



C3535L.C3535M Series High Power LED

Introduction

The C3535L, C3535M LED from TSLC brings industry leading technology to the solid state lighting market with its high quality and performance. With a silicone lens, C3535L, C3535M LEDs from TSLC feature very high brightness and efficacy, as well as excellent lifetime.



Table of Contents

| | |
|--|----|
| Characteristics | 1 |
| Mechanical Dimensions | 8 |
| Recommended Solder Pad Design | 11 |
| Relative Spectral Power Distribution | 12 |
| Typical Spatial Radiation Pattern | 13 |
| Typical Forward L-I Characteristics | 14 |
| Typical Forward I-V Characteristics | 14 |
| Typical L-Tj Characteristics | 15 |
| Recommended Soldering Profile | 16 |
| Thermal Design | 17 |
| Packing Information | 18 |

RoHS Compliant

Characteristics

Absolute Maximum Ratings (Tj = 25°C)

| Parameter | Rating |
|---------------------------|--|
| | White / Royal Blue / Blue / Green / Cyan / Amber / Red |
| DC Forward Current (mA) | 1000 mA (White / Royal Blue / Blue / Green / Cyan) |
| DC Forward Current (mA) | 700 mA (Amber/ Red / Super Red) |
| LED Junction Temperature | 150°C (White / Royal Blue / Blue / Green / Cyan) |
| LED Junction Temperature | 115°C (Red / Amber / Super Red) |
| LED Operating Temperature | -40°C~85°C |
| Storage Temperature | -40°C~125°C |
| Soldering Temperature | Max. 260°C / Max. 10sec. (JEDEC 020) |
| ESD Sensitivity | 8,000 V HBM (JESD-22A-114-B) |
| Reverse Voltage | Not designed to be driven in reverse bias (VR≤5V) |
| Preconditioning | Acc. to JEDEC Level 1 |

Product Name

C 3535 L – C0 L 1

1 2~5 6 7~8 9 10

Code 1: Substrate composition, C: Ceramic Al₂O₃

Code 2.3.4.5: Package size, 3535: 3.5*3.5mm

Code 6: Product Class

Code 7.8: Wavelength/CCT Class








| Code 6: | Code 7.8: | Color rendering |
|-------------------|-----------|---------------------------|
| L (Lighting) | C0 | Cool White CRI typ. 70 |
| | N1 | Neutral white CRI typ. 75 |
| | W7 | Warm white CRI min. 80 |
| M (Pure color) | SN | Super red (650-670nm) |
| | RN | Red (620-635nm) |
| | AN | Amber (580-600nm) |
| | GN | Green (520-535nm) |
| | CN | Cyan (500-520nm) |
| | BN | Blue(450-470nm) |
| | DN | Royal blue (440-450nm) |

Code 9: Lens type, L: 125~140 degree, A: 90 degree, F: 55 degree

Code 10: Internal code

General Characteristics at 350mA (Tj=25°C)

| Part number | Color | | Dominant Wavelength λ_d | | $2\theta_{1/2}$ | Temperature Coefficient of Vf (mV/°C) | Thermal Resistance Junction to Pad (°C/W) |
|------------------|---------------|---|---------------------------------|-----------------------------------|-----------------|---------------------------------------|---|
| | | | Peak Wavelength λ_p * | Correlated Color Temperature, CCT | | | |
| | | | Min | Max | | $\Delta V_F / \Delta T_J$ | RO_{J-P} |
| C3535L-C0 series | Cool White |  | 4750K | 10000K | 130/90/65 | -2~-4 | 8 |
| C3535L-N1 series | Neutral White |  | 3700K | 4750K | 130/90/65 | -2~-4 | 8 |
| C3535L-W7 series | Warm White |  | 2600K | 3700K | 130/90/65 | -2~-4 | 8 |
| C3535M-SN series | Super Red |  | 650* | 670* | 125/85/55 | -2~-4 | 10 |
| C3535M-RN series | Red |  | 620 | 635 | 125/85/55 | -2~-4 | 10 |
| C3535M-AN series | Amber |  | 580 | 600 | 125/85/55 | -2~-4 | 10 |
| C3535M-GN series | Green |  | 520 | 535 | 130/90/65 | -2~-4 | 8 |
| C3535M-CN series | Cyan |  | 500 | 520 | 130/90/65 | -2~-4 | 8 |
| C3535M-BN series | Blue |  | 450 | 470 | 130/90/65 | -2~-4 | 8 |
| C3535M-DN series | Royal Blue |  | 440* | 450* | 130/90/65 | -2~-4 | 8 |

Notes:

1. The peak/dominant wavelength is measured with an accuracy of $\pm 1\text{nm}$
2. Typical CRI for Cool White (4750 K – 10,000 K CCT) is 70.
3. Typical CRI for Neutral White (3700 K – 4750 K CCT) is 75.
4. Minimum CRI for Warm White (2600 K – 3700 K CCT) is 80.
5. All values stated are subject to the limits and set up of TSLC's testers. All other measurement data are defined as long-term production mean values and are only given for reference.
6. A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or effectiveness of that device or system. Life support devices or systems are intended (i) to be implanted in the human body, or (ii) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health of the user may be endangered. Components used as a critical component must be approved in writing by TSLC Corporation.

Luminous Flux and Forward Voltage (T_j=25°C), 125 degree

| Part number | Color | Performance at Test Current (350mA) | | | | Performance at 700mA Typical Luminous Flux (lm) |
|----------------------------|------------------|-------------------------------------|--|-----|-----|---|
| | | Group | Minimum Luminous Flux (lm) Radiometric Power (mW*) | VF | | |
| | | | | Min | Max | |
| C3535L-C0LX C3535L-C0L9 | Cool White | NQE | 107 | 2.8 | 3.6 | 180 |
| | | NRB | 114 | 2.8 | 3.6 | 190 |
| | | NRC | 122 | 2.8 | 3.6 | 205 |
| | | NRD | 130 | 2.8 | 3.6 | 220 |
| | | NRE | 139 | 2.8 | 3.6 | 235 |
| | | NSB | 148 | 2.8 | 3.6 | 250 |
| C3535L-N1LX C3535L-N1L9 | Neutral White | NQD | 100 | 2.8 | 3.6 | 170 |
| | | NQE | 107 | 2.8 | 3.6 | 180 |
| | | NRB | 114 | 2.8 | 3.6 | 190 |
| | | NRC | 122 | 2.8 | 3.6 | 205 |
| | | NRD | 130 | 2.8 | 3.6 | 220 |
| | | NRE | 139 | 2.8 | 3.6 | 235 |
| C3535L-W7LX C3535L-W7L9 | Warm White | NQB | 87.4 | 2.8 | 3.6 | 145 |
| | | NQC | 93.9 | 2.8 | 3.6 | 160 |
| | | NQD | 100 | 2.8 | 3.6 | 170 |
| | | NQE | 107 | 2.8 | 3.6 | 180 |
| | | NRB | 114 | 2.8 | 3.6 | 190 |
| C3535M-SNLX C3535M-SNL9 | Super Red | ND2 | 240* | 1.8 | 2.8 | 455* |
| | | ND3 | 280* | 1.8 | 2.8 | 530* |
| | | ND4 | 320* | 1.8 | 2.8 | 600* |
| C3535M-RNLX C3535M-RNL9 | Red | NMC | 45.7 | 1.8 | 2.8 | 85 |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 |
| | | NNC | 56.8 | 1.8 | 2.8 | 105 |
| | | NND | 62.0 | 1.8 | 2.8 | 114 |
| C3535M-ANLX C3535M-ANL9 | Amber | NMC | 45.7 | 1.8 | 2.8 | 85 |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 |
| | | NNC | 56.8 | 1.8 | 2.8 | 105 |
| | | NND | 62.0 | 1.8 | 2.8 | 114 |

| Part number | Color | Performance at Test Current (350mA) | | | | Performance at 700mA |
|----------------------------|---------------|-------------------------------------|--|-----|-----|--|
| | | Group | Minimum Luminous Flux (lm) Radiometric Power (mW*) | VF | | Typical Luminous Flux (lm) Radiometric Power (mW*) |
| | | | | Min | Max | |
| C3535M-GNLX C3535M-GNL9 | Green | NPB | 67.2 | 2.8 | 3.6 | 105 |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 |
| | | NPD | 80.6 | 2.8 | 3.6 | 125 |
| | | NQB | 87.4 | 2.8 | 3.6 | 135 |
| C3535M-CNLX C3535M-CNL9 | Cyan | NND | 62.0 | 2.8 | 3.6 | 95 |
| | | NPB | 67.2 | 2.8 | 3.6 | 105 |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 |
| | | NPD | 80.6 | 2.8 | 3.6 | 125 |
| C3535M-BNLX C3535M-BNL9 | Blue | NJB | 18.0 | 2.8 | 3.6 | 30 |
| | | NJC | 23.5 | 2.8 | 3.6 | 39 |
| | | NKB | 30.6 | 2.8 | 3.6 | 50 |
| C3535M-DNLX C3535M-DNL9 | Royal Blue | NE1 | 400* | 2.8 | 3.6 | 680* |
| | | NE2 | 440* | 2.8 | 3.6 | 745* |
| | | NE3 | 480* | 2.8 | 3.6 | 815* |
| | | NE4 | 520* | 2.8 | 3.6 | 880* |
| | | NE5 | 560* | 2.8 | 3.6 | 950* |
| | | NF1 | 600* | 2.8 | 3.6 | 1020* |

Note:

1. Luminous flux & Radiometric power is measured with an accuracy of $\pm 10\%$
2. The forward voltage is measured with an accuracy of $\pm 0.2V$
3. For white, not all bins are available in all CCT.

