OSRAM KW DELSS2.RA

Datasheet

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OSRAM

TOPLED® E1608

KW DELSS2.RA

The TOPLED E1608 expands ams-OSRAM's low power portfolio to meet the requirements in the field of illumination of switches and buttons in automotive interior applications. The TOPLED E1608 offers one of the smallest LED industry standard footprints in a highly reliable and well proved package concept. The TOPLED E1608 is available in different colors and brightness levels. Its outstanding performance is suitable for a huge variety of applications where a small package design with excellent reliability is needed.

Applications

- Cluster, Button Backlighting
- Electronic Equipment
- Interior Illumination (e.g. Ambient Map)

Features

- Package: white SMT package, colored diffused silicone resin
- Chip technology: InGaN on Sapphire
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.33, Cy = 0.33 acc. to CIE 1931 (• white)
- Corrosion Robustness Class: 2B
- Qualifications: AEC-Q102 Qualified
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)

AEC-Q102 QUALIFIED

Ordering Information

Type	Luminous Intensity [1] I_F = 20 mA I_v	Ordering Code
KW DELSS2.RA-AXBZ-FK0PM0-2686	1120 ... 2800 mcd	Q65112A6162
KW DELSS2.RA-AXBZ-FK0PN0-2686	1120 ... 2800 mcd	Q65113A4557
KW DELSS2.RA-AXBZ-FK1NN1-2686	1120 ... 2800 mcd	Q65113A4556
KW DELSS2.RA-AXBZ-FK2NM2-2686	1120 ... 2800 mcd	Q65112A8329
KW DELSS2.RA-AXBZ-FK3PM3-2686	1120 ... 2800 mcd	Q65113A1174

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
Forward current T_S = 25 °C	I_F	min. max.	1 mA 30 mA
Forward current pulsed D = 0.005 ; T_S = 25 °C	$I_{F\ pulse}$	max.	40 mA
Surge current t ≤ 10 µs; D = 0.005 ; T_S = 25 °C	I_{FS}	max.	40 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

Characteristics

I_F = 20 mA; T_S = 25 °C

Parameter	Symbol		Values
Chromaticity Coordinate [3]	Cx	typ.	0.33
	Cy	typ.	0.33
Viewing angle at 50% I_V	2φ	typ.	120 °
Forward Voltage [4]	V_F	min.	2.80 V
I_F = 20 mA		typ.	3.08 V
		max.	3.40 V
Reverse current [2]	I_R	typ.	10 µA
V_R = 5 V		max.	0.01 µA
Real thermal resistance junction/ambient [5][6]	$R_{thJA\ real}$	max.	570 K / W
Real thermal resistance junction/solderpoint [5]	$R_{thJS\ real}$	typ.	120 K / W
		max.	210 K / W

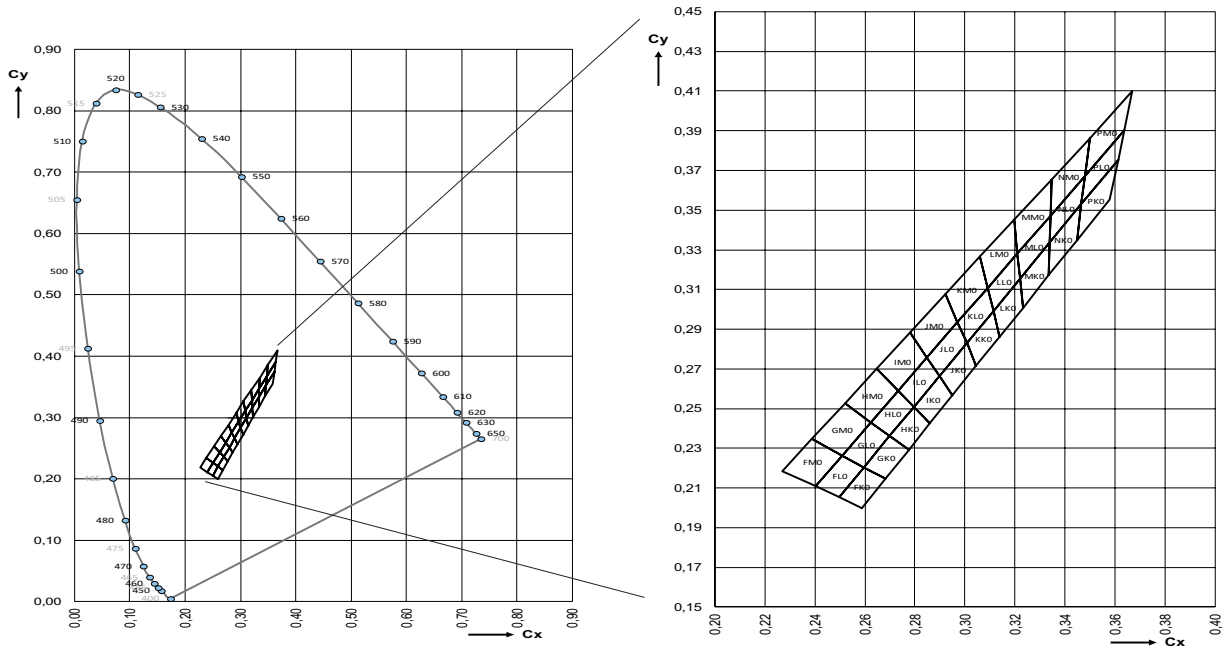
Brightness Groups

Group	Luminous Intensity [1] I_F = 20 mA min. I_v	Luminous Intensity [1] I_F = 20 mA max. I_v	Luminous Flux [7] I_F = 20 mA typ. Φ_V
AX	1120 mcd	1300 mcd	3630 mlm
AY	1300 mcd	1500 mcd	4200 mlm
AZ	1500 mcd	1800 mcd	4950 mlm
BX	1800 mcd	2100 mcd	5850 mlm
BY	2100 mcd	2400 mcd	6750 mlm
BZ	2400 mcd	2800 mcd	7800 mlm

Forward Voltage Groups

Group	Forward Voltage [4] I_F = 20 mA min. V_F	Forward Voltage [4] I_F = 20 mA max. V_F
26	2.80 V	3.10 V
86	3.10 V	3.40 V

Chromaticity Coordinate Groups



Chromaticity Coordinate Groups [3)]

