OSRAM KW DSL531.CC

Datasheet

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OSRAM

OSTUNE™ E3030

KW DSL531.CC

The OSTUNE™ E3030 KW DSL531.CC is specifically designed for automotive interior high quality white applications, offering highest brightness performance and a color temperature range from 2500 K (warm white) to 6500 K (cold white) at a superior CRI level.

Applications

- Ambient lighting
- Automotive aftermarket

Features

- Package: white SMT package, colored diffused silicone resin
- Chip technology: Volume emitter on Sapphire (AlInGaN)
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.321, Cy = 0.341 acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 2B
- Qualifications: AEC-Q102 Qualified
- Color temperature: 2400K - 6500K
- CRI: 90 (min.)
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

AEC-Q102 QUALIFIED

Ordering Information

Type	Color temperature	Luminous Flux [1] I_F = 140 mA Φ_V	Ordering Code
KW DSL531.CC-KXLX-4YC9-N464	2400 K	71 ... 130 lm	Q65115A2667
KW DSL531.CC-KXLX-4U9X-N464	2700 K	71 ... 130 lm	Q65115A2669
KW DSL531.CC-KYLX-4R9T-N464	3000 K	82 ... 130 lm	Q65115A2670
KW DSL531.CC-KYLX-4O9Q-N464	3500 K	82 ... 130 lm	Q65115A2671
KW DSL531.CC-KYLX-4L8N-N464	4000 K	82 ... 130 lm	Q65115A2663
KW DSL531.CC-KYLX-4I8K-N464	4500 K	82 ... 130 lm	Q65115A2664
KW DSL531.CC-KYLX-4F8H-N464	5500 K	82 ... 130 lm	Q65115A2666
KW DSL531.CC-KYLX-4C7E-N464	6500 K	82 ... 130 lm	Q65115A2662

Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	T_{op}	min. max.	-40 °C 110 °C
Storage Temperature	T_{stg}	min. max.	-40 °C 110 °C
Junction Temperature	T_j	max.	125 °C
Junction Temperature for short time applications*	T_j	max.	135 °C
Forward current T_S = 25 °C	I_F	min. max.	1.5 mA 250 mA
Forward current pulsed T_S = 25 °C, t_p = 0,1 ms, D = 3%	$I_{F\ pulse}$	max.	350 mA
Reverse voltage [2)] T_S = 25 °C	V_R	max.	5 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	V_{ESD}		2 kV

* The median lifetime (L70/B50) for Tj = 135°C is 100h.

Characteristics

I_F = 140 mA; T_S = 25 °C

Parameter	Symbol		Values
Luminous Flux [3] I_F = 140 mA	Φ_V	typ.	100 lm
Chromaticity Coordinate [4]	Cx Cy	typ.typ.	0.321 0.341
Viewing angle at 50% I_V	2φ	typ.	120 °
Forward Voltage [5] I_F = 140 mA	V_F	min. typ. max.	5.40 V 6.00 V 6.40 V
Reverse current [2] V_R = 5 V	I_R	typ. max.	0.01 µA 10 µA
Color Rendering Index	CRI	min.	90
Real thermal resistance junction/solderpoint [6]	$R_{thJS\ real}$	typ. max.	16 K / W 19 K / W

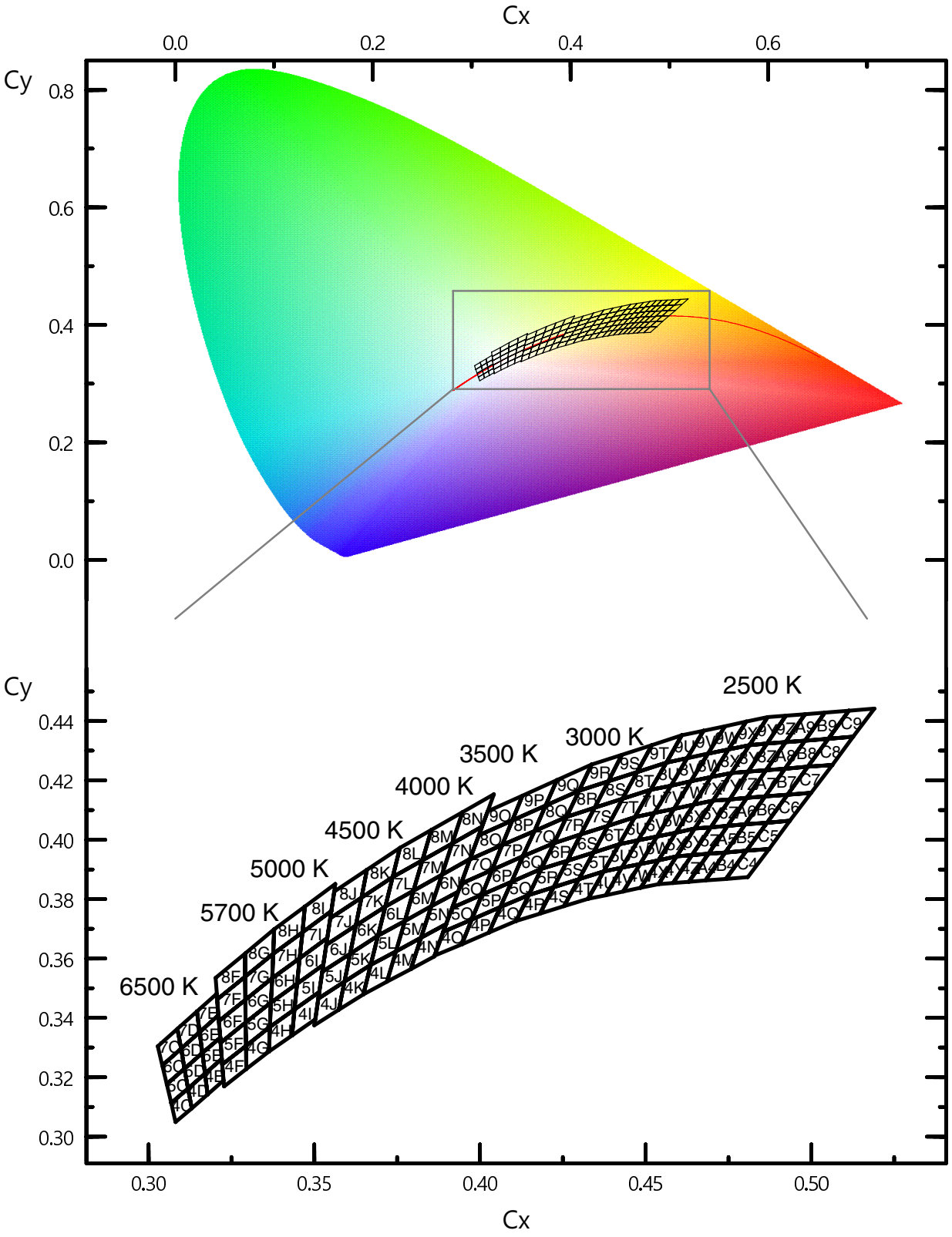
Brightness Groups

Group	Luminous Flux [1] I_F = 140 mA min. Φ_V	Luminous Flux [1] I_F = 140 mA max. Φ_V
KX	71 lm	82 lm
KY	82 lm	97 lm
KZ	97 lm	112 lm
LX	112 lm	130 lm

