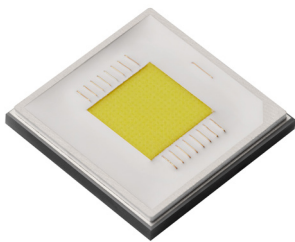


# SFT-90X-WS65-M2

## High Power White LEDs



### Features

- SFT white series is a powerful light source for beam pattern critical lighting applications. The flat window of an SFT white LED results in a much smaller light emitting surface than a dome-shaped cover, enabling smaller optics and higher optical efficiency in directional lighting systems.
- Ultra-high flux from a single large chip, with a maximum output of 5500 lm @ 20 A, 85°C.
  - Vertical chip with high lumen density and small emitting angle, ideal for efficient optical beam shaping to achieve high intensity, narrow beam angle and long beam distance.
  - Phosphor-on-chip with superior color uniformity over radiation angles, delivering homogeneous color in beam spots.
  - Maximum Drive Current: 20 A
  - Color Temperature: 6500K
  - Color Rendering Index: Typ. 70
  - Low thermal resistance: 0.35 °C/W
  - Electrically isolated thermal path
  - 8 kV HBM ESD rating per ANSI/ESDA/JEDEC JS-001



### Applications

- Portable Lighting
  - Battery or Solar Powered Lights
  - LED Work Lights
- Beacons
  - Outdoor Lighting

### Table of Contents

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## Ordering Information

### Ordering Part Numbers<sup>1</sup>

| CRI                | CCT   | Luminous Flux                 |                           | Chromaticity Bin Kit <sup>3</sup> | Ordering Part Numbers |
|--------------------|-------|-------------------------------|---------------------------|-----------------------------------|-----------------------|
|                    |       | Minimum Flux Bin <sup>1</sup> | Minimum Flux <sup>2</sup> |                                   |                       |
| Typ. 70<br>Min. 65 | 6500K | J7                            | 3195 lm                   | 651                               | SFT-90X-WS65-M2-J7651 |
|                    |       |                               |                           | 652                               | SFT-90X-WS65-M2-J7652 |
|                    |       |                               |                           | 653                               | SFT-90X-WS65-M2-J7653 |
|                    |       | J8                            | 3400 lm                   | 651                               | SFT-90X-WS65-M2-J8651 |
|                    |       |                               |                           | 652                               | SFT-90X-WS65-M2-J8652 |
|                    |       |                               |                           | 653                               | SFT-90X-WS65-M2-J8653 |

### Part Number Nomenclature

| SFT                                                                          | 90X                             | W<xy>                                                                                                                                | M2                           | <ffccc>                                                                                                                                                                       |
|------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Family                                                               | Chip Area                       | Color                                                                                                                                | Package Configuration        | Bin Kit                                                                                                                                                                       |
| <b>S:</b> Surface Mount<br><b>F:</b> Flat Window<br><b>T:</b> Single Emitter | <b>90X:</b> 9.0 mm <sup>2</sup> | <b>W:</b> White<br><b>&lt;x&gt;</b> CRI Category Code<br><b>S:</b> CRI>65<br><b>&lt;yy&gt;</b> Color Temperature<br><b>65:</b> 6500K | <b>M2:</b> 7070 package code | <b>&lt;ff&gt;</b> Minimum Flux Bin, see 'Luminous Flux Bins' table for details<br><b>&lt;ccc&gt;</b> Chromaticity Bin Kit, see 'Chromaticity Bin Kit Codes' table for details |

#### Notes:

1. The Ordering Part Number specifies the Minimum Flux Bin in shipment; higher flux bins may be shipped without advance notice. Please refer to 'Luminous Flux Binning' table for details of all flux bins.
2. Product test condition:  $I_f=10.0\text{ A}$ ,  $T_j=85^\circ\text{C}$ .
3. Shipments always adhere to the color bins specified in each Chromaticity Bin Kit. See 'Chromaticity Bin Kit Codes' table for the color bins included in each Bin Kit.



## Binning Structure

### Luminous Flux Bins<sup>1,2</sup>

| Flux Bin | Binning @ 10.0 A             |                   |                              | Correlated Minimum Flux (lm) @ $T_j=85^{\circ}\text{C}^2$ |       |        |        |
|----------|------------------------------|-------------------|------------------------------|-----------------------------------------------------------|-------|--------|--------|
|          | $T_j = 85^{\circ}\text{C}^1$ |                   | $T_j = 25^{\circ}\text{C}^1$ | 2.0 A                                                     | 5.0 A | 15.0 A | 20.0 A |
|          | Minimum Flux (lm)            | Maximum Flux (lm) | Minimum Flux (lm)            |                                                           |       |        |        |
| J7       | 3195                         | 3400              | 3553                         | 831                                                       | 1853  | 4313   | 5176   |
| J8       | 3400                         | 3635              | 3781                         | 884                                                       | 1972  | 4590   | 5508   |
| J9       | 3635                         | 3870              | 4042                         | 945                                                       | 2108  | 4907   | 5889   |
| K1       | 3870                         | 4140              | 4303                         | 1006                                                      | 2245  | 5225   | 6269   |

### Forward Voltage Bins<sup>3</sup>

| Voltage Bin | Binning @ 10.0 A, $T_j = 85^{\circ}\text{C}$ |                     |
|-------------|----------------------------------------------|---------------------|
|             | Minimum Voltage (V)                          | Maximum Voltage (V) |
| VK          | 2.9                                          | 3.1                 |
| VL          | 3.1                                          | 3.3                 |

#### Notes:

1. LEDs are measured at  $25^{\circ}\text{C}$  ambient temperature with 10.0 A 20 ms single pulse. The measured values are correlated to values at  $85^{\circ}\text{C}$  junction temperature ( $T_j$ ). Luminus maintains a  $\pm 6\%$  tolerance on flux measurement.
2. Flux values at other junction temperature ( $T_j$ ) and/or forward current conditions are calculated and for reference only.
3. Individual voltage bins are not orderable.