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FK0	0.2498	0.2053	FL0	0.2402	0.2108	FM0	0.2269	0.2185
	0.2597	0.2204		0.2509	0.2264		0.2388	0.2348
	0.2682	0.2146		0.2597	0.2204		0.2509	0.2264
	0.2589	0.2000		0.2498	0.2053		0.2402	0.2108
FK1	0.2547	0.2129	FL1	0.2456	0.2186	FM1	0.2329	0.2267
	0.2649	0.2283		0.2567	0.2348		0.2454	0.2438
	0.2729	0.2219		0.2649	0.2283		0.2567	0.2348
	0.2636	0.2073		0.2547	0.2129		0.2456	0.2186
FK2	0.2504	0.2159	FL2	0.2395	0.2228	FM2	0.2268	0.2309
	0.2611	0.2318		0.2515	0.2396		0.2402	0.2486
	0.2691	0.2254		0.2611	0.2318		0.2515	0.2396
	0.2593	0.2102		0.2504	0.2159		0.2395	0.2228
FK3	0.2450	0.2081	FL3	0.2336	0.2147	FM3	0.2203	0.2224
	0.2553	0.2234		0.2449	0.2306		0.2328	0.2390
	0.2640	0.2175		0.2553	0.2234		0.2449	0.2306
	0.2544	0.2027		0.2450	0.2081		0.2336	0.2147

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FN0	0.2136	0.2262	GL2	0.2515	0.2396	HK0	0.2700	0.2361
	0.2267	0.2432		0.2635	0.2566		0.2797	0.2509
	0.2388	0.2348		0.2717	0.2476		0.2861	0.2427
	0.2269	0.2185		0.2611	0.2318		0.2775	0.2292
FN1	0.2202	0.2347	GL3	0.2449	0.2306	HK1	0.2749	0.2435
	0.2342	0.2527		0.2572	0.2479		0.2848	0.2587
	0.2454	0.2438		0.2662	0.2396		0.2906	0.2498
	0.2329	0.2267		0.2553	0.2234		0.2818	0.2360
GK0	0.2597	0.2204	GM0	0.2388	0.2348	HK2	0.2717	0.2476
	0.2700	0.2361		0.2520	0.2527		0.2823	0.2633
	0.2775	0.2292		0.2624	0.2431		0.2880	0.2546
	0.2682	0.2146		0.2509	0.2264		0.2786	0.2401
GK1	0.2649	0.2283	GM1	0.2454	0.2438	HK3	0.2662	0.2396
	0.2749	0.2435		0.2583	0.2614		0.2765	0.2550
	0.2818	0.2360		0.2679	0.2511		0.2829	0.2468
	0.2729	0.2219		0.2567	0.2348		0.2738	0.2327
GK2	0.2611	0.2318	GM2	0.2402	0.2486	HL0	0.2624	0.2431
	0.2717	0.2476		0.2540	0.2669		0.2733	0.2590
	0.2786	0.2401		0.2635	0.2566		0.2797	0.2509
	0.2691	0.2254		0.2515	0.2396		0.2700	0.2361
GK3	0.2553	0.2234	GM3	0.2328	0.2390	HL1	0.2679	0.2511
	0.2662	0.2396		0.2468	0.2575		0.2791	0.2674
	0.2738	0.2327		0.2572	0.2479		0.2848	0.2587
	0.2640	0.2175		0.2449	0.2306		0.2749	0.2435
GL0	0.2509	0.2264	GN0	0.2267	0.2432	HL2	0.2635	0.2566
	0.2624	0.2431		0.2416	0.2623		0.2757	0.2737
	0.2700	0.2361		0.2520	0.2527		0.2823	0.2633
	0.2597	0.2204		0.2388	0.2348		0.2717	0.2476
GL1	0.2567	0.2348	GN1	0.2342	0.2527	HL3	0.2572	0.2479
	0.2679	0.2511		0.2488	0.2717		0.2690	0.2645
	0.2749	0.2435		0.2583	0.2614		0.2765	0.2550
	0.2649	0.2283		0.2454	0.2438		0.2662	0.2396

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
HM0	0.2520	0.2527	IK2	0.2823	0.2633	IM2	0.2679	0.2855
	0.2646	0.2700		0.2935	0.2800		0.2827	0.3051
	0.2733	0.2590		0.2979	0.2699		0.2885	0.2917
	0.2624	0.2431		0.2880	0.2546		0.2757	0.2737
HM1	0.2583	0.2614	IK3	0.2765	0.2550	IM3	0.2602	0.2755
	0.2718	0.2792		0.2873	0.2711		0.2746	0.2946
	0.2791	0.2674		0.2924	0.2616		0.2814	0.2820
	0.2679	0.2511		0.2829	0.2468		0.2690	0.2645
HM2	0.2540	0.2669	IL0	0.2733	0.2590	IN0	0.2559	0.2810
	0.2679	0.2855		0.2848	0.2757		0.2712	0.3009
	0.2757	0.2737		0.2898	0.2664		0.2780	0.2883
	0.2635	0.2566		0.2797	0.2509		0.2646	0.2700
HM3	0.2468	0.2575	IL1	0.2791	0.2674	IN1	0.2636	0.2910
	0.2602	0.2755		0.2910	0.2846		0.2793	0.3114
	0.2690	0.2645		0.2953	0.2747		0.2851	0.2980
	0.2572	0.2479		0.2848	0.2587		0.2718	0.2792
HN0	0.2416	0.2623	IL2	0.2757	0.2737	JK0	0.2898	0.2664
	0.2559	0.2810		0.2885	0.2917		0.3007	0.2830
	0.2646	0.2700		0.2935	0.2800		0.3045	0.2717
	0.2520	0.2527		0.2823	0.2633		0.2950	0.2568
HN1	0.2488	0.2717	IL3	0.2690	0.2645	JK1	0.2953	0.2747
	0.2636	0.2910		0.2814	0.2820		0.3060	0.2911
	0.2718	0.2792		0.2873	0.2711		0.3092	0.2790
	0.2583	0.2614		0.2765	0.2550		0.2998	0.2643
IK0	0.2797	0.2509	IM0	0.2646	0.2700	JK2	0.2935	0.2800
	0.2898	0.2664		0.2780	0.2883		0.3049	0.2969
	0.2950	0.2568		0.2848	0.2757		0.3079	0.2855
	0.2861	0.2427		0.2733	0.2590		0.2979	0.2699
IK1	0.2848	0.2587	IM1	0.2718	0.2792	JK3	0.2873	0.2711
	0.2953	0.2747		0.2851	0.2980		0.2989	0.2883
	0.2998	0.2643		0.2910	0.2846		0.3026	0.2774
	0.2906	0.2498		0.2791	0.2674		0.2924	0.2616