Luminous Flux and Forward Voltage (Tj=25°C), 90 degree

| Part number | Color | Performance at Test Current (350mA) | | | | Performance at 700mA |
|----------------------------|------------------|-------------------------------------|--|-----|-----|--|
| | | Group | Minimum Luminous Flux (lm) Radiometric Power (mW*) | VF | | Typical Luminous Flux (lm) Radiometric Power (mW*) |
| | | | | Min | Max | |
| C3535L-C0AX C3535L-C0A9 | Cool White | NQE | 107 | 2.8 | 3.6 | 180 |
| | | NRB | 114 | 2.8 | 3.6 | 190 |
| | | NRC | 122 | 2.8 | 3.6 | 205 |
| | | NRD | 130 | 2.8 | 3.6 | 220 |
| | | NRE | 139 | 2.8 | 3.6 | 235 |
| C3535L-N1AX C3535L-N1A9 | Neutral White | NQD | 100 | 2.8 | 3.6 | 170 |
| | | NQE | 107 | 2.8 | 3.6 | 180 |
| | | NRB | 114 | 2.8 | 3.6 | 190 |
| | | NRC | 122 | 2.8 | 3.6 | 205 |
| | | NRD | 130 | 2.8 | 3.6 | 220 |
| C3535L-W7AX C3535L-W7A9 | Warm White | NQB | 87.4 | 2.8 | 3.6 | 145 |
| | | NQC | 93.9 | 2.8 | 3.6 | 160 |
| | | NQD | 100 | 2.8 | 3.6 | 170 |
| | | NQE | 107 | 2.8 | 3.6 | 180 |
| C3535M-SNAX C3535M-SNA9 | Super Red | ND4 | 320 | 1.8 | 2.8 | 575 |
| | | ND5 | 360 | 1.8 | 2.8 | 640 |
| | | NE1 | 400 | 1.8 | 2.8 | 720 |
| C3535M-RNAX C3535M-RNA9 | Red | NMC | 45.7 | 1.8 | 2.8 | 85 |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 |
| | | NNC | 56.8 | 1.8 | 2.8 | 105 |
| | | NND | 62.0 | 1.8 | 2.8 | 114 |
| C3535M-ANAX C3535M-ANA9 | Amber | NMB | 39.8 | 1.8 | 2.8 | 73 |
| | | NMC | 45.7 | 1.8 | 2.8 | 85 |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 |
| | | NNC | 56.8 | 1.8 | 2.8 | 105 |
| C3535M-GNAX C3535M-GNA9 | Green | NND | 62.0 | 2.8 | 3.6 | 95 |
| | | NPB | 67.2 | 2.8 | 3.6 | 105 |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 |
| C3535M-CNAX C3535M-CNA9 | Cyan | NND | 62.0 | 2.8 | 3.6 | 95 |
| | | NPB | 67.2 | 2.8 | 3.6 | 105 |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 |



| Part number | Color | Performance at Test Current (350mA) | | | | Performance at 700mA |
|----------------------------|---------------|-------------------------------------|--|-----|-----|--|
| | | Group | Minimum Luminous Flux (lm) Radiometric Power (mW*) | VF | | Typical Luminous Flux (lm) Radiometric Power (mW*) |
| | | | | Min | Max | |
| C3535M-BNAX C3535M-BNA9 | Blue | NJB | 18.0 | 2.8 | 3.6 | 30 |
| | | NJC | 23.5 | 2.8 | 3.6 | 39 |
| C3535M-DNAX C3535M-DNA9 | Royal Blue | NE1 | 400* | 2.8 | 3.6 | 680* |
| | | NE2 | 440* | 2.8 | 3.6 | 745* |
| | | NE3 | 480* | 2.8 | 3.6 | 815* |
| | | NE4 | 520* | 2.8 | 3.6 | 880* |
| | | NE5 | 560* | 2.8 | 3.6 | 950* |

Note:

1. Luminous flux & Radiometric power is measured with an accuracy of $\pm 10\%$
2. The forward voltage is measured with an accuracy of $\pm 0.2V$
3. For white, not all bins are available in all CCT.

Luminous Flux and Forward Voltage (Tj=25°C), 60 degree

| Part number | Color | Performance at Test Current (350mA) | | | | Performance at 700mA | |
|----------------------------|------------------|-------------------------------------|--|-----|-----|--|--|
| | | Group | Minimum Luminous Flux (lm) Radiometric Power (mW*) | VF | | Typical Luminous Flux (lm) Radiometric Power (mW*) | |
| | | | | Min | Max | | |
| C3535L-C0FX C3535L-C0F9 | Cool White | NQD | 100 | 2.8 | 3.6 | 170 | |
| | | NQE | 107 | 2.8 | 3.6 | 180 | |
| | | NRB | 114 | 2.8 | 3.6 | 190 | |
| | | NRC | 122 | 2.8 | 3.6 | 205 | |
| | | NRD | 130 | 2.8 | 3.6 | 220 | |
| C3535L-N1FX C3535L-N1F9 | Neutral White | NQC | 93.9 | 2.8 | 3.6 | 160 | |
| | | NQD | 100 | 2.8 | 3.6 | 170 | |
| | | NQE | 107 | 2.8 | 3.6 | 180 | |
| | | NRB | 114 | 2.8 | 3.6 | 190 | |
| C3535L-W7FX C3535L-W7F9 | Warm White | NPD | 80.6 | 2.8 | 3.6 | 135 | |
| | | NQB | 87.4 | 2.8 | 3.6 | 145 | |
| | | NQC | 93.9 | 2.8 | 3.6 | 160 | |
| | | NQD | 100 | 2.8 | 3.6 | 170 | |
| C3535M-SNFX C3535M-SNF9 | Super Red | ND1 | 200* | 1.8 | 2.8 | 380* | |
| | | ND2 | 240* | 1.8 | 2.8 | 455* | |
| C3535M-RNFX C3535M-RNF9 | Red | NMC | 45.7 | 1.8 | 2.8 | 85 | |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 | |
| C3535M-ANFX C3535M-ANF9 | Amber | NMC | 45.7 | 1.8 | 2.8 | 85 | |
| | | NNB | 51.7 | 1.8 | 2.8 | 95 | |
| C3535M-GNFX C3535M-GNF9 | Green | NND | 62 | 2.8 | 3.6 | 95 | |
| | | NPB | 67.2 | 2.8 | 3.6 | 105 | |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 | |
| C3535M-CNFX C3535M-CNF9 | Cyan | NND | 62 | 2.8 | 3.6 | 95 | |
| | | NPB | 67.2 | 2.8 | 3.6 | 105 | |
| | | NPC | 73.9 | 2.8 | 3.6 | 115 | |
| C3535M-BNFX C3535M-BNF9 | Blue | NIC | 14.0 | 2.8 | 3.6 | 23 | |
| | | NJB | 18.0 | 2.8 | 3.6 | 30 | |
| C3535M-DNFX C3535M-DNF9 | Royal | NE1 | 400* | 2.8 | 3.6 | 680* | |
| | Blue | NE2 | 440* | 2.8 | 3.6 | 745* | |

