

# LCW W5SM

Golden DRAGON®



## Applications

- Hospitality
- Mood Lighting
- Stage Lighting (LED & Laser)
- Table Lamp

## Features:

- Package: white SMD package, colorless clear silicone resin, chip level conversion
- Chip technology: ThinGaN
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.42, Cy = 0.4 acc. to CIE 1931 (• warm white)
- Optical efficacy: 87 lm/W
- Corrosion Robustness Class: 3B
- Color temperature: 2700K - 4500K
- CRI: 80
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

## Ordering Information

Type	Color temperature	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ $\Phi_V$	Ordering Code
LCW W5SM-JXKX-4U9X	2700 K	45 ... 82 lm	Q65110A9692
LCW W5SM-JYKY-4R9T	3000 K	52 ... 97 lm	Q65110A9693
LCW W5SM-JXKY-4O9Q	3500 K	45 ... 97 lm	Q65110A9681
LCW W5SM-JYKY-4L8N	4000 K	52 ... 97 lm	Q65110A9694
LCW W5SM-JYKZ-4J8K	4500 K	52 ... 112 lm	Q65110A9698

## 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.	135 °C
Junction Temperature for short time applications*	$T_j$	max.	175 °C
Forward Current $T_s = 25\text{ °C}$	$I_F$	min.	100 mA
		max.	1000 mA
Surge Current $t \leq 10\ \mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	2500 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	$V_{ESD}$		8 kV
Reverse current <sup>2)</sup>	$I_R$	max.	200 mA

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

## Characteristics

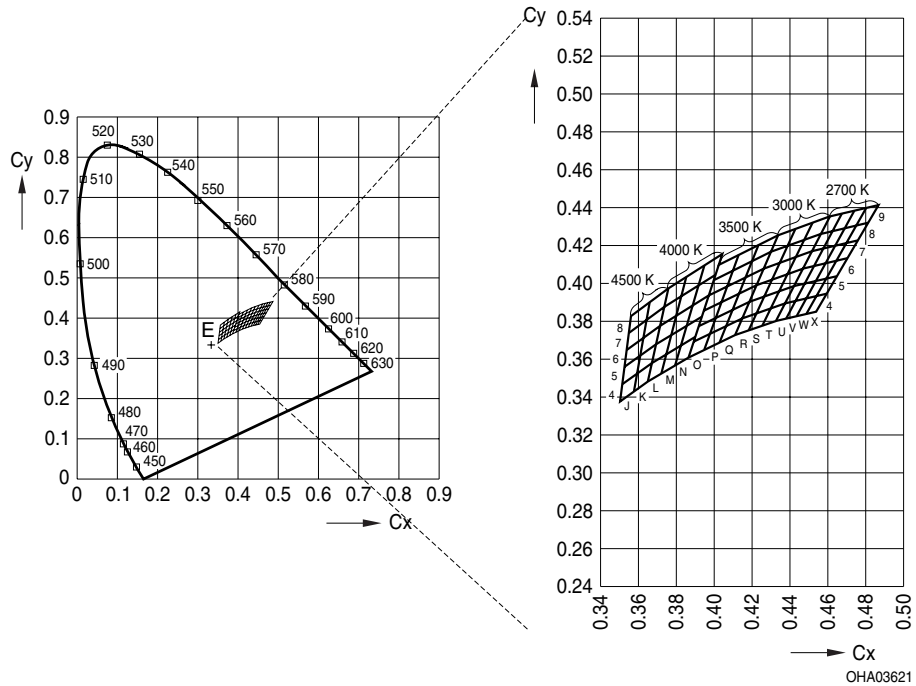
$I_F = 350 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	Cx	typ.	0.42
	Cy	typ.	0.4
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 350 \text{ mA}$	$V_F$	min.	2.70 V
		typ.	3.20 V
		max.	3.70 V
Reverse voltage (ESD device)	$V_{R\text{ESD}}$	min.	45 V
Reverse voltage <sup>2)</sup> $I_R = 20 \text{ mA}$	$V_R$	max.	1.2 V
Color Rendering Index	CRI	typ.	80
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{\text{thJS real}}$	typ.	5.0 K / W
		max.	6.4 K / W

## Brightness Groups

Group	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ min. $\Phi_V$	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ max. $\Phi_V$	Luminous Intensity <sup>6)</sup> $I_F = 350 \text{ mA}$ typ. $I_V$
JX	45 lm	52 lm	16 cd
JY	52 lm	61 lm	19 cd
JZ	61 lm	71 lm	22 cd
KX	71 lm	82 lm	25 cd
KY	82 lm	97 lm	30 cd
KZ	97 lm	112 lm	35 cd

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



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

Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
4U	0.4326	0.3801	2700	5U	0.4373	0.3893	2700	6U	0.4420	0.3985	2700
	0.4373	0.3893	2700		0.4420	0.3985	2700		0.4468	0.4077	2700
	0.4428	0.3906	2700		0.4477	0.3998	2700		0.4526	0.4090	2700
	0.4379	0.3814	2700		0.4428	0.3906	2700		0.4477	0.3998	2700
4V	0.4379	0.3814	2700	5V	0.4428	0.3906	2700	6V	0.4477	0.3998	2700
	0.4428	0.3906	2700		0.4477	0.3998	2700		0.4526	0.4090	2700
	0.4483	0.3919	2700		0.4534	0.4011	2700		0.4585	0.4104	2700
	0.4432	0.3826	2700		0.4483	0.3919	2700		0.4534	0.4011	2700
4W	0.4432	0.3826	2700	5W	0.4483	0.3919	2700	6W	0.4534	0.4011	2700
	0.4483	0.3919	2700		0.4534	0.4011	2700		0.4585	0.4104	2700
	0.4538	0.3931	2700		0.4591	0.4025	2700		0.4644	0.4118	2700
	0.4485	0.3838	2700		0.4538	0.3931	2700		0.4591	0.4025	2700
4X	0.4485	0.3838	2700	5X	0.4538	0.3931	2700	6X	0.4591	0.4025	2700
	0.4538	0.3931	2700		0.4591	0.4025	2700		0.4644	0.4118	2700
	0.4593	0.3944	2700		0.4648	0.4038	2700		0.4703	0.4132	2700
	0.4538	0.3850	2700		0.4593	0.3944	2700		0.4648	0.4038	2700