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
JL0	0.2848	0.2757	JN0	0.2712	0.3009	KL2	0.3016	0.3101
	0.2971	0.2935		0.2873	0.3219		0.3143	0.3280
	0.3007	0.2830		0.2922	0.3077		0.3161	0.3137
	0.2898	0.2664		0.2780	0.2883		0.3049	0.2969
JL1	0.2910	0.2846	JN1	0.2793	0.3114	KL3	0.2947	0.3006
	0.3031	0.3022		0.2952	0.3322		0.3075	0.3182
	0.3060	0.2911		0.2991	0.3172		0.3102	0.3050
	0.2953	0.2747		0.2851	0.2980		0.2989	0.2883
JL2	0.2885	0.2917	KK0	0.3007	0.2830	KM0	0.2922	0.3077
	0.3016	0.3101		0.3113	0.2992		0.3060	0.3266
	0.3049	0.2969		0.3138	0.2862		0.3090	0.3108
	0.2935	0.2800		0.3045	0.2717		0.2971	0.2935
JL3	0.2814	0.2820	KK1	0.3060	0.2911	KM1	0.2991	0.3172
	0.2947	0.3006		0.3166	0.3073		0.3128	0.3359
	0.2989	0.2883		0.3185	0.2935		0.3150	0.3195
	0.2873	0.2711		0.3092	0.2790		0.3031	0.3022
JM0	0.2780	0.2883	KK2	0.3049	0.2969	KM2	0.2976	0.3251
	0.2922	0.3077		0.3161	0.3137		0.3122	0.3444
	0.2971	0.2935		0.3179	0.3008		0.3143	0.3280
	0.2848	0.2757		0.3079	0.2855		0.3016	0.3101
JM1	0.2851	0.2980	KK3	0.2989	0.2883	KM3	0.2898	0.3148
	0.2991	0.3172		0.3102	0.3050		0.3045	0.3345
	0.3031	0.3022		0.3126	0.2927		0.3075	0.3182
	0.2910	0.2846		0.3026	0.2774		0.2947	0.3006
JM2	0.2827	0.3051	KL0	0.2971	0.2935	KN0	0.2873	0.3219
	0.2976	0.3251		0.3090	0.3108		0.3030	0.3424
	0.3016	0.3101		0.3113	0.2992		0.3060	0.3266
	0.2885	0.2917		0.3007	0.2830		0.2922	0.3077
JM3	0.2746	0.2946	KL1	0.3031	0.3022	KN1	0.2952	0.3322
	0.2898	0.3148		0.3150	0.3195		0.3107	0.3523
	0.2947	0.3006		0.3166	0.3073		0.3128	0.3359
	0.2814	0.2820		0.3060	0.2911		0.2991	0.3172

Group	Cx	Cy
LK0	0.3113	0.2992
	0.3219	0.3154
	0.3231	0.3008
	0.3138	0.2862
LK1	0.3166	0.3073
	0.3279	0.3245
	0.3283	0.3090
	0.3185	0.2935
LK2	0.3161	0.3137
	0.3280	0.3313
	0.3285	0.3172
	0.3179	0.3008
LK3	0.3102	0.3050
	0.3214	0.3218
	0.3225	0.3081
	0.3126	0.2927
LL0	0.3090	0.3108
	0.3209	0.3281
	0.3219	0.3154
	0.3113	0.2992
LL1	0.3150	0.3195
	0.3275	0.3377
	0.3279	0.3245
	0.3166	0.3073
LL2	0.3143	0.3280
	0.3277	0.3468
	0.3280	0.3313
	0.3161	0.3137
LL3	0.3075	0.3182
	0.3203	0.3366
	0.3214	0.3218
	0.3102	0.3050

Group	Cx	Cy
LM0	0.3060	0.3266
	0.3196	0.3451
	0.3209	0.3281
	0.3090	0.3108
LM1	0.3128	0.3359
	0.3271	0.3553
	0.3275	0.3377
	0.3150	0.3195
LM2	0.3122	0.3444
	0.3273	0.3641
	0.3277	0.3468
	0.3143	0.3280
LM3	0.3045	0.3345
	0.3190	0.3536
	0.3203	0.3366
	0.3075	0.3182
LN0	0.3030	0.3424
	0.3183	0.3621
	0.3196	0.3451
	0.3060	0.3266
LN1	0.3107	0.3523
	0.3266	0.3726
	0.3271	0.3553
	0.3128	0.3359
MK0	0.3219	0.3154
	0.3339	0.3336
	0.3335	0.3172
	0.3231	0.3008
MK1	0.3279	0.3245
	0.3402	0.3433
	0.3391	0.3260
	0.3283	0.3090

Group	Cx	Cy
MK2	0.3280	0.3313
	0.3409	0.3505
	0.3400	0.3351
	0.3285	0.3172
MK3	0.3214	0.3218
	0.3340	0.3404
	0.3337	0.3254
	0.3225	0.3081
ML0	0.3209	0.3281
	0.3341	0.3472
	0.3339	0.3336
	0.3219	0.3154
ML1	0.3275	0.3377
	0.3410	0.3573
	0.3402	0.3433
	0.3279	0.3245
ML2	0.3277	0.3468
	0.3420	0.3668
	0.3409	0.3505
	0.3280	0.3313
ML3	0.3203	0.3366
	0.3343	0.3563
	0.3340	0.3404
	0.3214	0.3218
MM0	0.3196	0.3451
	0.3345	0.3654
	0.3341	0.3472
	0.3209	0.3281
MM1	0.3271	0.3553
	0.3422	0.3759
	0.3410	0.3573
	0.3275	0.3377

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
MM2	0.3273	0.3641	NL0	0.3341	0.3472	NN0	0.3349	0.3830
	0.3431	0.3854		0.3479	0.3673		0.3517	0.4053
	0.3420	0.3668		0.3465	0.3530		0.3498	0.3863
	0.3277	0.3468		0.3339	0.3336		0.3345	0.3654
MM3	0.3190	0.3536	NL1	0.3402	0.3433	NN1	0.3422	0.3759
	0.3347	0.3742		0.3410	0.3573		0.3433	0.3942
	0.3343	0.3563		0.3551	0.3778		0.3602	0.4165
	0.3203	0.3366		0.3532	0.3633		0.3577	0.3971
MN0	0.3183	0.3621	NL2	0.3409	0.3505	PK0	0.3465	0.3530
	0.3349	0.3830		0.3420	0.3668		0.3599	0.3735
	0.3345	0.3654		0.3567	0.3876		0.3567	0.3535
	0.3196	0.3451		0.3544	0.3706		0.3447	0.3347
MN1	0.3266	0.3726	NL3	0.3340	0.3404	PK3	0.3456	0.3439
	0.3433	0.3942		0.3343	0.3563		0.3472	0.3602
	0.3422	0.3759		0.3489	0.3768		0.3611	0.3809
	0.3271	0.3553		0.3472	0.3602		0.3583	0.3635
NK0	0.3339	0.3336	NM0	0.3345	0.3654	PL0	0.3479	0.3673
	0.3465	0.3530		0.3498	0.3863		0.3623	0.3882
	0.3447	0.3347		0.3479	0.3673		0.3599	0.3735
	0.3335	0.3172		0.3341	0.3472		0.3465	0.3530
NK1	0.3391	0.3260	NM1	0.3410	0.3573	PL3	0.3472	0.3602
	0.3402	0.3433		0.3422	0.3759		0.3489	0.3768
	0.3532	0.3633		0.3577	0.3971		0.3639	0.3981
	0.3507	0.3441		0.3551	0.3778		0.3611	0.3809
NK2	0.3400	0.3351	NM2	0.3420	0.3668	PM0	0.3498	0.3863
	0.3409	0.3505		0.3431	0.3854		0.3655	0.4079
	0.3544	0.3706		0.3593	0.4070		0.3623	0.3882
	0.3523	0.3541		0.3567	0.3876		0.3479	0.3673
NK3	0.3337	0.3254	NM3	0.3343	0.3563	PM3	0.3489	0.3768
	0.3340	0.3404		0.3347	0.3742		0.3508	0.3958
	0.3472	0.3602		0.3508	0.3958		0.3671	0.4178
	0.3456	0.3439		0.3489	0.3768		0.3639	0.3981

