

OSRAM GW JTLRS1.CM

Datasheet

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DURIS® E 2835

GW JTLRS1.CM

The compact, mid-power DURIS® E 2835 LED with an industry standard footprint. Optimum lumen packages for retrofit applications and a truly cost optimize product. It is the ideal choice for all indoor General Lighting applications.



Applications

- Indoor Lighting

Features

- Package: white SMT package, colored diffused silicone resin
- Typ. Radiation: 120° (Lambertian emitter)
- Color temperature: 2200K - 6500K
- CRI: 90 (min.), 92 (typ.), R9: 50 (min.)
- Lumen maintenance: Test results according to IESNA LM-80 available
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Luminous Flux: typ. 114 lm @ 2700 K
- Luminous efficacy: typ. 126 lm/W @ 2700 K

Ordering Information

| Type | Color temperature | Luminous Flux ¹⁾ $I_F = 100 \text{ mA}$ Φ_V | Ordering Code |
|----------------------------|-------------------|---|---------------|
| GW JTLRS1.CM-KWK5-XX510-1 | 2200 K | 85 ... 130 lm | Q65113A1012 |
| GW JTLRS1.CM-K1LW-XX58-1 | 2700 K | 105 ... 140 lm | Q65112A9276 |
| GW JTLRS1.CM-K2LZ-XX58-1-B | 2700 K | 110 ... 155 lm | Q65113A1324 |
| GW JTLRS1.CM-K1LW-XX57-1 | 3000 K | 105 ... 140 lm | Q65113A1002 |
| GW JTLRS1.CM-K2LZ-XX57-1-B | 3000 K | 110 ... 155 lm | Q65113A1322 |
| GW JTLRS1.CM-K1LW-XX56-1 | 3500 K | 105 ... 140 lm | Q65113A1000 |
| GW JTLRS1.CM-K2LW-XX55-1 | 4000 K | 110 ... 140 lm | Q65113A1006 |
| GW JTLRS1.CM-K4L2-XX55-1-B | 4000 K | 120 ... 165 lm | Q65113A1334 |
| GW JTLRS1.CM-K2LW-XX53-1 | 5000 K | 110 ... 140 lm | Q65113A1004 |
| GW JTLRS1.CM-K4L2-XX53-1-B | 5000 K | 120 ... 165 lm | Q65113A1332 |
| GW JTLRS1.CM-K3LW-XX52-1 | 5700 K | 115 ... 140 lm | Q65113A1010 |
| GW JTLRS1.CM-K3LW-XX51-1 | 6500 K | 115 ... 140 lm | Q65113A1008 |
| GW JTLRS1.CM-K4L2-XX51-1-B | 6500 K | 120 ... 165 lm | Q65113A1328 |

Maximum Ratings

| Parameter | Symbol | | Values |
|--|-----------|------|--------|
| Operating Temperature | T_{op} | min. | -40 °C |
| | | max. | 100 °C |
| Storage Temperature | T_{stg} | min. | -40 °C |
| | | max. | 100 °C |
| Junction Temperature | T_j | max. | 125 °C |
| Forward Current $T_j = 25\text{ °C}$ | I_F | min. | 10 mA |
| | | max. | 150 mA |
| Surge Current $t \leq 10\ \mu\text{s}$; $D = 0.005$; $T_j = 25\text{ °C}$ | I_{FS} | max. | 200 mA |
| ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2) | V_{ESD} | | 2 kV |

Note:

Ensure the appropriate derating current is being used in order to maintain a junction temperature which is lower than the maximum allowable limit.

Characteristics

$I_F = 100 \text{ mA}$; $T_J = 25 \text{ °C}$

| Parameter | Symbol | | Values |
|--|--------------------------|----------------------|--|
| Viewing angle at 50% I_V | 2ϕ | typ. | 120 ° |
| Forward Voltage ²⁾ $I_F = 100 \text{ mA}$ | V_F | min. typ. max. | 8.20 V 9.50 V 9.80 V |
| Reverse current ³⁾ | I_R | | Not designed for reverse operation |
| Color Rendering Index ⁴⁾ | CRI | min. typ. | 90 92 |
| Color Rendering Index (R9) ⁴⁾ | CRI (R9) | min. | 50 |
| Electrical thermal resistance junction/solderpoint with efficiency $\eta_e = 39 \%$ | $R_{thJS \text{ elec.}}$ | typ. | 15 K / W |