Discontinued

Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
7U	0.4468	0.4077	2700	9U	0.4562	0.4260	2700	5S	0.4222	0.3840	3000
	0.4515	0.4168	2700		0.4609	0.4352	2700		0.4263	0.3929	3000
	0.4576	0.4183	2700		0.4674	0.4367	2700		0.4342	0.3957	3000
	0.4526	0.4090	2700		0.4625	0.4275	2700		0.4298	0.3867	3000
7V	0.4526	0.4090	2700	9V	0.4625	0.4275	2700	5T	0.4298	0.3867	3000
	0.4576	0.4183	2700		0.4674	0.4367	2700		0.4342	0.3957	3000
	0.4636	0.4197	2700		0.4739	0.4382	2700		0.4420	0.3985	3000
	0.4585	0.4104	2700		0.4688	0.4290	2700		0.4373	0.3893	3000
7W	0.4585	0.4104	2700	9W	0.4688	0.4290	2700	6R	0.4185	0.3902	3000
	0.4636	0.4197	2700		0.4739	0.4382	2700		0.4223	0.3990	3000
	0.4697	0.4211	2700		0.4803	0.4398	2700		0.4305	0.4019	3000
	0.4644	0.4118	2700		0.4750	0.4304	2700		0.4263	0.3929	3000
7X	0.4644	0.4118	2700	9X	0.4750	0.4304	2700	6S	0.4263	0.3929	3000
	0.4697	0.4211	2700		0.4803	0.4398	2700		0.4305	0.4019	3000
	0.4758	0.4225	2700		0.4868	0.4413	2700		0.4386	0.4048	3000
	0.4703	0.4132	2700		0.4813	0.4319	2700		0.4342	0.3957	3000
8U	0.4515	0.4168	2700	4R	0.4109	0.3726	3000	6T	0.4342	0.3957	3000
	0.4562	0.4260	2700		0.4147	0.3814	3000		0.4386	0.4048	3000
	0.4625	0.4275	2700		0.4222	0.3840	3000		0.4468	0.4077	3000
	0.4576	0.4183	2700		0.4181	0.3751	3000		0.4420	0.3985	3000
8V	0.4576	0.4183	2700	4S	0.4181	0.3751	3000	7R	0.4223	0.3990	3000
	0.4625	0.4275	2700		0.4222	0.3840	3000		0.4261	0.4077	3000
	0.4688	0.4290	2700		0.4298	0.3867	3000		0.4346	0.4108	3000
	0.4636	0.4197	2700		0.4254	0.3776	3000		0.4305	0.4019	3000
8W	0.4636	0.4197	2700	4T	0.4254	0.3776	3000	7S	0.4305	0.4019	3000
	0.4688	0.4290	2700		0.4298	0.3867	3000		0.4346	0.4108	3000
	0.4750	0.4304	2700		0.4373	0.3893	3000		0.4430	0.4138	3000
	0.4697	0.4211	2700		0.4326	0.3801	3000		0.4386	0.4048	3000
8X	0.4697	0.4211	2700	5R	0.4147	0.3814	3000	7T	0.4386	0.4048	3000
	0.4750	0.4304	2700		0.4185	0.3902	3000		0.4430	0.4138	3000
	0.4813	0.4319	2700		0.4263	0.3929	3000		0.4515	0.4168	3000
	0.4758	0.4225	2700		0.4222	0.3840	3000		0.4468	0.4077	3000

Discontinued

Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
8R	0.4261	0.4077	3000	4Q	0.4027	0.3687	3500	7P	0.4036	0.3898	3500
	0.4299	0.4165	3000		0.4061	0.3773	3500		0.4067	0.3982	3500
	0.4387	0.4197	3000		0.4147	0.3814	3500		0.4164	0.4029	3500
	0.4346	0.4108	3000		0.4109	0.3726	3500		0.4130	0.3944	3500
8S	0.4346	0.4108	3000	5O	0.3890	0.3690	3500	7Q	0.4130	0.3944	3500
	0.4387	0.4197	3000		0.3916	0.3772	3500		0.4164	0.4029	3500
	0.4474	0.4228	3000		0.4006	0.3815	3500		0.4261	0.4077	3500
	0.4430	0.4138	3000		0.3975	0.3731	3500		0.4223	0.3990	3500
8T	0.4430	0.4138	3000	5P	0.3975	0.3731	3500	8O	0.3970	0.3934	3500
	0.4474	0.4228	3000		0.4006	0.3815	3500		0.3997	0.4015	3500
	0.4562	0.4260	3000		0.4095	0.3858	3500		0.4097	0.4065	3500
	0.4515	0.4168	3000		0.4061	0.3773	3500		0.4067	0.3982	3500
9R	0.4299	0.4165	3000	5Q	0.4061	0.3773	3500	8P	0.4067	0.3982	3500
	0.4337	0.4253	3000		0.4095	0.3858	3500		0.4097	0.4065	3500
	0.4428	0.4286	3000		0.4185	0.3902	3500		0.4198	0.4115	3500
	0.4387	0.4197	3000		0.4147	0.3814	3500		0.4164	0.4029	3500
9S	0.4387	0.4197	3000	6O	0.3916	0.3772	3500	8Q	0.4164	0.4029	3500
	0.4428	0.4286	3000		0.3943	0.3853	3500		0.4198	0.4115	3500
	0.4519	0.4319	3000		0.4036	0.3898	3500		0.4299	0.4165	3500
	0.4474	0.4228	3000		0.4006	0.3815	3500		0.4261	0.4077	3500
9T	0.4474	0.4228	3000	6P	0.4006	0.3815	3500	9O	0.3997	0.4015	3500
	0.4519	0.4319	3000		0.4036	0.3898	3500		0.4023	0.4097	3500
	0.4609	0.4352	3000		0.4130	0.3944	3500		0.4128	0.4148	3500
	0.4562	0.4260	3000		0.4095	0.3858	3500		0.4097	0.4065	3500
4O	0.3863	0.3609	3500	6Q	0.4095	0.3858	3500	9P	0.4097	0.4065	3500
	0.3890	0.3690	3500		0.4130	0.3944	3500		0.4128	0.4148	3500
	0.3975	0.3731	3500		0.4223	0.3990	3500		0.4232	0.4201	3500
	0.3945	0.3648	3500		0.4185	0.3902	3500		0.4198	0.4115	3500
4P	0.3945	0.3648	3500	7O	0.3943	0.3853	3500	9Q	0.4198	0.4115	3500
	0.3975	0.3731	3500		0.3970	0.3934	3500		0.4232	0.4201	3500
	0.4061	0.3773	3500		0.4067	0.3982	3500		0.4337	0.4253	3500
	0.4027	0.3687	3500		0.4036	0.3898	3500		0.4299	0.4165	3500