Binning Structure

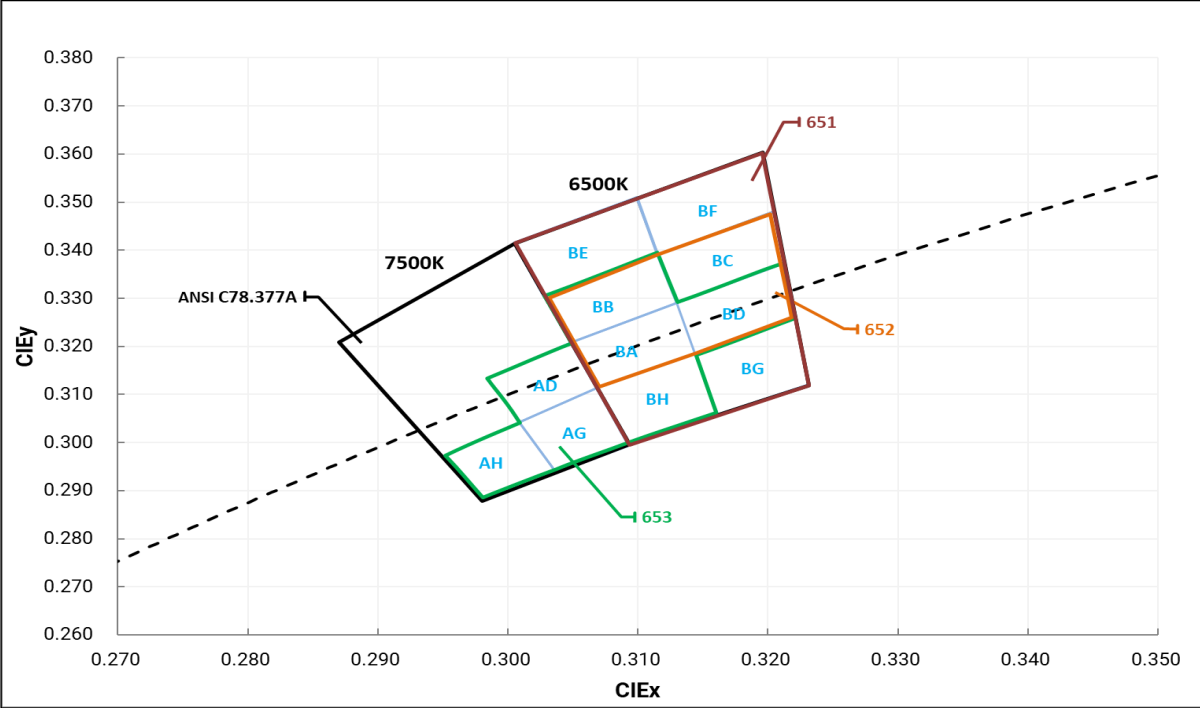
Chromaticity Binning Coordinates

| CCT   | Bin | CIEx   | CIEy   | Bin | CIEx   | CIEy   | Bin | CIEx   | CIEy   | Bin | CIEx   | CIEy   |
|-------|-----|--------|--------|-----|--------|--------|-----|--------|--------|-----|--------|--------|
| 6500K | BA  | 0.3048 | 0.3207 | BB  | 0.3028 | 0.3304 | BC  | 0.3115 | 0.3391 | BD  | 0.3130 | 0.3290 |
|       |     | 0.3130 | 0.3290 |     | 0.3115 | 0.3391 |     | 0.3205 | 0.3481 |     | 0.3213 | 0.3373 |
|       |     | 0.3144 | 0.3186 |     | 0.3130 | 0.3290 |     | 0.3213 | 0.3373 |     | 0.3221 | 0.3261 |
|       |     | 0.3068 | 0.3113 |     | 0.3048 | 0.3207 |     | 0.3130 | 0.3290 |     | 0.3144 | 0.3186 |
|       | BH  | 0.3068 | 0.3113 | BE  | 0.3005 | 0.3415 | BF  | 0.3099 | 0.3509 | BG  | 0.3144 | 0.3186 |
|       |     | 0.3144 | 0.3186 |     | 0.3099 | 0.3509 |     | 0.3196 | 0.3602 |     | 0.3221 | 0.3261 |
|       |     | 0.3161 | 0.3059 |     | 0.3115 | 0.3391 |     | 0.3205 | 0.3481 |     | 0.3231 | 0.3120 |
|       |     | 0.3093 | 0.2993 |     | 0.3028 | 0.3304 |     | 0.3115 | 0.3391 |     | 0.3161 | 0.3059 |
| 7500K | AD  | 0.2984 | 0.3133 | AG  | 0.3037 | 0.2937 | AH  | 0.2980 | 0.2880 |     |        |        |
|       |     | 0.3048 | 0.3207 |     | 0.3009 | 0.3042 |     | 0.2950 | 0.2970 |     |        |        |
|       |     | 0.3068 | 0.3113 |     | 0.3068 | 0.3113 |     | 0.3009 | 0.3042 |     |        |        |
|       |     | 0.3009 | 0.3042 |     | 0.3093 | 0.2993 |     | 0.3037 | 0.2937 |     |        |        |