Forward Voltage Groups

Group	Forward Voltage [5] I_F = 140 mA min. V_F	Forward Voltage [5] I_F = 140 mA max. V_F
N4	5.40 V	5.60 V
S4	5.60 V	5.80 V
W4	5.80 V	6.00 V
24	6.00 V	6.20 V
64	6.20 V	6.40 V

Chromaticity Coordinate Groups



Chromaticity Coordinate Groups [4)]

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
4C	0.3081	0.3049	4K	0.3574	0.3427	4S	0.4181	0.3751
	0.3068	0.3113		0.3591	0.3522		0.4222	0.3840
	0.3119	0.3162		0.3670	0.3578		0.4298	0.3867
	0.3130	0.3095		0.3648	0.3479		0.4254	0.3776
4D	0.3130	0.3095	4L	0.3648	0.3479	4T	0.4254	0.3776
	0.3119	0.3162		0.3670	0.3578		0.4298	0.3867
	0.3170	0.3212		0.3746	0.3624		0.4373	0.3893
	0.3178	0.3142		0.3719	0.3522		0.4326	0.3801
4E	0.3178	0.3142	4M	0.3719	0.3522	4U	0.4326	0.3801
	0.3170	0.3212		0.3746	0.3624		0.4373	0.3893
	0.3221	0.3262		0.3822	0.3670		0.4428	0.3906
	0.3226	0.3189		0.3791	0.3564		0.4379	0.3814
4F	0.3228	0.3170	4N	0.3791	0.3564	4V	0.4379	0.3814
	0.3222	0.3243		0.3822	0.3670		0.4428	0.3906
	0.3294	0.3306		0.3898	0.3716		0.4483	0.3919
	0.3295	0.3228		0.3862	0.3607		0.4432	0.3826
4G	0.3295	0.3228	4O	0.3863	0.3609	4W	0.4432	0.3826
	0.3294	0.3306		0.3890	0.3690		0.4483	0.3919
	0.3366	0.3369		0.3975	0.3731		0.4538	0.3931
	0.3363	0.3287		0.3945	0.3648		0.4485	0.3838
4H	0.3363	0.3287	4P	0.3945	0.3648	4X	0.4485	0.3838
	0.3366	0.3369		0.3975	0.3731		0.4538	0.3931
	0.3441	0.3428		0.4061	0.3773		0.4593	0.3944
	0.3433	0.3341		0.4027	0.3687		0.4538	0.3850
4I	0.3433	0.3341	4Q	0.4027	0.3687	4Y	0.4593	0.3944
	0.3441	0.3428		0.4061	0.3773		0.4639	0.3948
	0.3515	0.3487		0.4147	0.3814		0.4582	0.3854
	0.3503	0.3396		0.4109	0.3726		0.4538	0.3850
4J	0.3500	0.3375	4R	0.4109	0.3726	4Z	0.4639	0.3948
	0.3512	0.3465		0.4147	0.3814		0.4689	0.3953
	0.3591	0.3522		0.4222	0.3840		0.4630	0.3858
	0.3574	0.3427		0.4181	0.3751		0.4582	0.3854

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
5C	0.3068	0.3113	5K	0.3591	0.3522	5S	0.4222	0.3840
	0.3055	0.3177		0.3608	0.3616		0.4263	0.3929
	0.3108	0.3229		0.3692	0.3677		0.4342	0.3957
	0.3119	0.3162		0.3670	0.3578		0.4298	0.3867
5D	0.3119	0.3162	5L	0.3670	0.3578	5T	0.4298	0.3867
	0.3108	0.3229		0.3692	0.3677		0.4342	0.3957
	0.3162	0.3282		0.3773	0.3726		0.4420	0.3985
	0.3170	0.3212		0.3746	0.3624		0.4373	0.3893
5E	0.3170	0.3212	5M	0.3746	0.3624	5U	0.4373	0.3893
	0.3162	0.3282		0.3773	0.3726		0.4420	0.3985
	0.3216	0.3334		0.3853	0.3776		0.4477	0.3998
	0.3221	0.3262		0.3822	0.3670		0.4428	0.3906
5F	0.3222	0.3243	5N	0.3822	0.3670	5V	0.4428	0.3906
	0.3217	0.3316		0.3853	0.3776		0.4477	0.3998
	0.3293	0.3384		0.3934	0.3825		0.4534	0.4011
	0.3294	0.3306		0.3898	0.3716		0.4483	0.3919
5G	0.3294	0.3306	5O	0.3890	0.3690	5W	0.4483	0.3919
	0.3293	0.3384		0.3916	0.3772		0.4534	0.4011
	0.3369	0.3451		0.4006	0.3815		0.4591	0.4025
	0.3366	0.3369		0.3975	0.3731		0.4538	0.3931
5H	0.3366	0.3369	5P	0.3975	0.3731	5X	0.4538	0.3931
	0.3369	0.3451		0.4006	0.3815		0.4591	0.4025
	0.3448	0.3515		0.4095	0.3858		0.4648	0.4038
	0.3441	0.3428		0.4061	0.3773		0.4593	0.3944
5I	0.3441	0.3428	5Q	0.4061	0.3773	5Y	0.4648	0.4038
	0.3448	0.3515		0.4095	0.3858		0.4696	0.4042
	0.3527	0.3578		0.4185	0.3902		0.4639	0.3948
	0.3515	0.3487		0.4147	0.3814		0.4593	0.3944
5J	0.3512	0.3465	5R	0.4147	0.3814	5Z	0.4696	0.4042
	0.3524	0.3555		0.4185	0.3902		0.4747	0.4047
	0.3608	0.3616		0.4263	0.3929		0.4689	0.3953
	0.3591	0.3522		0.4222	0.3840		0.4639	0.3948