Group	Cx	Cy
PN0	0.3517	0.4053
	0.3687	0.4276
	0.3655	0.4079
	0.3498	0.3863

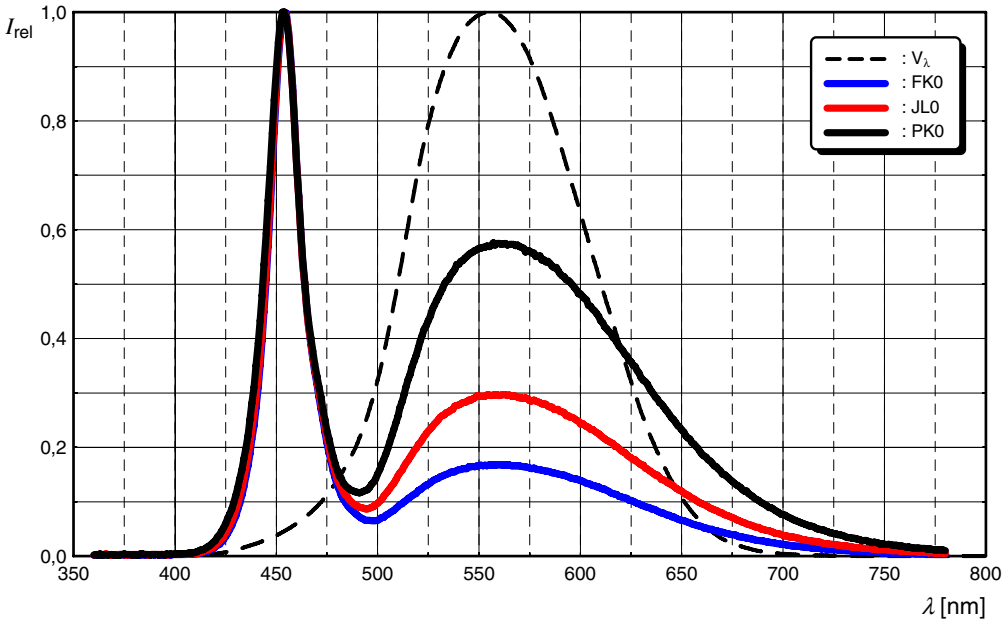
Group Name on Label

Example: AX-FK0-26

Brightness	Color Chromaticity	Forward Voltage
AX	FK0	26

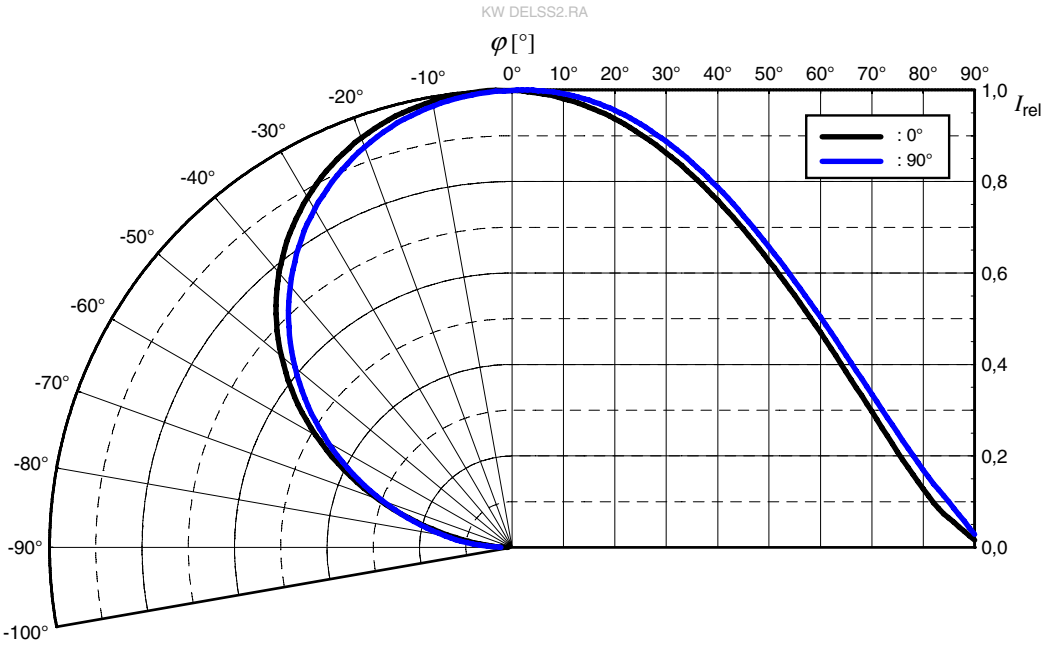
Relative Spectral Emission [7)]

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



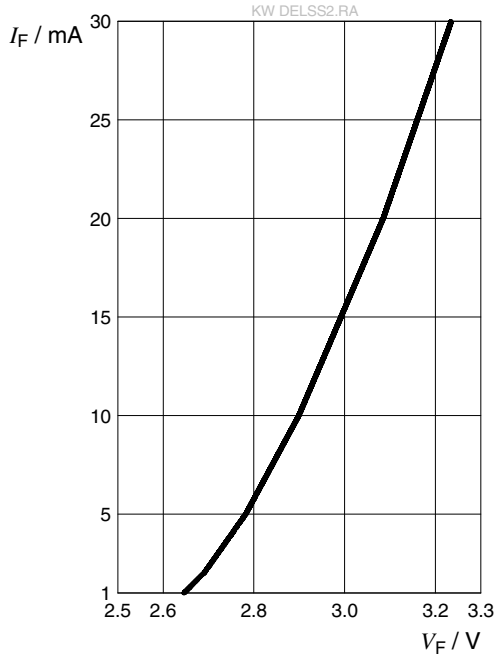
Radiation Characteristics [7)]