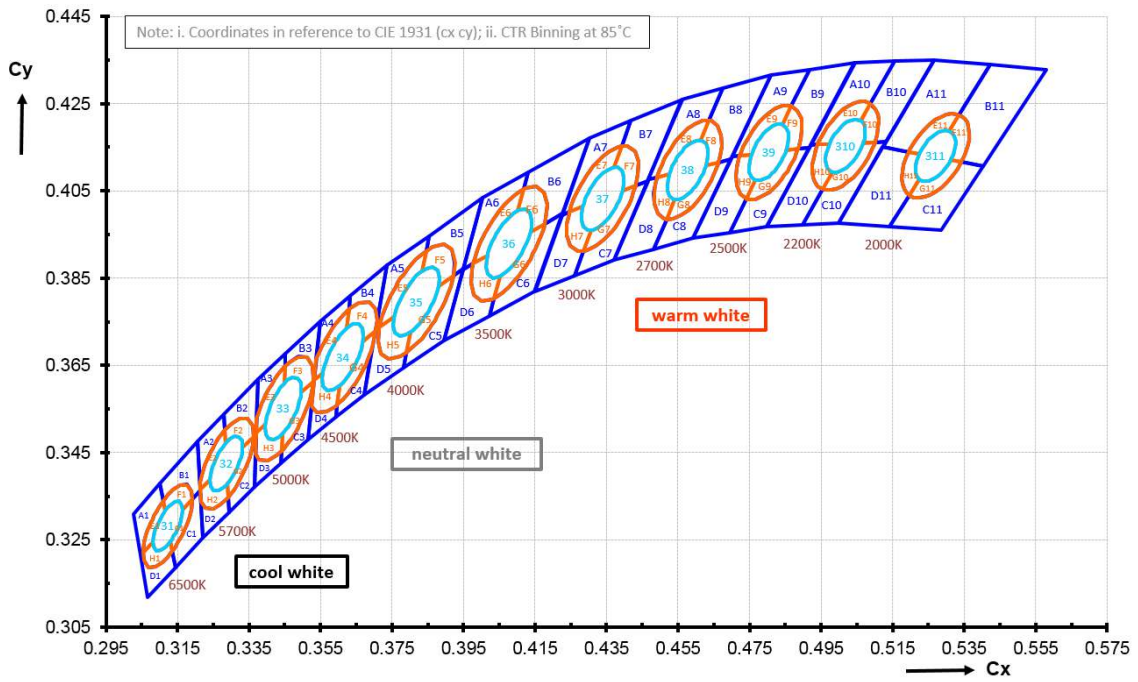
Brightness Groups

| Group | Luminous Flux ¹⁾ $I_F = 100 \text{ mA}$ min. Φ_V | Luminous Flux ¹⁾ $I_F = 100 \text{ mA}$ max. Φ_V |
|-------|---|---|
| KW | 85 lm | 90 lm |
| KX | 90 lm | 95 lm |
| KY | 95 lm | 100 lm |
| KZ | 100 lm | 105 lm |
| K1 | 105 lm | 110 lm |
| K2 | 110 lm | 115 lm |
| K3 | 115 lm | 120 lm |
| K4 | 120 lm | 125 lm |
| K5 | 125 lm | 130 lm |
| LV | 130 lm | 135 lm |
| LW | 135 lm | 140 lm |
| LX | 140 lm | 145 lm |
| LY | 145 lm | 150 lm |
| LZ | 150 lm | 155 lm |
| L1 | 155 lm | 160 lm |
| L2 | 160 lm | 165 lm |

Forward Voltage Groups

| Group | Forward Voltage ²⁾ $I_F = 100 \text{ mA}$ min. V_F | Forward Voltage ²⁾ $I_F = 100 \text{ mA}$ max. V_F |
|-------|--|--|
| C2 | 8.20 V | 8.40 V |
| D1 | 8.40 V | 8.60 V |
| D2 | 8.60 V | 8.80 V |
| E1 | 8.80 V | 9.00 V |
| E2 | 9.00 V | 9.20 V |
| F1 | 9.20 V | 9.40 V |
| F2 | 9.40 V | 9.60 V |
| G1 | 9.60 V | 9.80 V |

Chromaticity Coordinate Groups ⁵⁾



Chromaticity Coordinate Groups

| CCT | Center Cx | Center Cy | 3step a | 3step b | 5step a | 5step b | ∅ |
|--------|--------------|--------------|------------|------------|------------|------------|------|
| 5700 K | 0.3287 | 0.3425 | 0.0072 | 0.0032 | 0.0119 | 0.0052 | 58.8 |
| 6500 K | 0.3123 | 0.3282 | 0.0066 | 0.0027 | 0.0110 | 0.0045 | 58.1 |
| 2200 K | 0.5020 | 0.4156 | 0.0072 | 0.0040 | 0.0120 | 0.0067 | 39.9 |
| 2700 K | 0.4577 | 0.4098 | 0.0080 | 0.0041 | 0.0133 | 0.0068 | 54.1 |
| 3000 K | 0.4339 | 0.4032 | 0.0086 | 0.0042 | 0.0142 | 0.0069 | 53.7 |
| 3500 K | 0.4077 | 0.3929 | 0.0093 | 0.0042 | 0.0155 | 0.0069 | 53.9 |
| 4000 K | 0.3818 | 0.3796 | 0.0094 | 0.0041 | 0.0157 | 0.0068 | 53.4 |
| 5000 K | 0.3446 | 0.3551 | 0.0081 | 0.0035 | 0.0135 | 0.0059 | 59.8 |

| CCT | Group | 1 | | 2 | | 3 | | 4 | | 5 | |
|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | Cx | Cy | Cx | Cy | Cx | Cy | Cx | Cy | Cx | Cy |
| 2200 K | A | 0.5155 | 0.4347 | 0.5044 | 0.4344 | 0.4921 | 0.4156 | 0.4941 | 0.4156 | 0.5088 | 0.4249 |
| | B | 0.5155 | 0.4347 | 0.5265 | 0.4350 | 0.5132 | 0.4163 | 0.5101 | 0.4161 | 0.5088 | 0.4249 |
| | C | 0.5132 | 0.4163 | 0.4998 | 0.3975 | 0.4898 | 0.3971 | 0.4955 | 0.4054 | 0.5101 | 0.4161 |
| | D | 0.4955 | 0.4054 | 0.4941 | 0.4156 | 0.4921 | 0.4156 | 0.4798 | 0.3967 | 0.4898 | 0.3971 |
| | E | 0.5088 | 0.4249 | 0.4941 | 0.4156 | 0.4973 | 0.4157 | 0.5061 | 0.4210 | | |
| | F | 0.5088 | 0.4249 | 0.5101 | 0.4161 | 0.5068 | 0.4160 | 0.5061 | 0.4210 | | |
| | G | 0.5101 | 0.4161 | 0.4955 | 0.4054 | 0.4981 | 0.4093 | 0.5068 | 0.4158 | | |
| | H | 0.4981 | 0.4093 | 0.4973 | 0.4157 | 0.4941 | 0.4156 | 0.4955 | 0.4054 | | |
| 2700 K | A | 0.4675 | 0.4285 | 0.4561 | 0.4259 | 0.4467 | 0.4076 | 0.4491 | 0.4081 | 0.4637 | 0.4212 |
| | B | 0.4675 | 0.4285 | 0.4811 | 0.4315 | 0.4698 | 0.4123 | 0.4663 | 0.4115 | 0.4637 | 0.4212 |
| | C | 0.4698 | 0.4123 | 0.4591 | 0.3941 | 0.4482 | 0.3917 | 0.4517 | 0.3984 | 0.4663 | 0.4115 |
| | D | 0.4517 | 0.3984 | 0.4491 | 0.4081 | 0.4467 | 0.4076 | 0.4372 | 0.3892 | 0.4482 | 0.3917 |
| | E | 0.4637 | 0.4212 | 0.4491 | 0.4081 | 0.4526 | 0.4088 | 0.4613 | 0.4166 | | |
| | F | 0.4637 | 0.4212 | 0.4663 | 0.4115 | 0.4628 | 0.4108 | 0.4613 | 0.4166 | | |
| | G | 0.4663 | 0.4115 | 0.4517 | 0.3984 | 0.4541 | 0.4030 | 0.4628 | 0.4108 | | |
| | H | 0.4541 | 0.4030 | 0.4526 | 0.4088 | 0.4491 | 0.4081 | 0.4517 | 0.3984 | | |
| 3000 K | A | 0.4418 | 0.4211 | 0.4302 | 0.4171 | 0.4226 | 0.3995 | 0.4246 | 0.4002 | 0.4393 | 0.4153 |
| | B | 0.4418 | 0.4211 | 0.4561 | 0.4259 | 0.4465 | 0.4073 | 0.4432 | 0.4062 | 0.4393 | 0.4153 |
| | C | 0.4465 | 0.4073 | 0.4372 | 0.3892 | 0.4261 | 0.3856 | 0.4285 | 0.3911 | 0.4432 | 0.4062 |
| | D | 0.4285 | 0.3911 | 0.4246 | 0.4002 | 0.4226 | 0.3995 | 0.4149 | 0.3819 | 0.4261 | 0.3856 |
| | E | 0.4393 | 0.4153 | 0.4246 | 0.4002 | 0.4283 | 0.4014 | 0.4371 | 0.4105 | | |
| | F | 0.4393 | 0.4153 | 0.4432 | 0.4062 | 0.4395 | 0.4050 | 0.4371 | 0.4105 | | |
| | G | 0.4432 | 0.4062 | 0.4285 | 0.3911 | 0.4307 | 0.3960 | 0.4395 | 0.4050 | | |
| | H | 0.4307 | 0.3960 | 0.4283 | 0.4014 | 0.4246 | 0.4002 | 0.4285 | 0.3911 | | |
| 3500 K | A | 0.4131 | 0.4093 | 0.4003 | 0.4034 | 0.3949 | 0.3871 | 0.3977 | 0.3883 | 0.4118 | 0.4054 |
| | B | 0.4131 | 0.4093 | 0.4302 | 0.4171 | 0.4227 | 0.3997 | 0.4177 | 0.3975 | 0.4118 | 0.4054 |
| | C | 0.4227 | 0.3997 | 0.4149 | 0.3819 | 0.4022 | 0.3763 | 0.4036 | 0.3804 | 0.4177 | 0.3975 |
| | D | 0.4036 | 0.3804 | 0.3977 | 0.3883 | 0.3949 | 0.3871 | 0.3895 | 0.3707 | 0.4022 | 0.3763 |
| | E | 0.4118 | 0.4054 | 0.3977 | 0.3883 | 0.4017 | 0.3902 | 0.4102 | 0.4004 | | |
| | F | 0.4118 | 0.4054 | 0.4177 | 0.3975 | 0.4137 | 0.3956 | 0.4102 | 0.4004 | | |
| | G | 0.4177 | 0.3975 | 0.4036 | 0.3804 | 0.4052 | 0.3854 | 0.4137 | 0.3956 | | |
| | H | 0.4052 | 0.3854 | 0.4017 | 0.3902 | 0.3977 | 0.3883 | 0.4036 | 0.3804 | | |