## Binning Structure

Chromaticity Binning Diagram<sup>1,2</sup>



Chromaticity Bin Kit Codes

| CCT           | Bin Kit | Chromaticity Bins              |
|---------------|---------|--------------------------------|
| 6500K         | 651     | BA, BB, BC, BD, BE, BF, BG, BH |
|               | 652     | BA, BB, BC, BD                 |
| 6500K - 7500K | 653     | BA, BB, BD, BH, AD, AG, AH     |

**Notes:**

- 1. LED chromaticity is measured and binned at 25°C ambient temperature with 10.0 A 20 ms single pulse.
- 2. Luminus maintains a tolerance of ±0.005 on Chromaticity (CIE<sub>x</sub>, CIE<sub>y</sub>) measurement.



## Absolute Maximum Ratings

| Parameter                                            |         | Symbol       | Value      | Unit |
|------------------------------------------------------|---------|--------------|------------|------|
| DC Forward Current                                   | Minimum | $I_{f\ min}$ | 0.1        | A    |
|                                                      | Maximum | $I_{f\ max}$ | 20         |      |
| Surge Current ( $t < 10\ ms$ , Duty Cycle $< 10\%$ ) |         | $I_s$        | 22         | A    |
| Reverse Voltage ( $I_r = 10\ mA$ )                   |         | $V_r$        | 5          | V    |
| Power Dissipation                                    |         | $P_D$        | 72         | W    |
| Junction Temperature                                 |         | $T_{j\ max}$ | 150        | °C   |
| Operating Temperature Range                          |         | $T_{opr}$    | -40 to 100 | °C   |
| Storage Temperature Range                            |         | $T_{stg}$    | -40 to 100 | °C   |
| ESD withstand Voltage ANSI/ESDA/JEDEC JS-001 (HBM)   |         | $V_{HBM}$    | 8          | kV   |
| ESD withstand Voltage ANSI/ESDA/JEDEC JS-002 (CDM)   |         | $V_{CDM}$    | 1          | kV   |

## Characteristics

| Parameter                                                             |         | Symbol                     | Value | Unit  |
|-----------------------------------------------------------------------|---------|----------------------------|-------|-------|
| Color Rendering Index1 ( $T_j = 85^\circ C$ )                         | Minimum | $CRI_{min}$                | 65    |       |
|                                                                       | Typical | $CRI_{typ}$                | 70    |       |
| Forward Voltage ( $I_f = 10.0\ A$ , $T_j = 85^\circ C$ )              | Minimum | $V_{f\ min}$               | 2.9   | V     |
|                                                                       | Typical | $V_{f\ typ}$               | 3.2   |       |
|                                                                       | Maximum | $V_{f\ max}$               | 3.3   |       |
| Viewing Angle (FWHM)                                                  |         | $2\theta_{1/2}$            | 120   | °     |
| Temperature Coefficient of Voltage                                    |         | $\partial_{VF}/\partial_T$ | -1.0  | mV/°C |
| Electrical Thermal Resistance (Junction to Solder Point) <sup>2</sup> |         | $R_{th\ JS\ elec}$         | 0.35  | °C/W  |

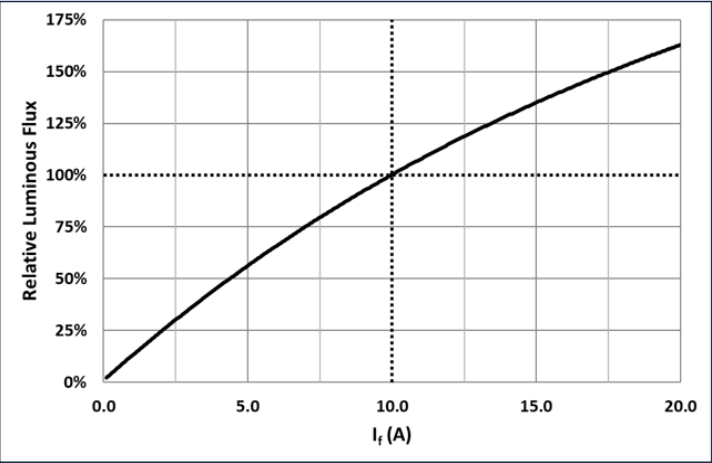
**Note:**

1. Luminus maintains a tolerance of  $\pm 2$  on Color Rendering Index (CRI) measurement.



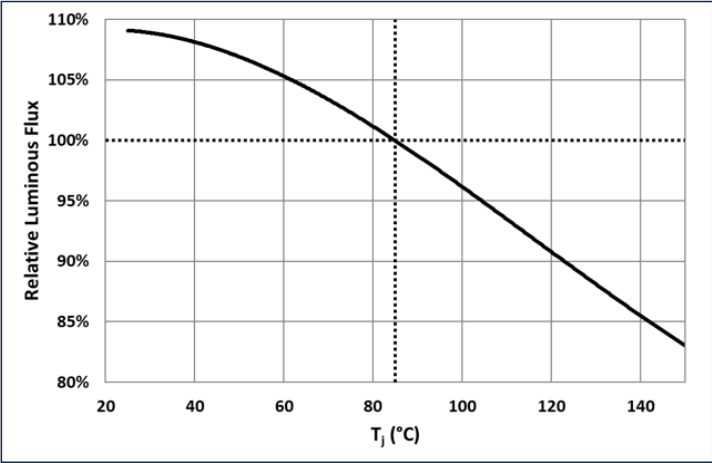
Relative Luminous Flux vs Forward Current

