

# GW Q9LR31.PM

## OSCONIQ® S 5050

The latest QFN cast 5050 LED version adds to its impressive 5050 line-up of high efficacy performance combined with DLC Premium Lifetime.

This OSCONIQ S 5050 leadframe package brings its Robustness stability to another level with a Superior Corrosion protection that further enhance the suitability for Outdoor Professional lighting.



## Applications

- Highbay Industrial
- Street, Tunnel and Outdoor

## Features:

- Package: white SMT package, colored diffused resin
- Typ. Radiation: 120° (Lambertian emitter)
- Color temperature: 2200K - 6500K
- CRI: 70 (min.)
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)
- Luminous Flux: typ. 217 lm @ 4000 K
- Luminous efficacy: typ. 218 lm/W @ 4000 K

## Ordering Information

Type	Color temperature	Luminous Flux <sup>1)</sup> $I_F = 45 \text{ mA}$ $\Phi_V$	Ordering Code
GW Q9LR31.PM-L9M8-XX510-1	2200 K	170.0 ... 260.0 lm	Q65113A2555
GW Q9LR31.PM-M1MF-XX58-1	2700 K	180.0 ... 280.0 lm	Q65113A2556
GW Q9LR31.PM-M3N2-XX57-1	3000 K	200.0 ... 300.0 lm	Q65113A2006
GW Q9LR31.PM-M3N2-XX56-1	3500 K	200.0 ... 300.0 lm	Q65113A2005
GW Q9LR31.PM-M4N3-XX55-1	4000 K	210.0 ... 310.0 lm	Q65113A2004
GW Q9LR31.PM-M4N3-XX53-1	5000 K	210.0 ... 310.0 lm	Q65113A2003
GW Q9LR31.PM-M3N2-XX52-1	5700 K	200.0 ... 300.0 lm	Q65113A2002
GW Q9LR31.PM-M3N2-XX51-1	6500 K	200.0 ... 300.0 lm	Q65113A2001

## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min.	-40 °C
		max.	105 °C
Storage Temperature	$T_{stg}$	min.	-40 °C
		max.	105 °C
Junction Temperature	$T_j$	max.	125 °C
Forward Current $T_j = 25\text{ °C}$	$I_F$	min.	10 mA
		max.	265 mA
Reverse current <sup>2)</sup>	$I_R$	max.	200 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	$V_{ESD}$		8 kV

## Characteristics

$I_F = 45 \text{ mA}$ ;  $T_J = 25 \text{ }^\circ\text{C}$

Parameter	Symbol		Values
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>3)</sup> $I_F = 45 \text{ mA}$	$V_F$	min. typ. max.	20.80 V 22.10 V 23.20 V
Reverse voltage <sup>2)</sup> $I_R = 20 \text{ mA}$	$V_R$	max.	1.2 V
Color Rendering Index <sup>4)</sup>	CRI	min.	70
Electrical thermal resistance junction/solderpoint with efficiency $\eta_e = 60 \%$	$R_{thJS \text{ elec.}}$	typ.	1.5 K / W

## Electro - Optical Characteristics <sup>5)</sup>

$T_J = 25 \text{ }^\circ\text{C}$ ; CRI = 70; 4000 K

Forward Current $I_F$	Forward Voltage typ. $V_F$	Power typ. P	Luminous Flux typ. $\Phi_V$	Luminous efficacy typ. $\eta$
45 mA	22.08 V	1.0 W	217 lm	217 lm/W
90 mA	23.11 V	2.1 W	420 lm	200 lm/W
150 mA	24.35 V	3.7 W	673 lm	182 lm/W
160 mA	24.60 V	3.9 W	714 lm	183 lm/W
200 mA	25.30 V	5.1 W	869 lm	170 lm/W
265 mA	26.45 V	7.0 W	1103 lm	158 lm/W

