

# LCW MVSG.EC

## Mini TOPLED®

Small size high-flux LED for slim designs



### Applications

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

### Features:

- Package: white SMT package, colored diffused silicone resin
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.38, Cy = 0.38 acc. to CIE 1931 (● warm white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- Color temperature: 2700K - 6500K
- CRI: 82
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

## Ordering Information

Type	Color temperature	Luminous Intensity <sup>1)</sup> $I_F = 20 \text{ mA}$ $I_v$	Ordering Code
LCW MVSG.EC-AZBZ-4U9X-1	2700 K	1500 ... 2800 mcd	Q65111A5621
LCW MVSG.EC-AZBZ-4R9T-1	3000 K	1500 ... 2800 mcd	Q65111A4583
LCW MVSG.EC-AZBZ-4O9Q-1	3500 K	1500 ... 2800 mcd	Q65112A1297
LCW MVSG.EC-BXCX-4L8N-1	4000 K	1800 ... 3300 mcd	Q65111A5622
LCW MVSG.EC-BXCX-4J8K-1	4500 K	1800 ... 3300 mcd	Q65111A5623
LCW MVSG.EC-BXCX-4H8I-1	5000 K	1800 ... 3300 mcd	Q65111A4584
LCW MVSG.EC-BXCX-4F8G-1	5700 K	1800 ... 3300 mcd	Q65111A5624
LCW MVSG.EC-BXCX-4C8E-1	6500 K	1800 ... 3300 mcd	Q65111A5625

## 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.	3 mA
		max.	30 mA
Surge Current $t \leq 10\ \mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	300 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

## Characteristics

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

Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	$C_x$	typ.	0.38
	$C_y$	typ.	0.38
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 20 \text{ mA}$	$V_F$	min.	2.70 V
		typ.	3.05 V
		max.	3.40 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.	82
Real thermal resistance junction/ambient <sup>5)6)</sup>	$R_{\text{thJA real}}$	max.	360 K / W
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{\text{thJS real}}$	max.	130 K / W

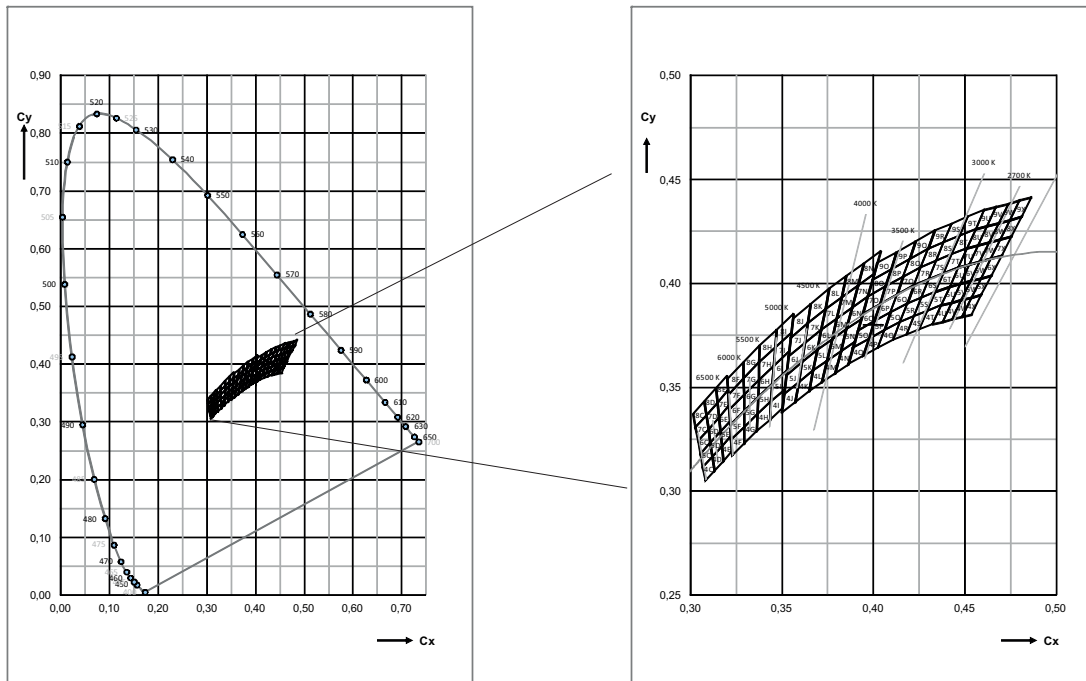
## Brightness Groups

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. $\Phi_v$
AZ	1500 mcd	1800 mcd	5000 mlm
BX	1800 mcd	2100 mcd	5900 mlm
BY	2100 mcd	2400 mcd	6800 mlm
BZ	2400 mcd	2800 mcd	7800 mlm
CX	2800 mcd	3300 mcd	9200 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. $V_F$
Z4	2.70 V	2.90 V
44	2.90 V	3.10 V
86	3.10 V	3.40 V