| | | | | | | | | | | | |
|--------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 4000 K | A | 0.3853 | 0.3947 | 0.3737 | 0.3879 | 0.3704 | 0.3731 | 0.3714 | 0.3737 | 0.3845 | 0.3913 |
| | B | 0.3853 | 0.3947 | 0.4003 | 0.4034 | 0.3949 | 0.3871 | 0.3922 | 0.3855 | 0.3845 | 0.3913 |
| | C | 0.3949 | 0.3871 | 0.3895 | 0.3707 | 0.3783 | 0.3645 | 0.3791 | 0.3679 | 0.3922 | 0.3855 |
| | D | 0.3791 | 0.3679 | 0.3714 | 0.3737 | 0.3704 | 0.3731 | 0.3671 | 0.3583 | 0.3783 | 0.3645 |
| | E | 0.3845 | 0.3913 | 0.3714 | 0.3737 | 0.3756 | 0.3760 | 0.3834 | 0.3866 | | |
| | F | 0.3845 | 0.3913 | 0.3922 | 0.3855 | 0.3880 | 0.3832 | 0.3834 | 0.3866 | | |
| | G | 0.3922 | 0.3855 | 0.3791 | 0.3679 | 0.3802 | 0.3726 | 0.3880 | 0.3832 | | |
| | H | 0.3802 | 0.3726 | 0.3756 | 0.3760 | 0.3714 | 0.3737 | 0.3791 | 0.3679 | | |
| 5000 K | A | 0.3452 | 0.3678 | 0.3375 | 0.3619 | 0.3372 | 0.3528 | 0.3451 | 0.3648 | | |
| | B | 0.3452 | 0.3678 | 0.3550 | 0.3752 | 0.3532 | 0.3614 | 0.3530 | 0.3612 | 0.3451 | 0.3648 |
| | C | 0.3532 | 0.3614 | 0.3514 | 0.3480 | 0.3440 | 0.3426 | 0.3441 | 0.3454 | 0.3530 | 0.3612 |
| | D | 0.3441 | 0.3454 | 0.3369 | 0.3445 | 0.3366 | 0.3372 | 0.3440 | 0.3426 | | |
| | E | 0.3451 | 0.3648 | 0.3372 | 0.3528 | 0.3371 | 0.3496 | 0.3396 | 0.3514 | 0.3449 | 0.3609 |
| | F | 0.3451 | 0.3648 | 0.3530 | 0.3612 | 0.3496 | 0.3588 | 0.3449 | 0.3609 | | |
| | G | 0.3530 | 0.3612 | 0.3441 | 0.3454 | 0.3443 | 0.3493 | 0.3496 | 0.3588 | | |
| | H | 0.3443 | 0.3493 | 0.3396 | 0.3514 | 0.3371 | 0.3496 | 0.3369 | 0.3445 | 0.3441 | 0.3454 |
| 5700 K | A | 0.3280 | 0.3539 | 0.3205 | 0.3475 | 0.3212 | 0.3373 | 0.3283 | 0.3502 | | |
| | B | 0.3280 | 0.3539 | 0.3375 | 0.3619 | 0.3370 | 0.3493 | 0.3363 | 0.3486 | 0.3283 | 0.3502 |
| | C | 0.3370 | 0.3493 | 0.3366 | 0.3372 | 0.3294 | 0.3314 | 0.3291 | 0.3348 | 0.3363 | 0.3486 |
| | D | 0.3291 | 0.3348 | 0.3215 | 0.3337 | 0.3221 | 0.3255 | 0.3294 | 0.3314 | | |
| | E | 0.3283 | 0.3502 | 0.3212 | 0.3373 | 0.3213 | 0.3365 | 0.3242 | 0.3388 | 0.3284 | 0.3471 |
| | F | 0.3283 | 0.3502 | 0.3363 | 0.3486 | 0.3332 | 0.3462 | 0.3284 | 0.3471 | | |
| | G | 0.3363 | 0.3486 | 0.3291 | 0.3348 | 0.3290 | 0.3379 | 0.3332 | 0.3462 | | |
| | H | 0.3291 | 0.3348 | 0.3215 | 0.3337 | 0.3213 | 0.3365 | 0.3242 | 0.3388 | 0.3290 | 0.3379 |
| 6500 K | A | 0.3102 | 0.3379 | 0.3027 | 0.3310 | 0.3047 | 0.3214 | 0.3054 | 0.3220 | 0.3110 | 0.3340 |
| | B | 0.3102 | 0.3379 | 0.3205 | 0.3475 | 0.3213 | 0.3363 | 0.3192 | 0.3344 | 0.3110 | 0.3340 |
| | C | 0.3213 | 0.3363 | 0.3221 | 0.3255 | 0.3144 | 0.3187 | 0.3136 | 0.3224 | 0.3192 | 0.3344 |
| | D | 0.3136 | 0.3224 | 0.3054 | 0.3220 | 0.3047 | 0.3214 | 0.3067 | 0.3118 | 0.3144 | 0.3187 |
| | E | 0.3110 | 0.3340 | 0.3054 | 0.3220 | 0.3082 | 0.3245 | 0.3115 | 0.3317 | | |
| | F | 0.3110 | 0.3340 | 0.3192 | 0.3344 | 0.3165 | 0.3319 | 0.3115 | 0.3317 | | |
| | G | 0.3192 | 0.3344 | 0.3136 | 0.3224 | 0.3131 | 0.3247 | 0.3165 | 0.3319 | | |
| | H | 0.3136 | 0.3224 | 0.3054 | 0.3220 | 0.3082 | 0.3245 | 0.3131 | 0.3247 | | |