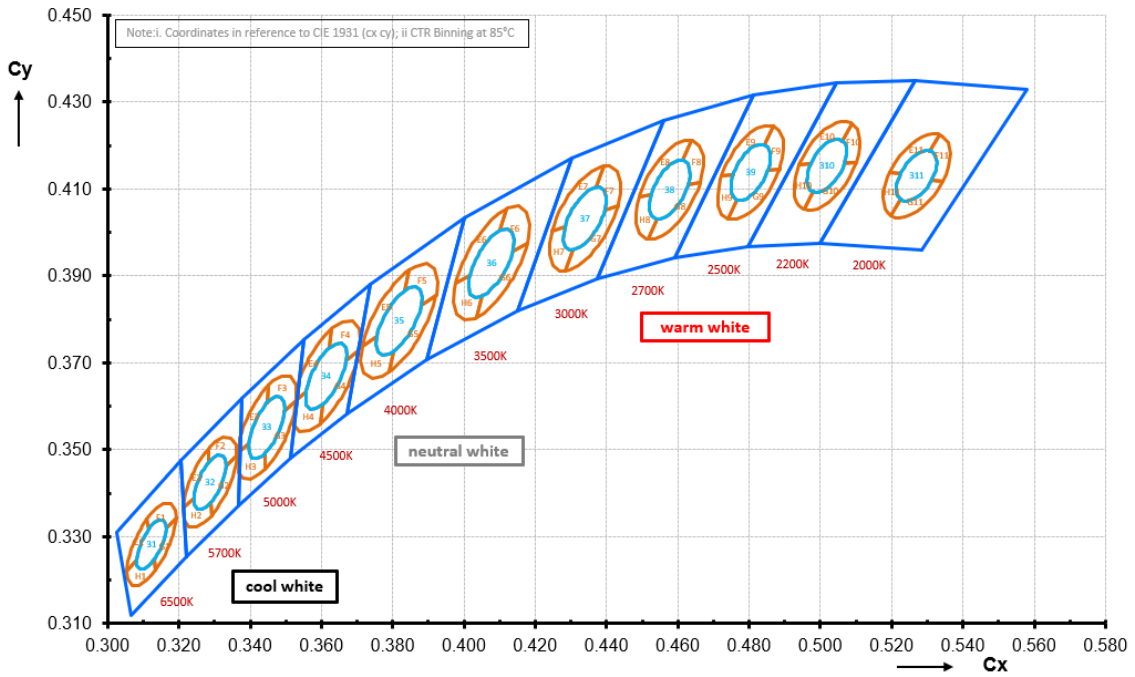
## Brightness Groups

Group	Luminous Flux <sup>1)</sup> $I_F = 45 \text{ mA}$ min. $\Phi_V$	Luminous Flux <sup>1)</sup> $I_F = 45 \text{ mA}$ max. $\Phi_V$
L9	170.0 lm	180.0 lm
M1	180.0 lm	190.0 lm
M2	190.0 lm	200.0 lm
M3	200.0 lm	210.0 lm
M4	210.0 lm	220.0 lm
M5	220.0 lm	230.0 lm
M6	230.0 lm	240.0 lm
M7	240.0 lm	250.0 lm
M8	250.0 lm	260.0 lm
M9	260.0 lm	270.0 lm
MF	270.0 lm	280.0 lm
N1	280.0 lm	290.0 lm
N2	290.0 lm	300.0 lm
N3	300.0 lm	310.0 lm

## Forward Voltage Groups

Group	Forward Voltage <sup>3)</sup> $I_F = 45 \text{ mA}$ min. $V_F$	Forward Voltage <sup>3)</sup> $I_F = 45 \text{ mA}$ max. $V_F$
K8	20.80 V	21.60 V
T8	21.60 V	22.40 V
28	22.40 V	23.20 V

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



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## Chromaticity Coordinate Groups

CCT	Center Cx	Center Cy	3step a	3step b	5step a	5step b	Ø
2200 K	0.5020	0.4156	0.0072	0.0040	0.0120	0.0067	39.9
2700 K	0.4577	0.4098	0.0080	0.0041	0.0133	0.0068	54.1
3000 K	0.4339	0.4032	0.0086	0.0042	0.0142	0.0069	53.7
4000 K	0.3818	0.3796	0.0094	0.0041	0.0157	0.0068	53.4
4500 K	0.3613	0.3669	0.0089	0.0038	0.0148	0.0063	57.0
5000 K	0.3446	0.3551	0.0081	0.0035	0.0135	0.0059	59.8
5700 K	0.3287	0.3425	0.0072	0.0032	0.0119	0.0052	58.8
6500 K	0.3123	0.3282	0.0066	0.0027	0.0110	0.0045	58.1