### 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

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

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



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

Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
8K	0.3642	0.3805	4500	7I	0.3456	0.3601	5000	6G	0.3293	0.3384	5700
	0.3659	0.3900	4500		0.3464	0.3688	5000		0.3292	0.3461	5700
	0.3758	0.3973	4500		0.3551	0.3760	5000		0.3373	0.3534	5700
	0.3736	0.3874	4500		0.3539	0.3669	5000		0.3369	0.3451	5700
4H	0.3363	0.3287	5000	8H	0.3376	0.3616	5000	7F	0.3212	0.3389	5700
	0.3366	0.3369	5000		0.3379	0.3698	5000		0.3206	0.3462	5700
	0.3441	0.3428	5000		0.3471	0.3775	5000		0.3292	0.3539	5700
	0.3433	0.3341	5000		0.3464	0.3688	5000		0.3292	0.3461	5700
4I	0.3433	0.3341	5000	8I	0.3464	0.3688	5000	7G	0.3292	0.3461	5700
	0.3441	0.3428	5000		0.3471	0.3775	5000		0.3292	0.3539	5700
	0.3515	0.3487	5000		0.3563	0.3851	5000		0.3376	0.3616	5700
	0.3503	0.3396	5000		0.3551	0.3760	5000		0.3373	0.3534	5700
5H	0.3366	0.3369	5000	4F	0.3228	0.3170	5700	8F	0.3206	0.3462	5700
	0.3369	0.3451	5000		0.3222	0.3243	5700		0.3201	0.3534	5700
	0.3448	0.3515	5000		0.3294	0.3306	5700		0.3291	0.3617	5700
	0.3441	0.3428	5000		0.3295	0.3228	5700		0.3292	0.3539	5700
5I	0.3441	0.3428	5000	4G	0.3295	0.3228	5700	8G	0.3292	0.3539	5700
	0.3448	0.3515	5000		0.3294	0.3306	5700		0.3291	0.3617	5700
	0.3527	0.3578	5000		0.3366	0.3369	5700		0.3379	0.3698	5700
	0.3515	0.3487	5000		0.3363	0.3287	5700		0.3376	0.3616	5700
6H	0.3369	0.3451	5000	5F	0.3222	0.3243	5700	4C	0.3081	0.3049	6500
	0.3373	0.3534	5000		0.3217	0.3316	5700		0.3068	0.3113	6500
	0.3456	0.3601	5000		0.3293	0.3384	5700		0.3119	0.3162	6500
	0.3448	0.3515	5000		0.3294	0.3306	5700		0.3130	0.3095	6500
6I	0.3448	0.3515	5000	5G	0.3294	0.3306	5700	4D	0.3130	0.3095	6500
	0.3456	0.3601	5000		0.3293	0.3384	5700		0.3119	0.3162	6500
	0.3539	0.3669	5000		0.3369	0.3451	5700		0.3170	0.3212	6500
	0.3527	0.3578	5000		0.3366	0.3369	5700		0.3178	0.3142	6500
7H	0.3373	0.3534	5000	6F	0.3217	0.3316	5700	4E	0.3178	0.3142	6500
	0.3376	0.3616	5000		0.3212	0.3389	5700		0.3170	0.3212	6500
	0.3464	0.3688	5000		0.3292	0.3461	5700		0.3221	0.3262	6500
	0.3456	0.3601	5000		0.3293	0.3384	5700		0.3226	0.3189	6500

Group	Cx	Cy	CCT	Group	Cx	Cy	CCT	Group	Cx	Cy	CCT
5C	0.3068	0.3113	6500	6D	0.3108	0.3229	6500	7E	0.3154	0.3352	6500
	0.3055	0.3177	6500		0.3098	0.3296	6500		0.3146	0.3422	6500
	0.3108	0.3229	6500		0.3154	0.3352	6500		0.3205	0.3481	6500
	0.3119	0.3162	6500		0.3162	0.3282	6500		0.3210	0.3408	6500
5D	0.3119	0.3162	6500	6E	0.3162	0.3282	6500	8C	0.3028	0.3304	6500
	0.3108	0.3229	6500		0.3154	0.3352	6500		0.3015	0.3368	6500
	0.3162	0.3282	6500		0.3210	0.3408	6500		0.3076	0.3430	6500
	0.3170	0.3212	6500		0.3216	0.3334	6500		0.3087	0.3363	6500
5E	0.3170	0.3212	6500	7C	0.3041	0.3240	6500	8D	0.3087	0.3363	6500
	0.3162	0.3282	6500		0.3028	0.3304	6500		0.3076	0.3430	6500
	0.3216	0.3334	6500		0.3087	0.3363	6500		0.3138	0.3492	6500
	0.3221	0.3262	6500		0.3098	0.3296	6500		0.3146	0.3422	6500
6C	0.3055	0.3177	6500	7D	0.3098	0.3296	6500	8E	0.3146	0.3422	6500
	0.3041	0.3240	6500		0.3087	0.3363	6500		0.3138	0.3492	6500
	0.3098	0.3296	6500		0.3146	0.3422	6500		0.3200	0.3554	6500
	0.3108	0.3229	6500		0.3154	0.3352	6500		0.3205	0.3481	6500