Note: 1. Luminous flux & Radiometric power is measured with an accuracy of ±10%

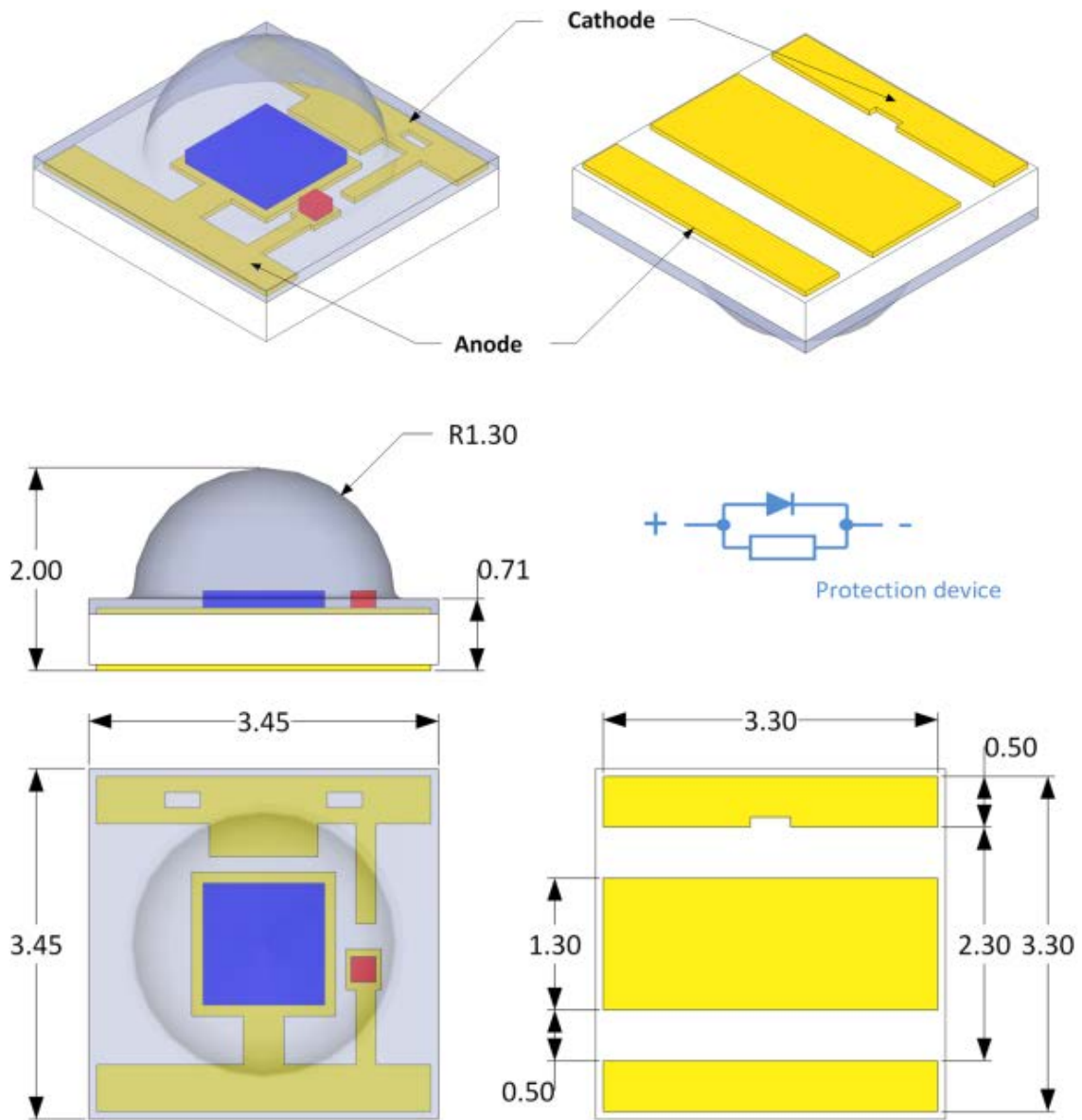
2. The forward voltage is measured with an accuracy of ±0.2V.

3. For white, not all bins are available in all CCT.



Mechanical Dimensions

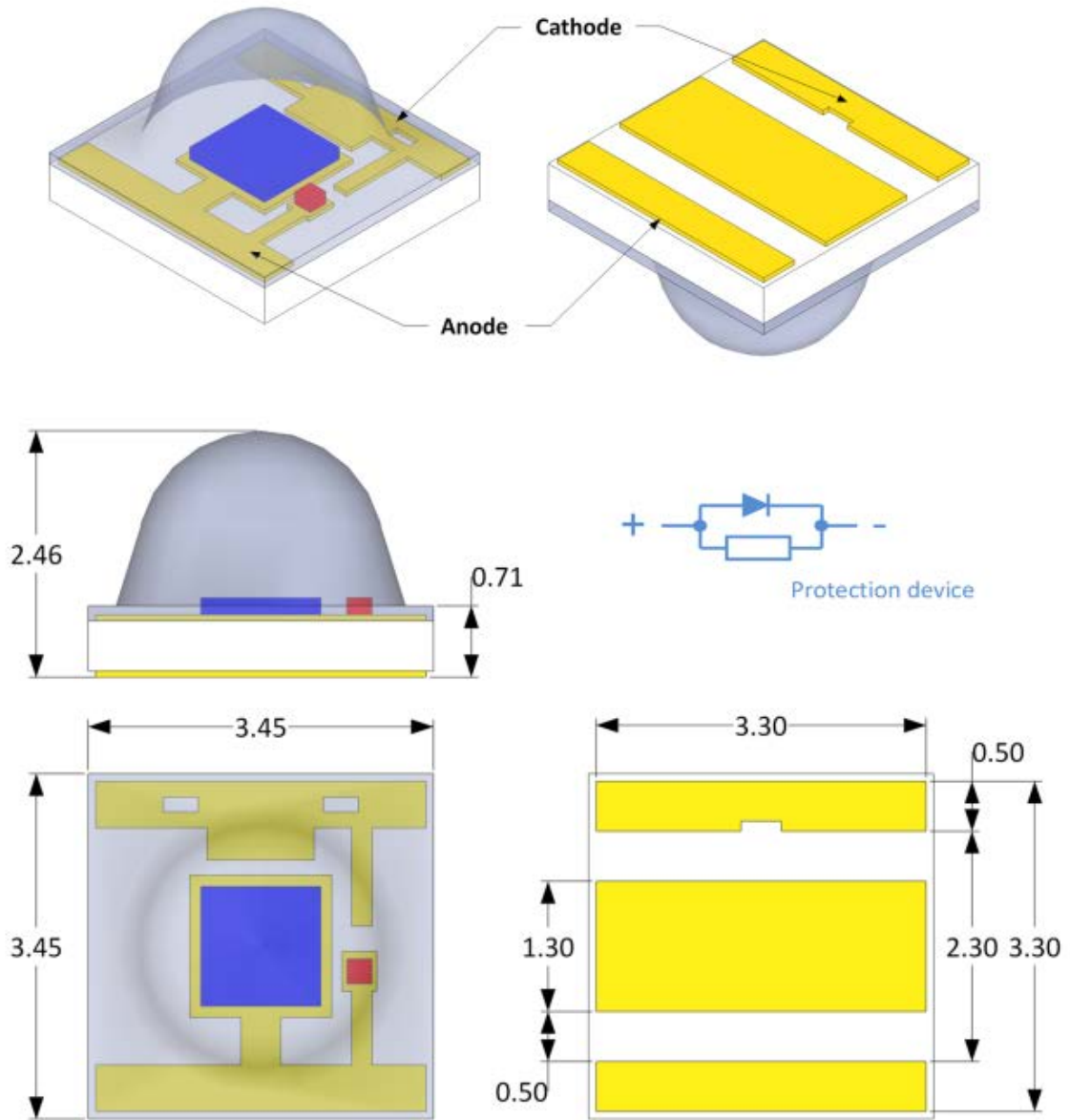
Beam angle 125°



Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are ± 0.13 mm unless otherwise indicated

