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

- Ambient Lighting
- Appliances & Tools
- Automotive Aftermarket
- Functional Illumination

Features

- Package: white SMT package, colored diffused silicone resin
- Chip technology: Volume emitter on Sapphire (AlInGaN)
- 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-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] I_F = 20 mA	V_F	min.	2.80 V
		typ.	3.08 V
		max.	3.40 V
Reverse current [2] V_R = 5 V	I_R	typ.	0.01 µA
		max.	10 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

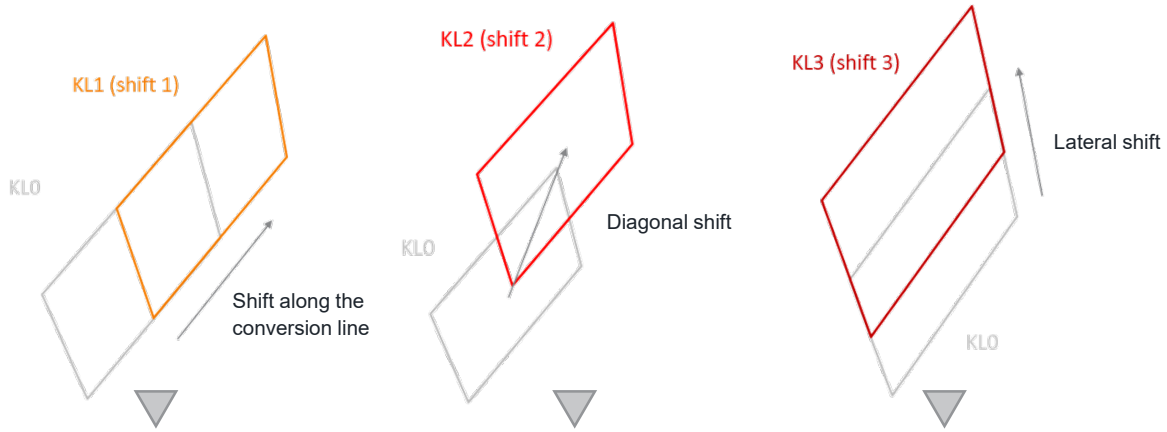
Group	Luminous Intensity [1] I_F = 20 mA min. I_v	Luminous Intensity [1] I_F = 20 mA max. I_v	Luminous Flux [7] I_F = 20 mA typ. Φ_V
AX	1120 mcd	1300 mcd	3630 mlm
AY	1300 mcd	1500 mcd	4200 mlm
AZ	1500 mcd	1800 mcd	4950 mlm
BX	1800 mcd	2100 mcd	5850 mlm
BY	2100 mcd	2400 mcd	6750 mlm
BZ	2400 mcd	2800 mcd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

Explanation of shifted bins

Original bins + 3 different shifts available (as long as shifted bins fall within outer limits of FK0PN0)

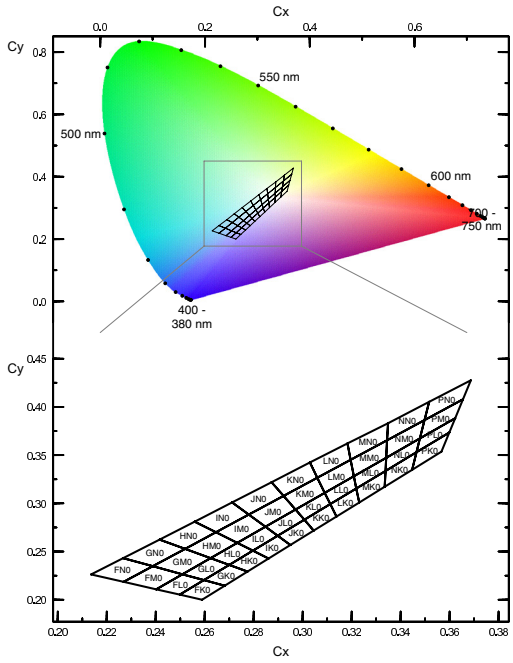


FK1NN1
(no “P” row)

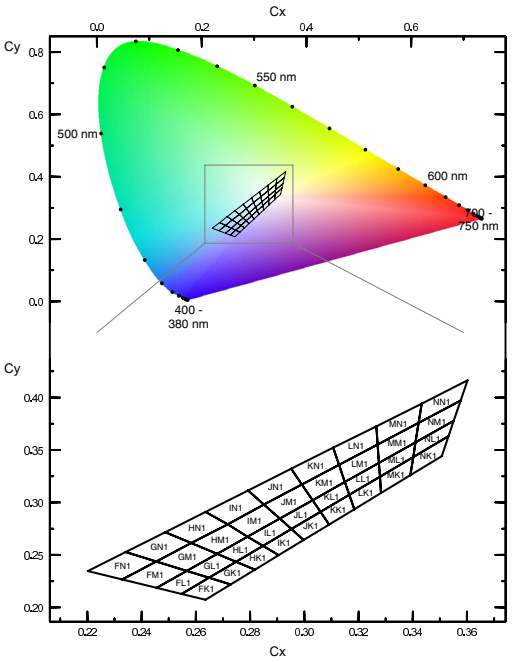
FK2NM2
(no “P” row, no “N” line)

FK3PM3
(no “N” line)

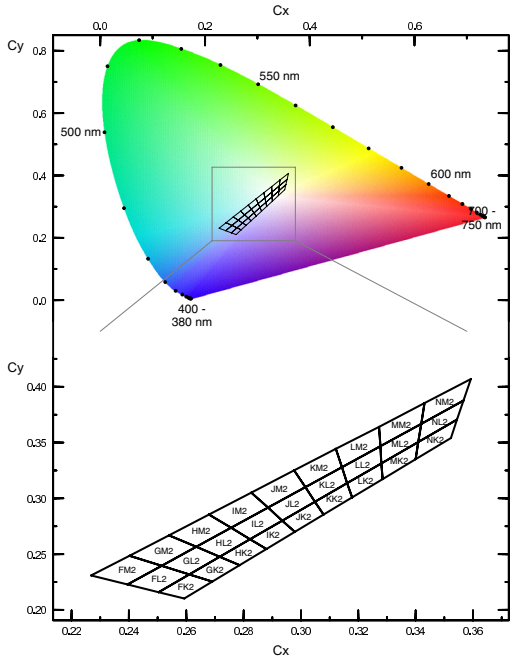
Chromaticity Coordinate Groups



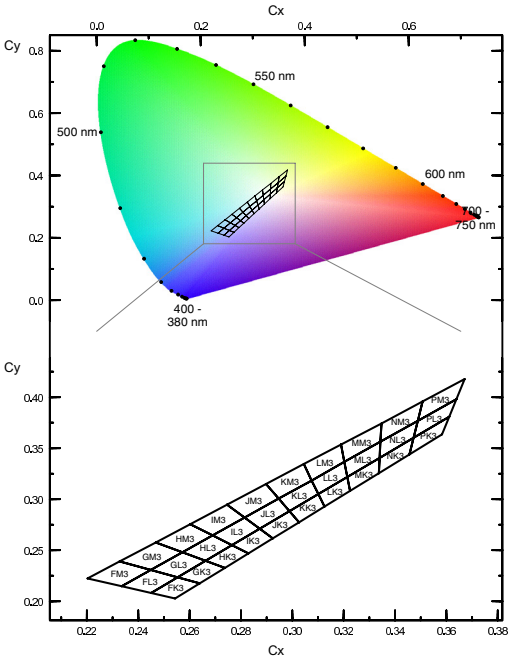
Chromaticity Coordinate Groups



Chromaticity Coordinate Groups



Chromaticity Coordinate Groups



Chromaticity Coordinate Groups [3)]