---

## Group Name on Label

**Example: AZ-4C-44**

Brightness

Color Chromaticity

Forward Voltage

---

AZ

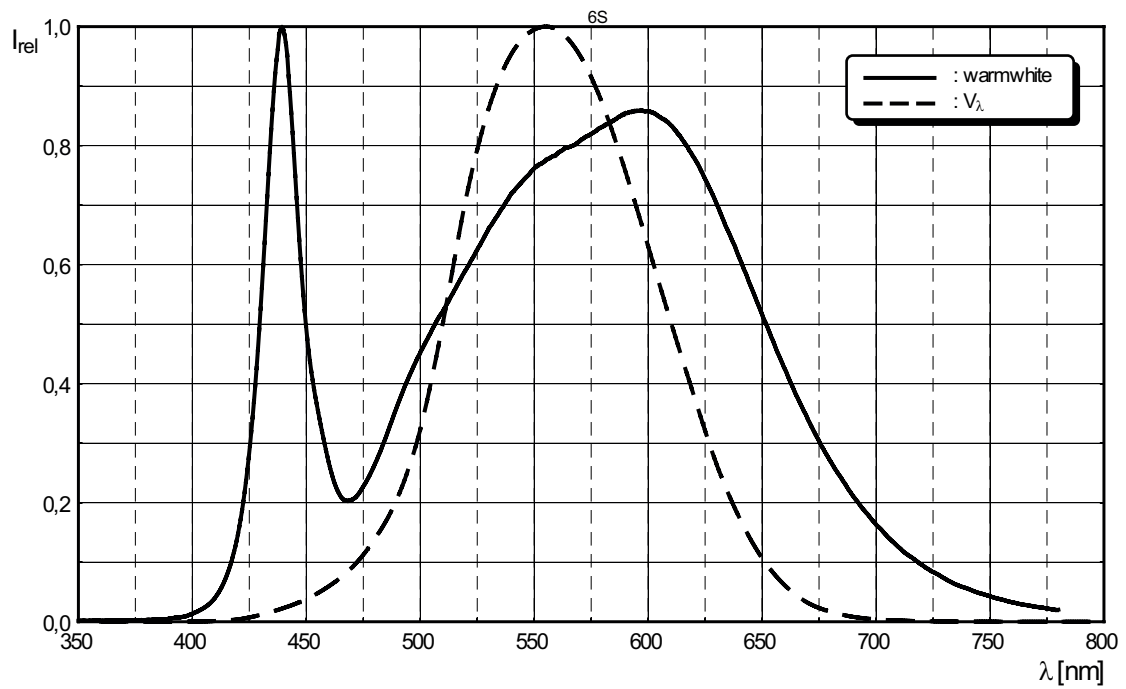
4C

44

---

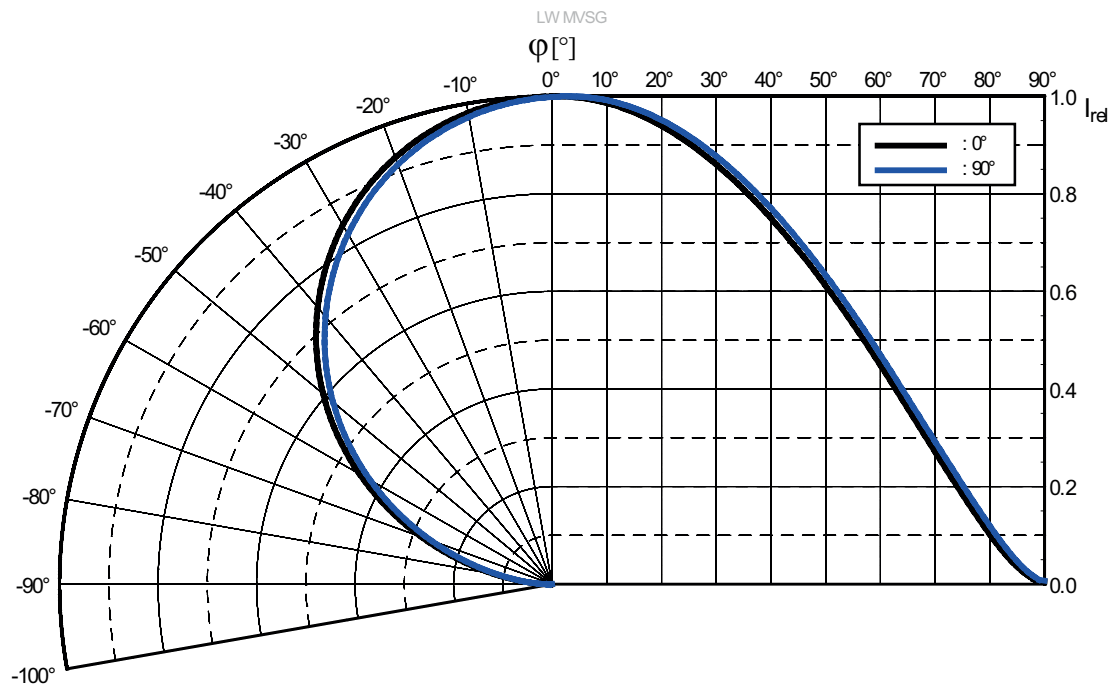
### Relative Spectral Emission <sup>7)</sup>