$I_{rel} = f(\phi)$; T_S = 25 °C



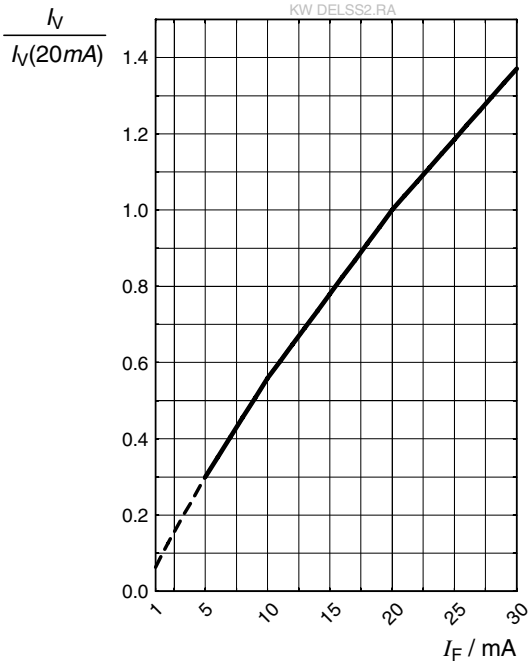
Forward current [7)]

$I_F = f(V_F)$; T_S = 25 °C



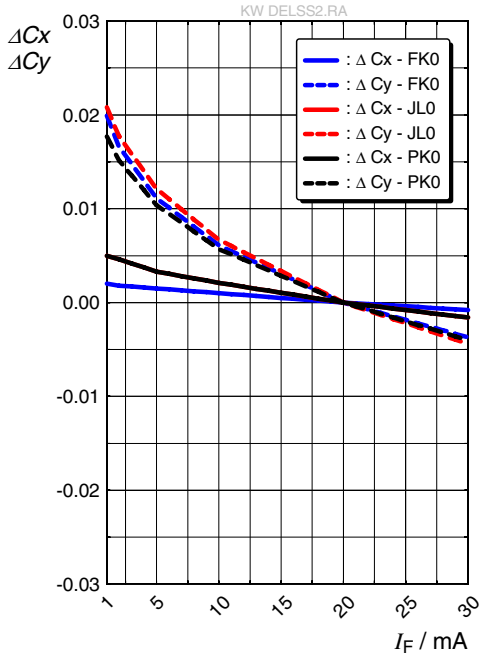
Relative Luminous Intensity [7), 8)]

$I_v/I_v(20\ mA) = f(I_F)$; T_S = 25 °C



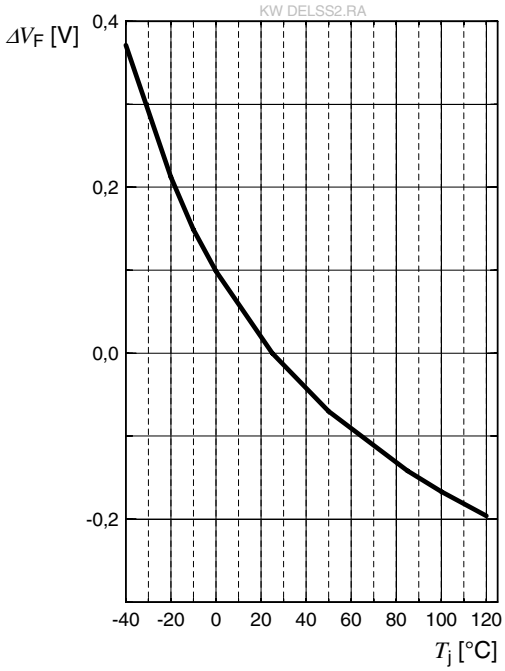
Chromaticity Coordinate Shift [7)]

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



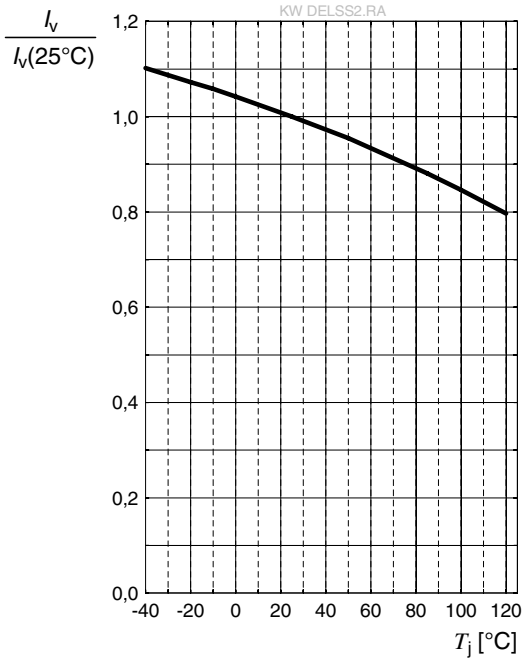
Forward Voltage [7)]

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



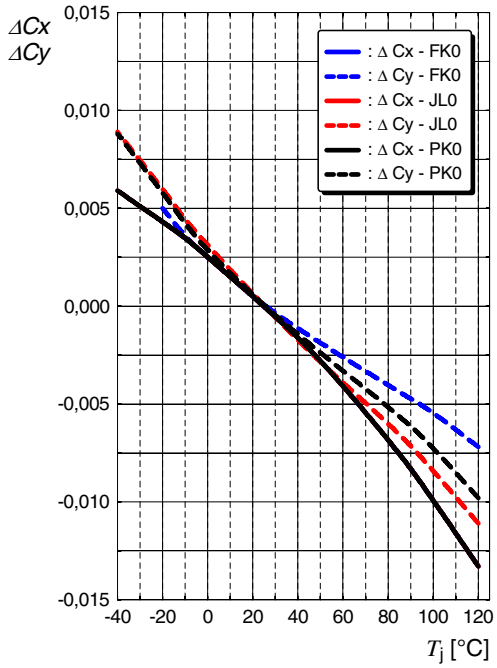
Relative Luminous Intensity [7)]

$I_v/I_v(25\ °C) = f(T_j);\ I_F = 20\ mA$



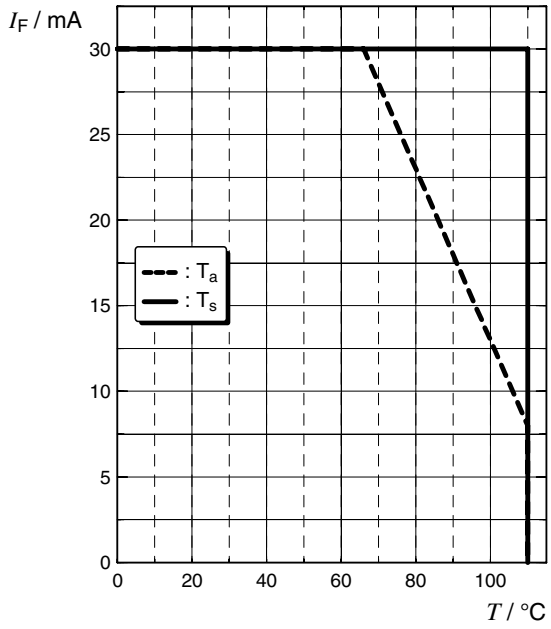
Chromaticity Coordinate Shift [7)]