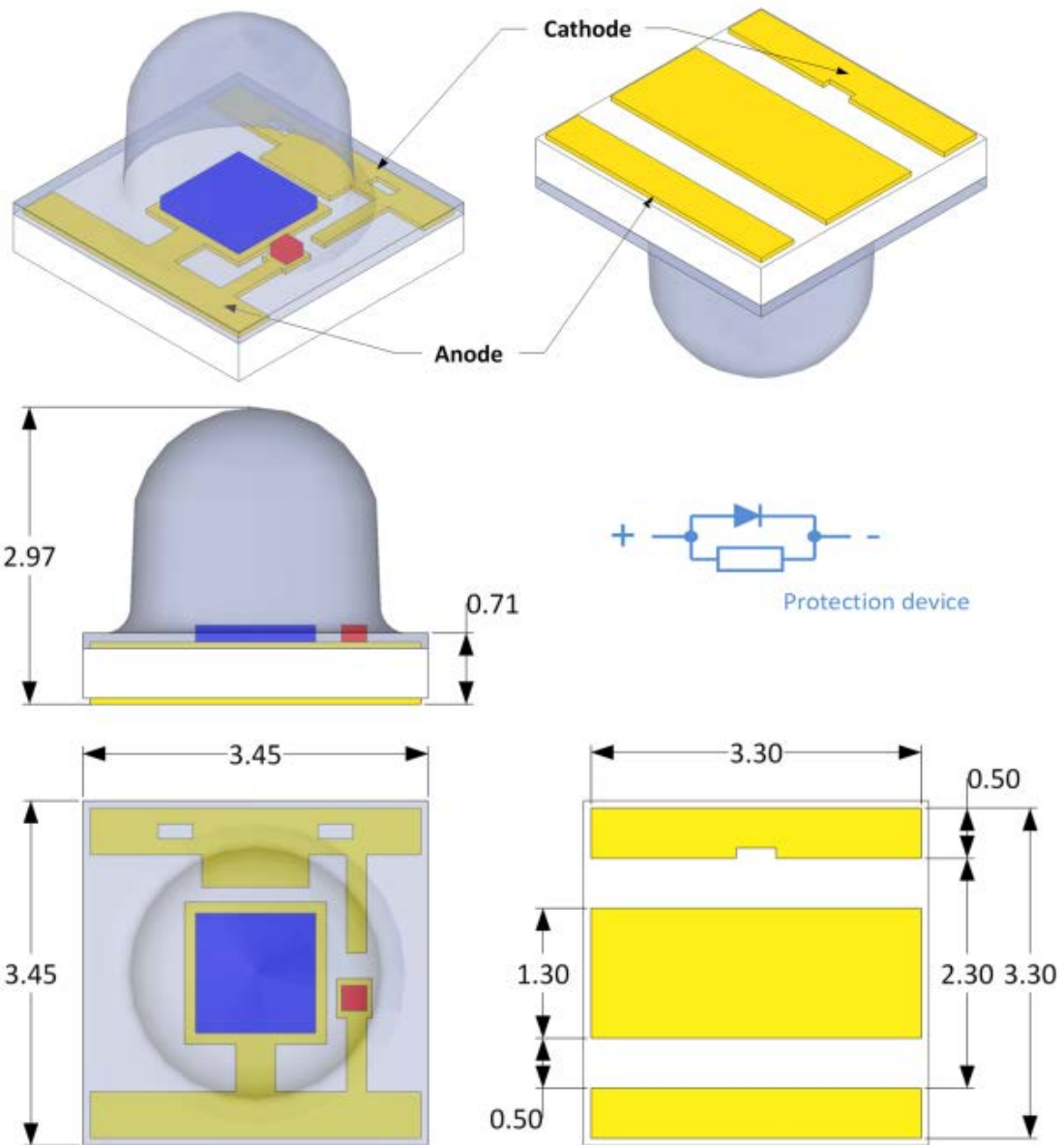
Beam angle 90°



Notes:

4. Drawing is not to scale
5. All dimensions are in millimeter
6. Dimensions are $\pm 0.13\text{mm}$ unless otherwise indicated

Beam angle 65°

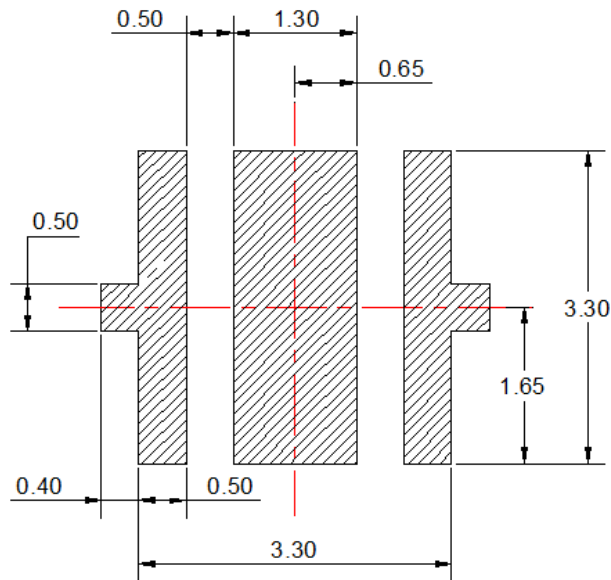


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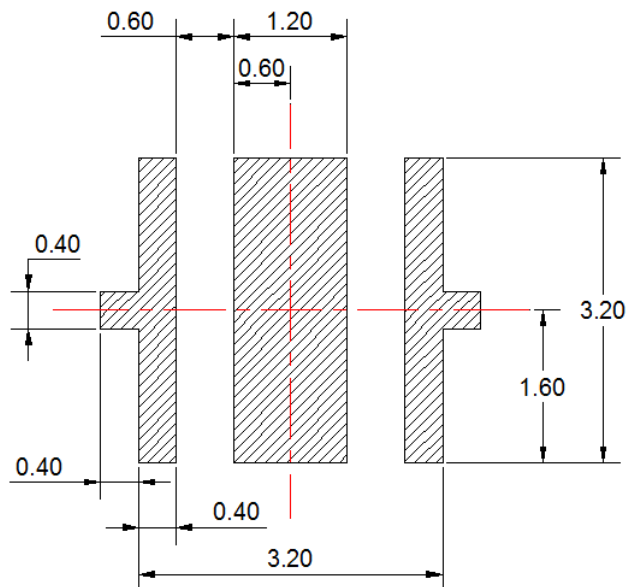
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are $\pm 0.13\text{mm}$ unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



Recommended Stencil Pattern Design (Marked Area is Opening)

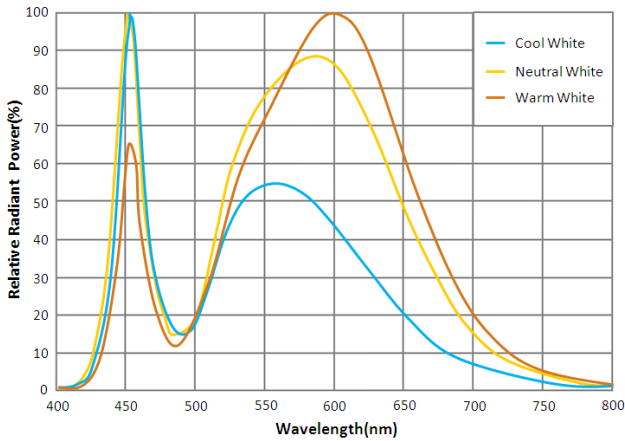


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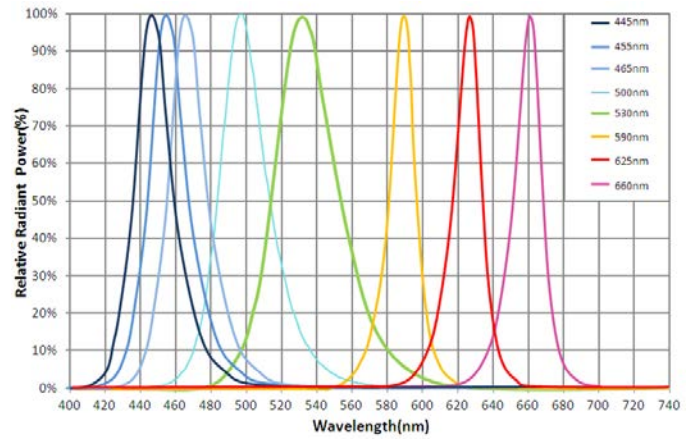
1. Drawing is not to scale
2. All dimensions are in millimeter