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
6C	0.3055	0.3177	6K	0.3608	0.3616	6S	0.4263	0.3929
	0.3041	0.3240		0.3625	0.3711		0.4305	0.4019
	0.3098	0.3296		0.3714	0.3775		0.4386	0.4048
	0.3108	0.3229		0.3692	0.3677		0.4342	0.3957
6D	0.3108	0.3229	6L	0.3692	0.3677	6T	0.4342	0.3957
	0.3098	0.3296		0.3714	0.3775		0.4386	0.4048
	0.3154	0.3352		0.3799	0.3828		0.4468	0.4077
	0.3162	0.3282		0.3773	0.3726		0.4420	0.3985
6E	0.3162	0.3282	6M	0.3773	0.3726	6U	0.4420	0.3985
	0.3154	0.3352		0.3799	0.3828		0.4468	0.4077
	0.3210	0.3408		0.3885	0.3882		0.4526	0.4090
	0.3216	0.3334		0.3853	0.3776		0.4477	0.3998
6F	0.3217	0.3316	6N	0.3853	0.3776	6V	0.4477	0.3998
	0.3212	0.3389		0.3885	0.3882		0.4526	0.4090
	0.3292	0.3461		0.3970	0.3935		0.4585	0.4104
	0.3293	0.3384		0.3934	0.3825		0.4534	0.4011
6G	0.3293	0.3384	6O	0.3916	0.3772	6W	0.4534	0.4011
	0.3292	0.3461		0.3943	0.3853		0.4585	0.4104
	0.3373	0.3534		0.4036	0.3898		0.4644	0.4118
	0.3369	0.3451		0.4006	0.3815		0.4591	0.4025
6H	0.3369	0.3451	6P	0.4006	0.3815	6X	0.4591	0.4025
	0.3373	0.3534		0.4036	0.3898		0.4644	0.4118
	0.3456	0.3601		0.4130	0.3944		0.4703	0.4132
	0.3448	0.3515		0.4095	0.3858		0.4648	0.4038
6I	0.3448	0.3515	6Q	0.4095	0.3858	6Y	0.4703	0.4132
	0.3456	0.3601		0.4130	0.3944		0.4753	0.4136
	0.3539	0.3669		0.4223	0.3990		0.4696	0.4042
	0.3527	0.3578		0.4185	0.3902		0.4648	0.4038
6J	0.3524	0.3555	6R	0.4185	0.3902	6Z	0.4753	0.4136
	0.3536	0.3646		0.4223	0.3990		0.4805	0.4141
	0.3625	0.3711		0.4305	0.4019		0.4747	0.4047
	0.3608	0.3616		0.4263	0.3929		0.4696	0.4042

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
7C	0.3041	0.3240	7K	0.3625	0.3711	7S	0.4305	0.4019
	0.3028	0.3304		0.3642	0.3805		0.4346	0.4108
	0.3087	0.3363		0.3736	0.3874		0.4430	0.4138
	0.3098	0.3296		0.3714	0.3775		0.4386	0.4048
7D	0.3098	0.3296	7L	0.3714	0.3775	7T	0.4386	0.4048
	0.3087	0.3363		0.3736	0.3874		0.4430	0.4138
	0.3146	0.3422		0.3826	0.3931		0.4515	0.4168
	0.3154	0.3352		0.3799	0.3828		0.4468	0.4077
7E	0.3154	0.3352	7M	0.3799	0.3828	7U	0.4468	0.4077
	0.3146	0.3422		0.3826	0.3931		0.4515	0.4168
	0.3205	0.3481		0.3916	0.3987		0.4576	0.4183
	0.3210	0.3408		0.3885	0.3882		0.4526	0.4090
7F	0.3212	0.3389	7N	0.3885	0.3882	7V	0.4526	0.4090
	0.3206	0.3462		0.3916	0.3987		0.4576	0.4183
	0.3292	0.3539		0.4006	0.4044		0.4636	0.4197
	0.3292	0.3461		0.3970	0.3935		0.4585	0.4104
7G	0.3292	0.3461	7O	0.3943	0.3853	7W	0.4585	0.4104
	0.3292	0.3539		0.3970	0.3934		0.4636	0.4197
	0.3376	0.3616		0.4067	0.3982		0.4697	0.4211
	0.3373	0.3534		0.4036	0.3898		0.4644	0.4118
7H	0.3373	0.3534	7P	0.4036	0.3898	7X	0.4644	0.4118
	0.3376	0.3616		0.4067	0.3982		0.4697	0.4211
	0.3464	0.3688		0.4164	0.4029		0.4758	0.4225
	0.3456	0.3601		0.4130	0.3944		0.4703	0.4132
7I	0.3456	0.3601	7Q	0.4130	0.3944	7Y	0.4758	0.4225
	0.3464	0.3688		0.4164	0.4029		0.4809	0.4230
	0.3551	0.3760		0.4261	0.4077		0.4753	0.4136
	0.3539	0.3669		0.4223	0.3990		0.4703	0.4132
7J	0.3536	0.3646	7R	0.4223	0.3990	7Z	0.4809	0.4230
	0.3548	0.3736		0.4261	0.4077		0.4863	0.4234
	0.3642	0.3805		0.4346	0.4108		0.4805	0.4141
	0.3625	0.3711		0.4305	0.4019		0.4753	0.4136

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
8F	0.3206	0.3462	8N	0.3916	0.3987	8V	0.4576	0.4183
	0.3201	0.3534		0.3947	0.4093		0.4625	0.4275
	0.3291	0.3617		0.4042	0.4153		0.4688	0.4290
	0.3292	0.3539		0.4006	0.4044		0.4636	0.4197
8G	0.3292	0.3539	8O	0.3970	0.3934	8W	0.4636	0.4197
	0.3291	0.3617		0.3997	0.4015		0.4688	0.4290
	0.3379	0.3698		0.4097	0.4065		0.4750	0.4304
	0.3376	0.3616		0.4067	0.3982		0.4697	0.4211
8H	0.3376	0.3616	8P	0.4067	0.3982	8X	0.4697	0.4211
	0.3379	0.3698		0.4097	0.4065		0.4750	0.4304
	0.3471	0.3775		0.4198	0.4115		0.4813	0.4319
	0.3464	0.3688		0.4164	0.4029		0.4758	0.4225
8I	0.3464	0.3688	8Q	0.4164	0.4029	8Y	0.4813	0.4319
	0.3471	0.3775		0.4198	0.4115		0.4866	0.4324
	0.3563	0.3851		0.4299	0.4165		0.4809	0.4230
	0.3551	0.3760		0.4261	0.4077		0.4758	0.4225
8J	0.3548	0.3736	8R	0.4261	0.4077	8Z	0.4866	0.4324
	0.3560	0.3826		0.4299	0.4165		0.4922	0.4329
	0.3659	0.3900		0.4387	0.4197		0.4863	0.4234
	0.3642	0.3805		0.4346	0.4108		0.4809	0.4230
8K	0.3642	0.3805	8S	0.4346	0.4108	9O	0.3997	0.4015
	0.3659	0.3900		0.4387	0.4197		0.4023	0.4097
	0.3758	0.3973		0.4474	0.4228		0.4128	0.4148
	0.3736	0.3874		0.4430	0.4138		0.4097	0.4065
8L	0.3736	0.3874	8T	0.4430	0.4138	9P	0.4097	0.4065
	0.3758	0.3973		0.4474	0.4228		0.4128	0.4148
	0.3853	0.4033		0.4562	0.4260		0.4232	0.4201
	0.3826	0.3931		0.4515	0.4168		0.4198	0.4115
8M	0.3826	0.3931	8U	0.4515	0.4168	9Q	0.4198	0.4115
	0.3853	0.4033		0.4562	0.4260		0.4232	0.4201
	0.3947	0.4093		0.4625	0.4275		0.4337	0.4253
	0.3916	0.3987		0.4576	0.4183		0.4299	0.4165