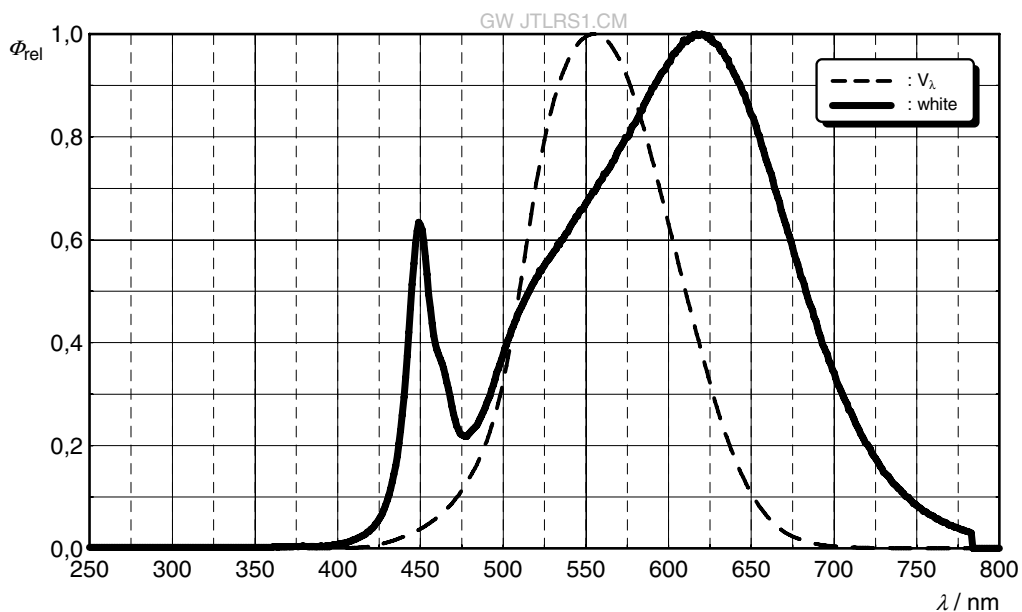
Group Name on Label

Example: K1-C2

| Brightness | Forward Voltage |
|------------|-----------------|
| K1 | C2 |

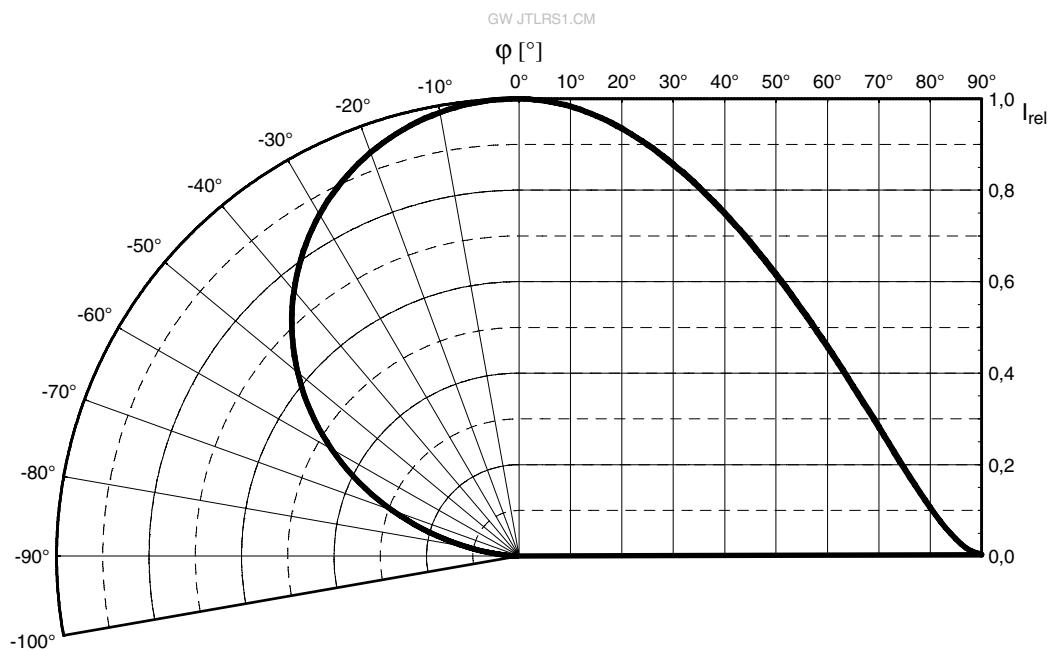
Relative Spectral Emission ⁶⁾

$\Phi_{rel} = f(\lambda); I_F = 100 \text{ mA}; T_J = 25 \text{ }^\circ\text{C}$



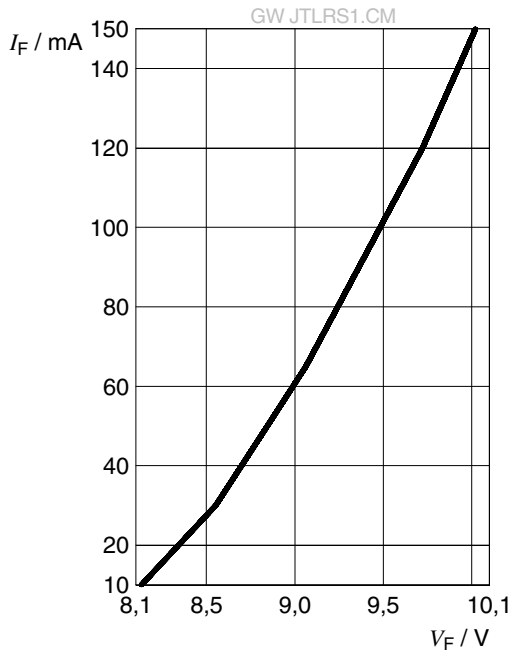
Radiation Characteristics ⁶⁾

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



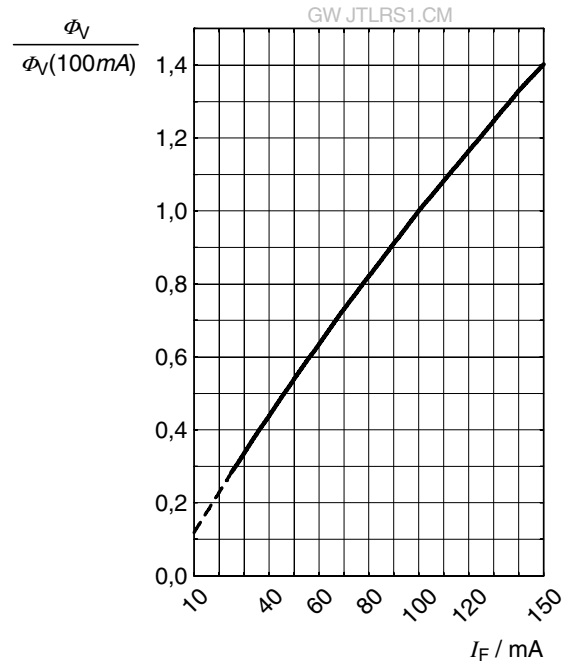
Forward current ⁶⁾