Relative Spectral Power Distribution, T_j=25°C

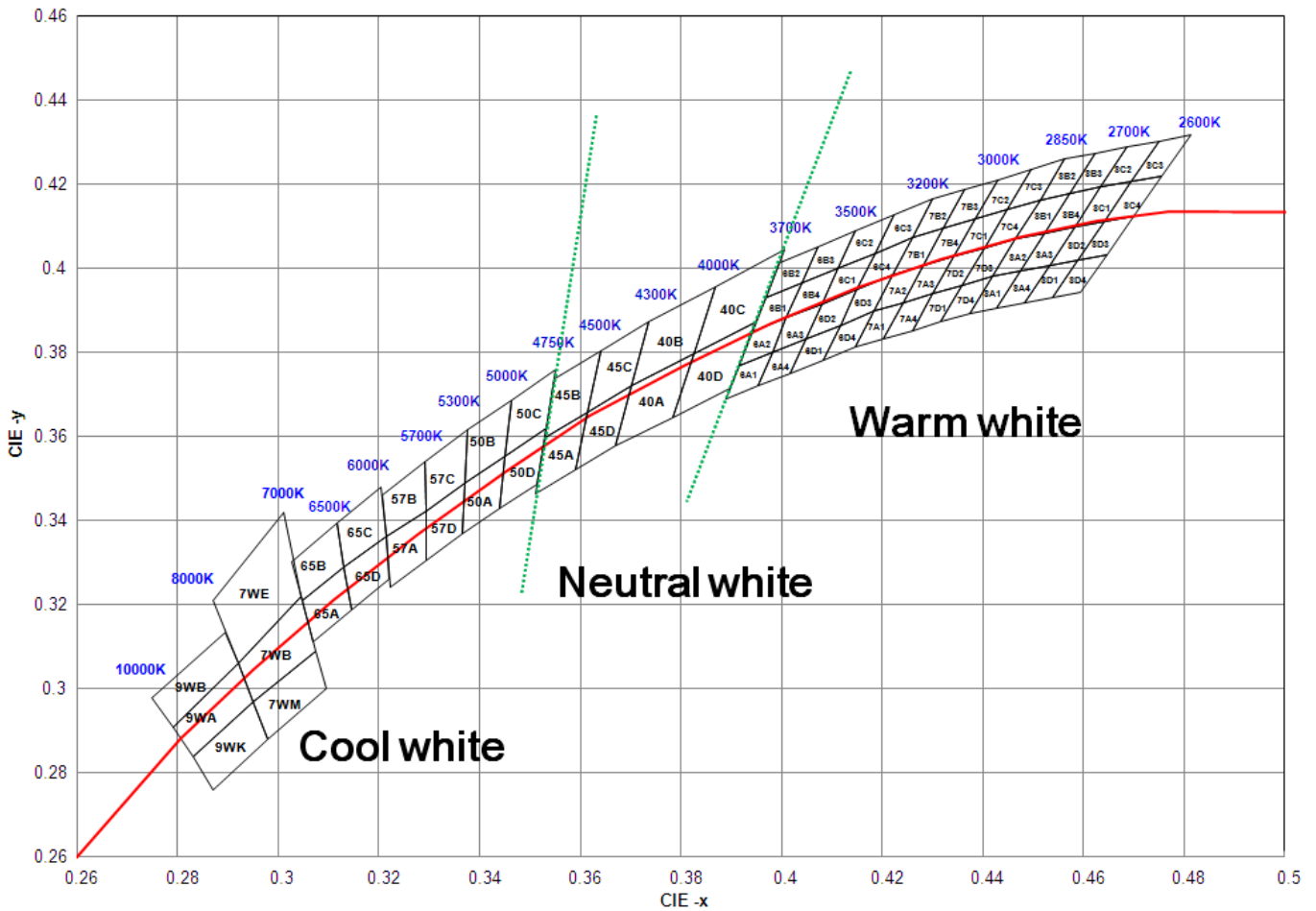
White Series



Blue / Green / Amber / Red Series

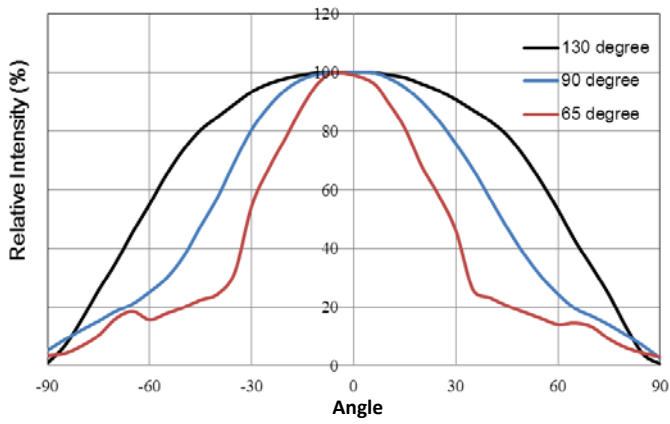


White Bin

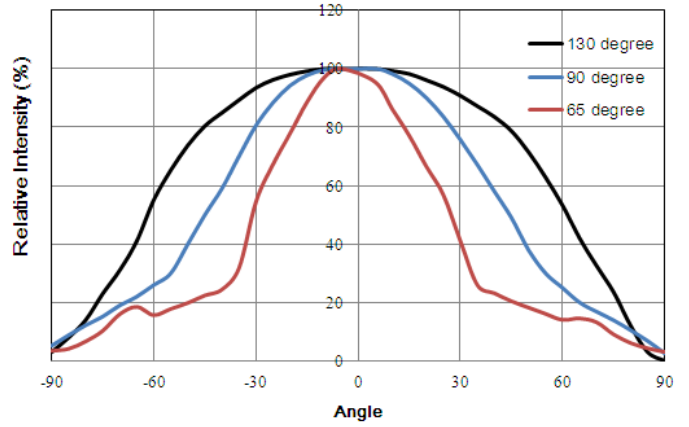


Typical Spatial Radiation Pattern

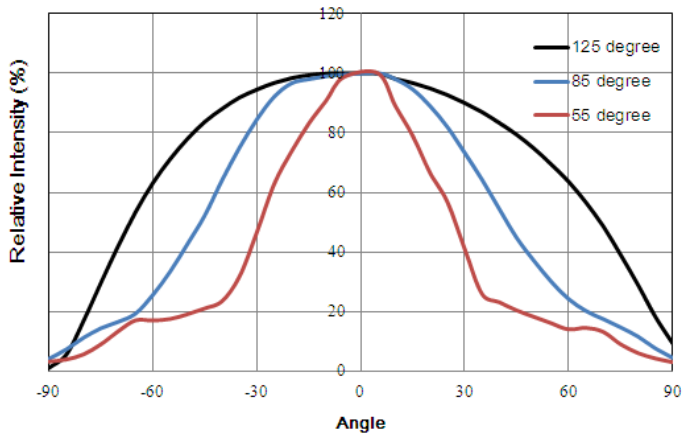
White Series



Royal Blue / Blue / Green / Cyan

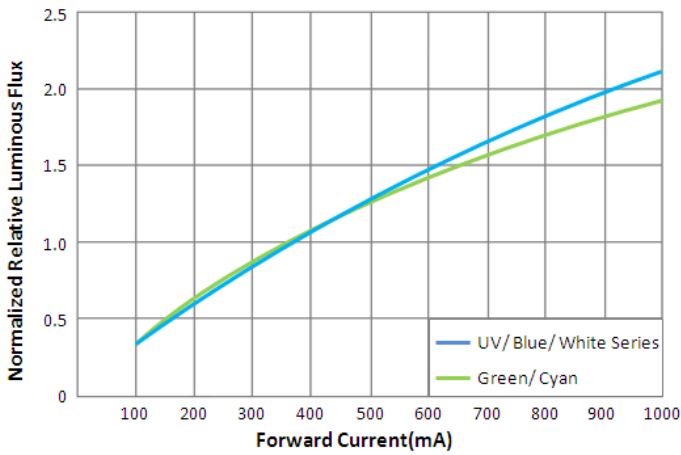


Amber / Red / Super Red

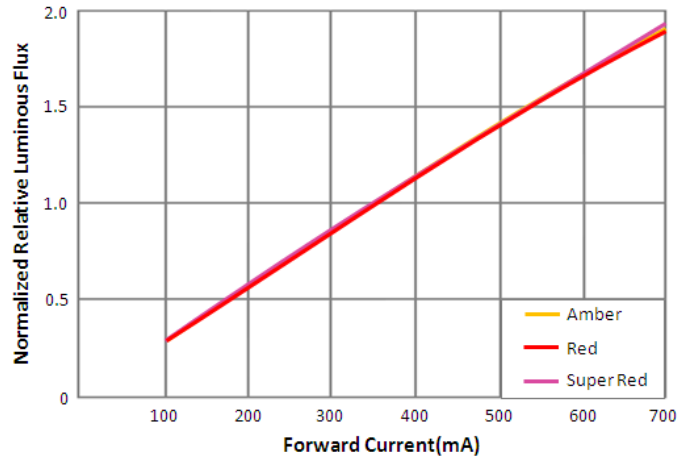


Typical Forward L-I Characteristics, Tj=25 °C

White Series / Blue / Royal Blue / Green / Cyan