Discontinued



Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
4L	0.3648	0.3479	4000	6N	0.3853	0.3776	4000	4K	0.3574	0.3427	4500
	0.3670	0.3578	4000		0.3885	0.3882	4000		0.3591	0.3522	4500
	0.3746	0.3624	4000		0.3970	0.3935	4000		0.3670	0.3578	4500
	0.3719	0.3522	4000		0.3934	0.3825	4000		0.3648	0.3479	4500
4M	0.3719	0.3522	4000	7L	0.3714	0.3775	4000	5J	0.3512	0.3465	4500
	0.3746	0.3624	4000		0.3736	0.3874	4000		0.3524	0.3555	4500
	0.3822	0.3670	4000		0.3826	0.3931	4000		0.3608	0.3616	4500
	0.3791	0.3564	4000		0.3799	0.3828	4000		0.3591	0.3522	4500
4N	0.3791	0.3564	4000	7M	0.3799	0.3828	4000	5K	0.3591	0.3522	4500
	0.3822	0.3670	4000		0.3826	0.3931	4000		0.3608	0.3616	4500
	0.3898	0.3716	4000		0.3916	0.3987	4000		0.3692	0.3677	4500
	0.3862	0.3607	4000		0.3885	0.3882	4000		0.3670	0.3578	4500
5L	0.3670	0.3578	4000	7N	0.3885	0.3882	4000	6J	0.3524	0.3555	4500
	0.3692	0.3677	4000		0.3916	0.3987	4000		0.3536	0.3646	4500
	0.3773	0.3726	4000		0.4006	0.4044	4000		0.3625	0.3711	4500
	0.3746	0.3624	4000		0.3970	0.3935	4000		0.3608	0.3616	4500
5M	0.3746	0.3624	4000	8L	0.3736	0.3874	4000	6K	0.3608	0.3616	4500
	0.3773	0.3726	4000		0.3758	0.3973	4000		0.3625	0.3711	4500
	0.3853	0.3776	4000		0.3853	0.4033	4000		0.3714	0.3775	4500
	0.3822	0.3670	4000		0.3826	0.3931	4000		0.3692	0.3677	4500
5N	0.3822	0.3670	4000	8M	0.3826	0.3931	4000	7J	0.3536	0.3646	4500
	0.3853	0.3776	4000		0.3853	0.4033	4000		0.3548	0.3736	4500
	0.3934	0.3825	4000		0.3947	0.4093	4000		0.3642	0.3805	4500
	0.3898	0.3716	4000		0.3916	0.3987	4000		0.3625	0.3711	4500
6L	0.3692	0.3677	4000	8N	0.3916	0.3987	4000	7K	0.3625	0.3711	4500
	0.3714	0.3775	4000		0.3947	0.4093	4000		0.3642	0.3805	4500
	0.3799	0.3828	4000		0.4042	0.4153	4000		0.3736	0.3874	4500
	0.3773	0.3726	4000		0.4006	0.4044	4000		0.3714	0.3775	4500
6M	0.3773	0.3726	4000	4J	0.3500	0.3375	4500	8J	0.3548	0.3736	4500
	0.3799	0.3828	4000		0.3512	0.3465	4500		0.3560	0.3826	4500
	0.3885	0.3882	4000		0.3591	0.3522	4500		0.3659	0.3900	4500
	0.3853	0.3776	4000		0.3574	0.3427	4500		0.3642	0.3805	4500

Discontinued

## LCW W5SM

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Group	Cx	Cy	CCT
8K	0.3642	0.3805	4500
	0.3659	0.3900	4500
	0.3758	0.3973	4500
	0.3736	0.3874	4500

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Discontinued

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## Group Name on Label

**Example: JX-4J**

Brightness

Color Chromaticity

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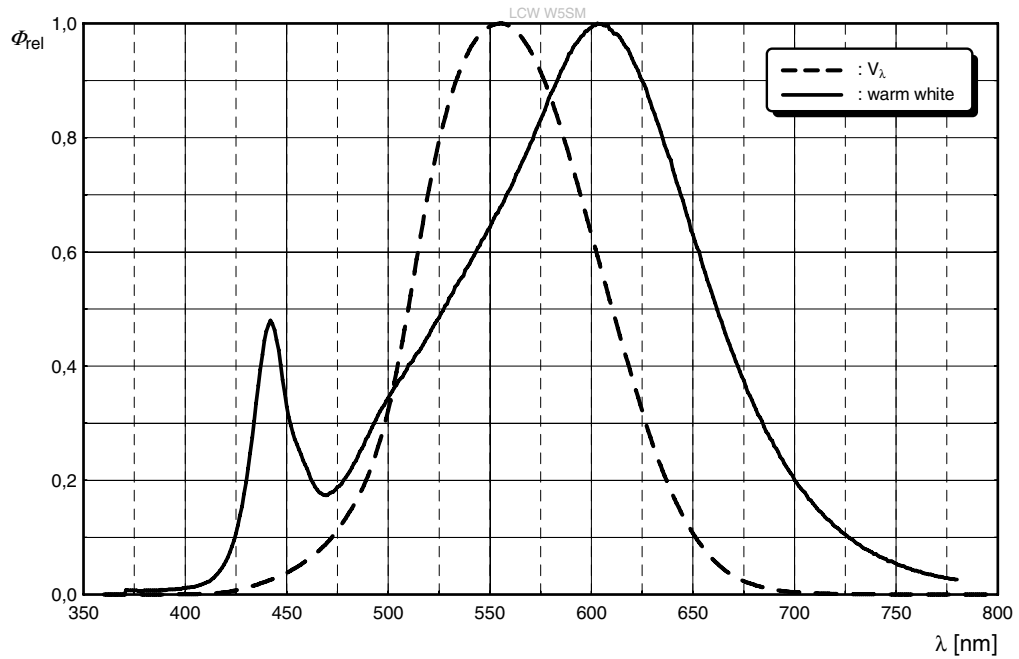
JX

4J

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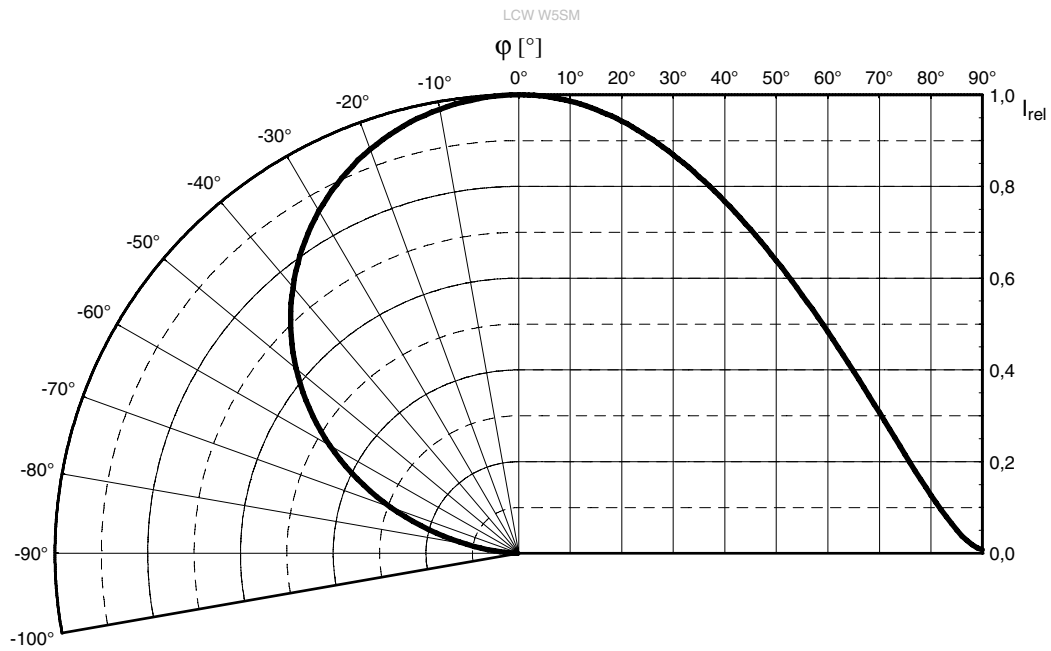
### Relative Spectral Emission <sup>6)</sup>