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
9R	0.4299	0.4165	A5	0.4747	0.4047	B7	0.4920	0.4239
	0.4337	0.4253		0.4800	0.4052		0.4989	0.4246
	0.4428	0.4286		0.4740	0.3957		0.4928	0.4152
	0.4387	0.4197		0.4689	0.3953		0.4860	0.4146
9S	0.4387	0.4197	A6	0.4805	0.4141	B8	0.4980	0.4334
	0.4428	0.4286		0.4860	0.4146		0.5051	0.4340
	0.4519	0.4319		0.4800	0.4052		0.4989	0.4246
	0.4474	0.4228		0.4747	0.4047		0.4920	0.4239
9T	0.4474	0.4228	A7	0.4863	0.4234	B9	0.5040	0.4428
	0.4519	0.4319		0.4920	0.4239		0.5113	0.4435
	0.4609	0.4352		0.4860	0.4146		0.5051	0.4340
	0.4562	0.4260		0.4805	0.4141		0.4980	0.4334
9U	0.4562	0.4260	A8	0.4922	0.4329	C4	0.4804	0.3963
	0.4609	0.4352		0.4980	0.4334		0.4872	0.3969
	0.4674	0.4367		0.4920	0.4239		0.4808	0.3874
	0.4625	0.4275		0.4863	0.4234		0.4742	0.3868
9V	0.4625	0.4275	A9	0.4980	0.4423	C5	0.4866	0.4057
	0.4674	0.4367		0.5040	0.4428		0.4935	0.4064
	0.4739	0.4382		0.4980	0.4334		0.4872	0.3969
	0.4688	0.4290		0.4922	0.4329		0.4804	0.3963
9W	0.4688	0.4290	B4	0.4740	0.3957	C6	0.4928	0.4152
	0.4739	0.4382		0.4804	0.3963		0.4999	0.4158
	0.4803	0.4398		0.4742	0.3868		0.4935	0.4064
	0.4750	0.4304		0.4680	0.3863		0.4866	0.4057
9X	0.4750	0.4304	B5	0.4800	0.4052	C7	0.4989	0.4246
	0.4803	0.4398		0.4866	0.4057		0.5063	0.4252
	0.4868	0.4413		0.4804	0.3963		0.4999	0.4158
	0.4813	0.4319		0.4740	0.3957		0.4928	0.4152
A4	0.4689	0.3953	B6	0.4860	0.4146	C8	0.5051	0.4340
	0.4740	0.3957		0.4928	0.4152		0.5126	0.4347
	0.4680	0.3863		0.4866	0.4057		0.5063	0.4252
	0.4630	0.3858		0.4800	0.4052		0.4989	0.4246

Group	Cx	Cy
C9	0.5113	0.4435
	0.5190	0.4442
	0.5126	0.4347
	0.5051	0.4340

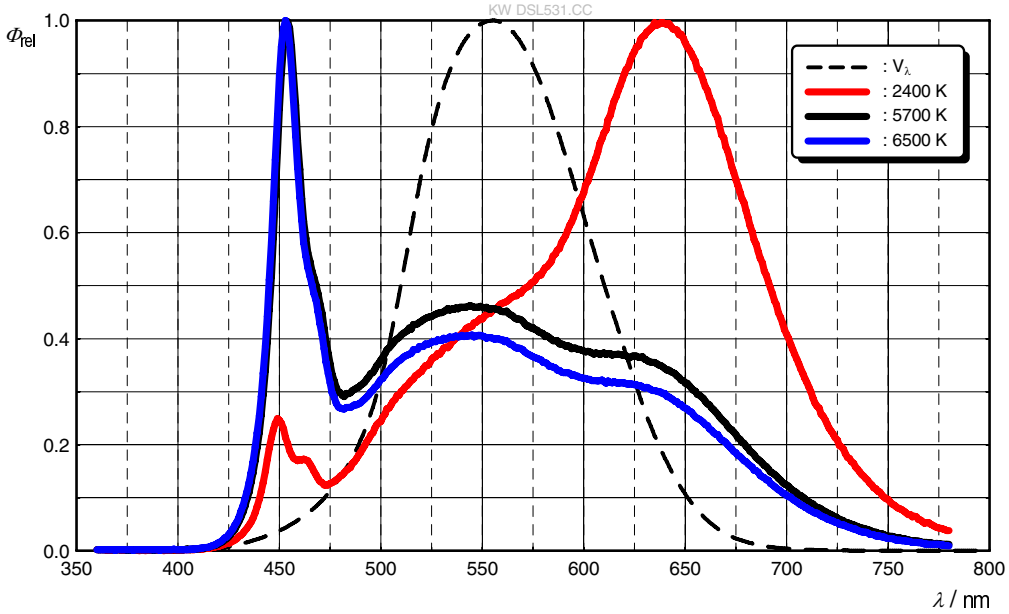
Group Name on Label

Example: KX-4C-24

Brightness	Color Chromaticity	Forward Voltage
KX	4C	24

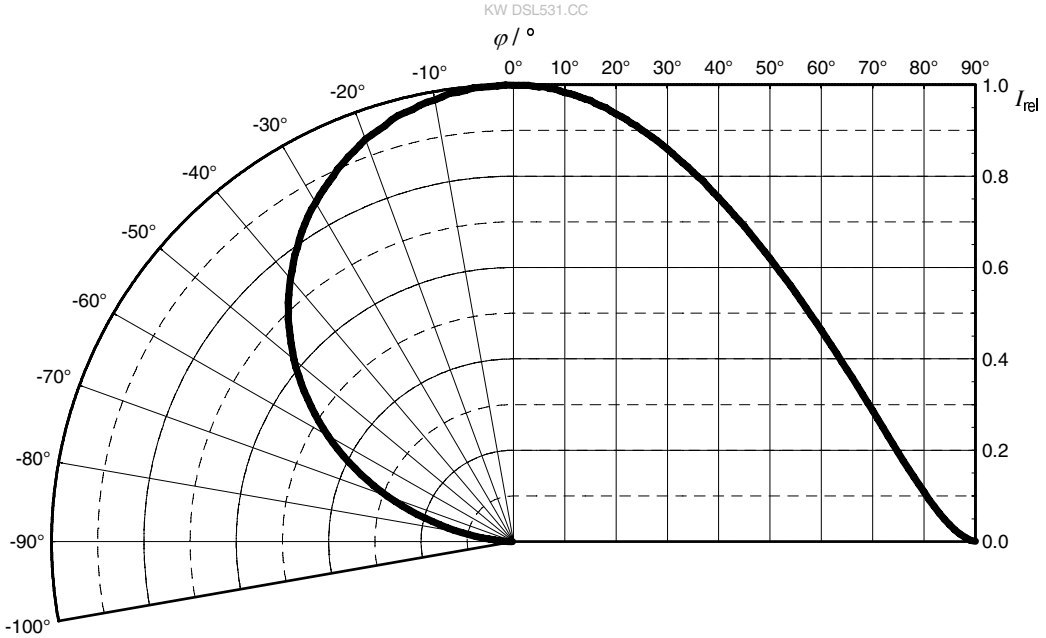
Relative Spectral Emission [3)]