$\Delta Cx, \Delta Cy = f(T_j);\ I_F = 20\ mA$



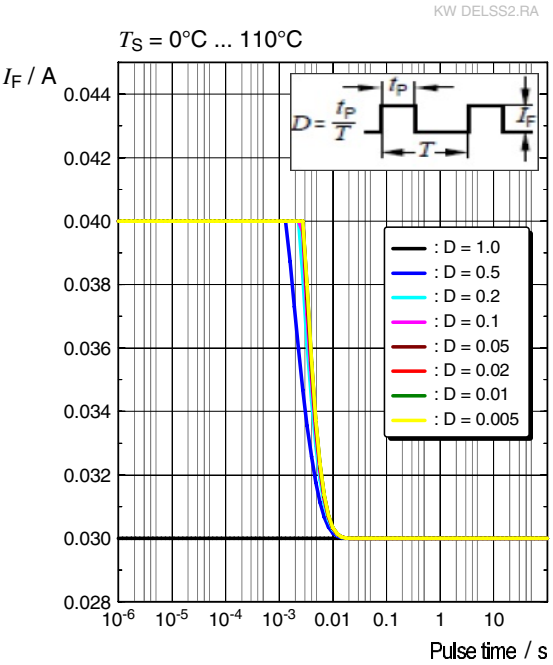
Max. Permissible Forward Current

$I_F = f(T)$

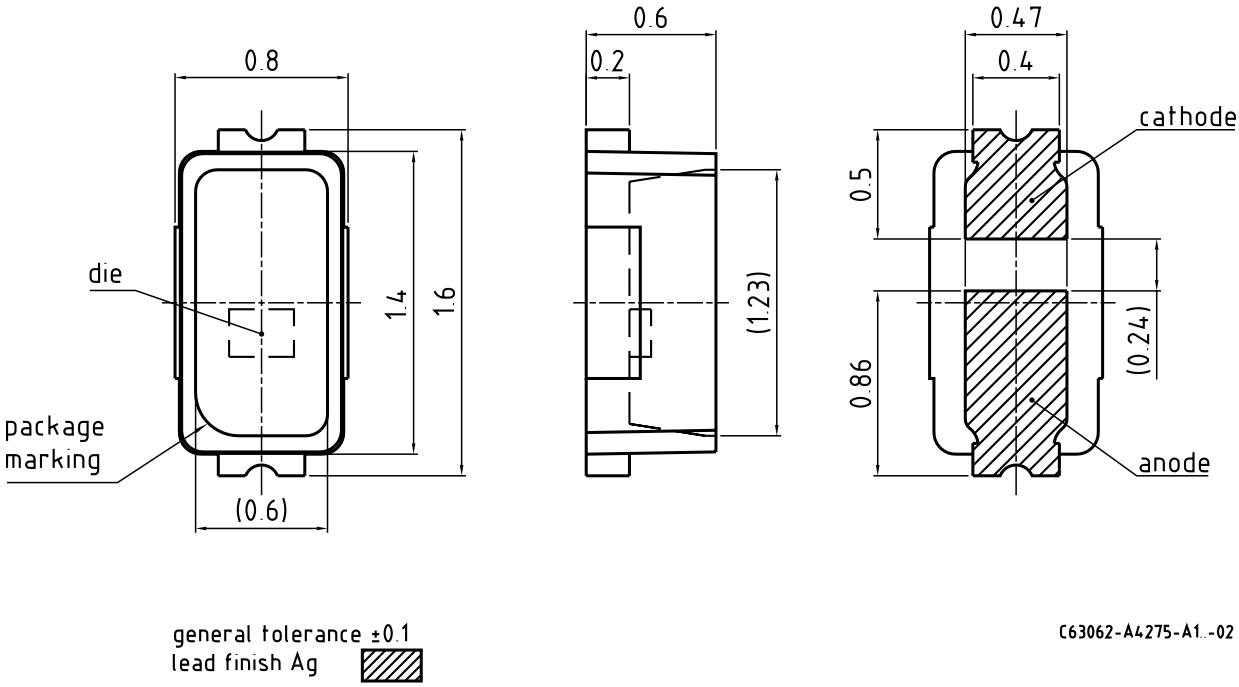


Permissible Pulse Handling Capability

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



Dimensional Drawing [9)]



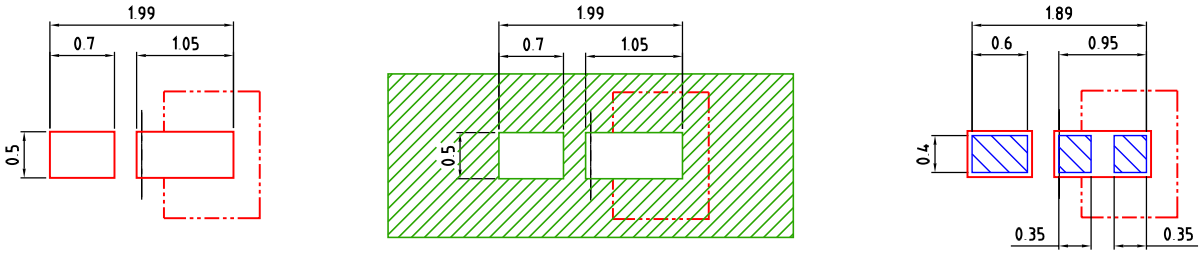
Further Information:

Approximate Weight: 2.0 mg

Package marking: Anode

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

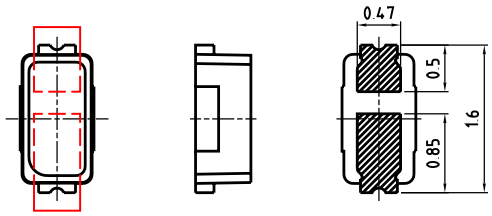
Recommended Solder Pad [9)]



foot print Cu area solder resist solder stencil

The usage of solder resist between anode and cathode pads is mandatory for applications where water may condense