$T_j = 85^{\circ}\text{C}$



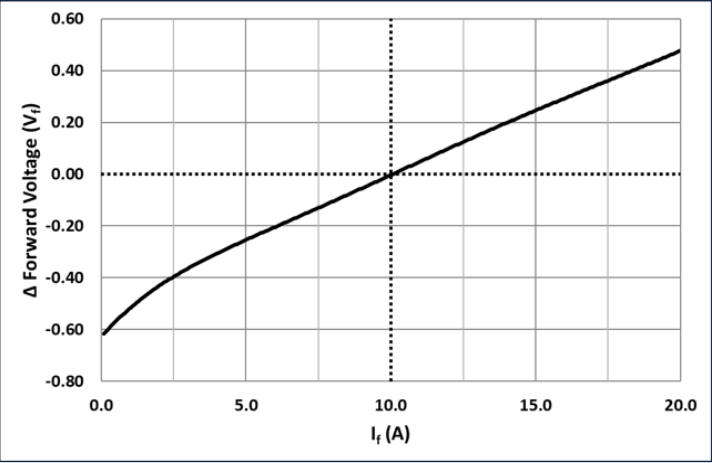
Relative Luminous Flux vs Temperature

$I_f = 10.0\text{ A}$



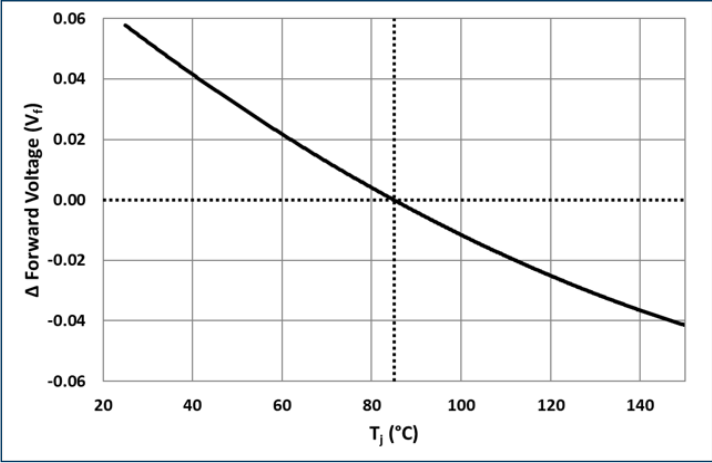
Forward Voltage vs Forward Current

$T_j = 85^{\circ}\text{C}$



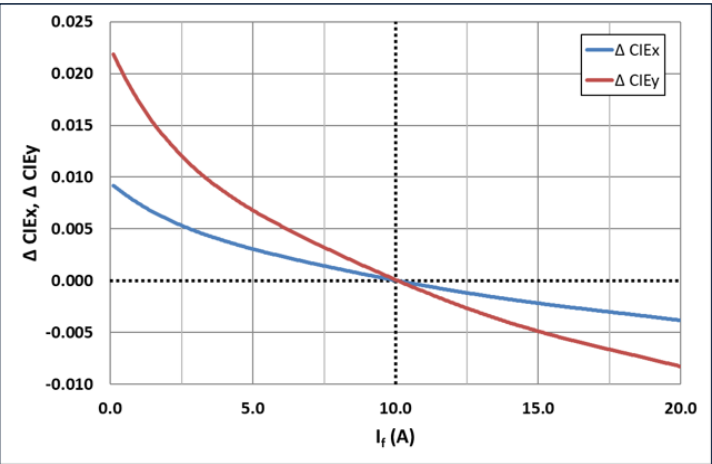
Forward Voltage vs Temperature

$I_f = 10.0\text{ A}$



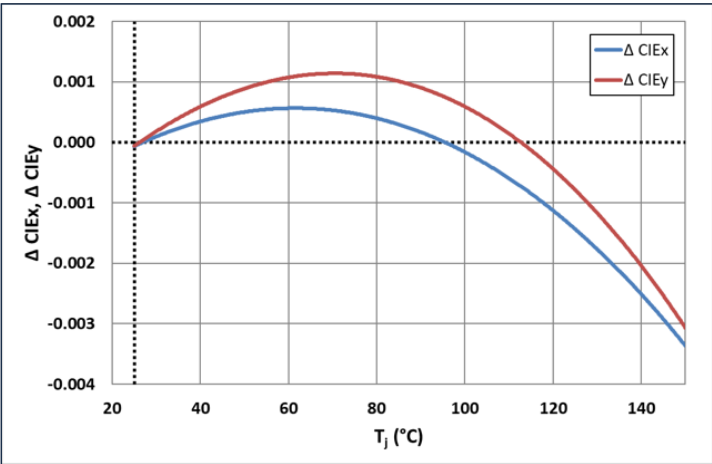
Relative Chromaticity vs Forward Current