CCT	Group	1		2		3		4		5	
		Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy
2200 K	E	0.5088	0.4249	0.4941	0.4156	0.4973	0.4157	0.5061	0.4210		
	F	0.5088	0.4249	0.5101	0.4161	0.5068	0.4160	0.5061	0.4210		
	G	0.5101	0.4161	0.4955	0.4054	0.4981	0.4093	0.5068	0.4158		
	H	0.4981	0.4093	0.4973	0.4157	0.4941	0.4156	0.4955	0.4054		
2700 K	E	0.4637	0.4212	0.4491	0.4081	0.4526	0.4088	0.4613	0.4166		
	F	0.4637	0.4212	0.4663	0.4115	0.4628	0.4108	0.4613	0.4166		
	G	0.4663	0.4115	0.4517	0.3984	0.4541	0.4030	0.4628	0.4108		
	H	0.4541	0.4030	0.4526	0.4088	0.4491	0.4081	0.4517	0.3984		
3000 K	E	0.4393	0.4153	0.4246	0.4002	0.4283	0.4014	0.4371	0.4105		
	F	0.4393	0.4153	0.4432	0.4062	0.4395	0.4050	0.4371	0.4105		
	G	0.4432	0.4062	0.4285	0.3911	0.4307	0.3960	0.4395	0.4050		
	H	0.4307	0.3960	0.4283	0.4014	0.4246	0.4002	0.4285	0.3911		
3500 K	E	0.4118	0.4054	0.3977	0.3883	0.4017	0.3902	0.4102	0.4004		
	F	0.4118	0.4054	0.4177	0.3975	0.4137	0.3956	0.4102	0.4004		
	G	0.4177	0.3975	0.4036	0.3804	0.4052	0.3854	0.4137	0.3956		
	H	0.4052	0.3854	0.4017	0.3902	0.3977	0.3883	0.4036	0.3804		
4000 K	E	0.3845	0.3913	0.3714	0.3737	0.3756	0.3760	0.3834	0.3866		
	F	0.3845	0.3913	0.3922	0.3855	0.3880	0.3832	0.3834	0.3866		
	G	0.3922	0.3855	0.3791	0.3679	0.3802	0.3726	0.3880	0.3832		
	H	0.3802	0.3726	0.3756	0.3760	0.3714	0.3737	0.3791	0.3679		
5000 K	E	0.3451	0.3648	0.3372	0.3528	0.3371	0.3496	0.3396	0.3514	0.3449	0.3609
	F	0.3451	0.3648	0.3530	0.3612	0.3496	0.3588	0.3449	0.3609		
	G	0.3530	0.3612	0.3441	0.3454	0.3443	0.3493	0.3496	0.3588		
	H	0.3443	0.3493	0.3396	0.3514	0.3371	0.3496	0.3369	0.3445	0.3441	0.3454
5700 K	E	0.3283	0.3502	0.3212	0.3373	0.3213	0.3365	0.3242	0.3388	0.3284	0.3471
	F	0.3283	0.3502	0.3363	0.3486	0.3332	0.3462	0.3284	0.3471		
	G	0.3363	0.3486	0.3291	0.3348	0.3290	0.3379	0.3332	0.3462		
	H	0.3291	0.3348	0.3215	0.3337	0.3213	0.3365	0.3242	0.3388	0.3290	0.3379
6500 K	E	0.3110	0.3340	0.3054	0.3220	0.3082	0.3245	0.3115	0.3317		
	F	0.3110	0.3340	0.3192	0.3344	0.3165	0.3319	0.3115	0.3317		
	G	0.3192	0.3344	0.3136	0.3224	0.3131	0.3247	0.3165	0.3319		
	H	0.3136	0.3224	0.3054	0.3220	0.3082	0.3245	0.3131	0.3247		