$I_{rel} = f(\lambda); I_F = 350 \text{ mA}; T_S = 25 \text{ }^\circ\text{C}$



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

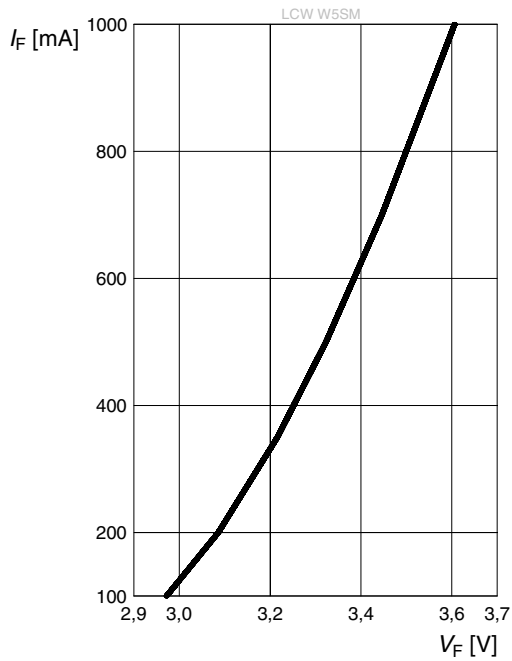
$I_{rel} = f(\phi); T_S = 25 \text{ }^\circ\text{C}$



Discontinued

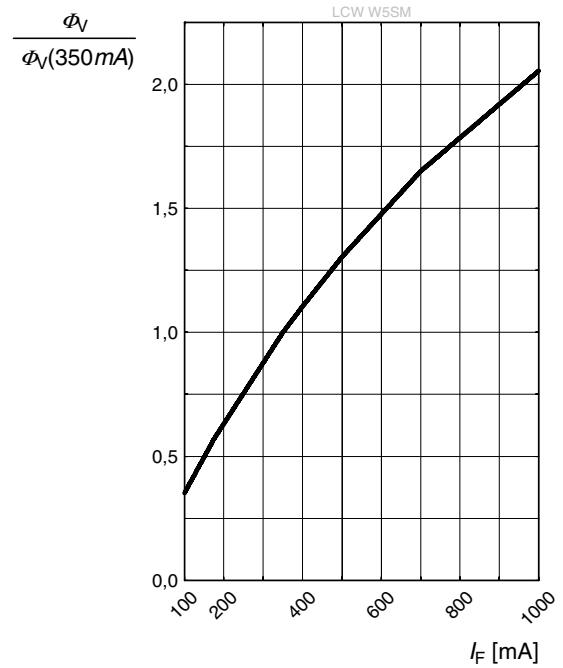
**Forward current** 6), 7)

$I_F = f(V_F); T_S = 25\text{ °C}$



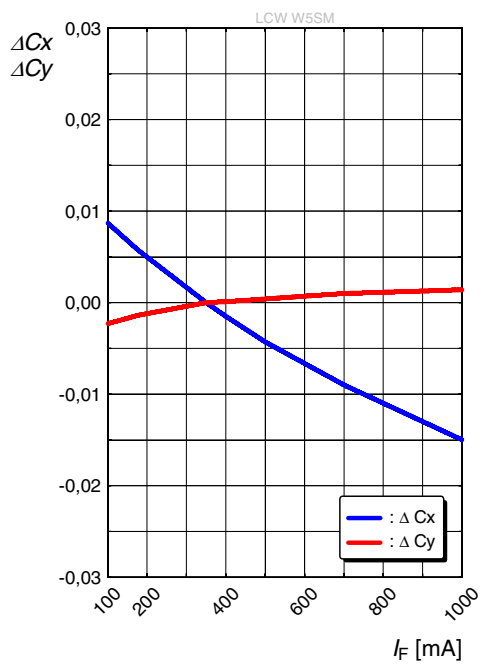
**Relative Luminous Flux** 6), 7)

$\Phi_V / \Phi_V(350\text{ mA}) = f(I_F); T_S = 25\text{ °C}$



**Chromaticity Coordinate Shift** 6)

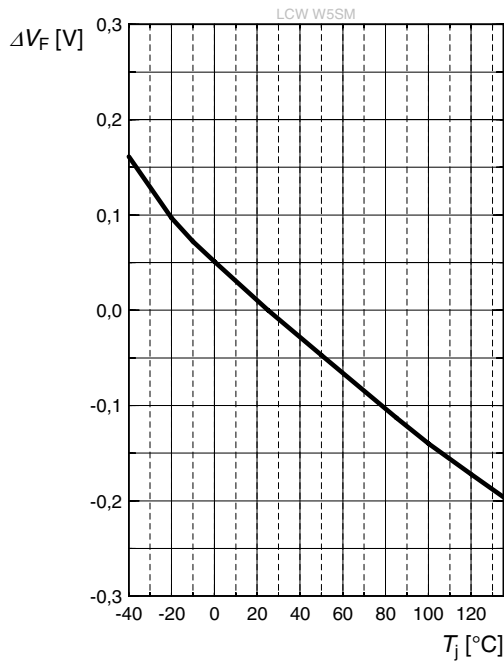
$\Delta Cx, \Delta Cy = f(I_F); T_S = 25\text{ °C}$