$T_j = 85^{\circ}\text{C}$



Relative Chromaticity vs Temperature

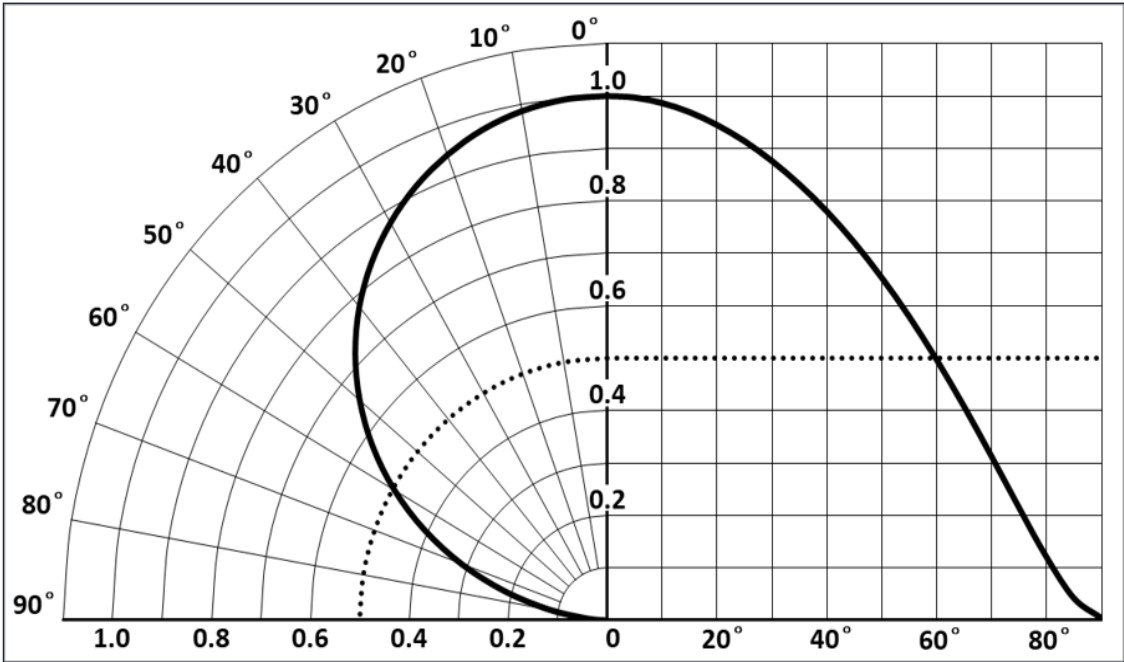
$I_f = 10.0\text{ A}$





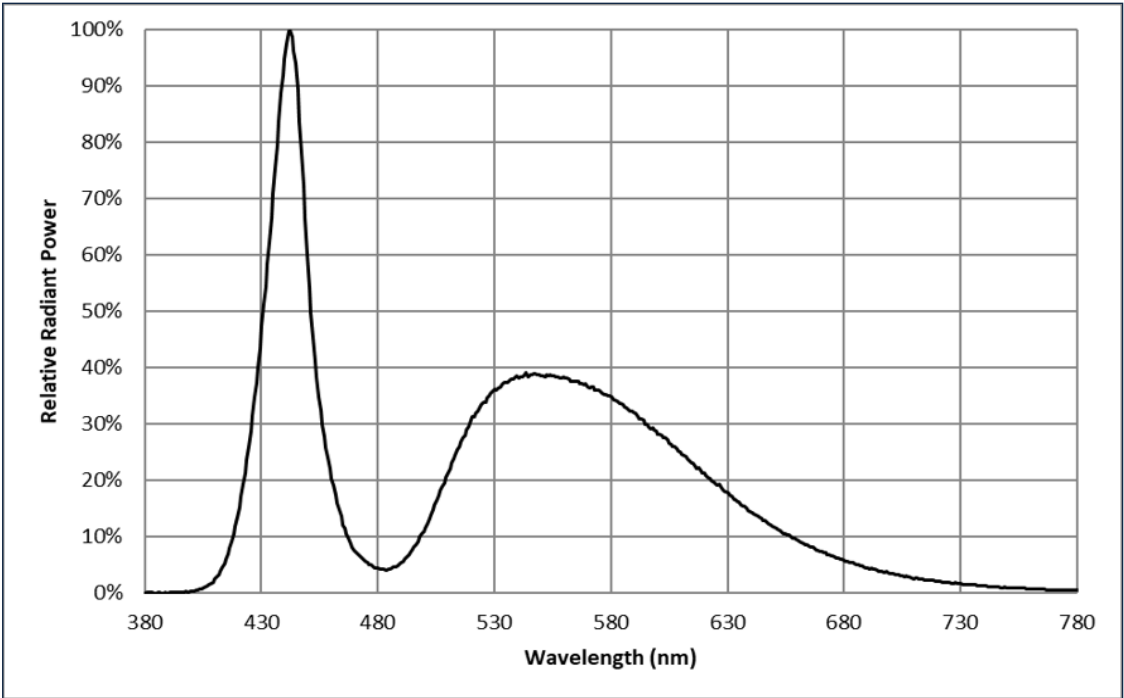
Angular Distribution

$I_f = 10.0\text{ A}$ ;  $T_j = 25^\circ\text{C}$



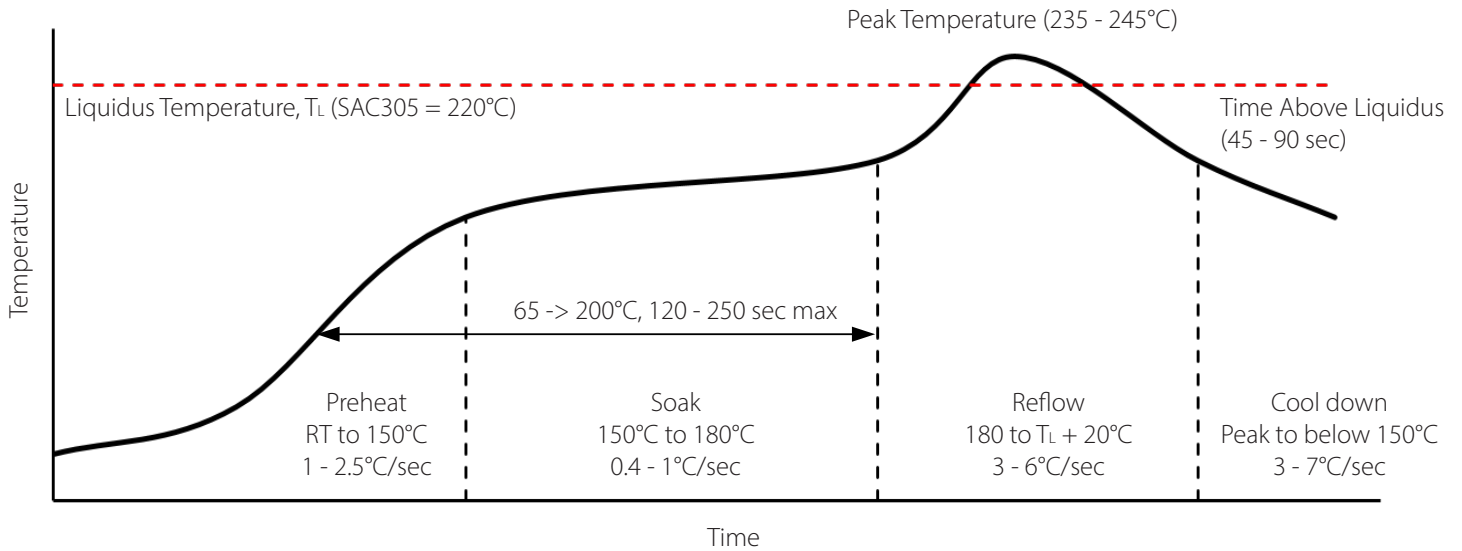
Relative Spectral Power Distribution

$I_f = 10.0\text{ A}$ ;  $T_j = 85^\circ\text{C}$