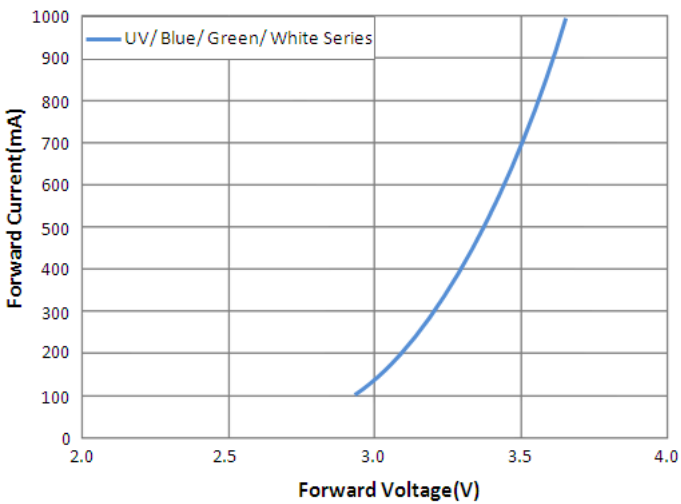


Amber / Red / Super Red

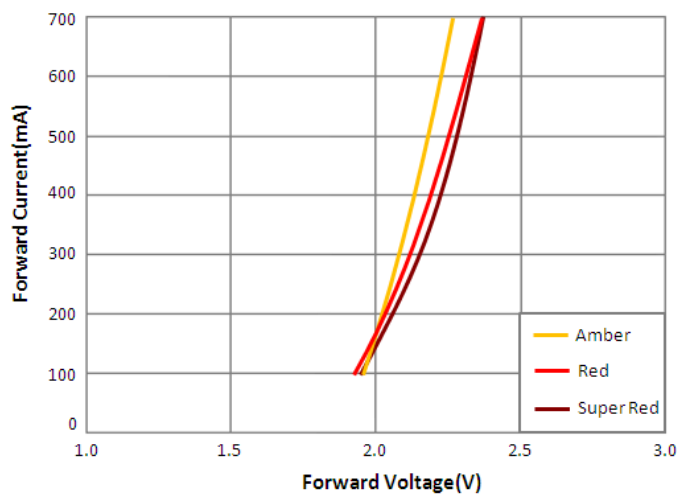


Typical Forward I-V Characteristics, Tj=25 °C

White Series / Blue / Royal Blue / Green / Cyan

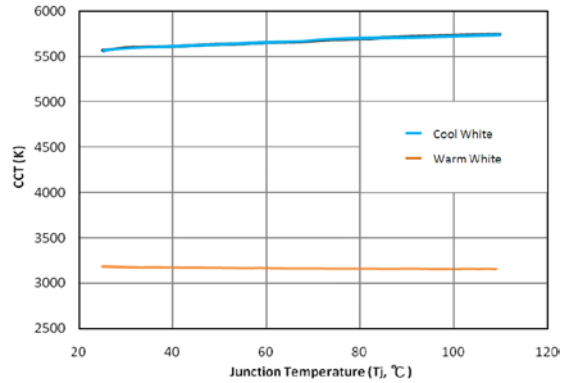
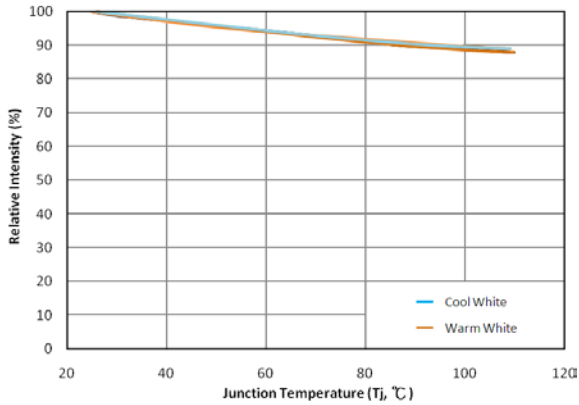


Amber / Red / Super Red

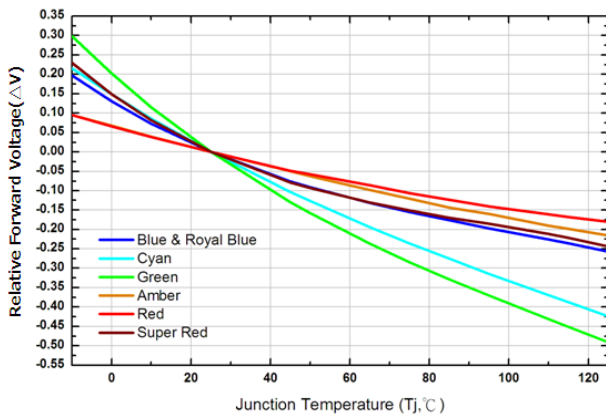
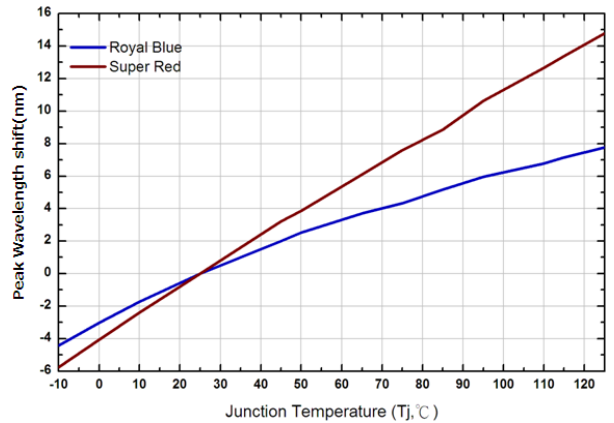
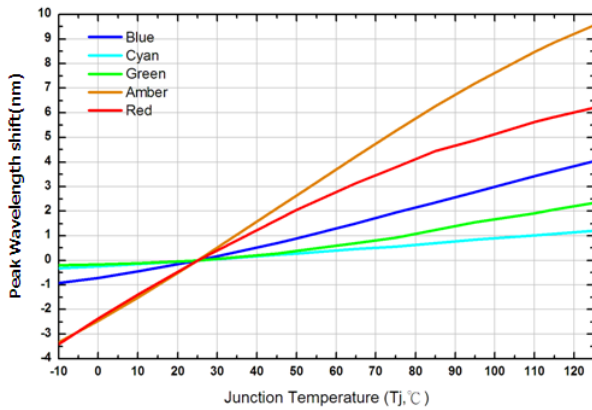
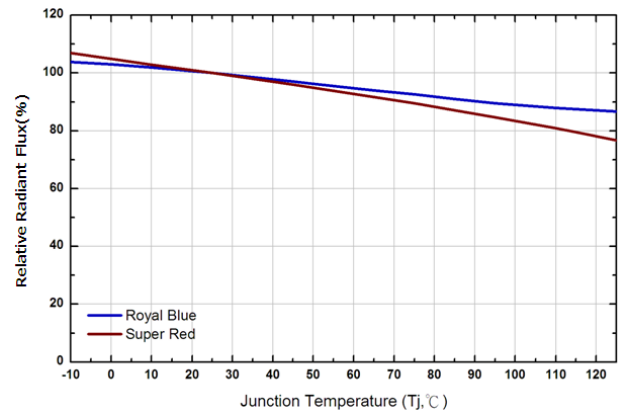
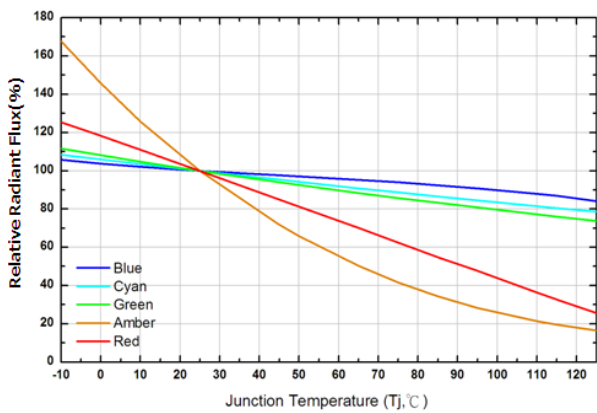