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## Group Name on Label

### Example: L9-28

Brightness	Forward Voltage
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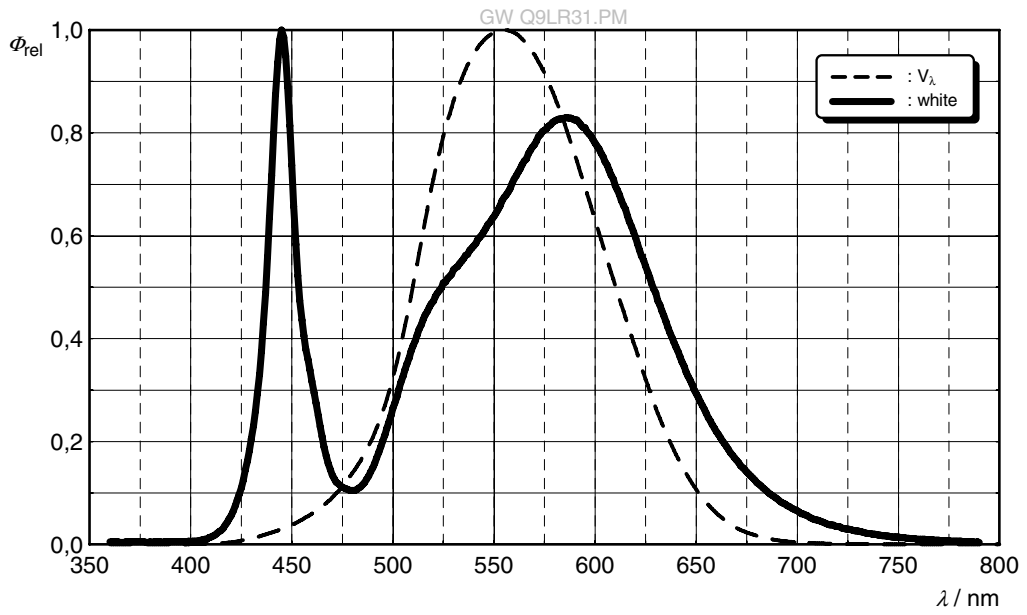
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L9	28
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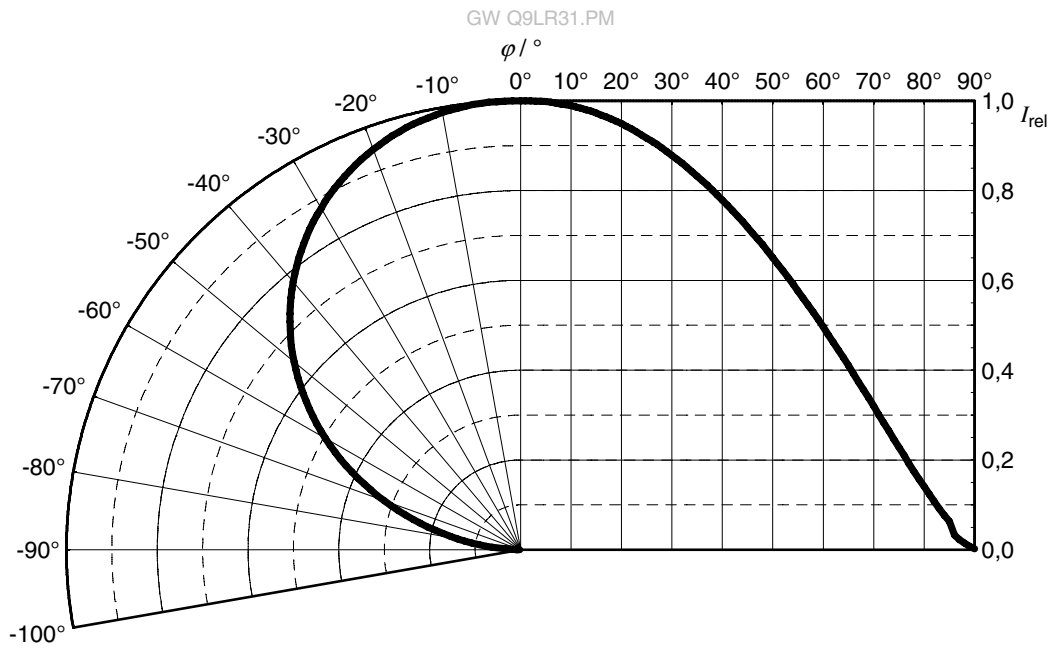
**Relative Spectral Emission** <sup>5)</sup>

$\Phi_{rel} = f(\lambda)$ ;  $I_F = 45 \text{ mA}$ ;  $T_J = 25 \text{ }^\circ\text{C}$