## Soldering Profile



### SMT Solder Rework Temperature Guidelines

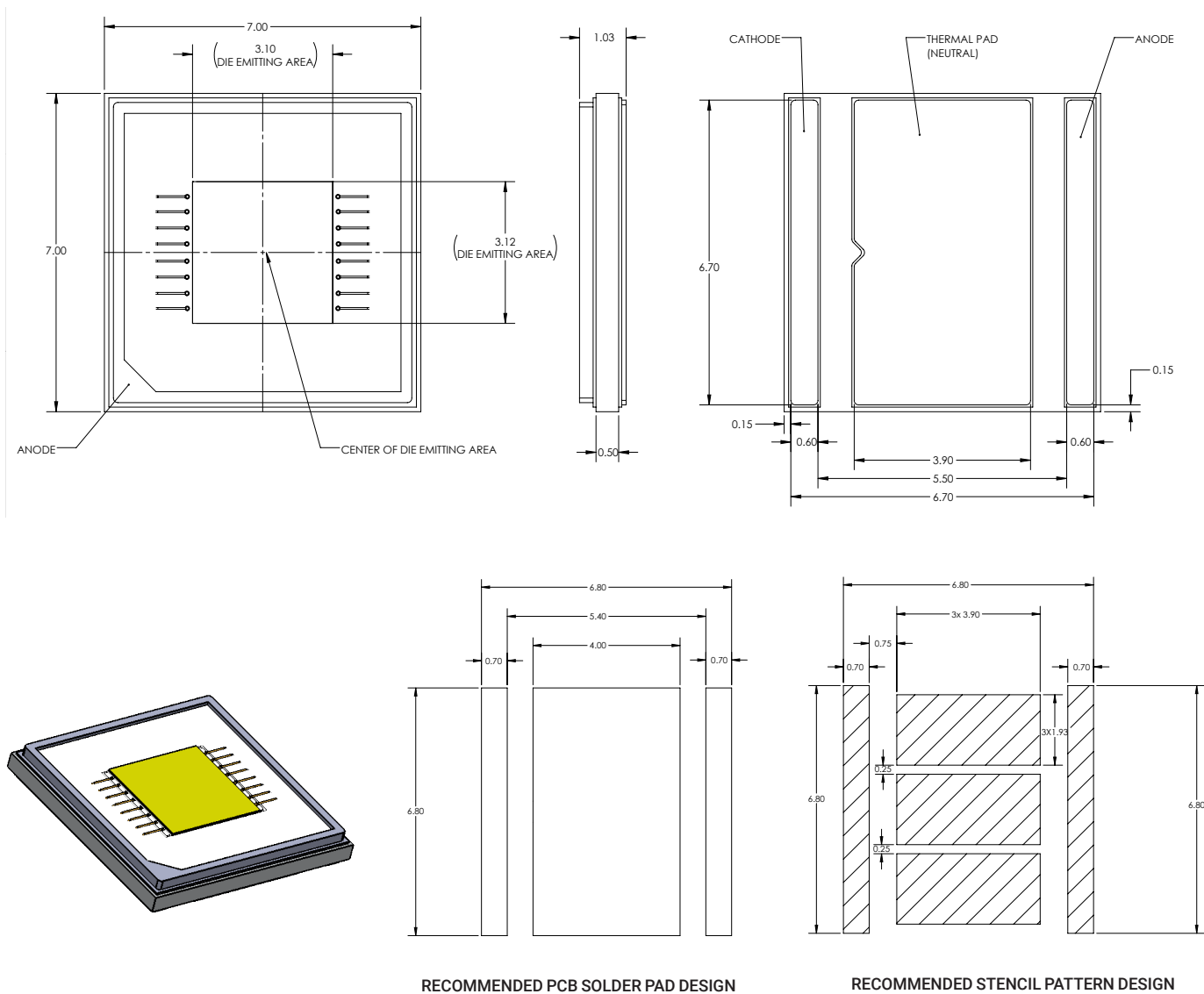
| Parameter            | Manual Hotplate Reflow | Hot Air Gun Reflow |
|----------------------|------------------------|--------------------|
| Heating Time         | < 60 sec               |                    |
| Hotplate Temperature | < 245°C                | < 150°C            |