Component Location on Pad

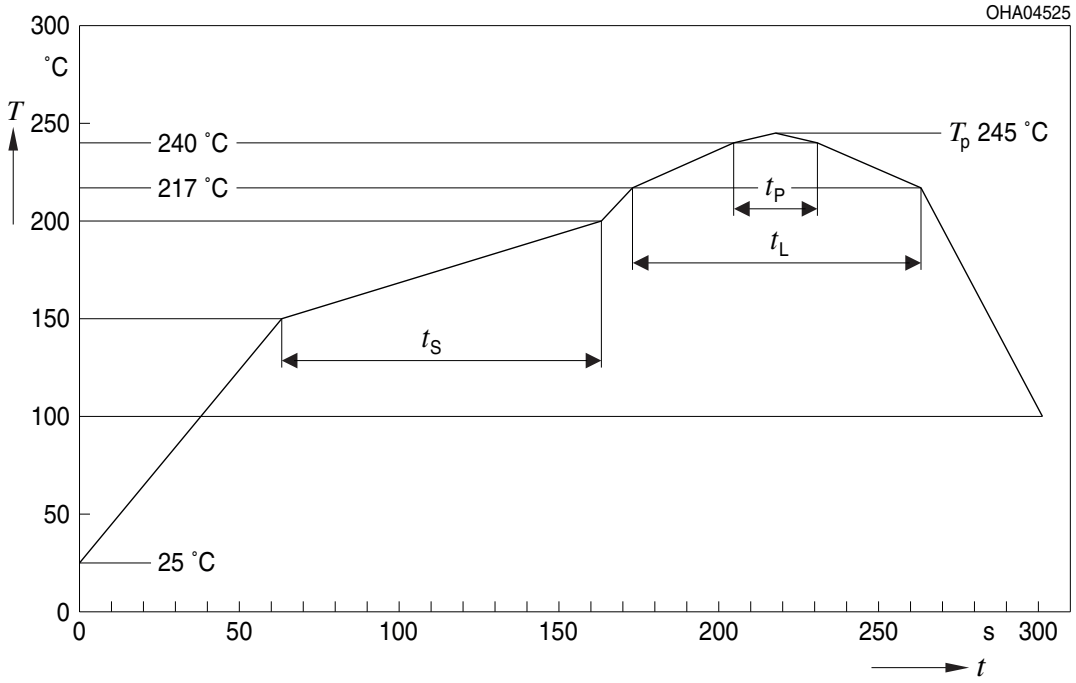


E062.3010.187 -02

All products are packed in a dry pack bag (Moisture Barrier Bag, MBB) according MIL-PRF-81705, after opening the MBB the products should go to reflow soldering process. Unused remaining LEDs should be protected from environment due to silver plated soldering terminal. In order to maintain solderability it is recommended to protect the silver plated solder terminals from corrosive environment before soldering. For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere.

Reflow Soldering Profile

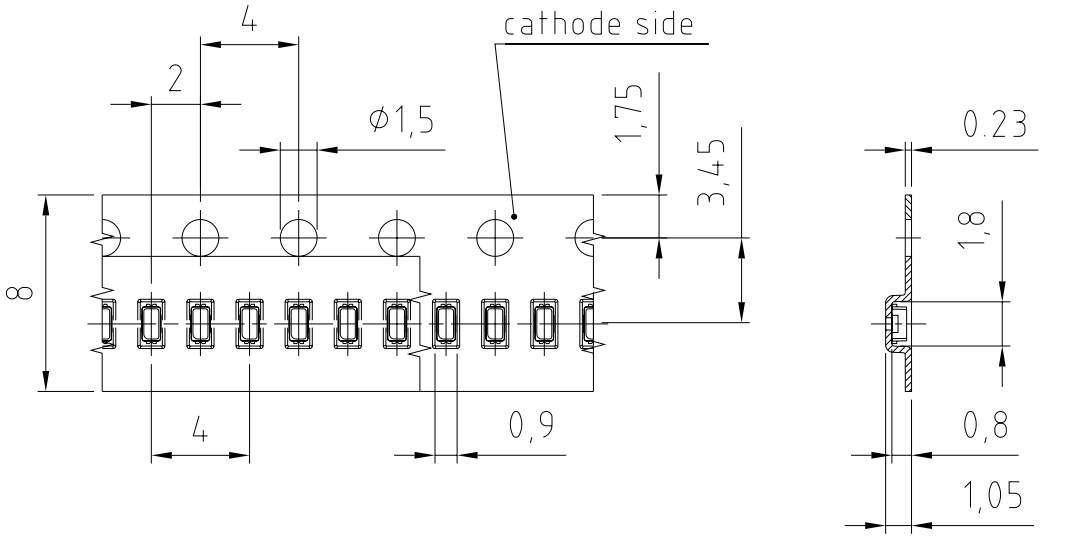
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



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

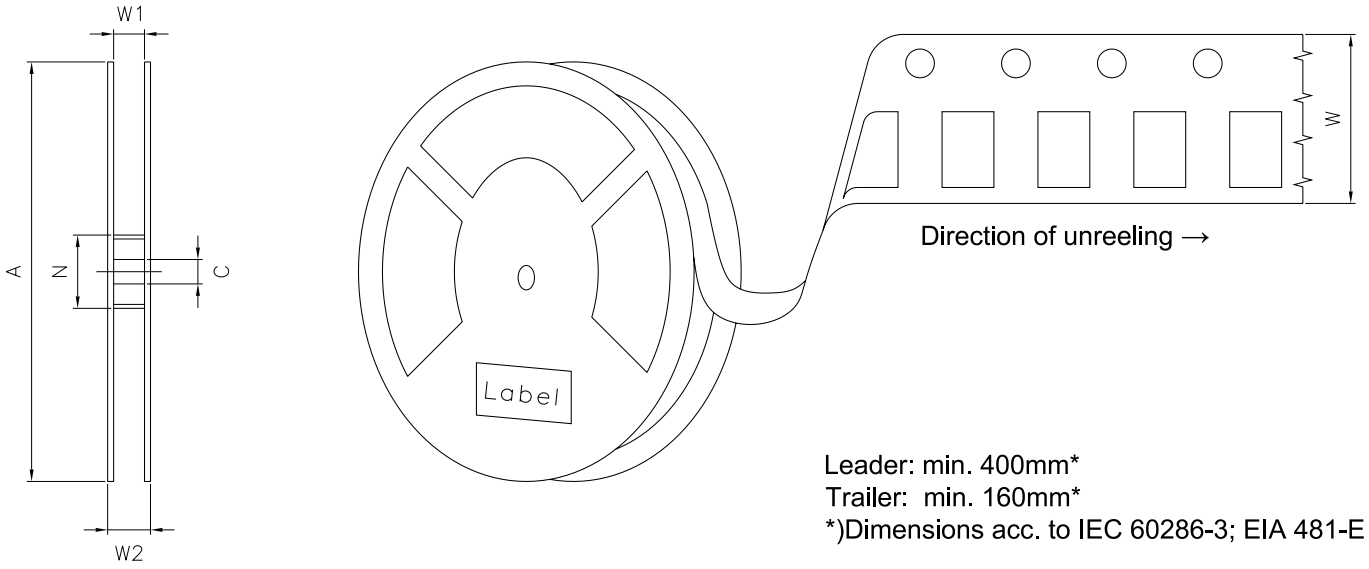
All temperatures refer to the center of the package, measured on the top of the component
* slope calculation DT/Dt: Dt max. 5 s; fulfillment for the whole T-range