Typical L-Tj Characteristics

White Series

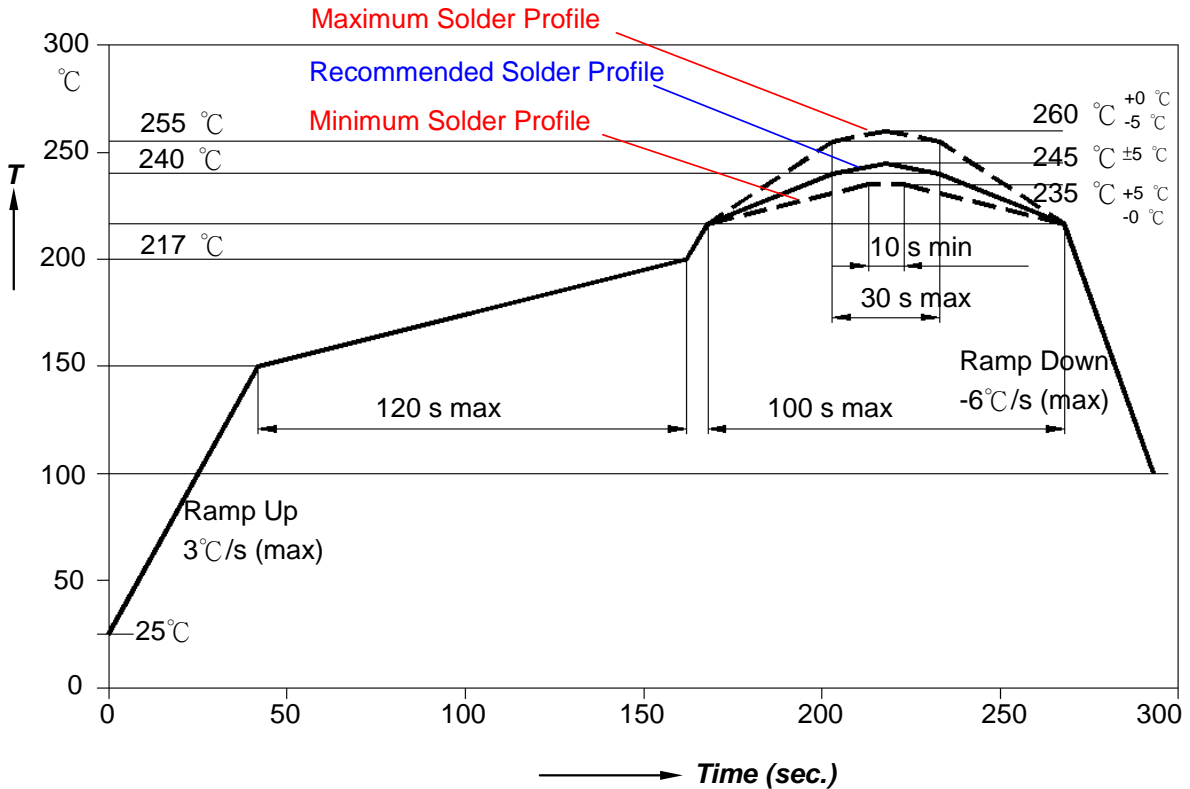


Blue / Green / Cyan / Amber / Red Series



Recommended Soldering Profile

The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest possible temperature is advised for the LEDs.

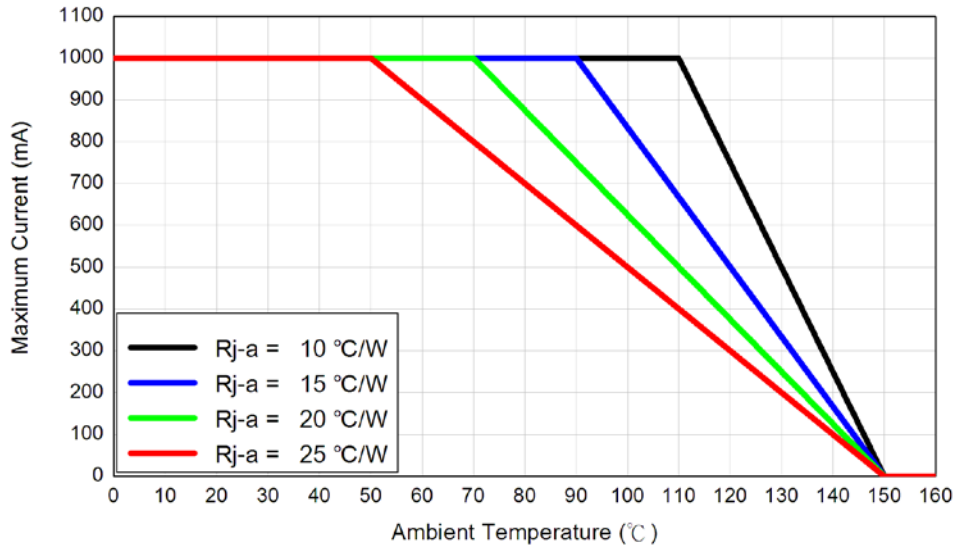


| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|-------------------------|------------------|
| Average Ramp-up Rate (Ts _{max} to Tp) | 3°C /second max. | 3°C /second max. |
| Preheat | | |
| - Temperature Min(Ts _{min}) | 100°C | 150°C |
| - Temperature Max(Ts _{max}) | 150°C | 200°C |
| - Time(ts _{min} to ts _{max}) | 60-120 seconds | 60-180 seconds |
| Time maintained above: | | |
| - Temperature(T _L) | 183°C | 217°C |
| - Time(t _L) | 60-150 seconds | 60-150 seconds |
| Peak/classification Temperature(Tp) | 215°C | 260°C |
| Time within 5°C of actual Peak Temperature(tp) | 10-30 seconds | 20-40 seconds |
| Ramp-Down Rate | 6°C /second max. | 6°C /second max. |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

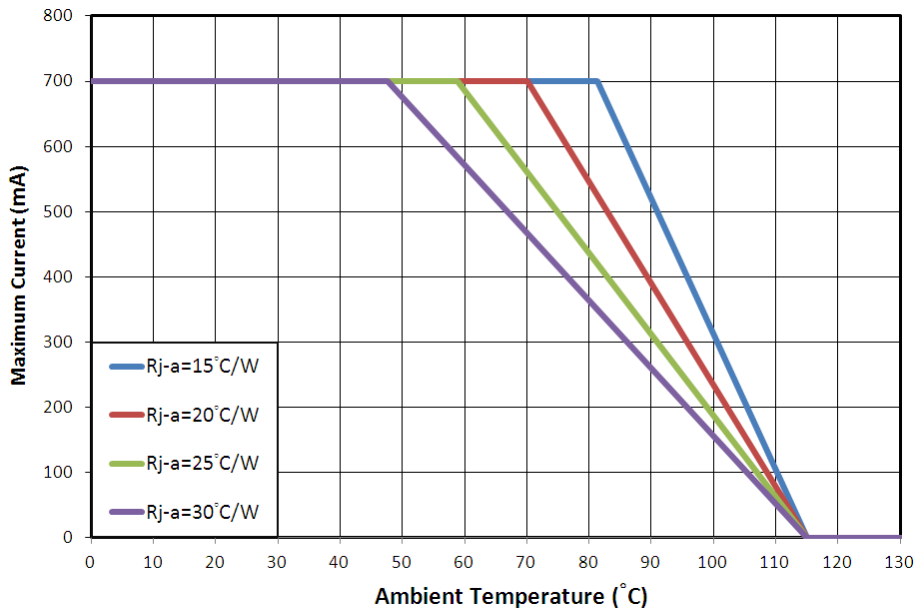
Thermal Design

Thermal design of the end product is important. The thermal resistance between the junction and the solder point and the end product should be designed to minimize the thermal resistance from the solder point to ambient in order to optimize the emitter life and optical characteristics. The maximum operation current is determined by the plot of Allowable Forward Current vs. Ambient Temperature.

White Series / Blue / Royal Blue / Green / Cyan



Amber / Red / Super Red



The junction temperature can be correlated to the thermal resistance between the junction and ambient (Rja) by the following equation.

$$T_j = T_a + R_{j-a} * W$$

Tj: LED junction temperature

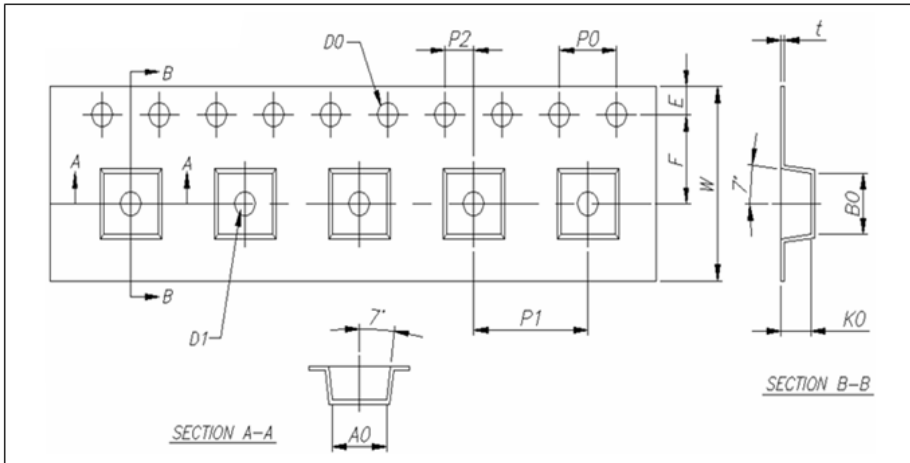
Ta: Ambient temperature

Rja: Thermal resistance between the junction and ambient

W: Input power ($I_F * V_F$)