$I_F = f(V_F); T_J = 25\text{ °C}$



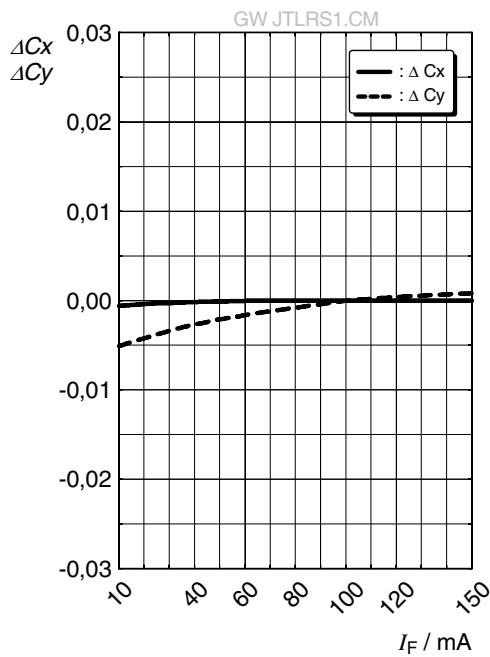
Relative Luminous Flux ^{6), 7)}

$\Phi_V / \Phi_V(100\text{ mA}) = f(I_F); T_J = 25\text{ °C}$



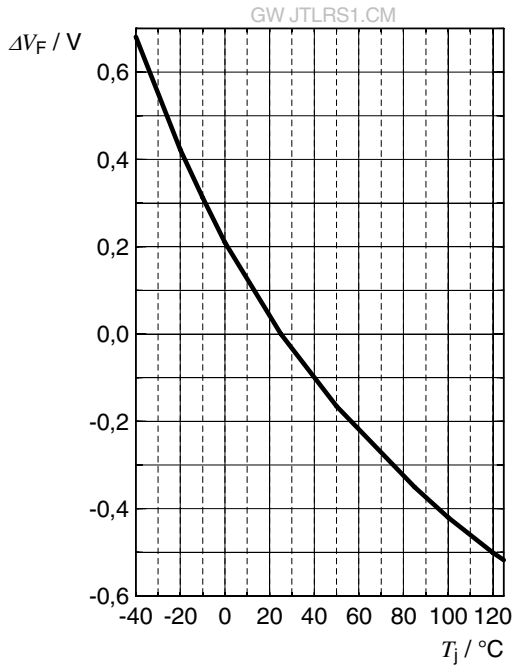
Chromaticity Coordinate Shift ⁶⁾

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



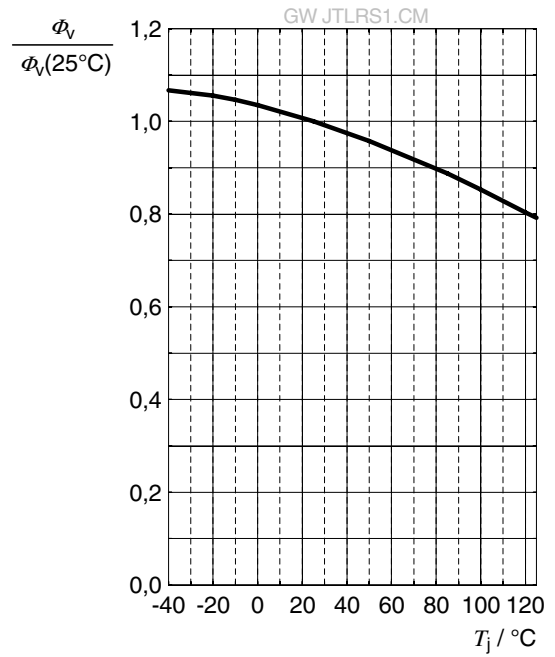
Forward Voltage ⁶⁾

$\Delta V_F = V_F - V_F(25\text{ }^\circ\text{C}) = f(T_j); I_F = 100\text{ mA}$



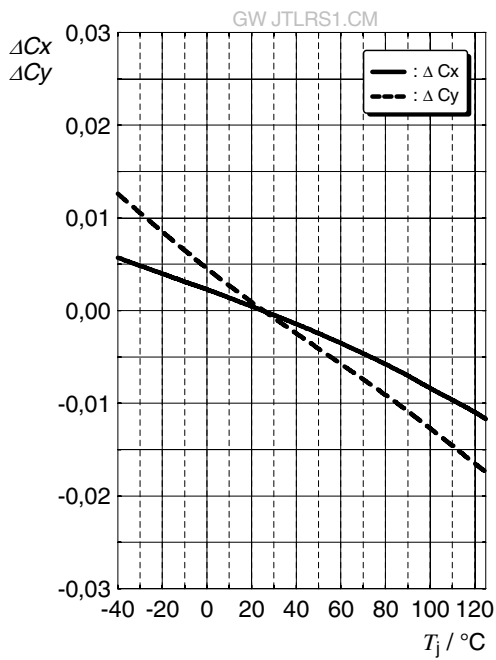