Group	Cx	Cy
FK0	0.2498	0.2053
	0.2597	0.2204
	0.2682	0.2146
	0.2589	0.2000
FK1	0.2547	0.2129
	0.2649	0.2283
	0.2729	0.2219
	0.2636	0.2073
FK2	0.2504	0.2159
	0.2611	0.2318
	0.2691	0.2254
	0.2593	0.2102
FK3	0.2450	0.2081
	0.2553	0.2234
	0.2640	0.2175
	0.2544	0.2027
FL0	0.2402	0.2108
	0.2509	0.2264
	0.2597	0.2204
	0.2498	0.2053
FL1	0.2456	0.2186
	0.2567	0.2348
	0.2649	0.2283
	0.2547	0.2129
FL2	0.2395	0.2228
	0.2515	0.2396
	0.2611	0.2318
	0.2504	0.2159
FL3	0.2336	0.2147
	0.2449	0.2306
	0.2553	0.2234
	0.2450	0.2081
FM0	0.2269	0.2185
	0.2388	0.2348
	0.2509	0.2264
	0.2402	0.2108
FM1	0.2329	0.2267
	0.2454	0.2438
	0.2567	0.2348
	0.2456	0.2186
FM2	0.2268	0.2309
	0.2402	0.2486
	0.2515	0.2396
	0.2395	0.2228
FM3	0.2203	0.2224
	0.2328	0.2390
	0.2449	0.2306
	0.2336	0.2147
FN0	0.2136	0.2262
	0.2267	0.2432
	0.2388	0.2348
	0.2269	0.2185
FN1	0.2202	0.2347
	0.2342	0.2527
	0.2454	0.2438
	0.2329	0.2267
GK0	0.2597	0.2204
	0.2700	0.2361
	0.2775	0.2292
	0.2682	0.2146
GK1	0.2649	0.2283
	0.2749	0.2435
	0.2818	0.2360
	0.2729	0.2219
GK2	0.2611	0.2318
	0.2717	0.2476
	0.2786	0.2401
	0.2691	0.2254
GK3	0.2553	0.2234
	0.2662	0.2396
	0.2738	0.2327
	0.2640	0.2175
GL0	0.2509	0.2264
	0.2624	0.2431
	0.2700	0.2361
	0.2597	0.2204
GL1	0.2567	0.2348
	0.2679	0.2511
	0.2749	0.2435
	0.2649	0.2283
GL2	0.2515	0.2396
	0.2635	0.2566
	0.2717	0.2476
	0.2611	0.2318
GL3	0.2449	0.2306
	0.2572	0.2479
	0.2662	0.2396
	0.2553	0.2234
GM0	0.2388	0.2348
	0.2520	0.2527
	0.2624	0.2431
	0.2509	0.2264
GM1	0.2454	0.2438
	0.2583	0.2614
	0.2679	0.2511
	0.2567	0.2348

Group	Cx	Cy
GM2	0.2402	0.2486
	0.2540	0.2669
	0.2635	0.2566
	0.2515	0.2396
GM3	0.2328	0.2390
	0.2468	0.2575
	0.2572	0.2479
	0.2449	0.2306
GN0	0.2267	0.2432
	0.2416	0.2623
	0.2520	0.2527
	0.2388	0.2348
GN1	0.2342	0.2527
	0.2488	0.2717
	0.2583	0.2614
	0.2454	0.2438
HK0	0.2700	0.2361
	0.2797	0.2509
	0.2861	0.2427
	0.2775	0.2292
HK1	0.2749	0.2435
	0.2848	0.2587
	0.2906	0.2498
	0.2818	0.2360
HK2	0.2717	0.2476
	0.2823	0.2633
	0.2880	0.2546
	0.2786	0.2401
HK3	0.2662	0.2396
	0.2765	0.2550
	0.2829	0.2468
	0.2738	0.2327

Group	Cx	Cy
HL0	0.2624	0.2431
	0.2733	0.2590
	0.2797	0.2509
	0.2700	0.2361
HL1	0.2679	0.2511
	0.2791	0.2674
	0.2848	0.2587
	0.2749	0.2435
HL2	0.2635	0.2566
	0.2757	0.2737
	0.2823	0.2633
	0.2717	0.2476
HL3	0.2572	0.2479
	0.2690	0.2645
	0.2765	0.2550
	0.2662	0.2396
HM0	0.2520	0.2527
	0.2646	0.2700
	0.2733	0.2590
	0.2624	0.2431
HM1	0.2583	0.2614
	0.2718	0.2792
	0.2791	0.2674
	0.2679	0.2511
HM2	0.2540	0.2669
	0.2679	0.2855
	0.2757	0.2737
	0.2635	0.2566
HM3	0.2468	0.2575
	0.2602	0.2755
	0.2690	0.2645
	0.2572	0.2479

Group	Cx	Cy
HN0	0.2416	0.2623
	0.2559	0.2810
	0.2646	0.2700
	0.2520	0.2527
HN1	0.2488	0.2717
	0.2636	0.2910
	0.2718	0.2792
	0.2583	0.2614
IK0	0.2797	0.2509
	0.2898	0.2664
	0.2950	0.2568
	0.2861	0.2427
IK1	0.2848	0.2587
	0.2953	0.2747
	0.2998	0.2643
	0.2906	0.2498
IK2	0.2823	0.2633
	0.2935	0.2800
	0.2979	0.2699
	0.2880	0.2546
IK3	0.2765	0.2550
	0.2873	0.2711
	0.2924	0.2616
	0.2829	0.2468
IL0	0.2733	0.2590
	0.2848	0.2757
	0.2898	0.2664
	0.2797	0.2509
IL1	0.2791	0.2674
	0.2910	0.2846
	0.2953	0.2747
	0.2848	0.2587

