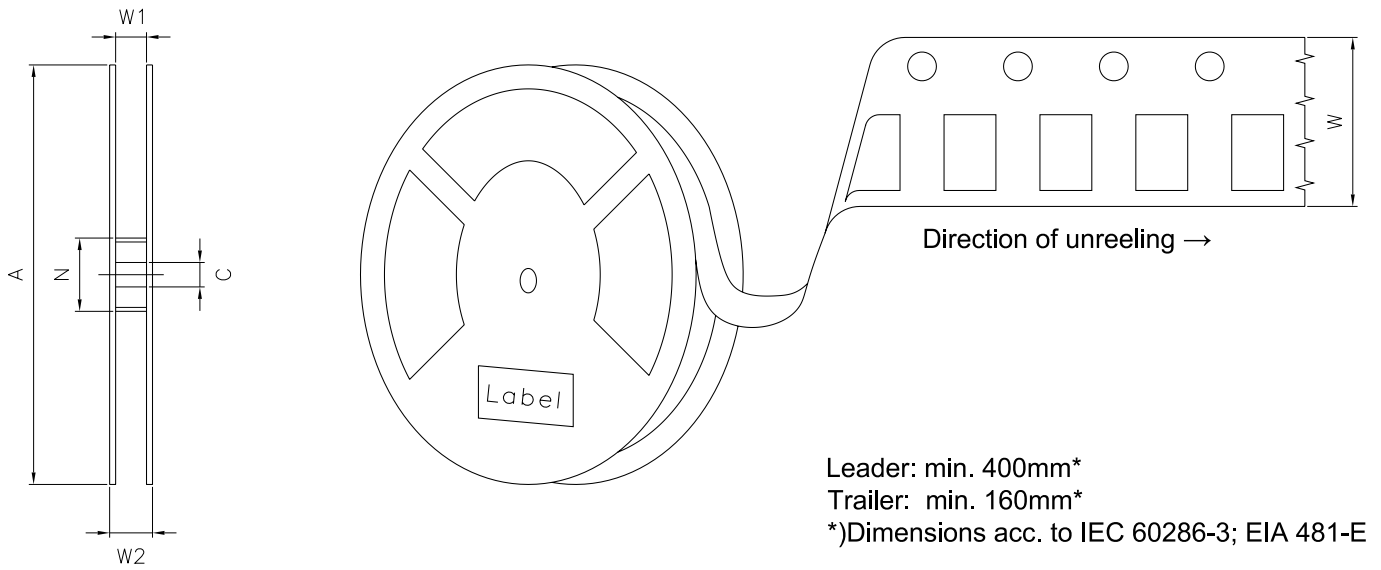
C63062-A3773-B16 -04  
Top Mount

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



C63062-A3773-B14 -04  
Reverse Mount

## 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	3000

### Barcode-Product-Label (BPL)

**OSRAM Opto Semiconductors** LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

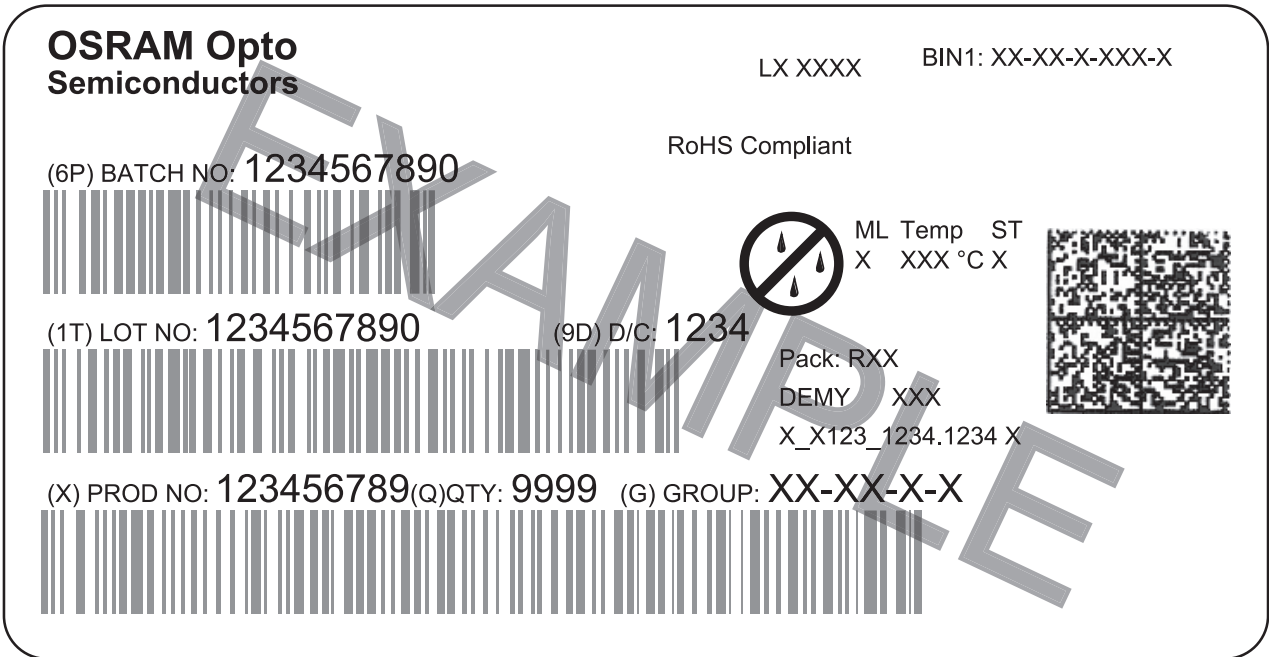
(6P) BATCH NO: 1234567890

(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 company name at the top left. To the right are fields for 'LX XXXX' and 'BIN1: XX-XX-X-XXX-X'. Below the logo is the text 'RoHS Compliant'. 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' and '(G) GROUP: XX-XX-X-X'. To the right of the second barcode is a circular icon with a crossed-out rain cloud and the text 'ML Temp ST X XXX °C X'. Below this is a square QR code. Further down is the text 'Pack: RXX', 'DEMY XXX', and 'X\_X123\_1234.1234 X'. A large 'EXAMPLE' watermark is overlaid diagonally across the label.