Discontinued

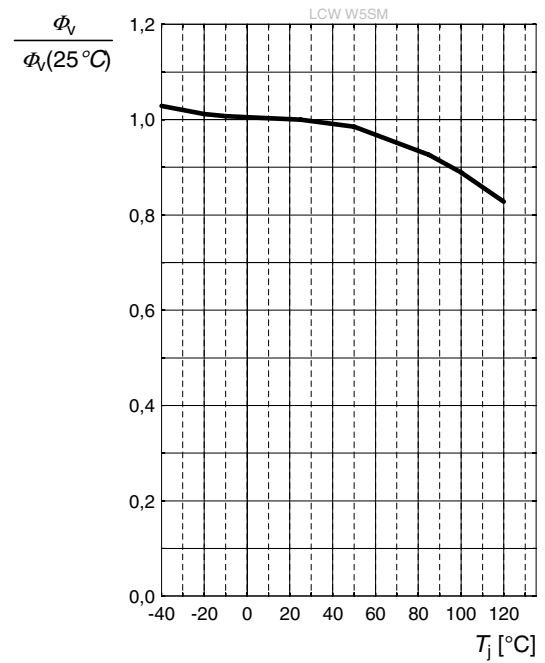
### Forward Voltage <sup>6)</sup>

$$\Delta V_F = V_F - V_F(25\text{ °C}) = f(T_j); I_F = 350\text{ mA}$$



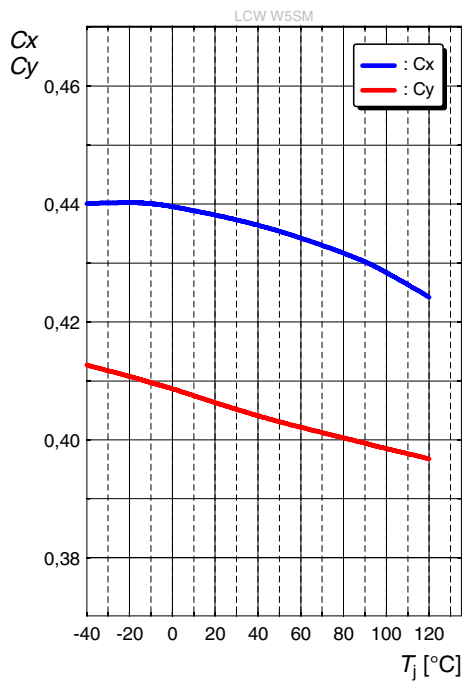
### Relative Luminous Flux <sup>6)</sup>

$$\Phi_V / \Phi_V(25\text{ °C}) = f(T_j); I_F = 350\text{ mA}$$



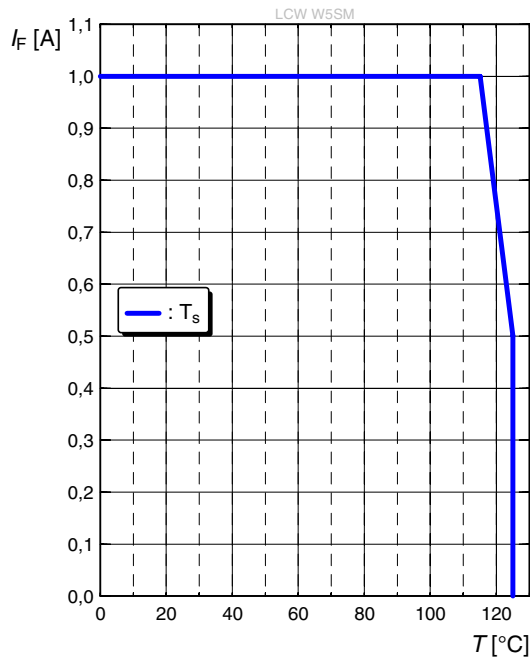
### Chromaticity Coordinate Shift <sup>6)</sup>

$$C_x, C_y = f(T_j); I_F = 350\text{ mA}$$



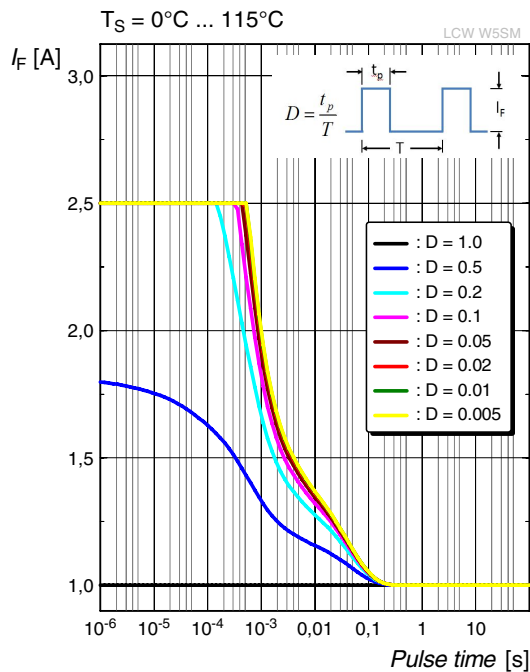
### Max. Permissible Forward Current

$$I_F = f(T)$$



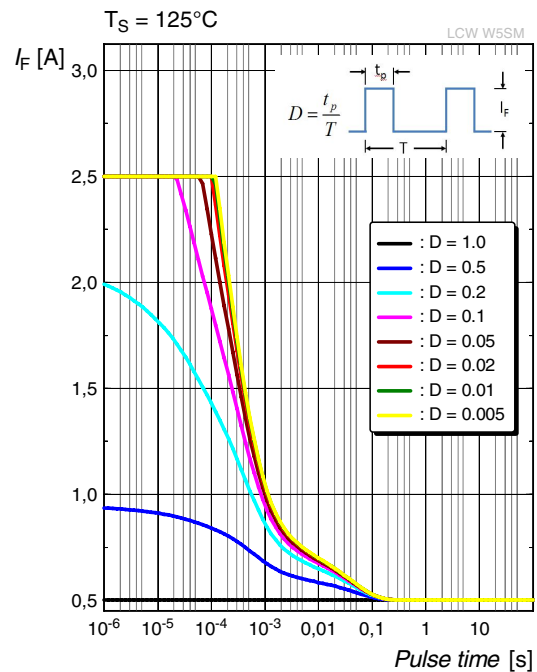
### Permissible Pulse Handling Capability

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



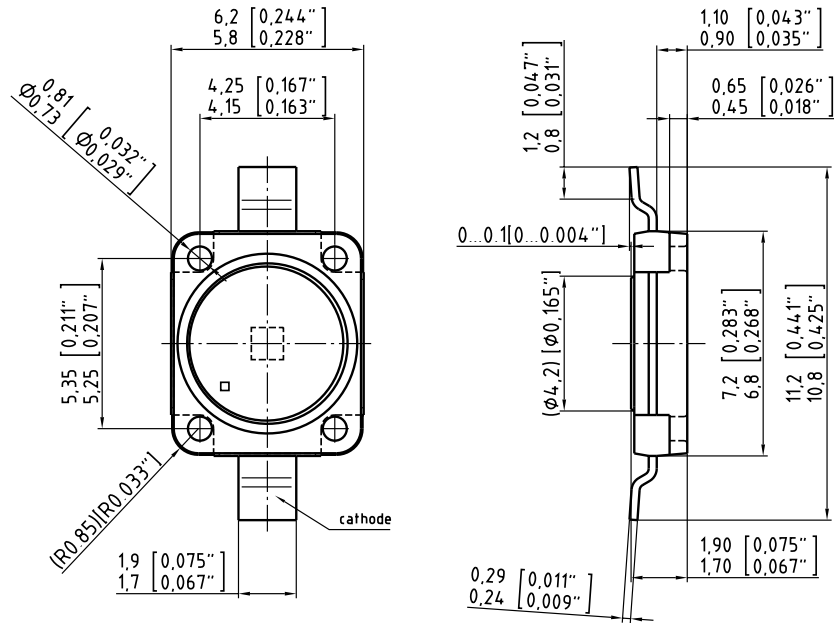
### Permissible Pulse Handling Capability