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



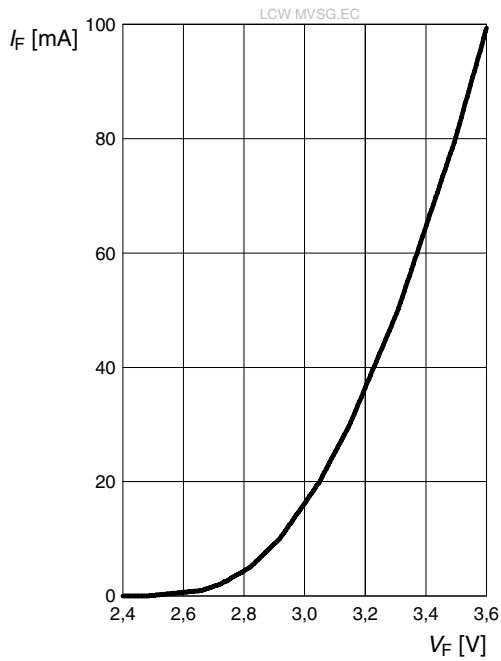
### Radiation Characteristics <sup>7)</sup>

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



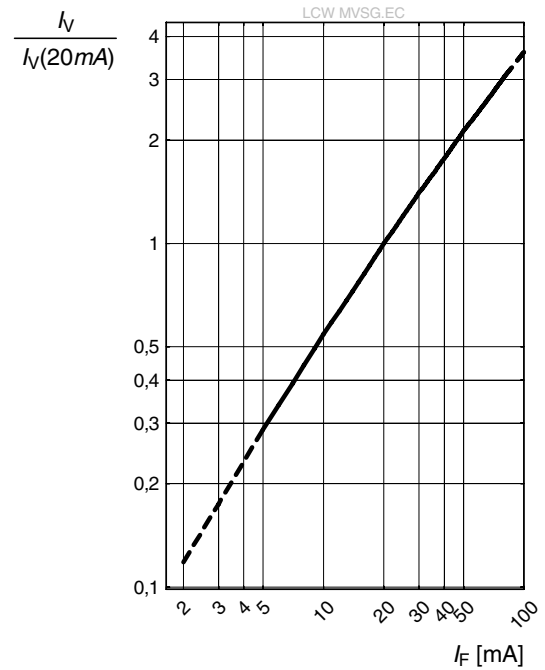
**Forward current** <sup>7)</sup>

$I_F = f(V_F); T_S = 25\text{ °C}$



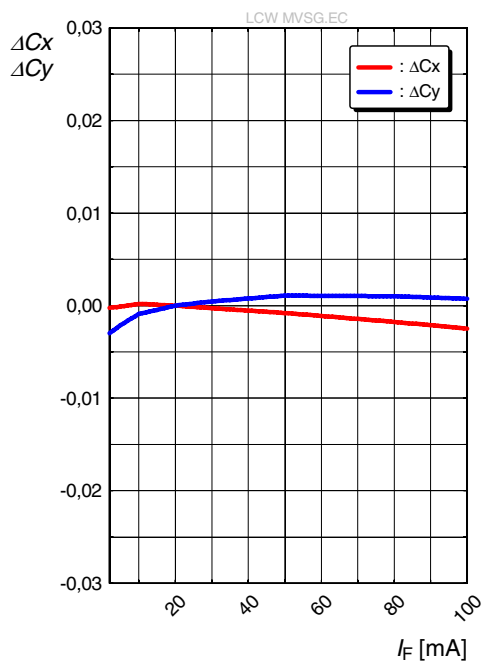
**Relative Luminous Intensity** <sup>7), 8)</sup>

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



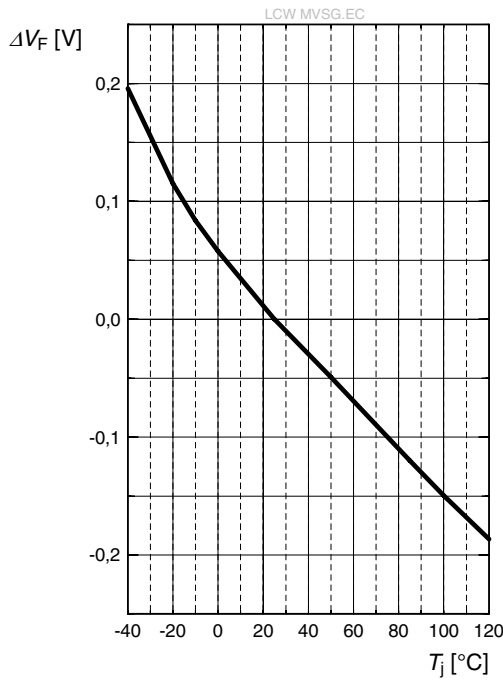
**Chromaticity Coordinate Shift** <sup>7)</sup>