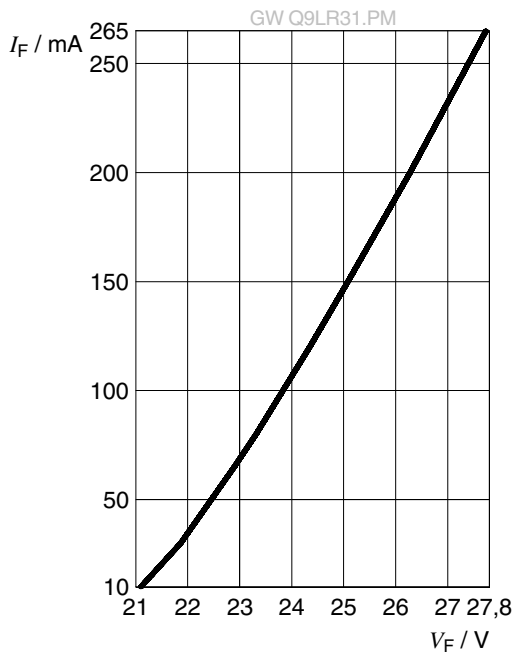
**Radiation Characteristics** <sup>5)</sup>

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



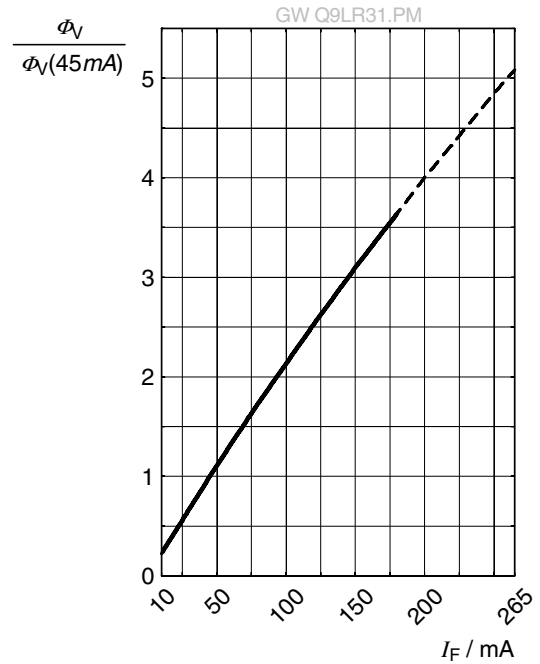
**Forward current** <sup>5)</sup>

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



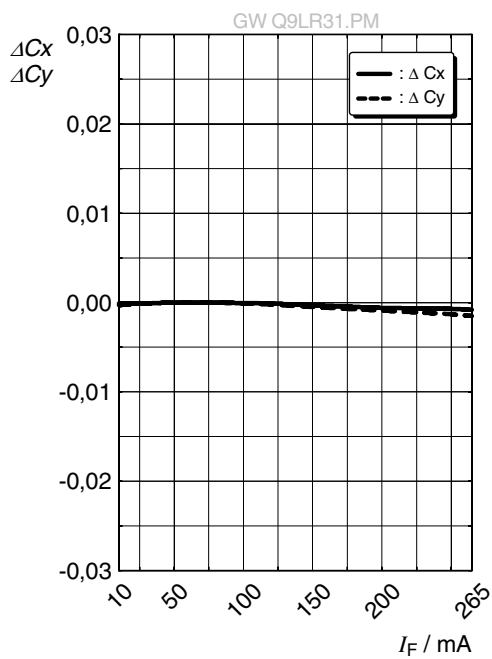
**Relative Luminous Flux** <sup>5), 7)</sup>