$\Phi_{rel} = f(\lambda)$; I_F = 140 mA; T_S = 25 °C



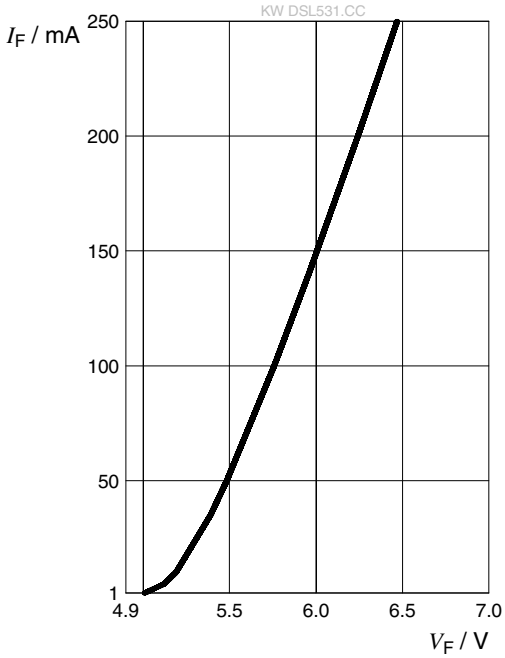
Radiation Characteristics [3)]

$I_{rel} = f(\varphi)$; T_S = 25 °C



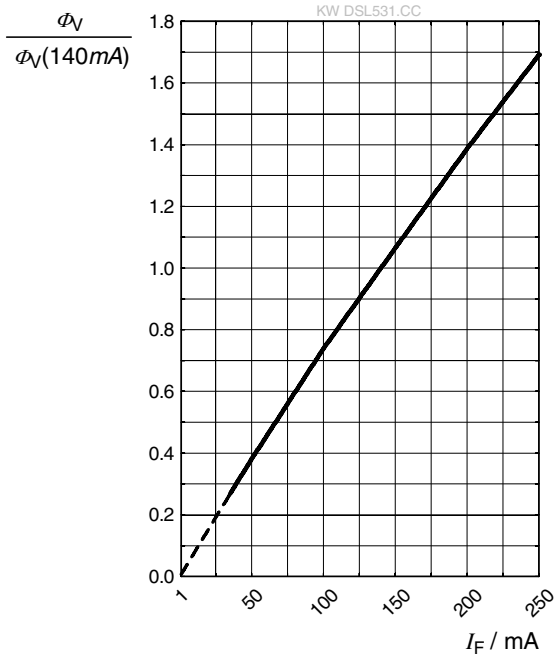
Forward current 3)

$I_F = f(V_F)$; T_S = 25 °C



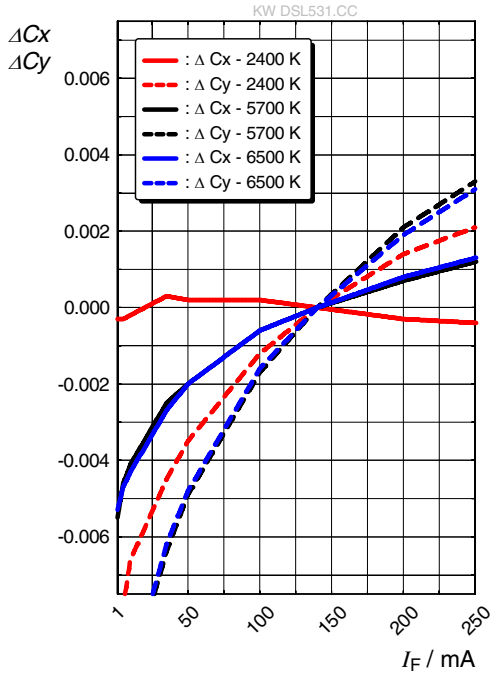
Relative Luminous Flux 3), 7)

$\Phi_v/\Phi_v(140\ mA) = f(I_F)$; T_S = 25 °C



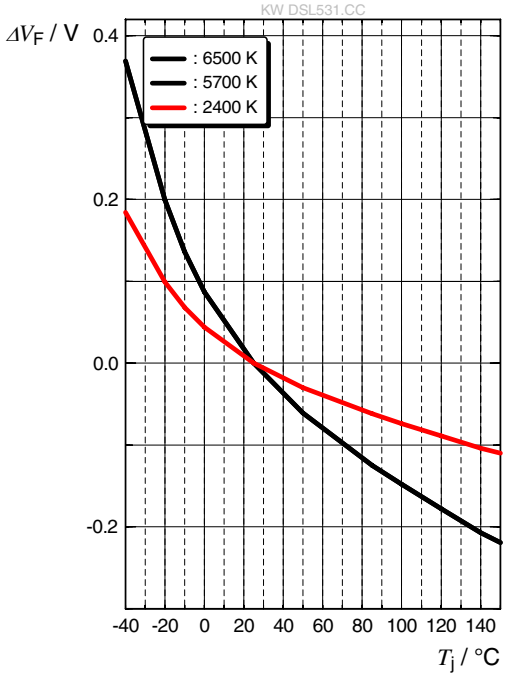
Chromaticity Coordinate Shift 3)

ΔCx, ΔCy = $f(I_F)$; T_S = 25 °C



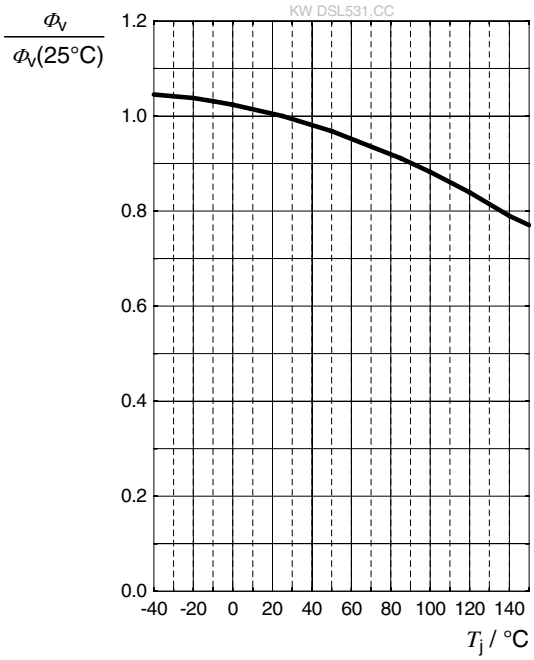
Forward Voltage [3)]