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



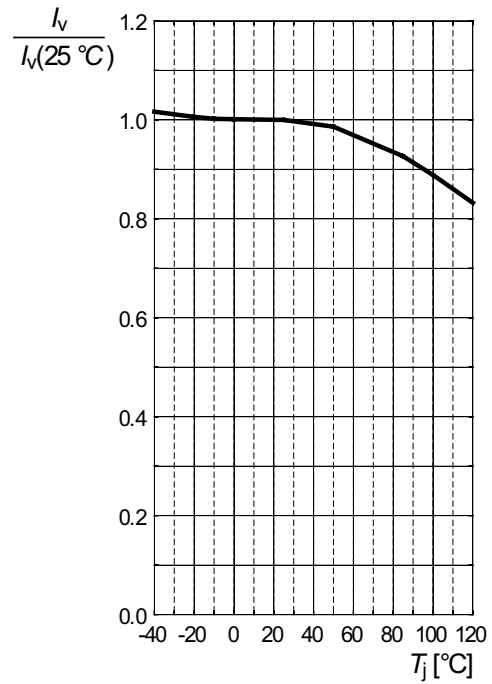
### Forward Voltage <sup>7)</sup>

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



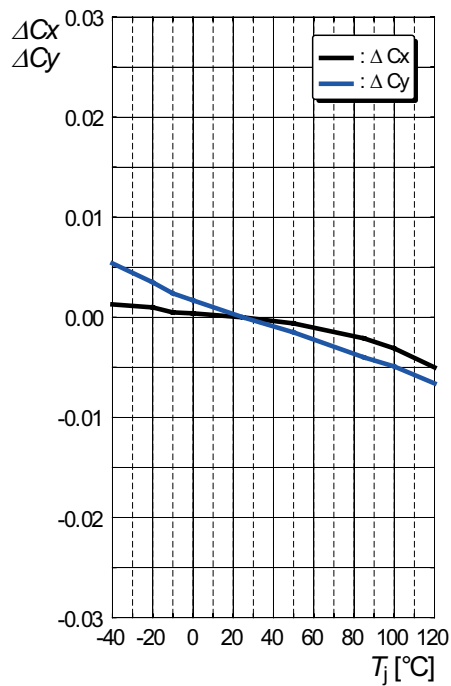
### Relative Luminous Intensity <sup>7)</sup>

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



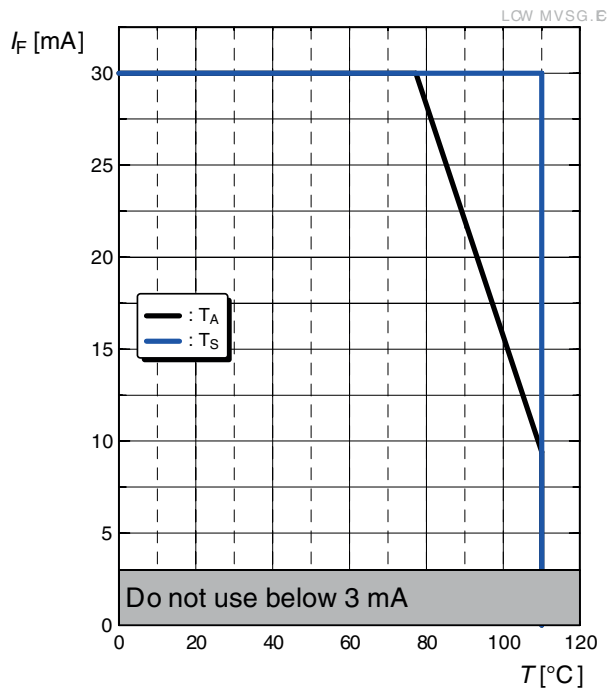
### Chromaticity Coordinate Shift <sup>7)</sup>