Packing Information

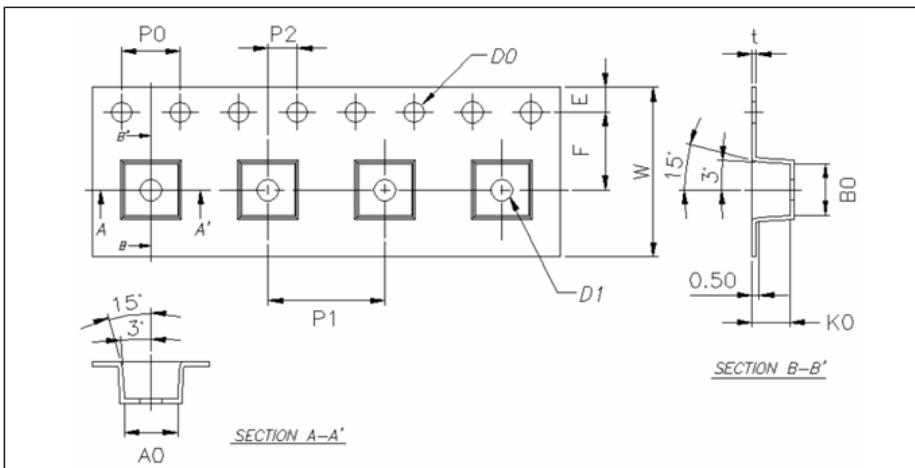
C3535L.C3535M series (beam angle 125°), Max QTY: 1000ea / roll



| Item | Specification | Tol.(+/-) |
|-------|---------------|-----------|
| W | 12.00 | ±0.20 |
| E | 1.75 | ±0.10 |
| F | 5.50 | ±0.05 |
| D0 | 1.50 | +0.10, -0 |
| D1 | 1.50 | ±0.10 |
| P0 | 4.00 | ±0.10 |
| P1 | 8.00 | ±0.10 |
| P2 | 2.00 | ±0.10 |
| P0X10 | 40.00 | ±0.20 |

| Item | Specification | Tol.(+/-) |
|------|---------------|-----------|
| t | 0.25 | ±0.05 |
| A0 | 3.80 | ±0.10 |
| B0 | 3.80 | ±0.10 |
| K0 | 2.20 | ±0.10 |

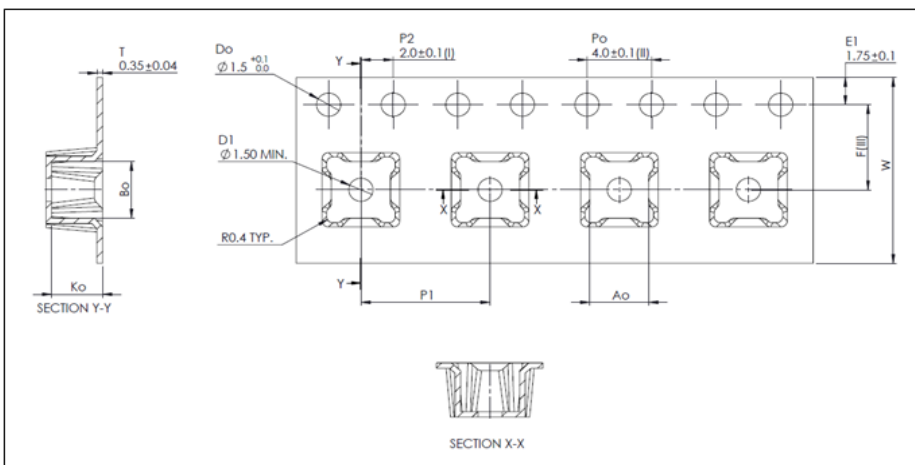
C3535L.C3535M series (beam angle 90°), Max QTY: 500ea / roll



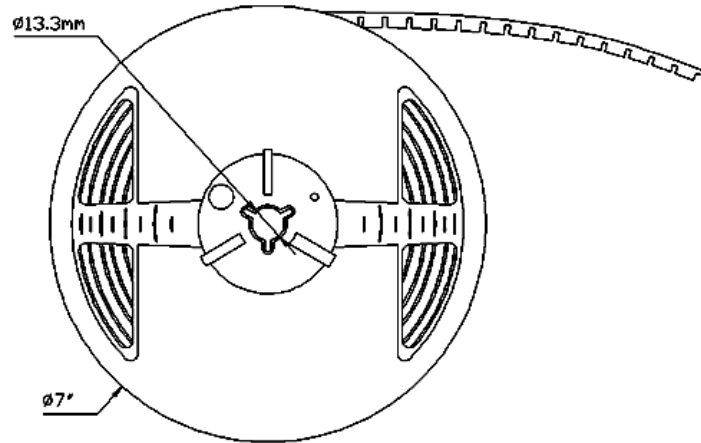
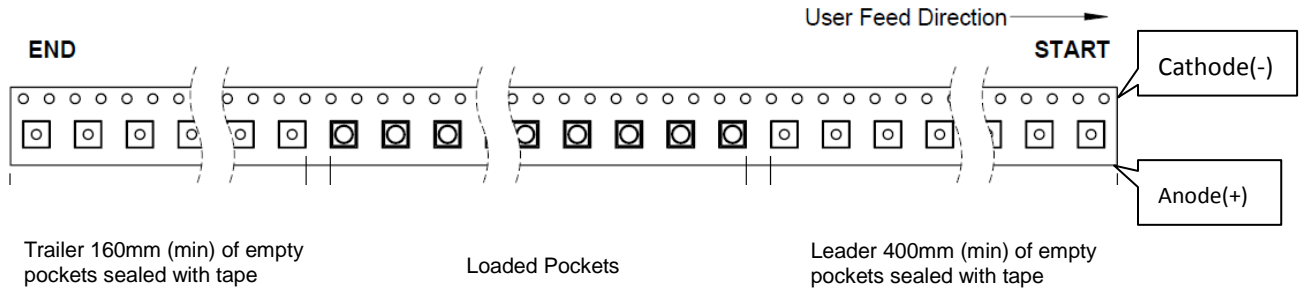
| Item | Specification | Tol.(+/-) |
|-------|---------------|-----------|
| W | 12.00 | ±0.30 |
| E | 1.75 | ±0.10 |
| F | 5.50 | ±0.05 |
| D0 | 1.50 | +0.10, -0 |
| D1 | 1.50 | +0.10, -0 |
| P0 | 4.00 | ±0.10 |
| P1 | 8.00 | ±0.10 |
| P2 | 2.00 | ±0.05 |
| P0X10 | 40.00 | ±0.20 |

| Item | Specification | Tol.(+/-) |
|------|---------------|-----------|
| t | 0.30 | ±0.05 |
| A0 | 3.65 | ±0.10 |
| B0 | 3.65 | ±0.10 |
| K0 | 2.56 | ±0.10 |

C3535L.C3535M series (beam angle 65°), Max QTY: 500ea / roll



| Item | Specification | Tol.(+/-) |
|------|---------------|-----------|
| A0 | 3.65 | ±0.10 |
| B0 | 3.65 | ±0.10 |
| K0 | 3.15 | ±0.10 |
| F | 5.50 | ±0.10 |
| P1 | 8.00 | ±0.10 |
| W | 12.00 | ±0.30 |



Note:

All dimensions are in millimeter.

About Us

TSLC Corporation is devoted to developing high-density, and multi-size emitters with powerful output to satisfy the needs of every customer.

TSLC Corporation is the leader in LED solutions. Unlimited design flexibility for interior and exterior spaces with high-end lighting effect; energy-efficient for UV curing to improve the quality of medical care; horticulture solutions create a better environment for everyone; high-intensity rotatable lightings for the entertainment industry, TSLC is always there for your lighting needs.

For further company or product information, please visit us at www.tslc.com.tw or please contact sales@tslc.com.tw.



www.tslc.com.tw

ASIA PACIFIC

1F, No. 11, Ke Jung Rd.

Chu-Nan Site

Hsinchu Science Park

Chu-Nan 350, Miao-Li City

Taiwan, ROC

Tel: +886-37-587098

Fax: +886-37-587099

sales@tslc.com.tw