$\Delta V_F = V_F - V_F(25\ °C) = f(T_j);\ I_F = 140\ mA$



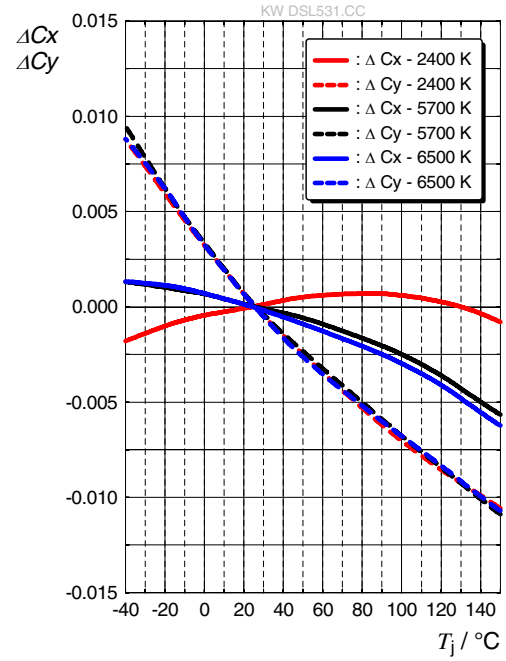
Relative Luminous Flux [3)]

$\Phi_v/\Phi_v(25\ °C) = f(T_j);\ I_F = 140\ mA$



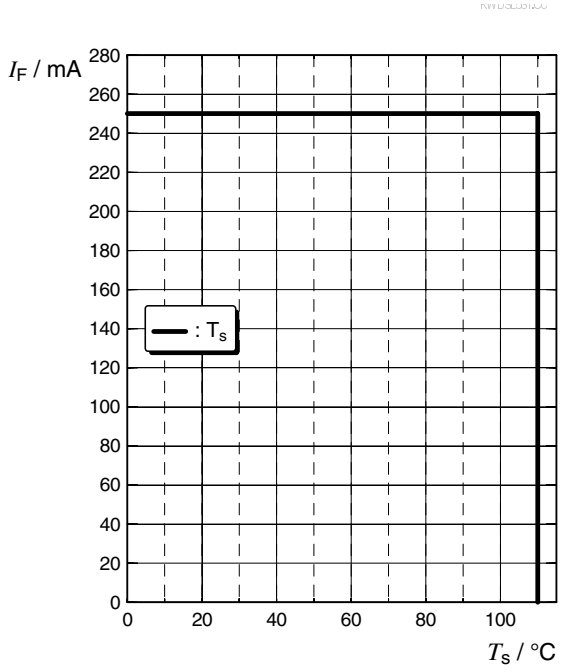
Chromaticity Coordinate Shift [3)]

$\Delta Cx, \Delta Cy = f(T_j);\ I_F = 140\ mA$



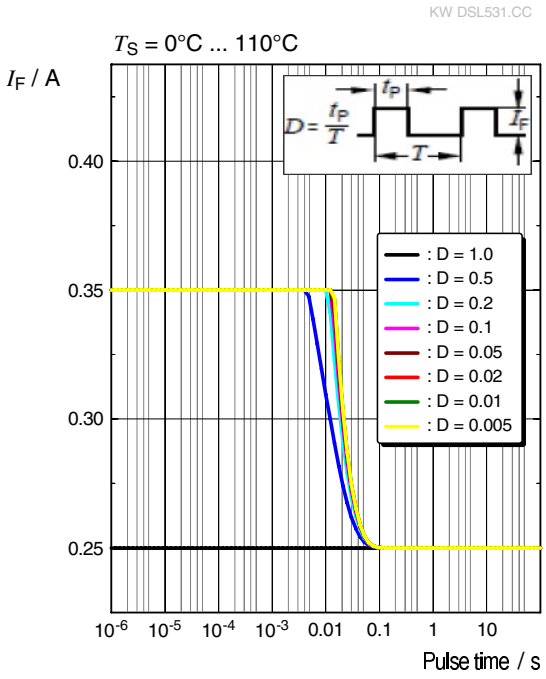
Max. Permissible Forward Current 6)

$I_F = f(T)$

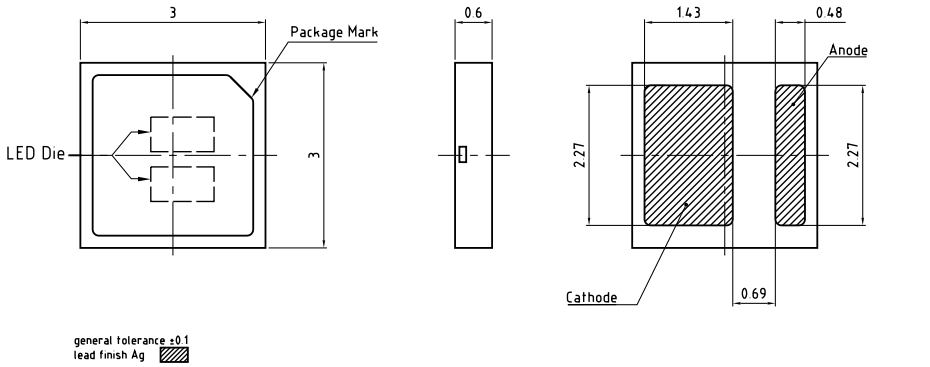


Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle



Dimensional Drawing [8)]

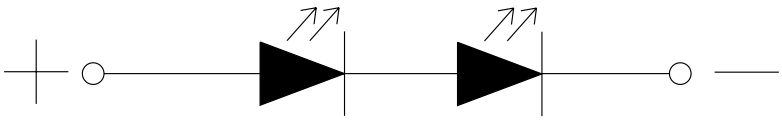


Further Information:

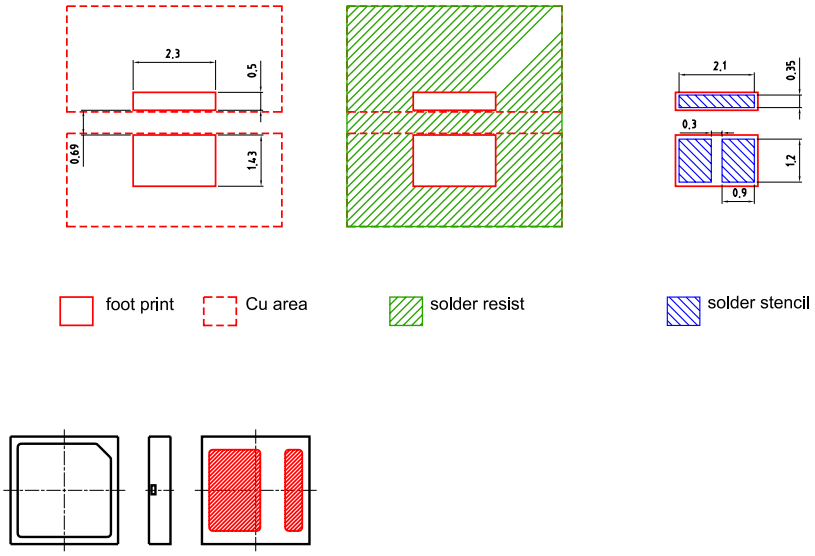
Approximate Weight: 16.0 mg

Corrosion test: Class: 2B
Test condition: 25°C / 75 % RH / 10 ppm H_2S / 21 days (IEC 60068-2-43)

Electrical Internal Circuit



Recommended Solder Pad [8)]

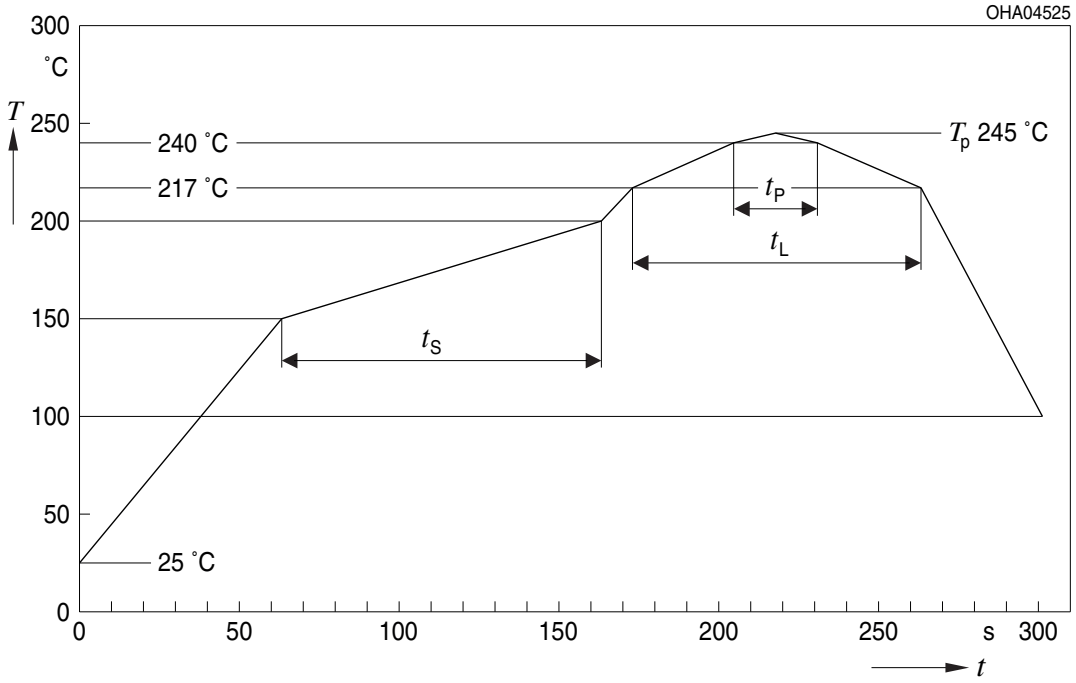


E067.0346.32-01

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

Reflow Soldering Profile

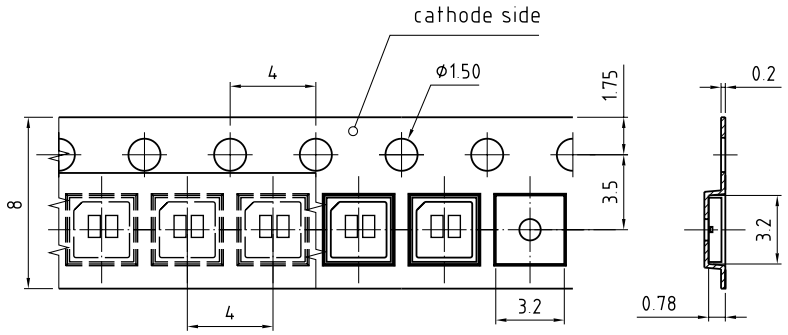
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 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*) 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 [8)]



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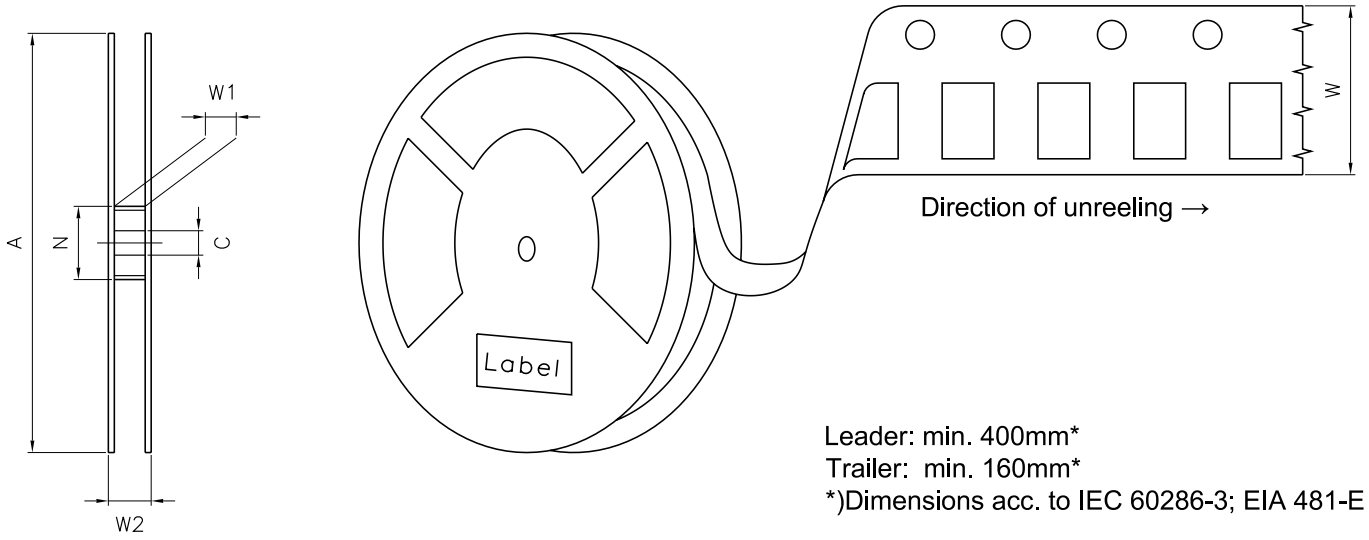
Tape and Reel [9)]