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



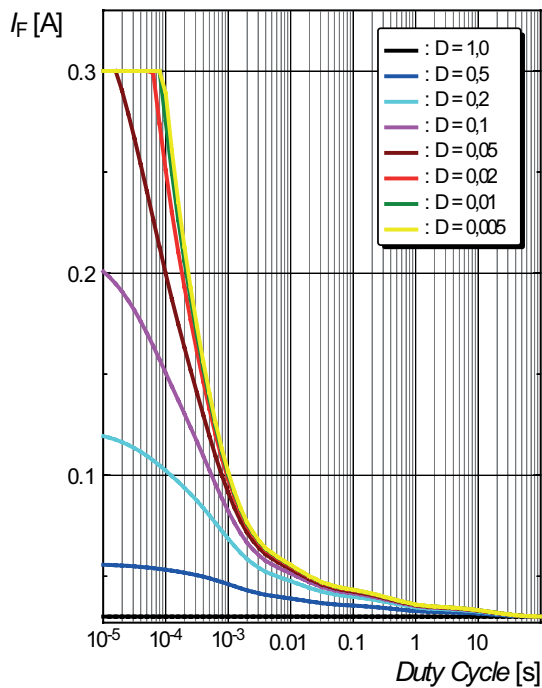
## Max. Permissible Forward Current

$$I_F = f(T)$$



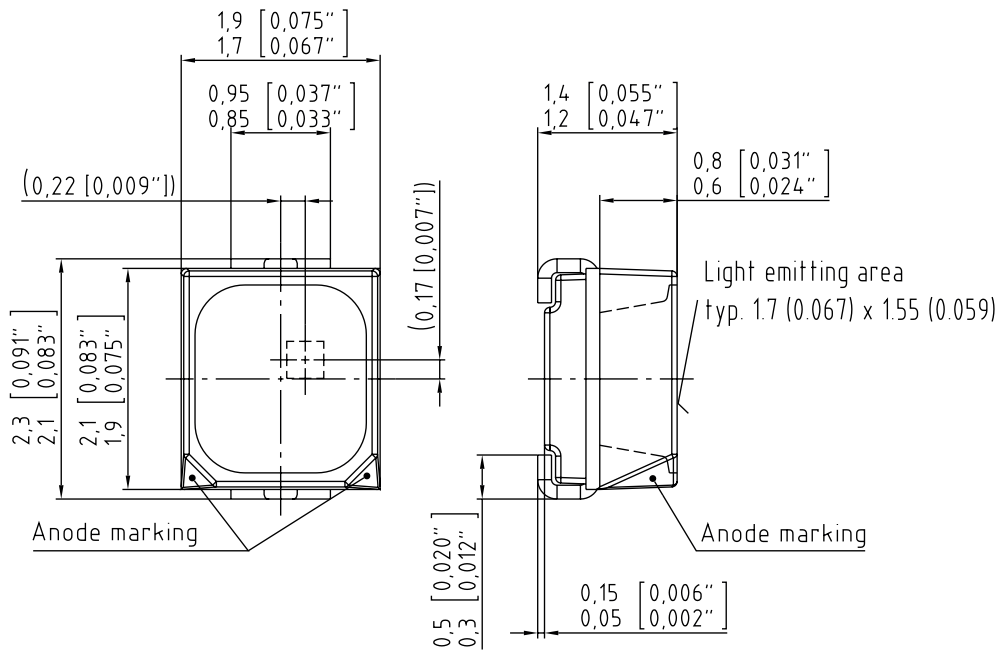
## Permissible Pulse Handling Capability

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





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



C63062-A4112-A10...-03

## Further Information:

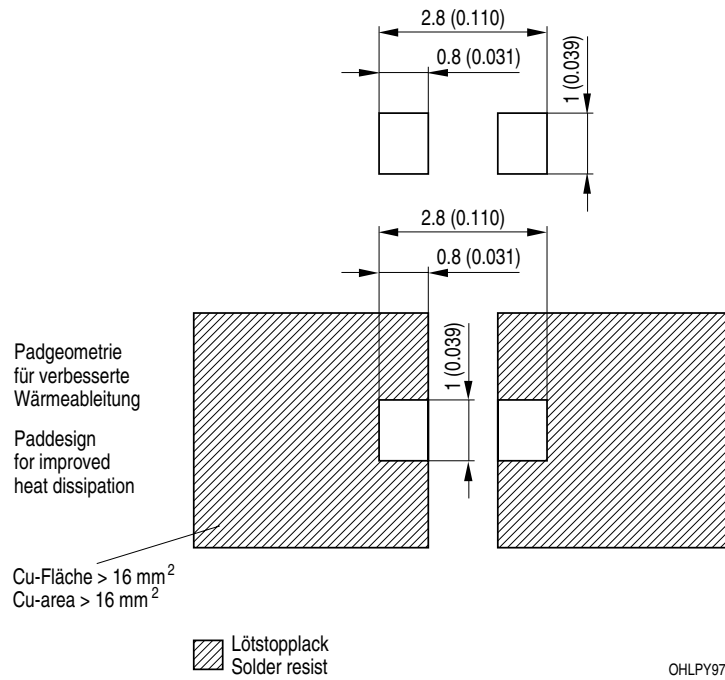
**Approximate Weight:** 8.5 mg

**Package marking:** Anode

**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.

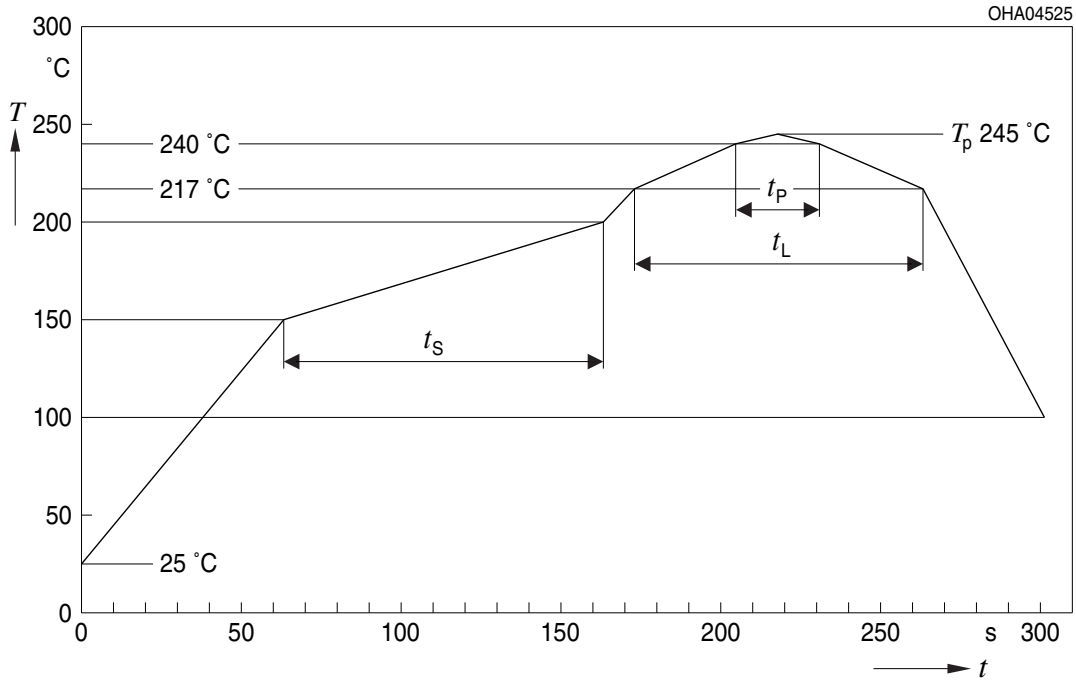
## Recommended Solder Pad <sup>9)</sup>



For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere.