$\Phi_V / \Phi_V(45\text{ mA}) = f(I_F); T_J = 25\text{ }^\circ\text{C}$



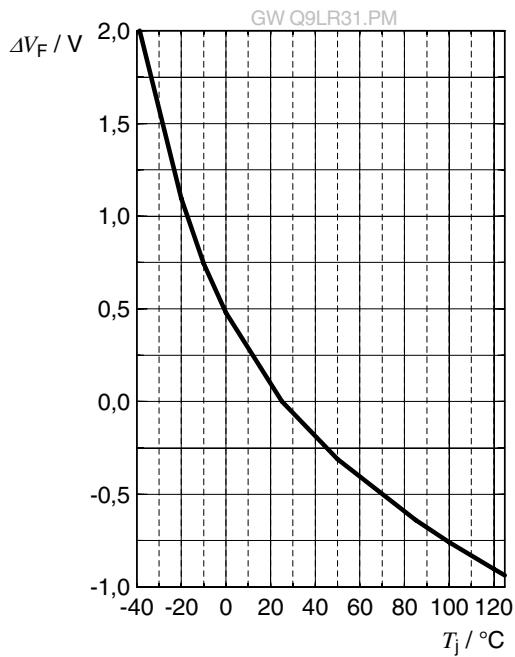
**Chromaticity Coordinate Shift** <sup>5)</sup>

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



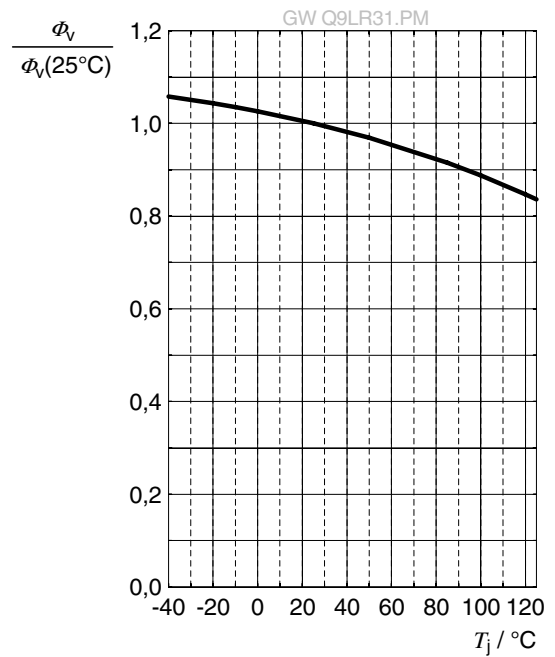
**Forward Voltage** <sup>5)</sup>

$$\Delta V_F = V_F - V_F(25\text{ }^\circ\text{C}) = f(T_j); I_F = 45\text{ mA}$$



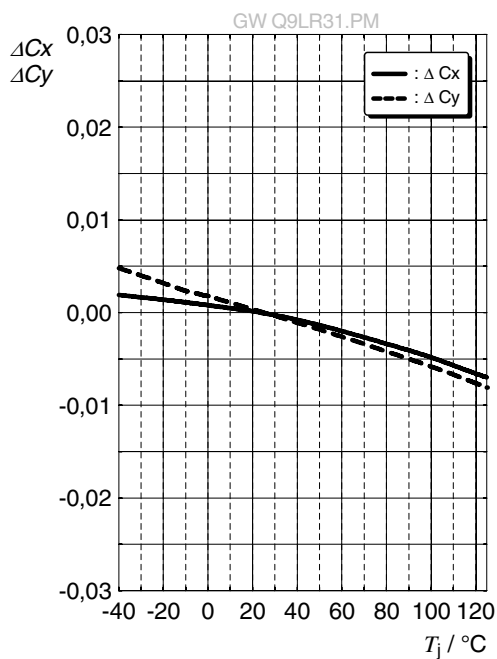
**Relative Luminous Flux** <sup>5)</sup>

$$\Phi_v / \Phi_v(25\text{ }^\circ\text{C}) = f(T_j); I_F = 45\text{ mA}$$



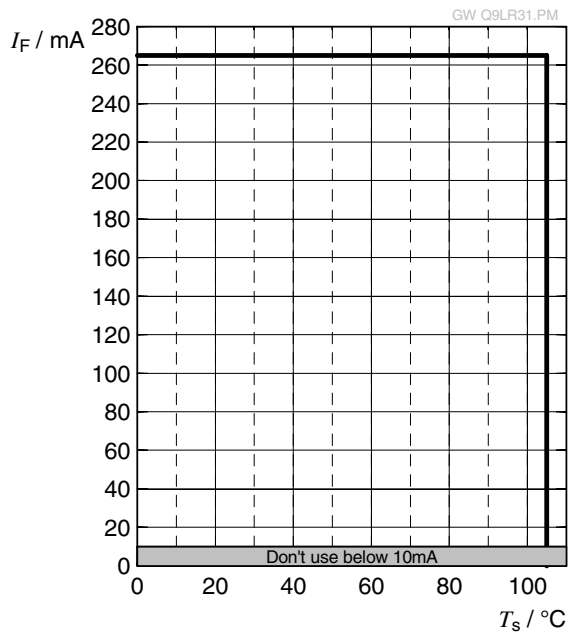
**Chromaticity Coordinate Shift** <sup>5)</sup>