Relative Luminous Flux ⁶⁾

$\Phi_v / \Phi_v(25\text{ }^\circ\text{C}) = f(T_j); I_F = 100\text{ mA}$



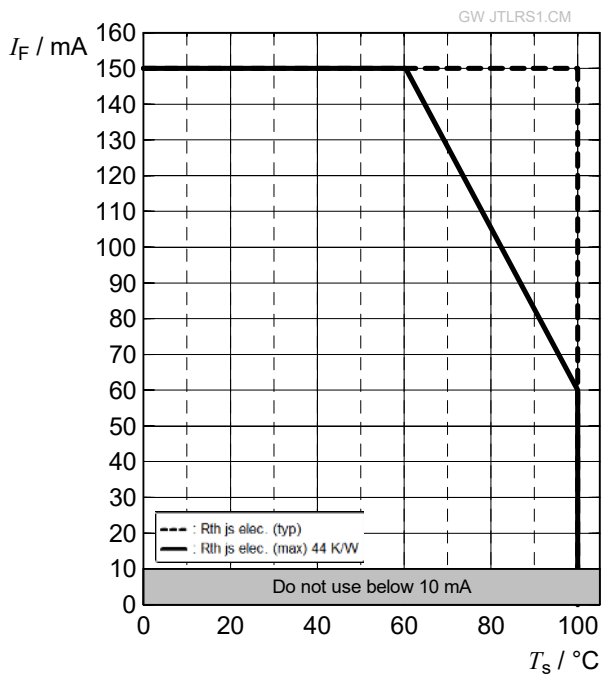
Chromaticity Coordinate Shift ⁶⁾

$\Delta Cx, \Delta Cy = f(T_j); I_F = 100\text{ mA}$

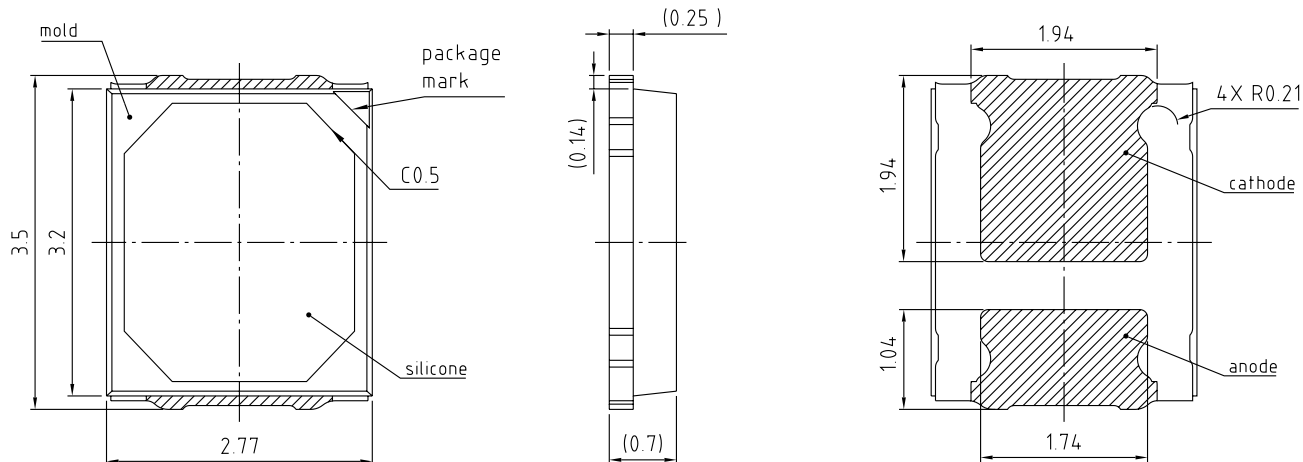


Max. Permissible Forward Current

$$I_F = f(T)$$



Dimensional Drawing ⁸⁾



general tolerance ± 0.1

lead finish Ag 

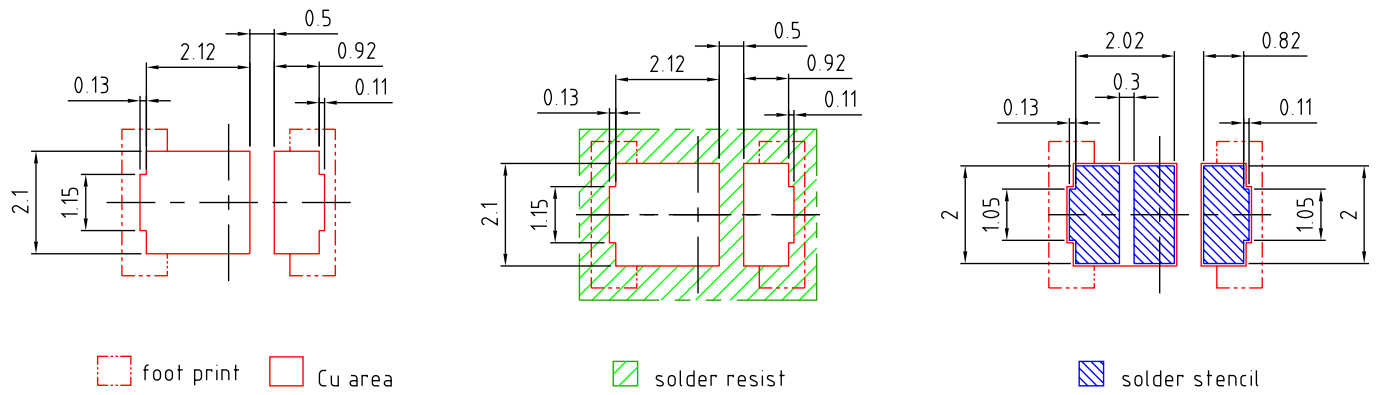
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Further Information:

Approximate Weight: 20.0 mg

Package marking: Cathode

Recommended Solder Pad ⁸⁾

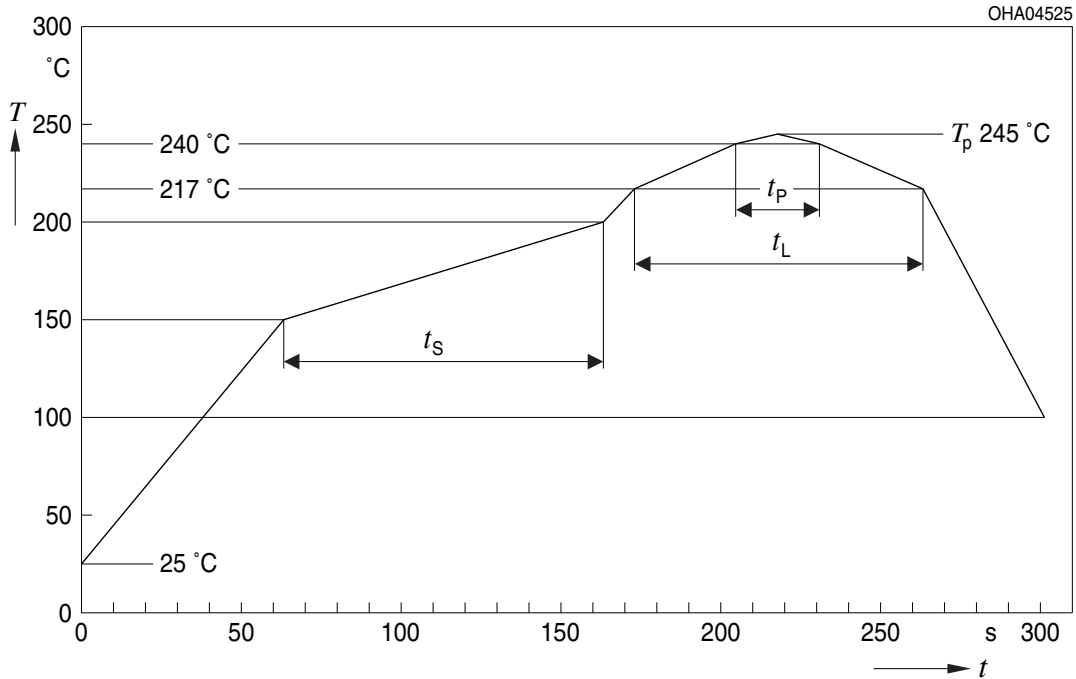


E067.0346.04-01

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.

Reflow Soldering Profile

Product complies to MSL Level 3 acc. to JEDEC J-STD-020E

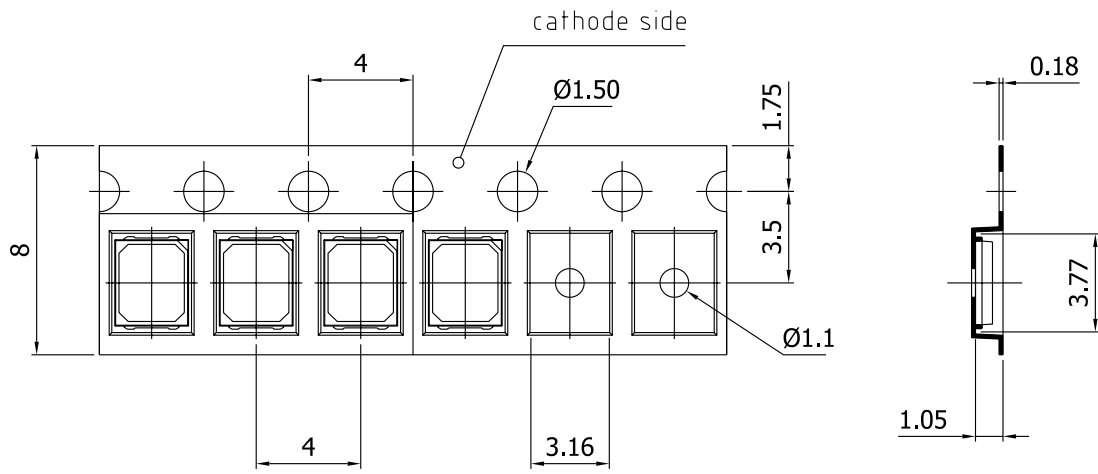


| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|--|--------|---------------------------|----------------|---------|------|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat ^{*)} 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time t_s T_{Smin} to T_{Smax} | t_s | 60 | 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

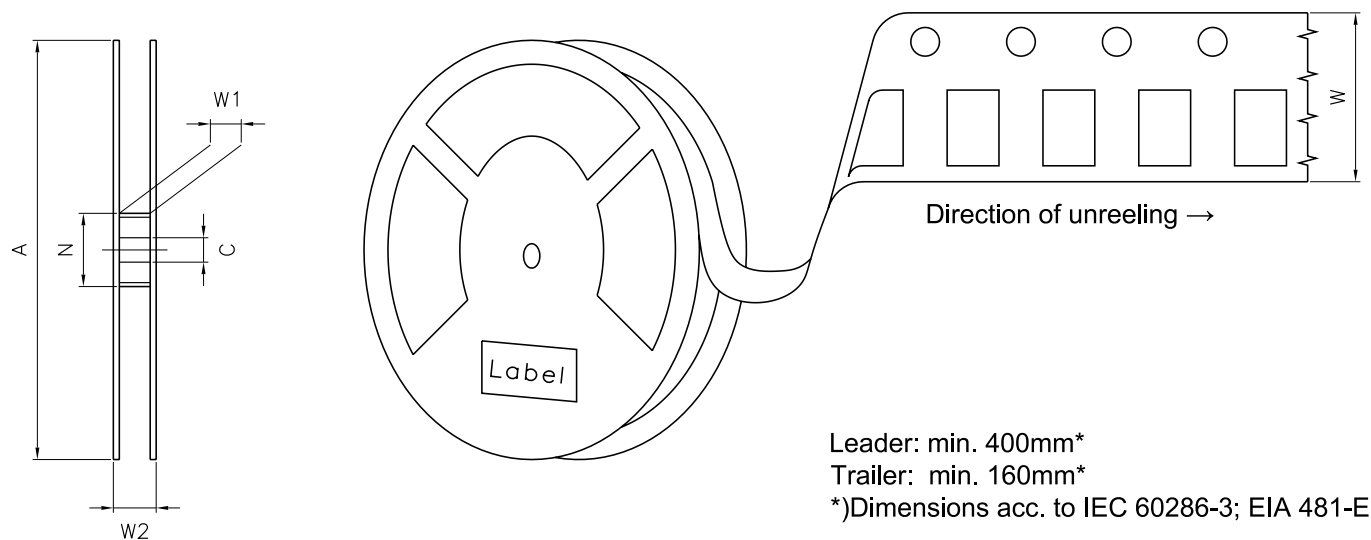
* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁸⁾



C67062-A0204-B9-01

Tape and Reel ⁹⁾



Reel Dimensions

| A | W | N_{\min} | W_1 | $W_{2\max}$ | Pieces per PU |
|--------|----------------------|------------|--------------|-------------|---------------|
| 330 mm | $8 + 0.3 / - 0.1$ mm | 60 mm | $8.4 + 2$ mm | 14.4 mm | 10000 |

Barcode-Product-Label (BPL)

OSRAM LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890

(1T) LOT NO: 1234567890 (9D) D/C: 1234

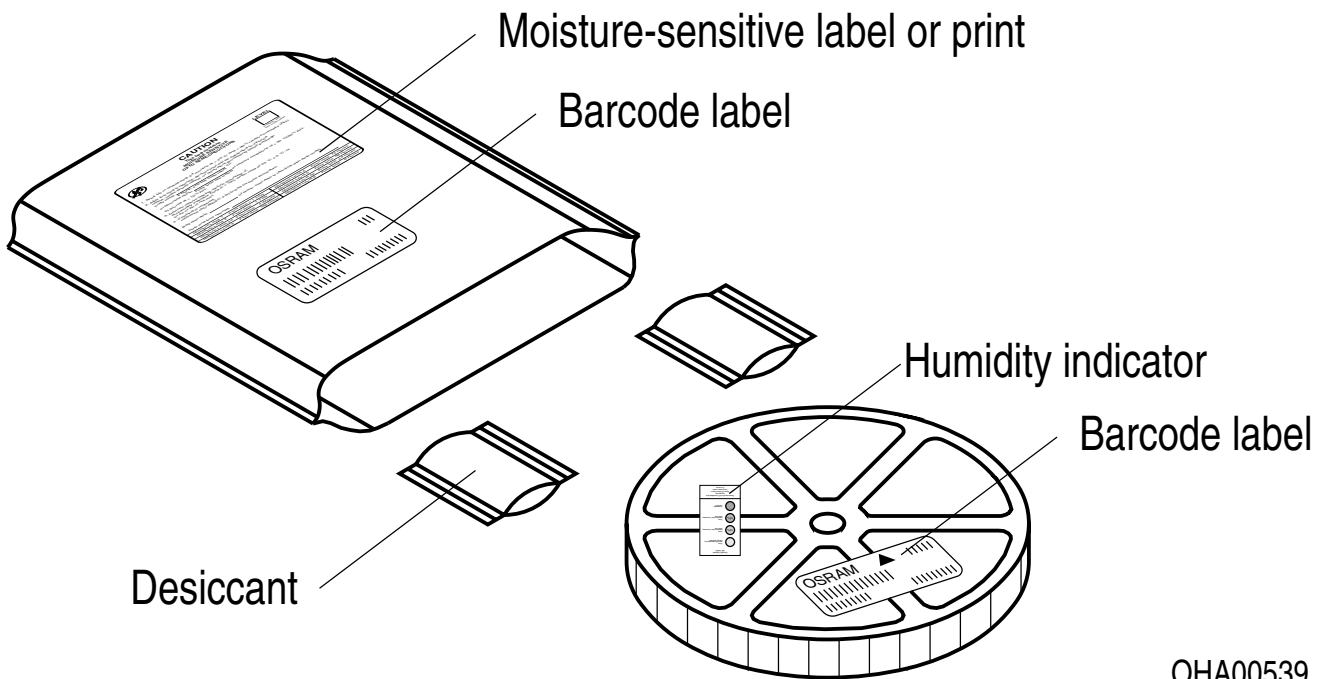
(X) PROD NO: 123456789 (Q) QTY: 9999 (G) GROUP: XX-XX-X-X

ML Temp ST
X XXX °C X

Pack: RXX
DEMY XXX
X_X123_1234.1234 X

OHA04563

Dry Packing Process and Materials



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 **low risk (exposure time 100 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.

This device is designed for specific/recommended applications only. Please consult OSRAM Opto Semiconductors Sales Staff in advance for detailed information on other non-recommended applications (e.g. automotive).

Change management for this component is aligned with the requirements of the lighting market.

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 10 ms, with a tolerance of +/- 7%.
- 2) **Forward Voltage:** The Forward voltage is measured during a current pulse duration of typically 1 ms with a tolerance of $\pm 0.05V$.
- 3) **Reverse Operation:** Not designed for reverse operation. Continuous reverse operation can cause migration and damage of the device.
- 4) **Color reproduction index:** Color reproduction index values (CRI-RA) are measured during a current pulse of typically 10 ms and with a tolerance of ± 2 . And CRI-R9 are measured during a current pulse of typically 10 ms and the 4000K with a tolerance of ± 6 .
- 5) **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 $k = 3$).
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 7) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 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 |
|---------|------------|---|
| 1.3 | 2019-11-01 | New Layout Schematic Transportation Box Dimensions of Transportation Box |
| 1.4 | 2020-04-02 | Features Ordering Information Electro - Optical Characteristics (Diagrams) Dimensional Drawing |
| 1.5 | 2021-08-20 | Features Characteristics Electro - Optical Characteristics (Diagrams) Glossary |
| 1.6 | 2023-02-01 | Ordering Information Characteristics Derating (Diagrams) Maximum Ratings |



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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