## Reflow Soldering Profile

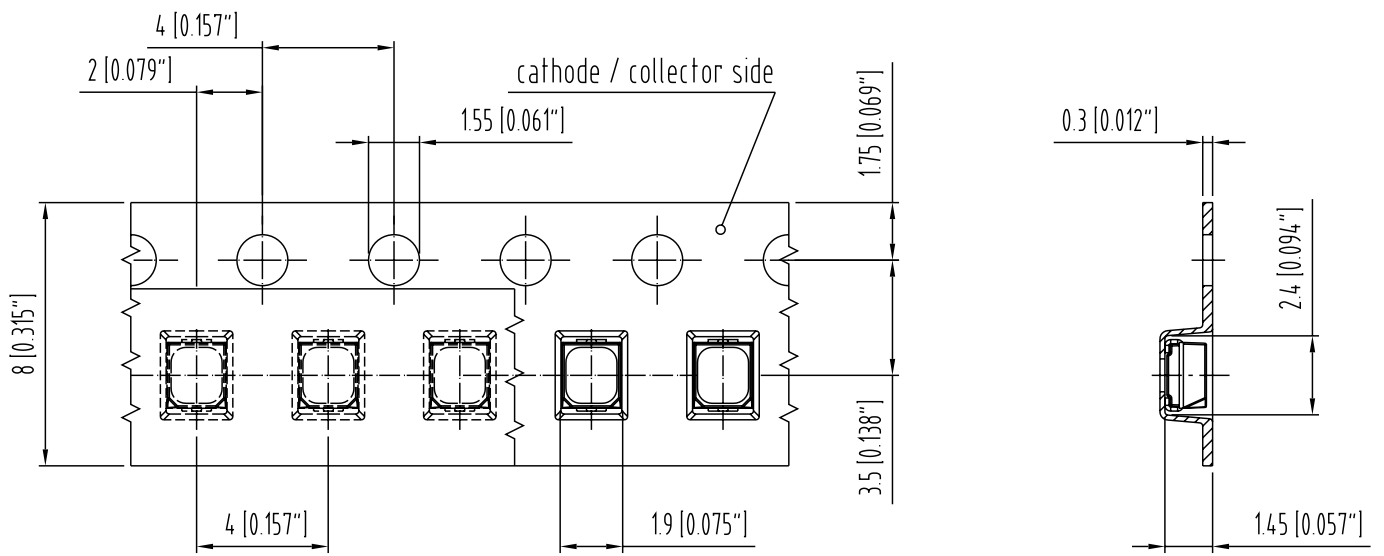
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



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 $T_p - 5 \text{ K}$	$t_p$	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>



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



**Reel Dimensions**

A	W	$N_{min}$	$W_1$	$W_{2max}$	Pieces per PU
180 mm	$8 + 0.3 / - 0.1$ mm	60 mm	$8.4 + 2$ mm	14.4 mm	500