Taping [9)]



C63062-A4275-B5 -02

Tape and Reel [10)]

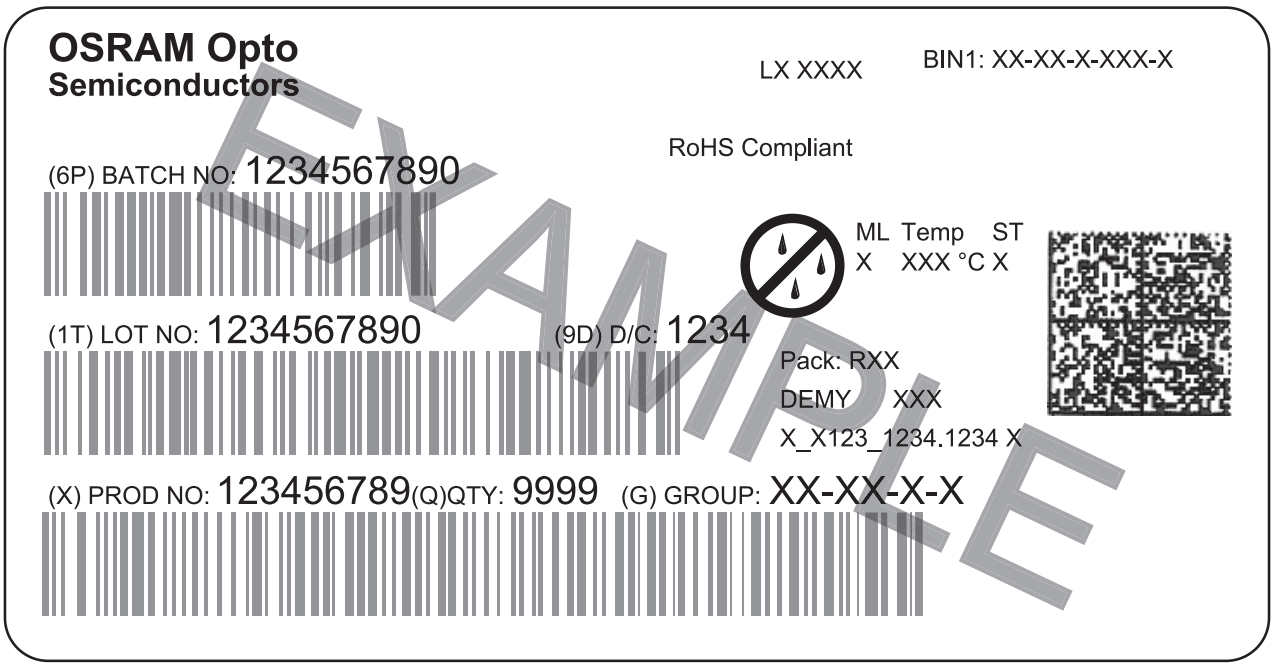


Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

Reel Dimensions

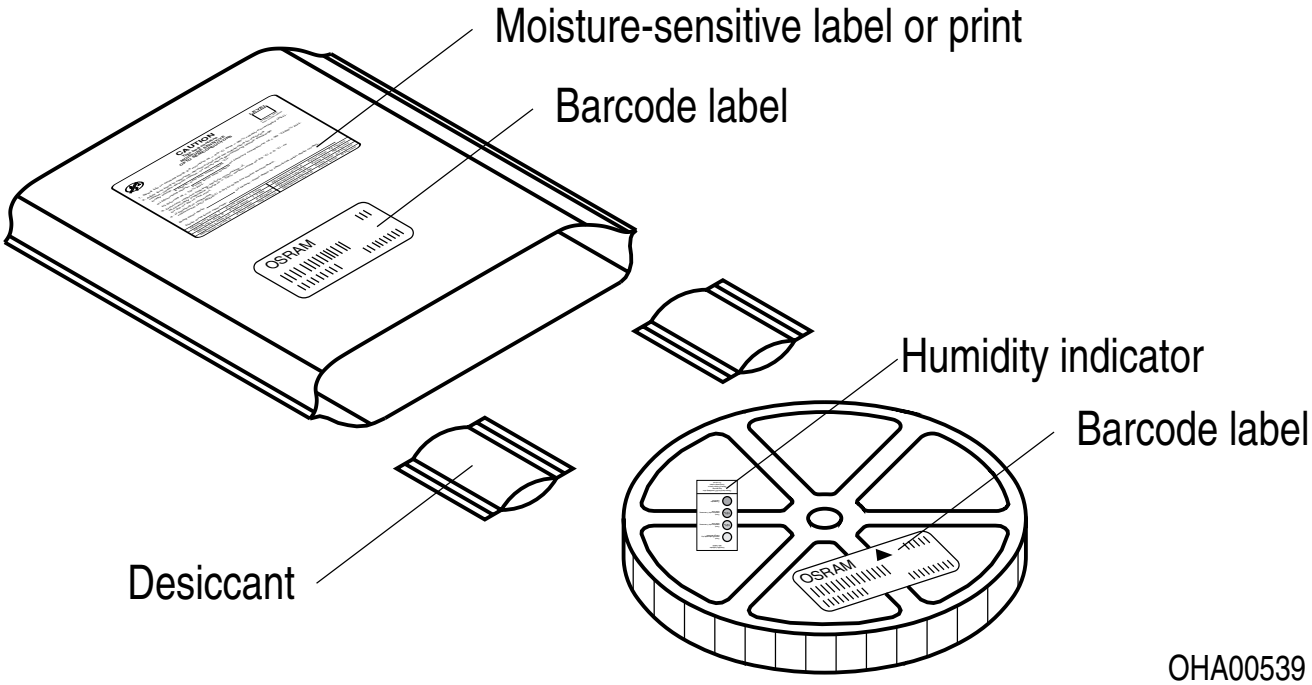
A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	9000

Barcode-Product-Label (BPL)



OHA04563

Dry Packing Process and Materials [9)]



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 **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

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) **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).

4) **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).

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

6) **Thermal Resistance:** RthJA results from mounting on PC board FR 4 (pad size 16 mm² 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 ±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
1.0	2019-01-22	Initial Version
1.1	2019-08-05	Maximum Ratings
1.2	2019-09-30	Additional Information
1.3	2020-03-05	Derating (Diagrams)
1.4	2020-03-09	Schematic Transportation Box Dimensions of Transportation Box
1.5	2020-06-04	Further Information
1.6	2022-03-08	Further Information New Layout
1.7	2022-06-01	Chromaticity Coordinate Groups

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不含有毒有害物质或元素。

Published by ams-OSRAM AG
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