$$C_x, C_y = f(T_j); I_F = 45\text{ mA}$$

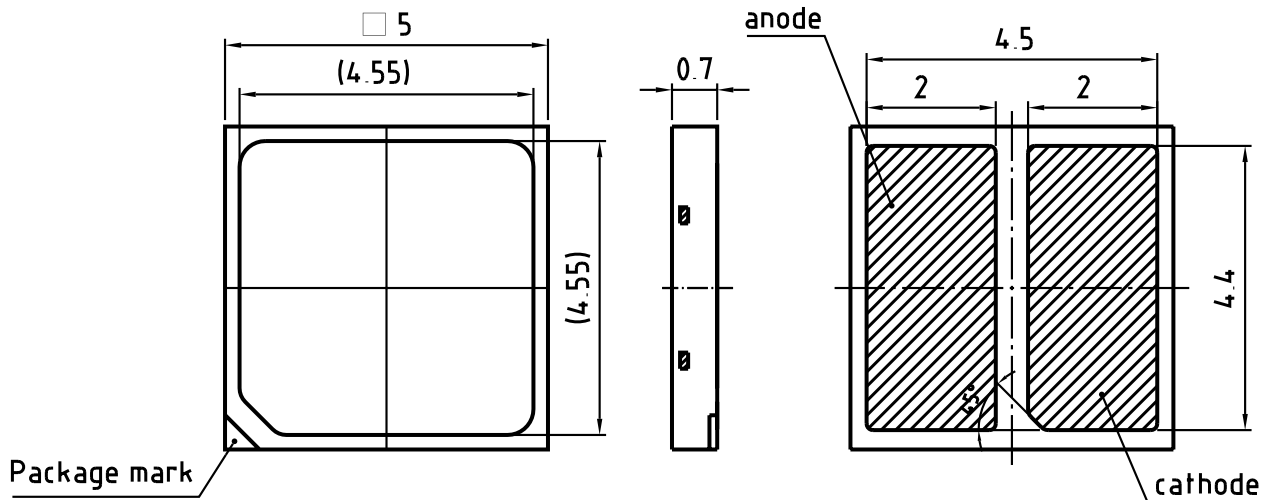


## Max. Permissible Forward Current

$$I_F = f(T)$$



**Dimensional Drawing** <sup>8)</sup>



general tolerance  $\pm 0.1$   
 lead finish Ag

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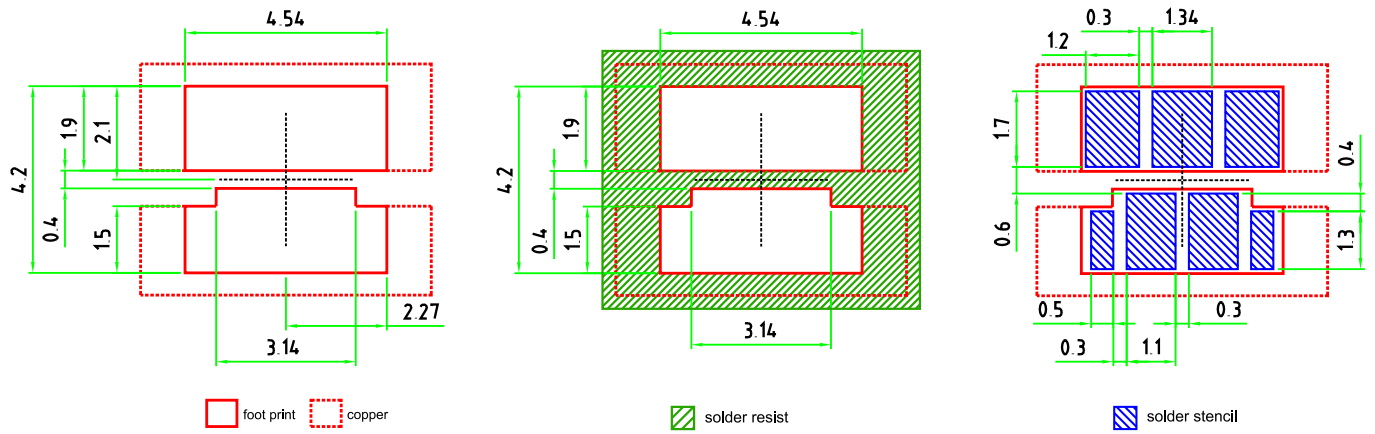
**Further Information:**