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



Discontinued

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



C63062-A3904-A6..-09

**Further Information**

**Approximate Weight:** 218.0 mg

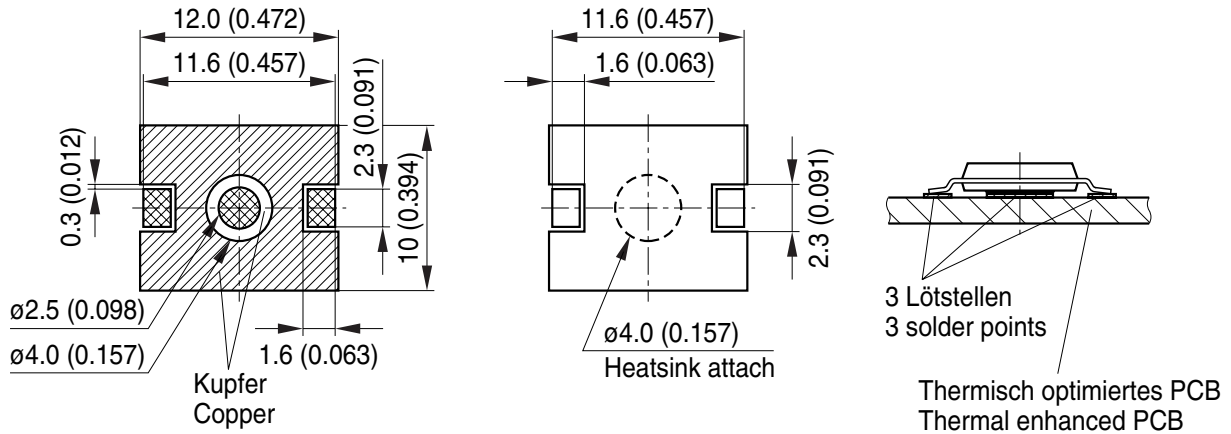
**Package marking:** Cathode




**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.



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



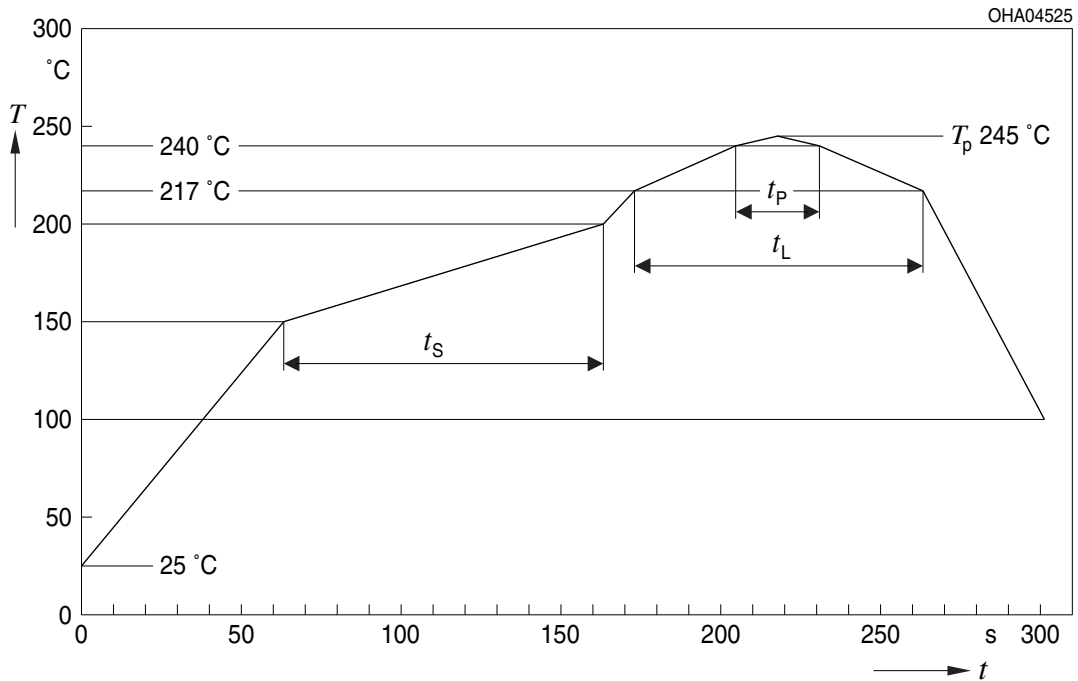
-  Lötstopplack  
Solder resist
-  Lötpasten Schablone  
Solder paste stencil
-  Bare Copper  
Freies Kupfer