Group	Cx	Cy
IL2	0.2757	0.2737
	0.2885	0.2917
	0.2935	0.2800
	0.2823	0.2633
IL3	0.2690	0.2645
	0.2814	0.2820
	0.2873	0.2711
	0.2765	0.2550
IM0	0.2646	0.2700
	0.2780	0.2883
	0.2848	0.2757
	0.2733	0.2590
IM1	0.2718	0.2792
	0.2851	0.2980
	0.2910	0.2846
	0.2791	0.2674
IM2	0.2679	0.2855
	0.2827	0.3051
	0.2885	0.2917
	0.2757	0.2737
IM3	0.2602	0.2755
	0.2746	0.2946
	0.2814	0.2820
	0.2690	0.2645
IN0	0.2559	0.2810
	0.2712	0.3009
	0.2780	0.2883
	0.2646	0.2700
IN1	0.2636	0.2910
	0.2793	0.3114
	0.2851	0.2980
	0.2718	0.2792

Group	Cx	Cy
JK0	0.2898	0.2664
	0.3007	0.2830
	0.3045	0.2717
	0.2950	0.2568
JK1	0.2953	0.2747
	0.3060	0.2911
	0.3092	0.2790
	0.2998	0.2643
JK2	0.2935	0.2800
	0.3049	0.2969
	0.3079	0.2855
	0.2979	0.2699
JK3	0.2873	0.2711
	0.2989	0.2883
	0.3026	0.2774
	0.2924	0.2616
JL0	0.2848	0.2757
	0.2971	0.2935
	0.3007	0.2830
	0.2898	0.2664
JL1	0.2910	0.2846
	0.3031	0.3022
	0.3060	0.2911
	0.2953	0.2747
JL2	0.2885	0.2917
	0.3016	0.3101
	0.3049	0.2969
	0.2935	0.2800
JL3	0.2814	0.2820
	0.2947	0.3006
	0.2989	0.2883
	0.2873	0.2711

Group	Cx	Cy
JM0	0.2780	0.2883
	0.2922	0.3077
	0.2971	0.2935
	0.2848	0.2757
JM1	0.2851	0.2980
	0.2991	0.3172
	0.3031	0.3022
	0.2910	0.2846
JM2	0.2827	0.3051
	0.2976	0.3251
	0.3016	0.3101
	0.2885	0.2917
JM3	0.2746	0.2946
	0.2898	0.3148
	0.2947	0.3006
	0.2814	0.2820
JN0	0.2712	0.3009
	0.2873	0.3219
	0.2922	0.3077
	0.2780	0.2883
JN1	0.2793	0.3114
	0.2952	0.3322
	0.2991	0.3172
	0.2851	0.2980
KK0	0.3007	0.2830
	0.3113	0.2992
	0.3138	0.2862
	0.3045	0.2717
KK1	0.3060	0.2911
	0.3166	0.3073
	0.3185	0.2935
	0.3092	0.2790

Group	Cx	Cy
KK2	0.3049	0.2969
	0.3161	0.3137
	0.3179	0.3008
	0.3079	0.2855
KK3	0.2989	0.2883
	0.3102	0.3050
	0.3126	0.2927
	0.3026	0.2774
KL0	0.2971	0.2935
	0.3090	0.3108
	0.3113	0.2992
	0.3007	0.2830
KL1	0.3031	0.3022
	0.3150	0.3195
	0.3166	0.3073
	0.3060	0.2911
KL2	0.3016	0.3101
	0.3143	0.3280
	0.3161	0.3137
	0.3049	0.2969
KL3	0.2947	0.3006
	0.3075	0.3182
	0.3102	0.3050
	0.2989	0.2883
KM0	0.2922	0.3077
	0.3060	0.3266
	0.3090	0.3108
	0.2971	0.2935
KM1	0.2991	0.3172
	0.3128	0.3359
	0.3150	0.3195
	0.3031	0.3022

Group	Cx	Cy
KM2	0.2976	0.3251
	0.3122	0.3444
	0.3143	0.3280
	0.3016	0.3101
KM3	0.2898	0.3148
	0.3045	0.3345
	0.3075	0.3182
	0.2947	0.3006
KN0	0.2873	0.3219
	0.3030	0.3424
	0.3060	0.3266
	0.2922	0.3077
KN1	0.2952	0.3322
	0.3107	0.3523
	0.3128	0.3359
	0.2991	0.3172
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

Group	Cx	Cy
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
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

Group	Cx	Cy
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
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
MM2	0.3273	0.3641
	0.3431	0.3854
	0.3420	0.3668
	0.3277	0.3468
MM3	0.3190	0.3536
	0.3347	0.3742
	0.3343	0.3563
	0.3203	0.3366
MN0	0.3183	0.3621
	0.3349	0.3830
	0.3345	0.3654
	0.3196	0.3451
MN1	0.3266	0.3726
	0.3433	0.3942
	0.3422	0.3759
	0.3271	0.3553
NK0	0.3339	0.3336
	0.3465	0.3530
	0.3447	0.3347
	0.3335	0.3172
NK1	0.3391	0.3260
	0.3402	0.3433
	0.3532	0.3633
	0.3507	0.3441
NK2	0.3400	0.3351
	0.3409	0.3505
	0.3544	0.3706
	0.3523	0.3541
NK3	0.3337	0.3254
	0.3340	0.3404
	0.3472	0.3602
	0.3456	0.3439
NL0	0.3341	0.3472
	0.3479	0.3673
	0.3465	0.3530
	0.3339	0.3336
NL1	0.3402	0.3433
	0.3410	0.3573
	0.3551	0.3778
	0.3532	0.3633
NL2	0.3409	0.3505
	0.3420	0.3668
	0.3567	0.3876
	0.3544	0.3706
NL3	0.3340	0.3404
	0.3343	0.3563
	0.3489	0.3768
	0.3472	0.3602

Group	Cx	Cy
NM0	0.3345	0.3654
	0.3498	0.3863
	0.3479	0.3673
	0.3341	0.3472
NM1	0.3410	0.3573
	0.3422	0.3759
	0.3577	0.3971
	0.3551	0.3778
NM2	0.3420	0.3668
	0.3431	0.3854
	0.3593	0.4070
	0.3567	0.3876
NM3	0.3343	0.3563
	0.3347	0.3742
	0.3508	0.3958
	0.3489	0.3768
NN0	0.3349	0.3830
	0.3517	0.4053
	0.3498	0.3863
	0.3345	0.3654

Group	Cx	Cy
NN1	0.3422	0.3759
	0.3433	0.3942
	0.3602	0.4165
	0.3577	0.3971
PK0	0.3465	0.3530
	0.3599	0.3735
	0.3567	0.3535
	0.3447	0.3347
PK3	0.3456	0.3439
	0.3472	0.3602
	0.3611	0.3809
	0.3583	0.3635
PL0	0.3479	0.3673
	0.3623	0.3882
	0.3599	0.3735
	0.3465	0.3530
PL3	0.3472	0.3602
	0.3489	0.3768
	0.3639	0.3981
	0.3611	0.3809