**Approximate Weight:** 63.0 mg

**Package marking:** Cathode

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

Recommended Solder Pad <sup>8)</sup>



E067.0346.08-01

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for any kind of wet cleaning or ultrasonic cleaning.

## Reflow Soldering Profile

Product complies to MSL Level 3 acc. to JEDEC J-STD-020E

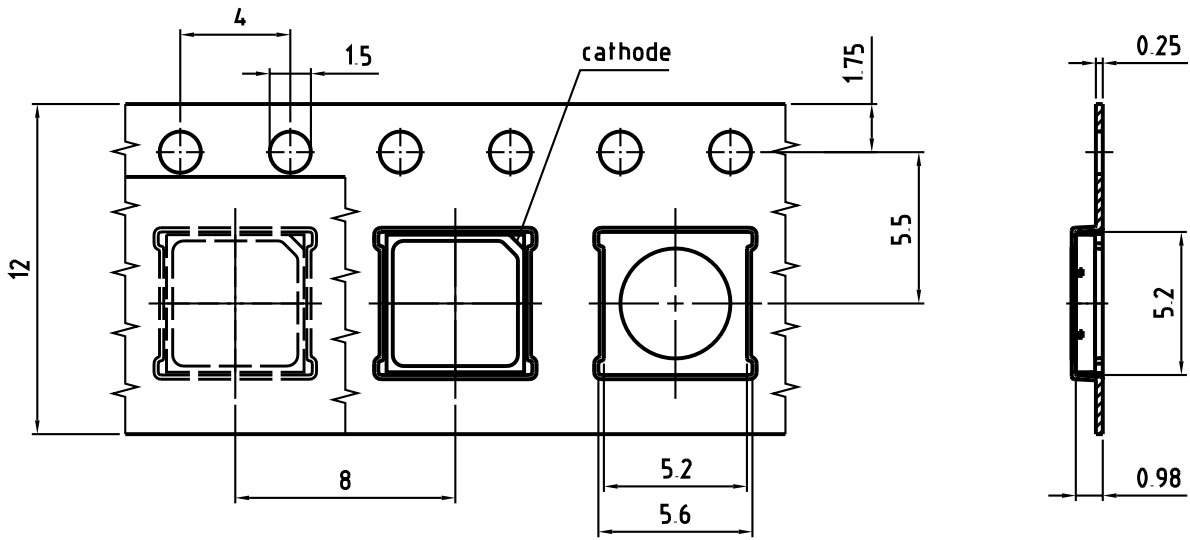


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		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>8)</sup>



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**Tape and Reel** <sup>9)</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	1500

### 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 (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. At the bottom right of the label area, there is 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



OHA00539

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

## 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.

This device is designed for specific/recommended applications only. Please consult OSRAM Opto Semiconductors Sales Staff in advance for detailed information on other non-recommended applications (e.g. automotive).

Change management for this component is aligned with the requirements of the lighting market.

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 10 ms, with a tolerance of +/- 7%.
- 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) **Forward Voltage:** The Forward voltage is measured during a current pulse duration of typically 1 ms with a tolerance of  $\pm 0.05V$ .
- 4) **Color reproduction index:** Color reproduction index values (CRI-RA) are measured during a current pulse of typically 10 ms and with a tolerance of  $\pm 2$ .
- 5) **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.
- 6) **Chromaticity coordinate groups:** Chromaticity coordinate groups are measured during a current pulse duration of typically 10ms with a tolerance of  $\pm 0.005$ .
- 7) **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.
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

## Revision History

Version	Date	Change
1.0	2021-02-02	Initial Version
1.1	2021-02-22	Ordering Information

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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。