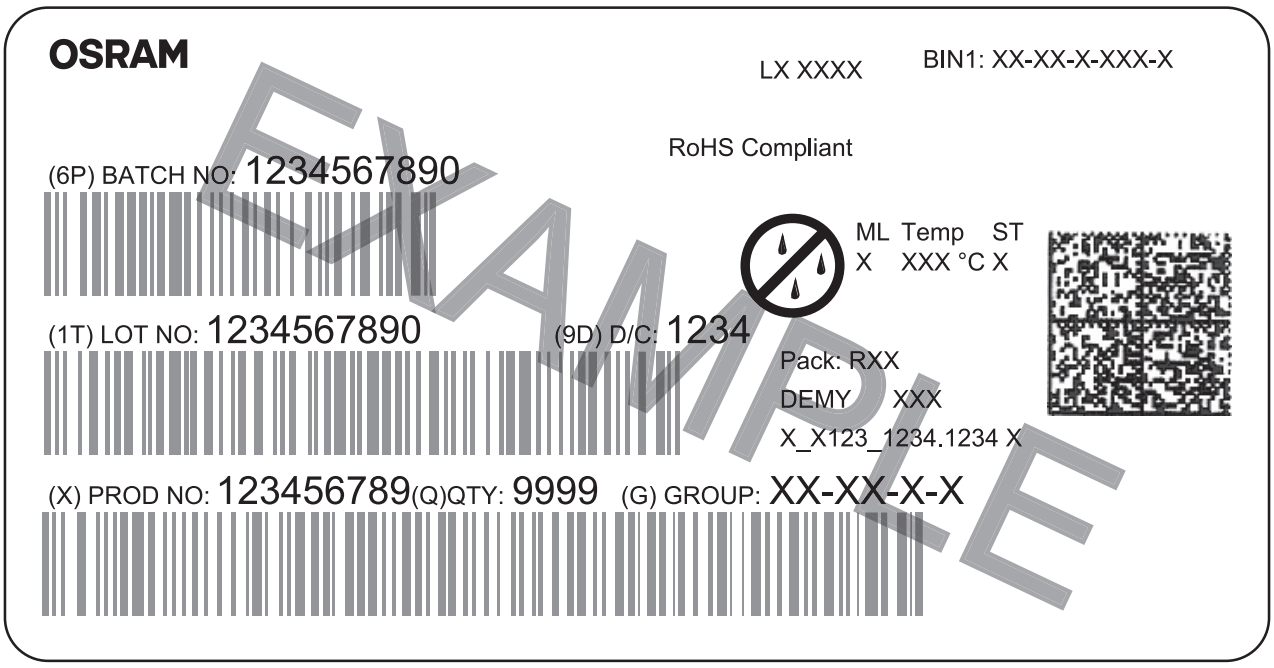


Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

Reel Dimensions

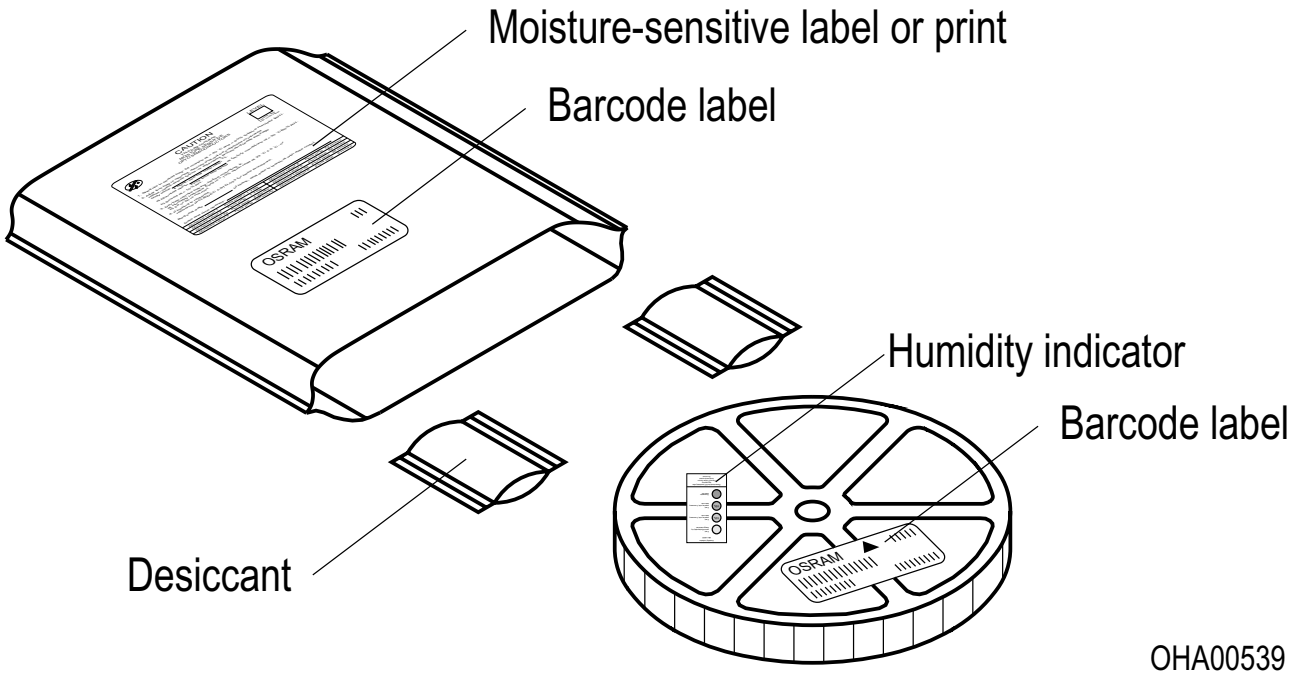
A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	4000

Barcode-Product-Label (BPL)



OHA04563

Dry Packing Process and Materials [8)]



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.

For further application related information please visit https://ams-osram.com/support/application-notes

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 our 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

Our components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.
Our products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using our components in product safety devices/ applications or medical devices/applications, buyer and/or customer has to inform our local sales partner immediately and we and buyer and /or customer will analyze and coordinate the customer-specific request between us 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 ±8 % and an expanded uncertainty of ±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) **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.

4) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 25 ms, with an internal reproducibility of ±0.005 and an expanded uncertainty of ±0.01 (acc. to GUM with a coverage factor of k = 3).

5) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of ±0.05 V and an expanded uncertainty of ±0.1 V (acc. to GUM with a coverage factor of k = 3).

6) **Thermal Resistance:** Rth max is based on statistic values (6σ) used for Derating.

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 ±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	2026-07-07	Initial Version
1.1	2026-07-14	Ordering Information
1.2	2026-10-02	Features Ordering Information

EU RoHS and China RoHS compliant product
此产品符合欧盟 RoHS 指令的要求；
按照中国的相关法规和标准，
不含有毒有害物质或元素。

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