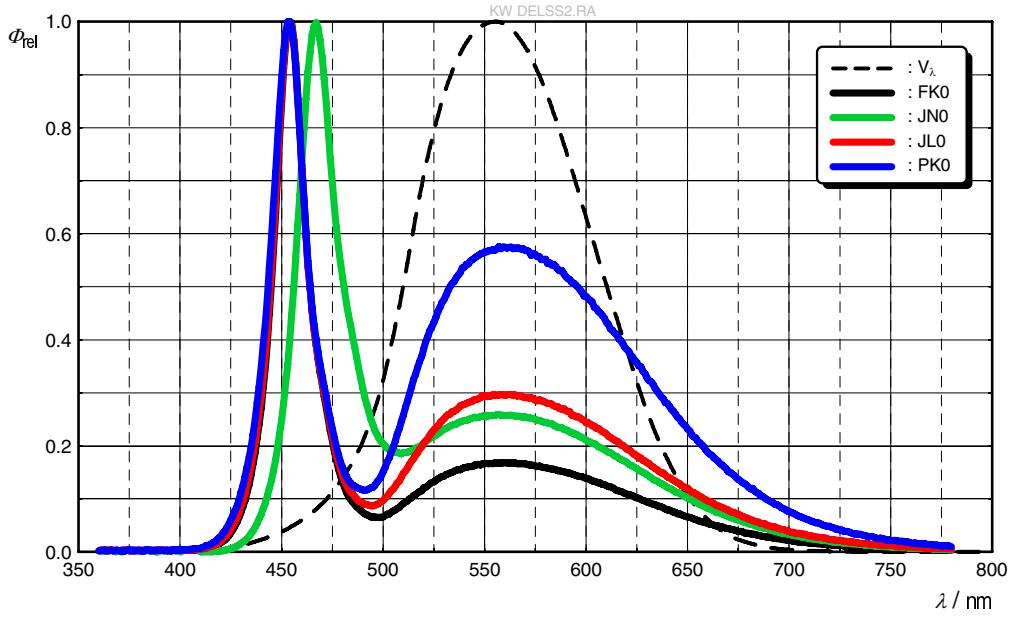
Group	Cx	Cy
PM0	0.3498	0.3863
	0.3655	0.4079
	0.3623	0.3882
	0.3479	0.3673
PM3	0.3489	0.3768
	0.3508	0.3958
	0.3671	0.4178
	0.3639	0.3981
PN0	0.3517	0.4053
	0.3687	0.4276
	0.3655	0.4079
	0.3498	0.3863

Group Name on Label

Example: AX-FK0-26

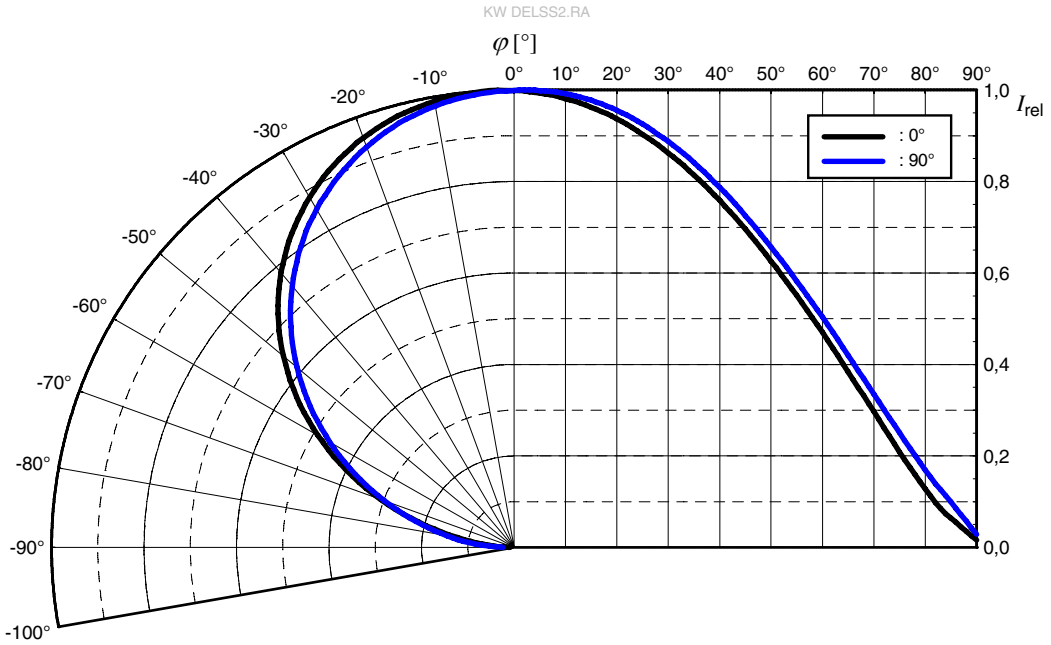
Brightness	Color Chromaticity	Forward Voltage
AX	FK0	26

Relative Spectral Emission [7)]



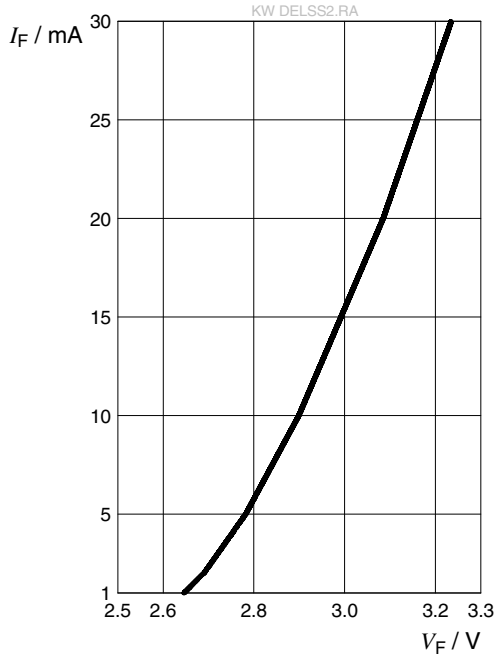
Radiation Characteristics [7)]

$I_{rel} = f(\phi)$; $T_S = 25$ °C



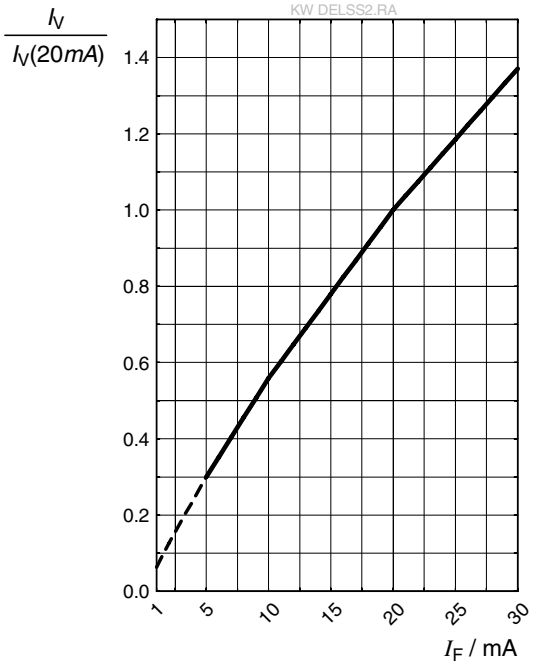
Forward current [7)]