OHAY0681

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

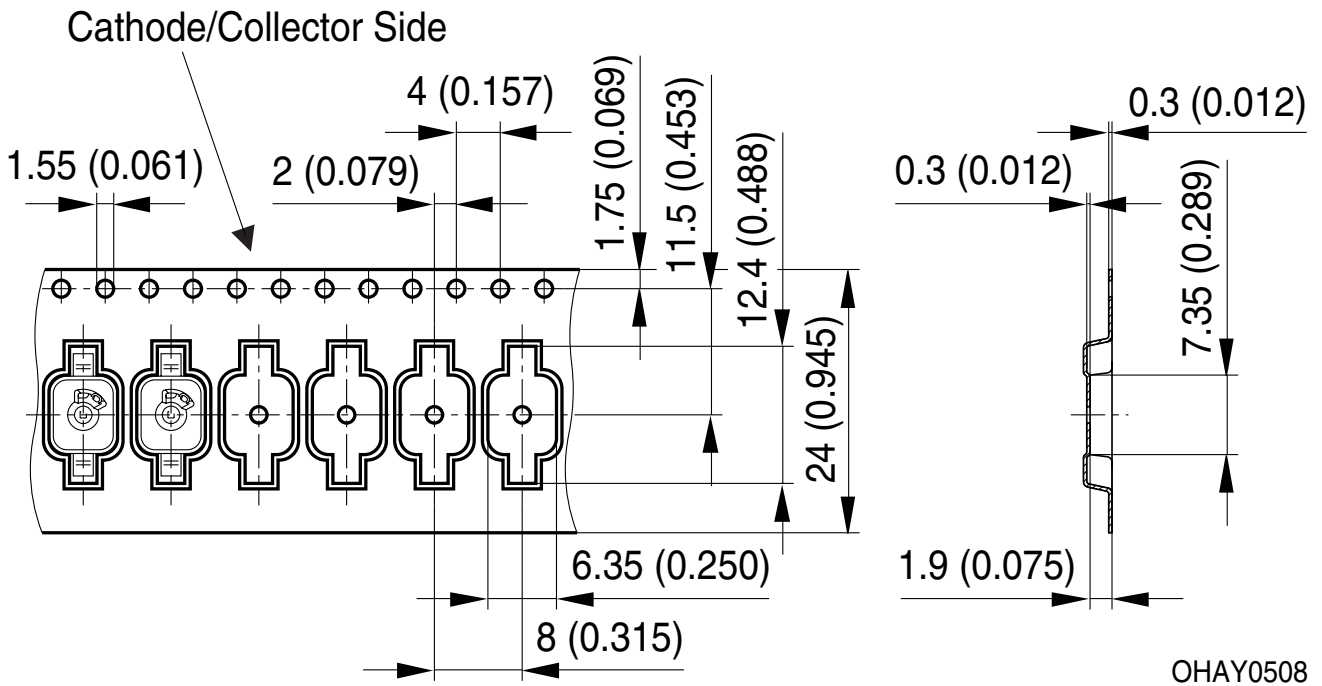


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$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

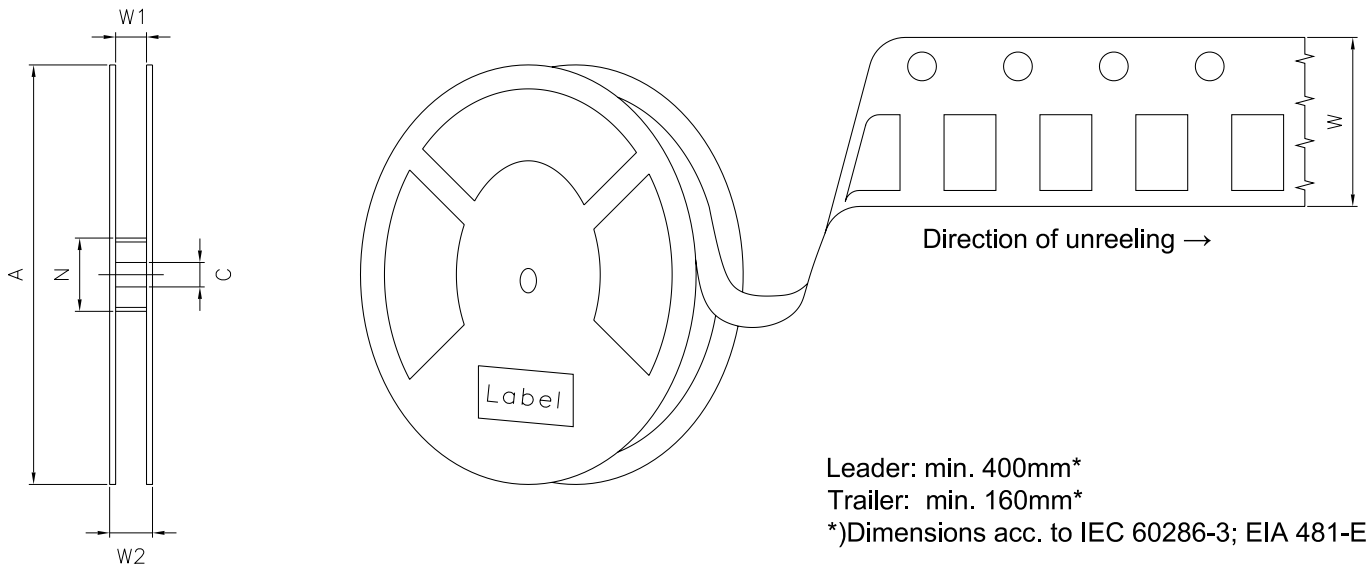
Discontinued

**Taping** <sup>8)</sup>



Discontinued

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



**Reel Dimensions**

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2 max</sub>	Pieces per PU
180 mm	24 + 0.3 / - 0.1 mm	60/100 mm	24.4 + 2 mm	30.4 mm	800