#### Notes:

- Product complies to Moisture Sensitivity Level 3 (MSL 3).
- The numbers in the table are specific to SAC305. Luminus recommends using an SAC305 solder paste with a no-clean flux for RoHS compliant products.
- During the pick and place process, axial forces on the dome (or window) should not exceed 0.5 Newtons (N).
- Use of a multi-zone IR reflow oven with a nitrogen blanket is recommended.
- Time-temperature profile of the reflow process showing the four functional profile zones are defined in IPC-7801. Temperature is referenced to the center of the PCB.
- Luminus recommends to use the solder paste data sheet information as a starting point in time-temperature process development.
- These are general guidelines. Consult the solder paste manufacturer's datasheet for guidelines specific to the alloy and flux combination used in your application. For more information, please refer to:  
<https://luminusdevices.zendesk.com/hc/en-us/articles/360060306692-How-do-I-Reflow-Solder-Luminus-SMD-Components->
- For any technical questions about soldering process, please contact Luminus at techsupport@luminus.com.

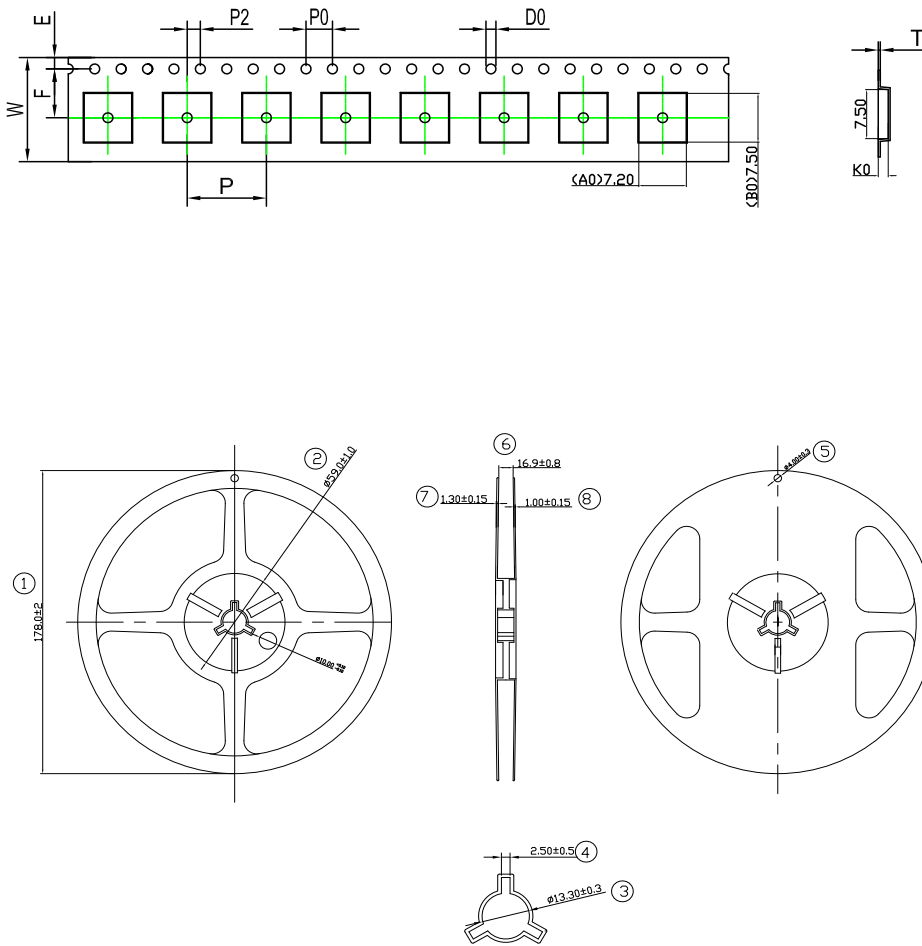


Mechanical Dimensions<sup>1</sup>



**Note:**  
1. All dimensions are in millimeter  $\pm 0.13$  mm.

## Tape and Reel Outline



| Parameter | Dimension (mm) |
|-----------|----------------|