$I_F = f(V_F)$; T_S = 25 °C



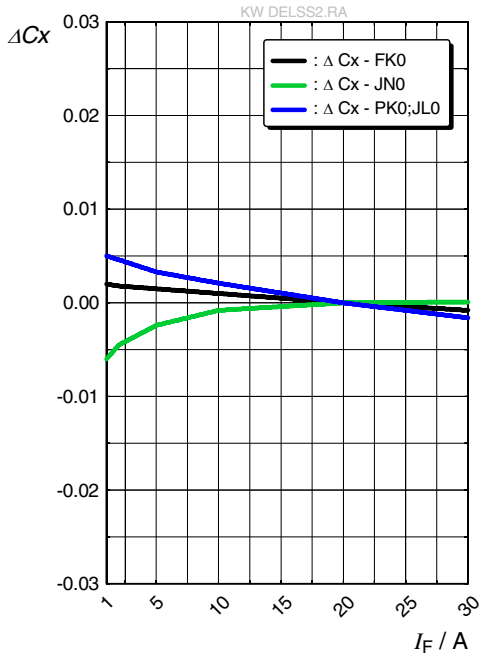
Relative Luminous Intensity [7), 8)]

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



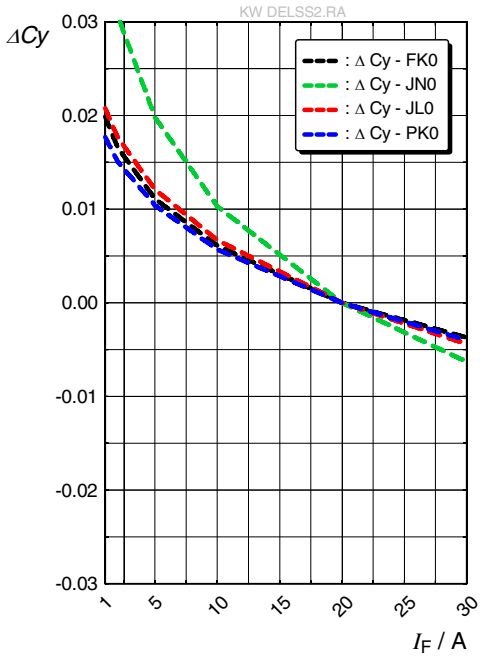
Chromaticity Coordinate Shift

$\Delta Cx = f(I_F)$; T_S = 25 °C



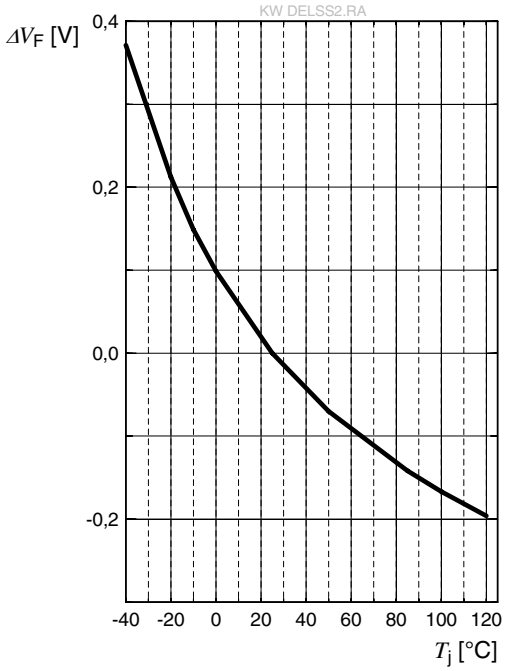
Chromaticity Coordinate Shift

$\Delta Cy = f(I_F)$; T_S = 25 °C



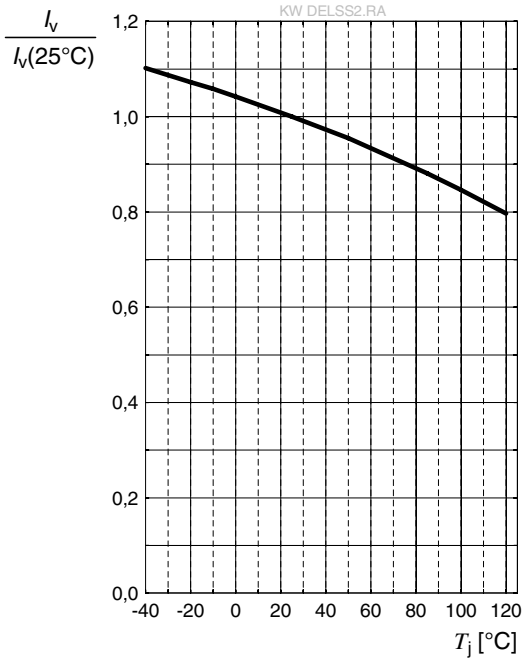
Forward Voltage [7)]

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



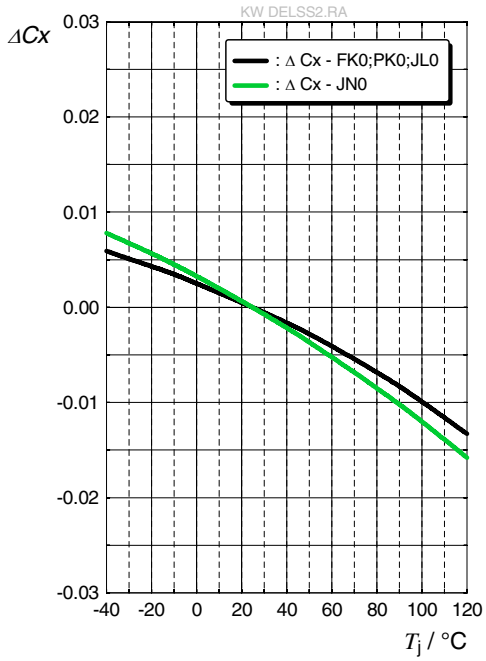
Relative Luminous Intensity [7)]

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



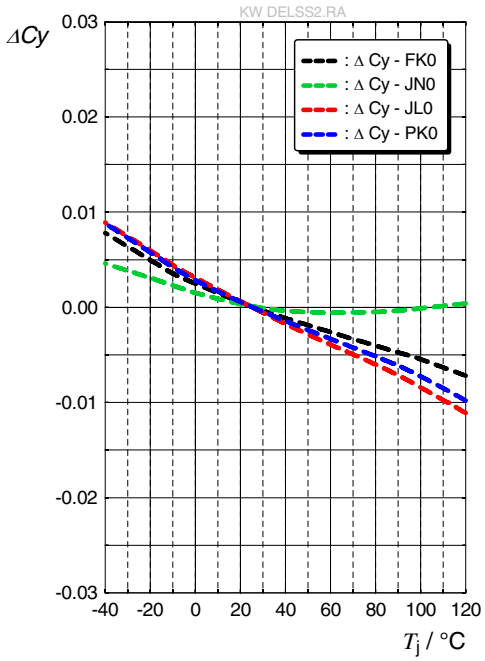
Chromaticity Coordinate Shift [7)]