### Barcode-Product-Label (BPL)

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

RoHS Compliant

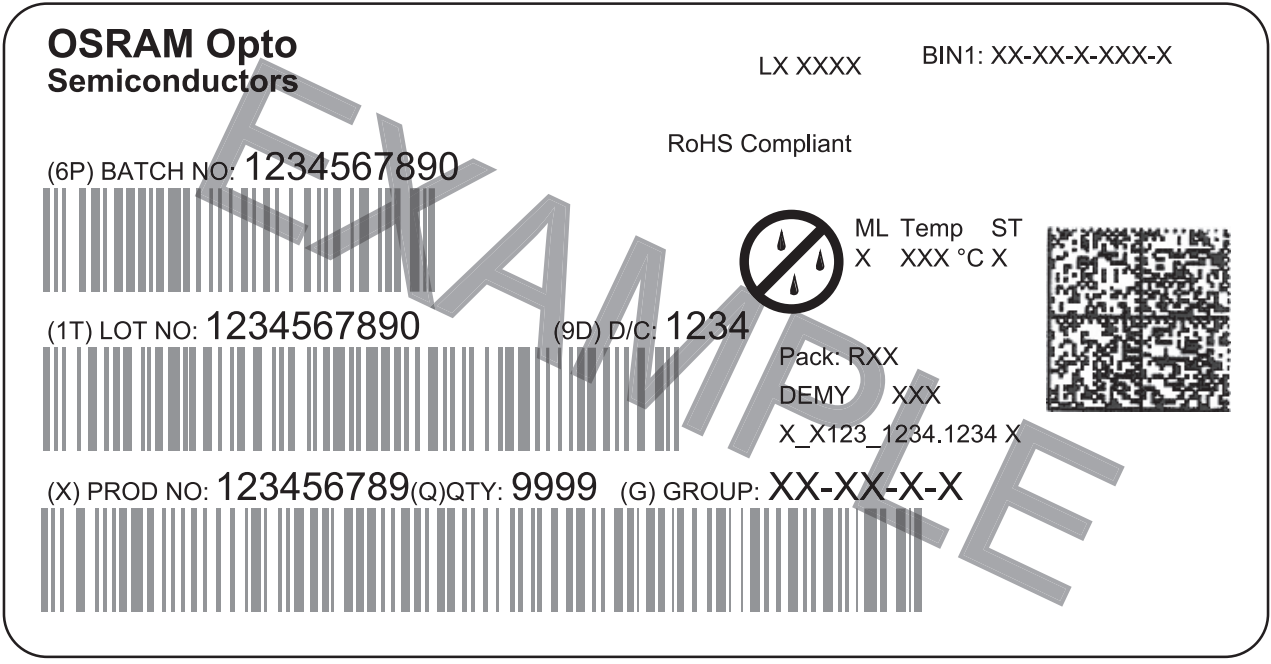
(6P) BATCH NO: 1234567890

(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

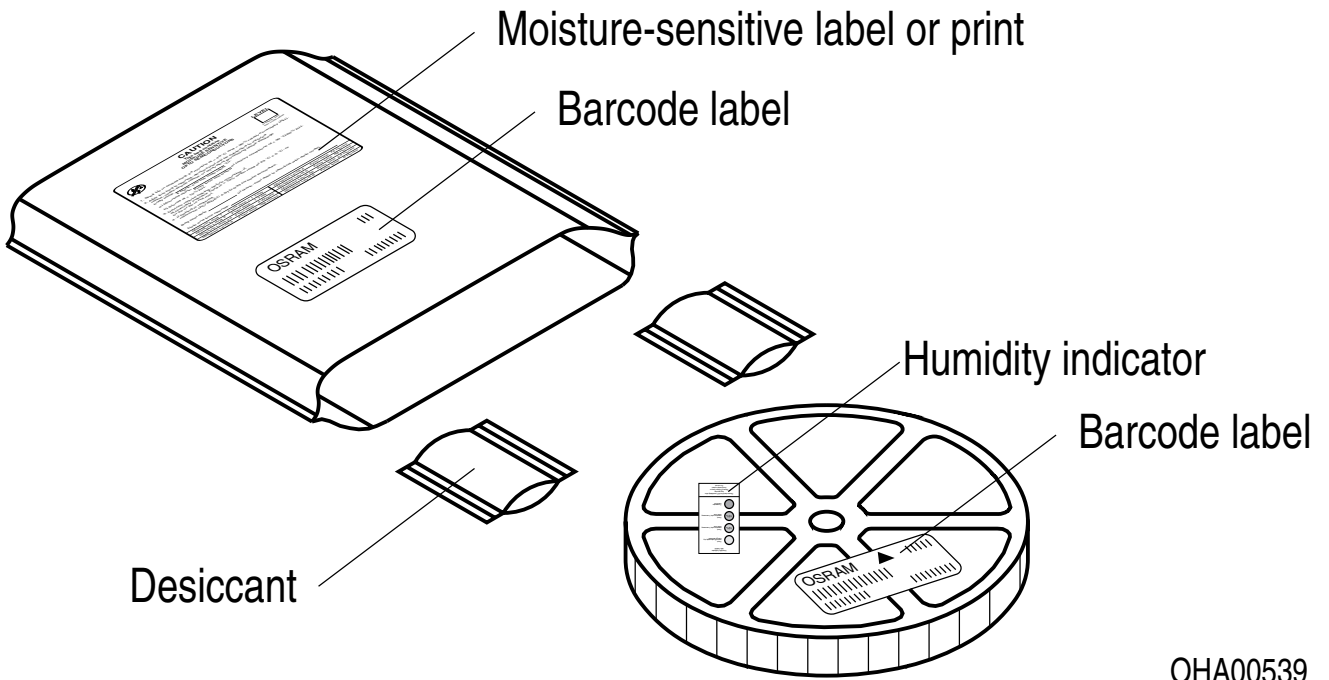
Pack: RXX  
DEMY XXX  
X\_X123\_1234.1234 X



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 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>8)</sup>

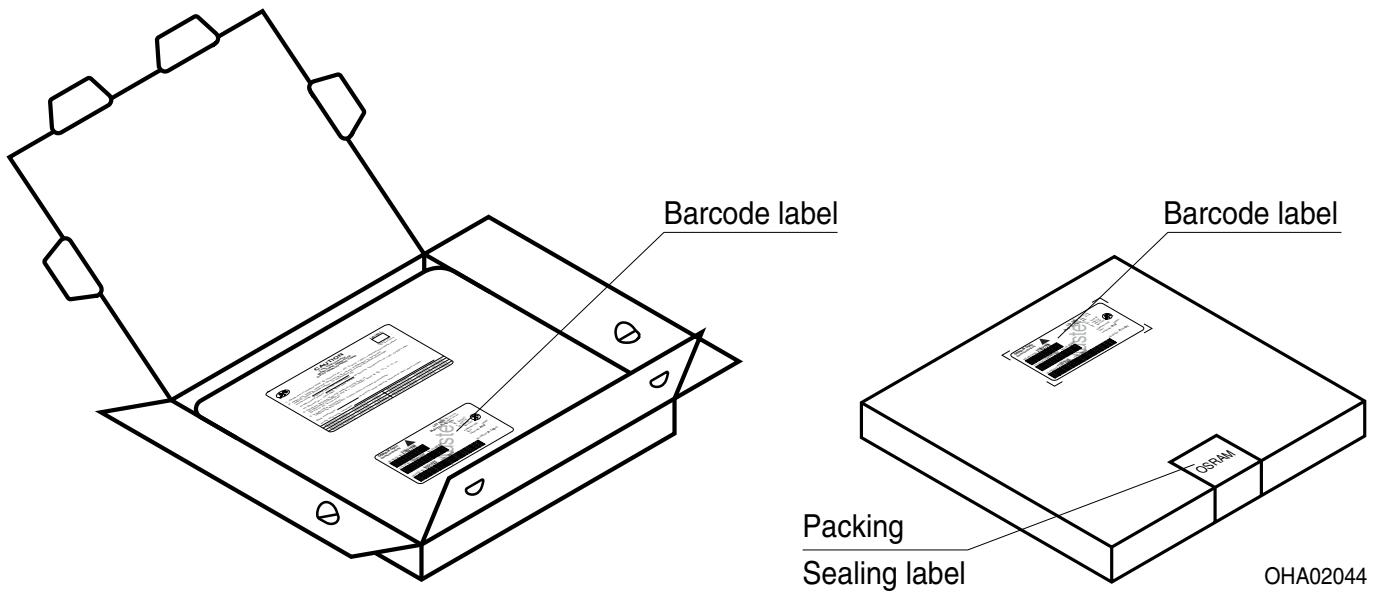


OHA00539

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

Discontinued

## Schematic Transportation Box <sup>8)</sup>



## Dimensions of Transportation Box

Width	Length	Height
195 ± 5 mm	195 ± 5 mm	42 ± 5 mm

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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 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.



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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 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:**  $R_{th\ max}$  is based on statistic values ( $6\sigma$ ).
- 6) **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.
- 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
1.5	2019-07-15	Discontinued

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