### Barcode-Product-Label (BPL)


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

RoHS Compliant

(6P) BATCH NO: 1234567890 ML Temp ST  
X XXX °C X

(1T) LOT NO: 1234567890 (9D) D/C: 1234 Pack: RXX  
DEMY XXX  
X\_X123\_1234.1234 X

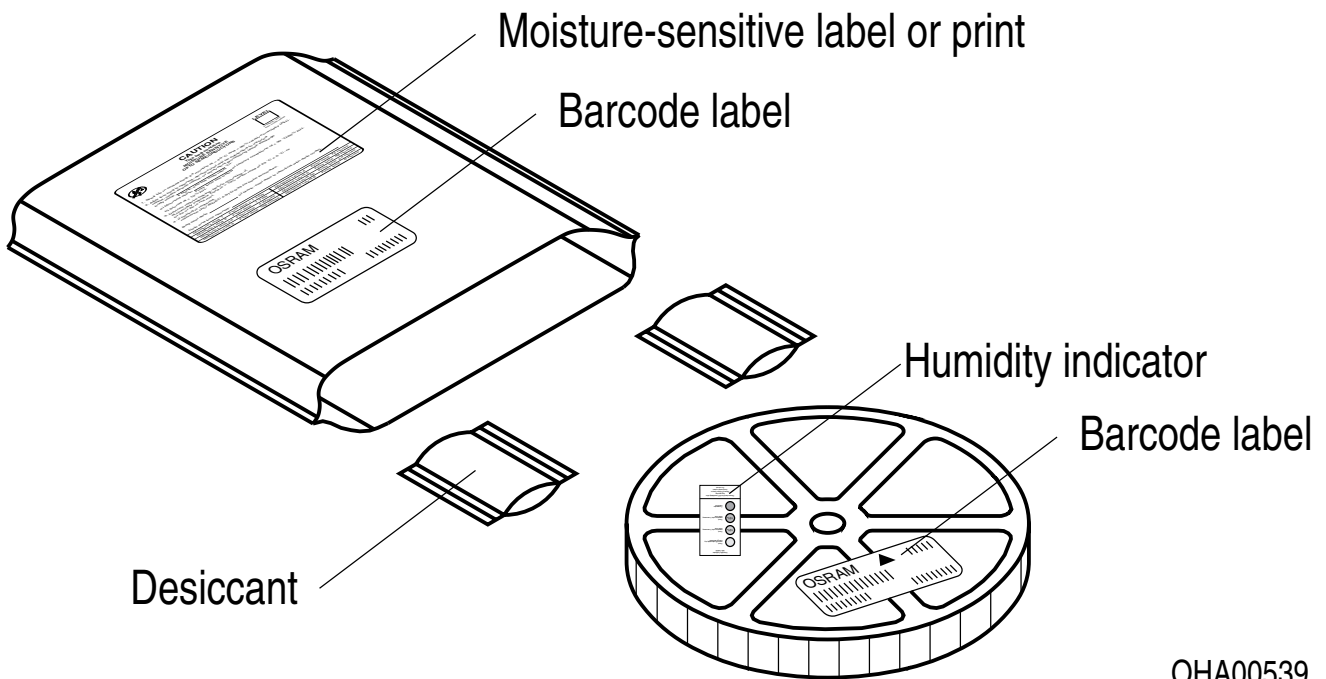
(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X



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' and is followed by 'ML Temp ST X XXX °C X' and a circular icon with a slash and three raindrops. The second is labeled '(1T) LOT NO: 1234567890' and is followed by '(9D) D/C: 1234', 'Pack: RXX', 'DEMY XXX', and 'X\_X123\_1234.1234 X'. The third is labeled '(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X'. A square QR code is located on the right side of the label.

OHA04563

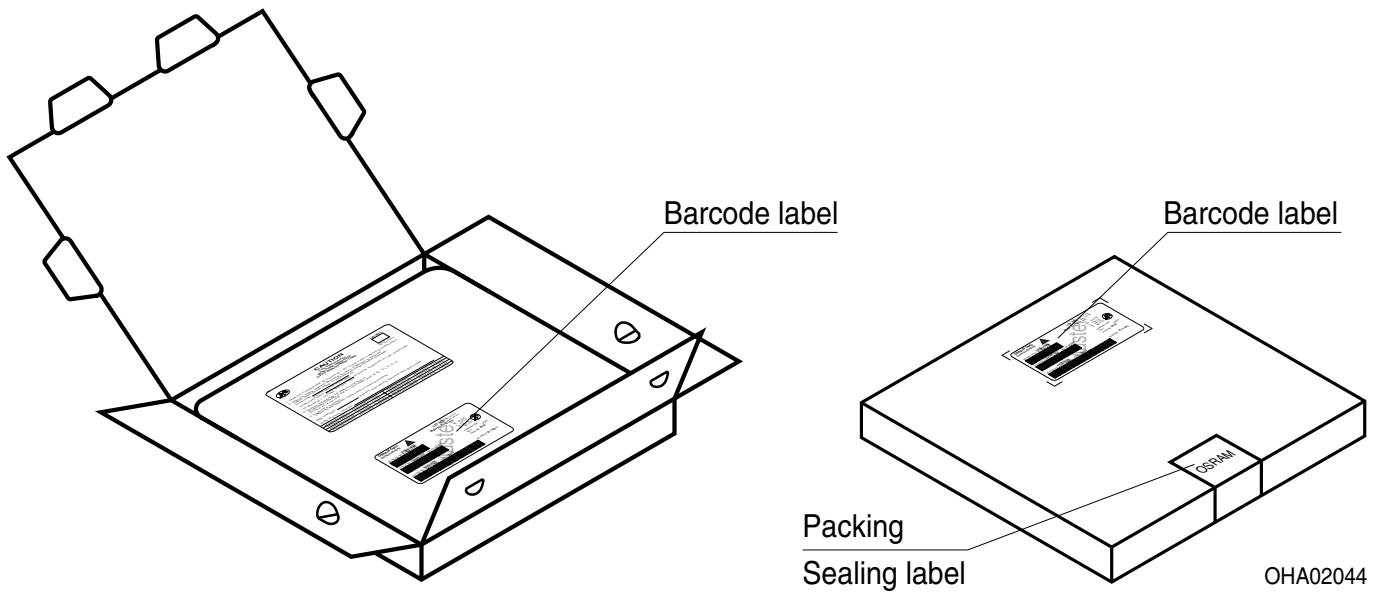
### Dry Packing Process and Materials <sup>9)</sup>



OHA00539

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

## Schematic Transportation Box <sup>9)</sup>



## Dimensions of Transportation Box

Width	Length	Height
200 ± 5 mm	195 ± 5 mm	30 ± 5 mm

## 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) **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
1.2	2019-11-15	Ordering Information Chromaticity Coordinate Groups

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