$\Delta Cx = f(I_F);\ T_S = 25\ °C$



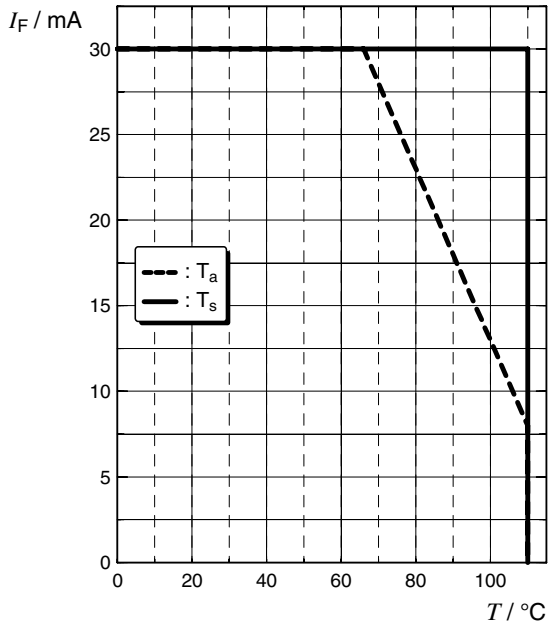
Chromaticity Coordinate Shift [7)]

$\Delta Cy = f(I_F);\ T_S = 25\ °C$



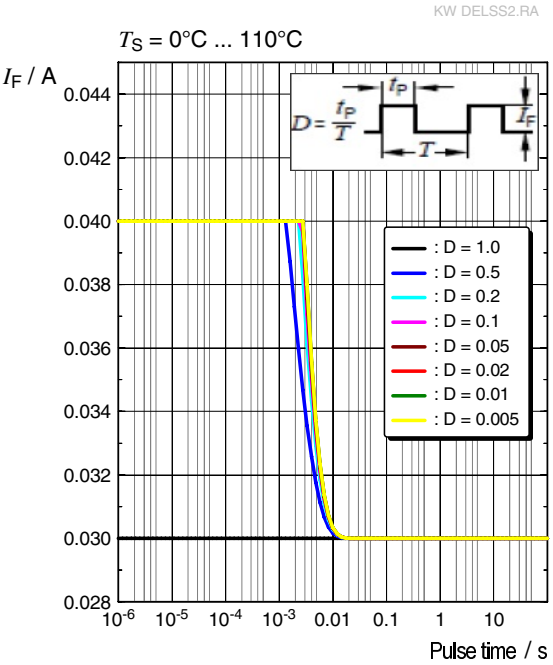
Max. Permissible Forward Current [5)]

$I_F = f(T)$

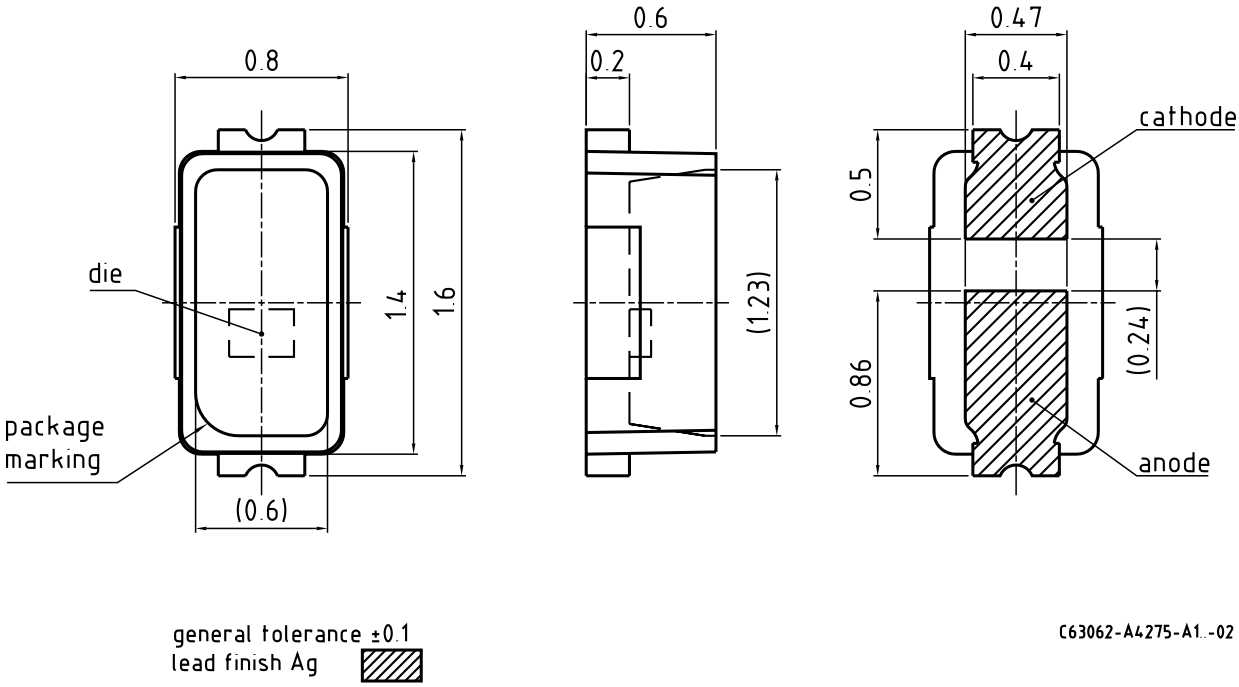


Permissible Pulse Handling Capability

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



Dimensional Drawing [9)]



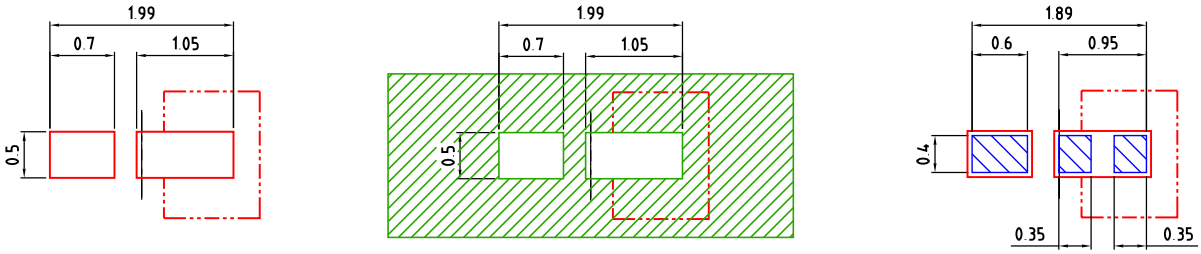
Further Information:

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)

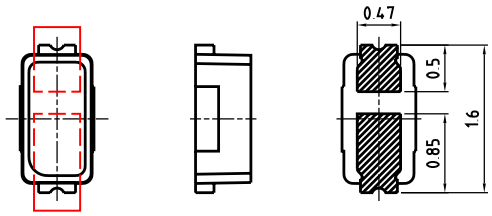
Recommended Solder Pad [9)]



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

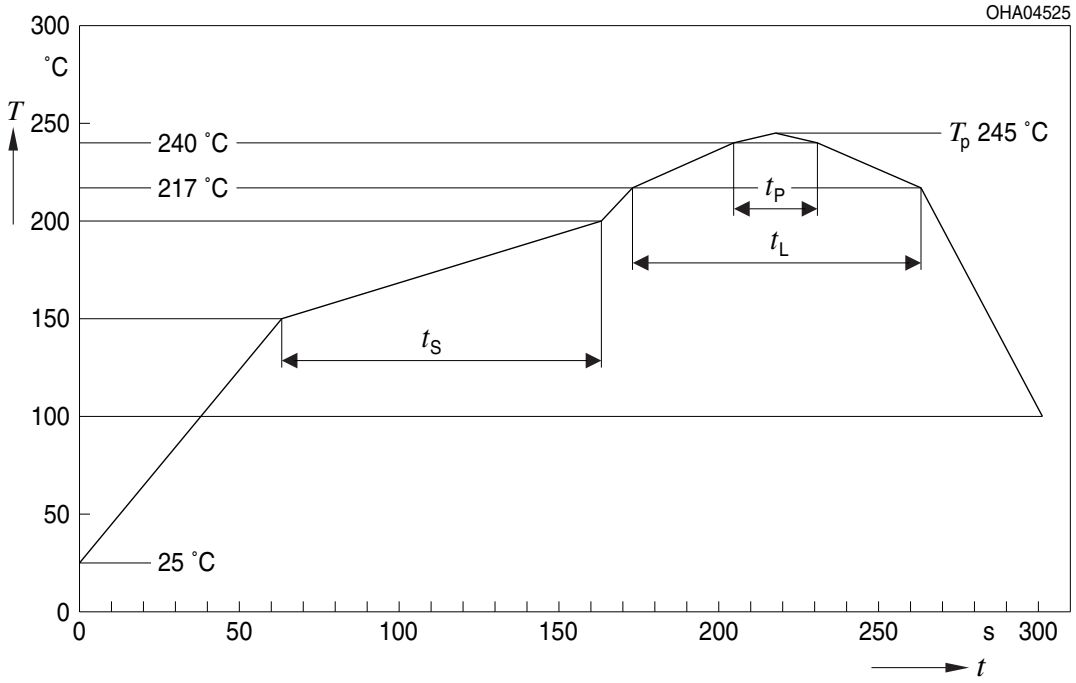


E062.3010.187 -02

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

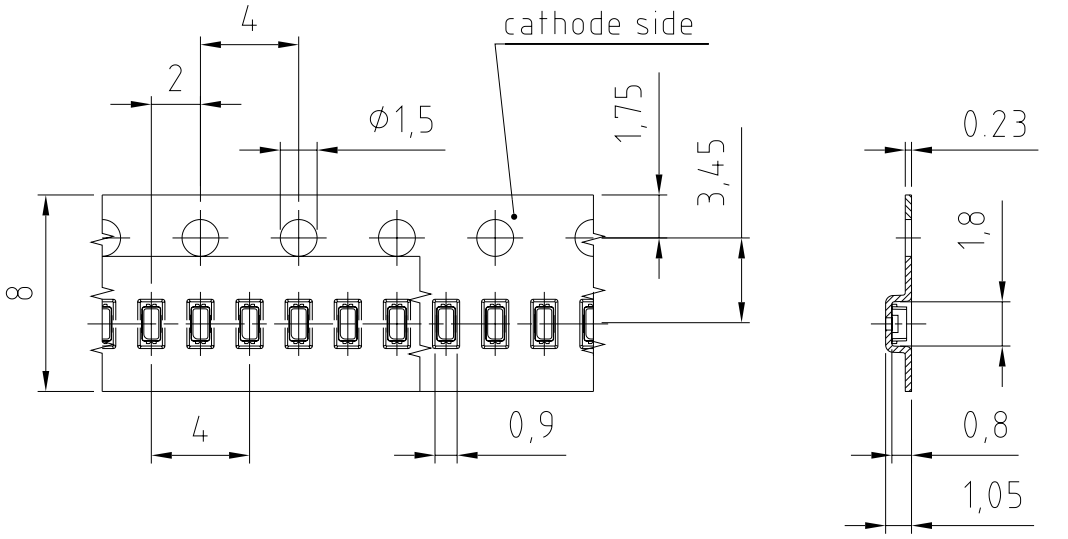
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



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

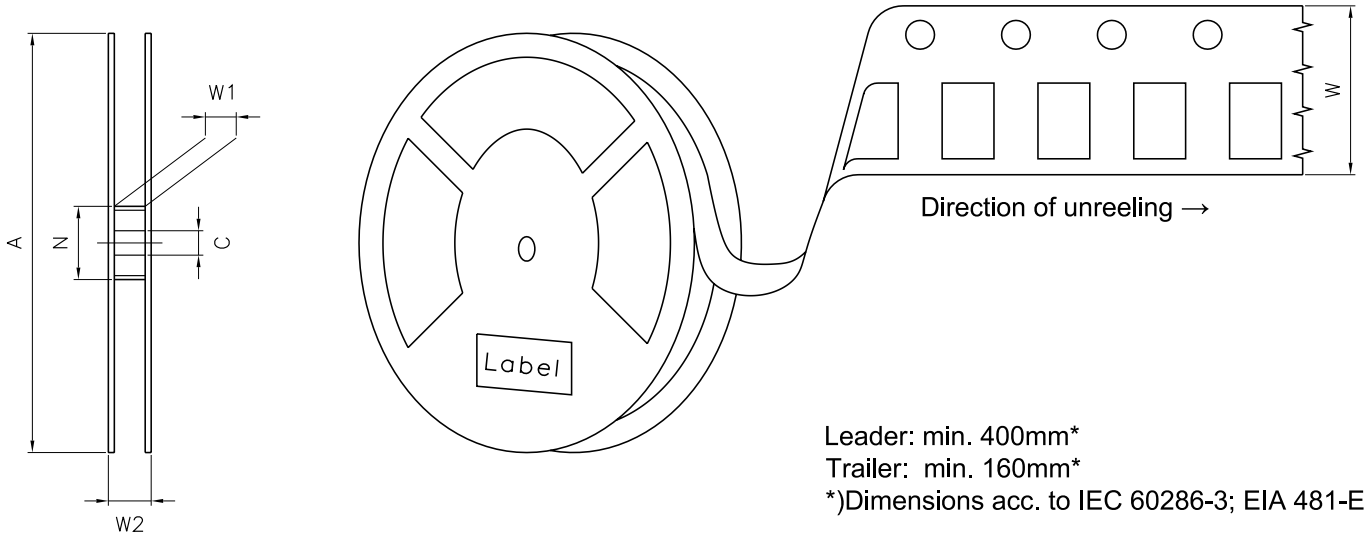
All temperatures refer to the center of the package, measured on the top of the component
* slope calculation DT/Dt: Dt max. 5 s; fulfillment for the whole T-range