OHA04563

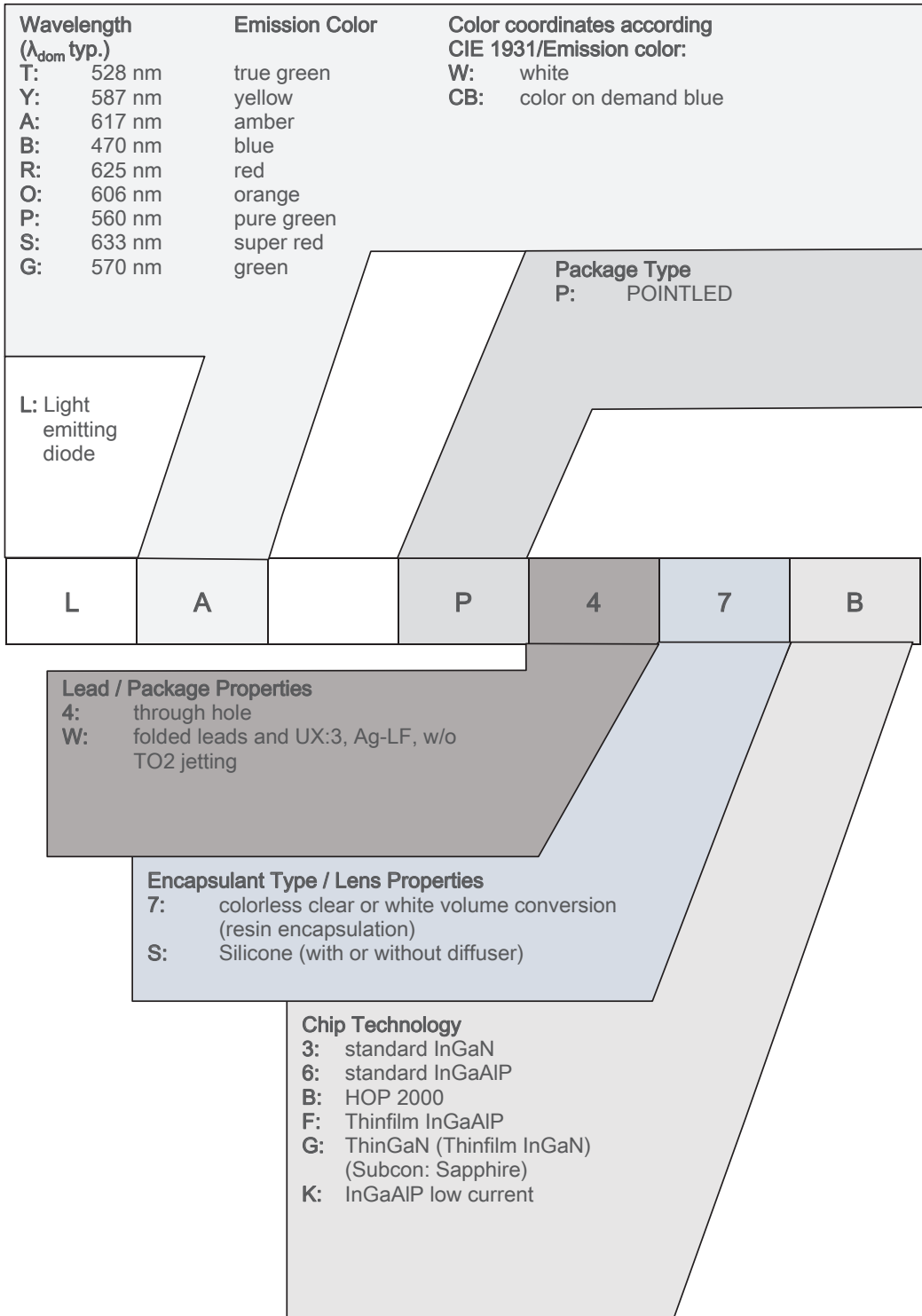
### Dry Packing Process and Materials <sup>9)</sup>



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  $\pm 0.05\text{ V}$  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) **Thermal Resistance:**  $R_{thJA}$  results from mounting on PC board FR 4 (pad size  $16\text{ mm}^2$  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.

## Revision History

Version	Date	Change
1.1	2020-05-27	Characteristics Maximum Ratings Glossary

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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。

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».



## JONHON

«**JONHON**» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«**FORSTAR**» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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