Taping [9)]



C63062-A4275-B5 -02

Tape and Reel [10)]

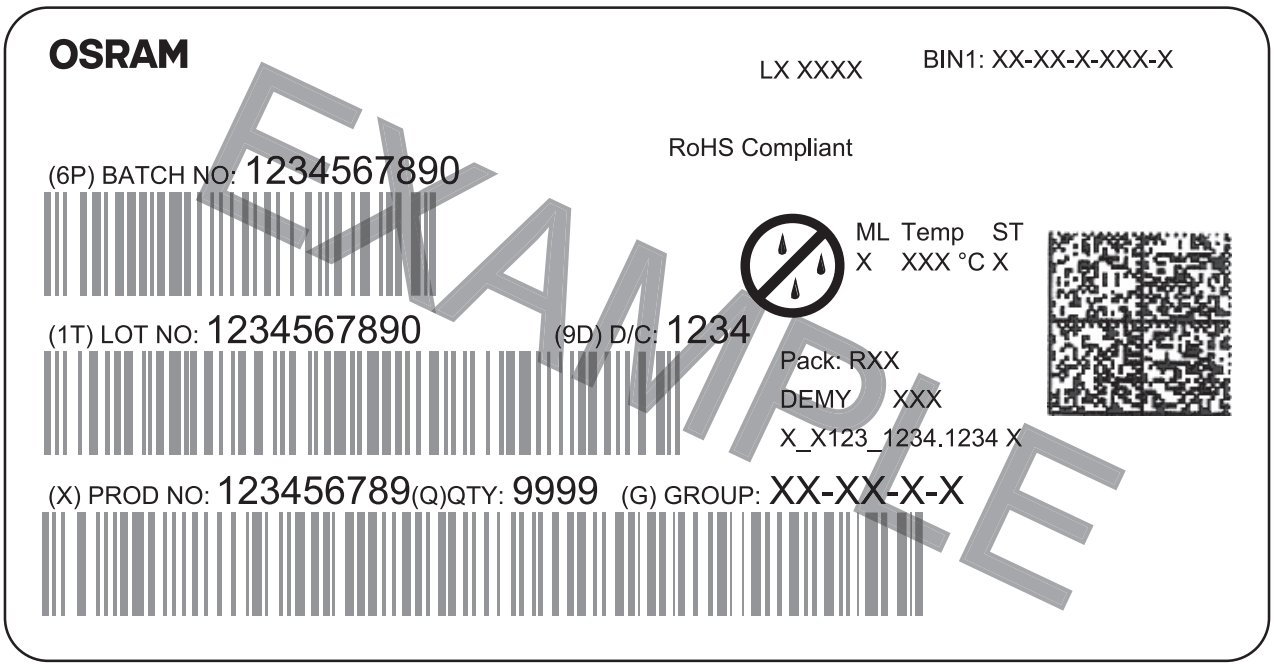


Leader: min. 400mm*
Trailer: min. 160mm*
*)Dimensions acc. to IEC 60286-3; EIA 481-E

Reel Dimensions

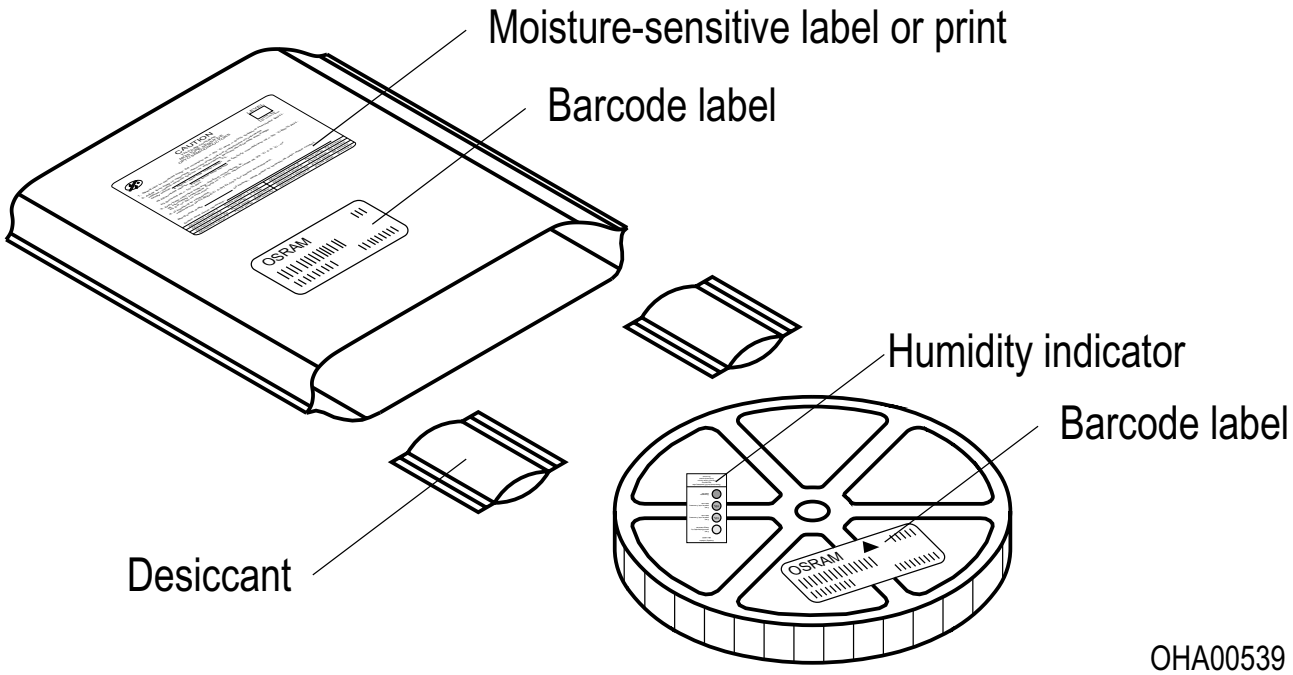
A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	5000

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 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) **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) used for Derating.

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
1.8	2022-06-22	Ordering Information
1.9	2022-11-21	Ordering Information Applications Electro - Optical Characteristics (Diagrams) Tape and Reel Reel Dimensions
1.10	2023-05-23	Electro - Optical Characteristics (Diagrams)
1.11	2024-06-26	Applications Features
1.12	2025-09-23	Additional 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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