| A0        | 7.2±0.1        |
| B0        | 7.5±0.1        |
| D0        | 1.5±0.1        |
| D1        | 1.5±0.1        |
| E         | 1.75±0.1       |
| F         | 5.5±0.1        |
| K0        | 1.6±0.1        |
| P0        | 4.0±0.1        |
| P         | 12.0±0.1       |
| P2        | 2.0±0.1        |
| T         | 0.30±0.05      |
| W         | 16.0±0.3       |

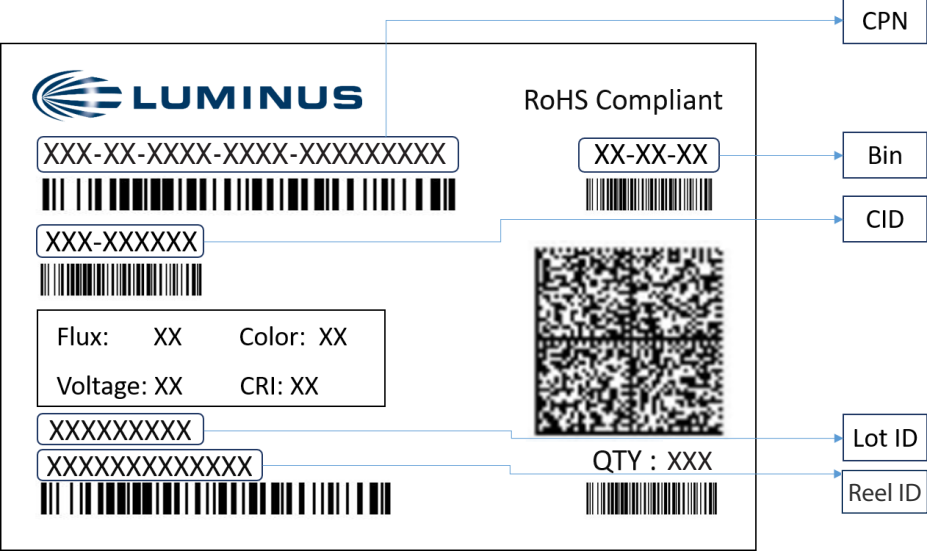
### Notes:

- Each Reel contains 500 units of LEDs.
- Black anti-static tape material (Denka ECM3/ECAP3)
- The accumulated tolerance for ten sprocket holes should be no more than 0.2 mm.
- The tortuosity of 250 mm tape should be no more than 1 mm per 100 mm.
- Leave minimum 800 mm with empty compartments sealed by cover tape for lead in.
- Leave minimum 1200 mm with empty compartments sealed by cover tape for trailer.
- All dimensions must comply to EIA-481-B.
- Final tape and reel packaging must meet the requirements of JEDEC-STD-033, LEVEL 2A.



## Shipping Label

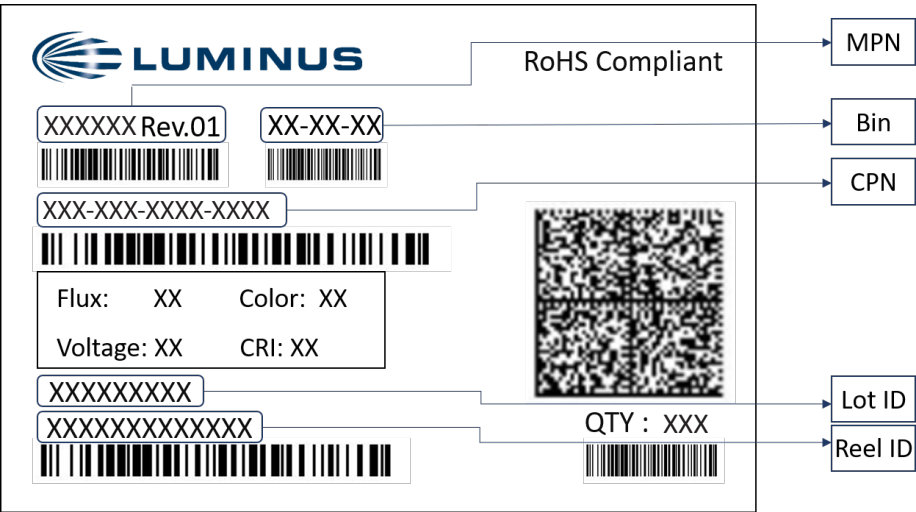
### Label on Packaging Box



#### Label Fields:

- CPN**: Luminus ordering part number
- CID**: Customer's part number
- QTY**: Quantity of parts per reel
- Flux**: Bin as defined on page 3
- Voltage**: Bin as defined on page 3
- Color**: Bin as defined on page 4 and 5
- CRI**: NA
- Lot ID & Reel ID**: For Luminus internal use

### Label on Reel

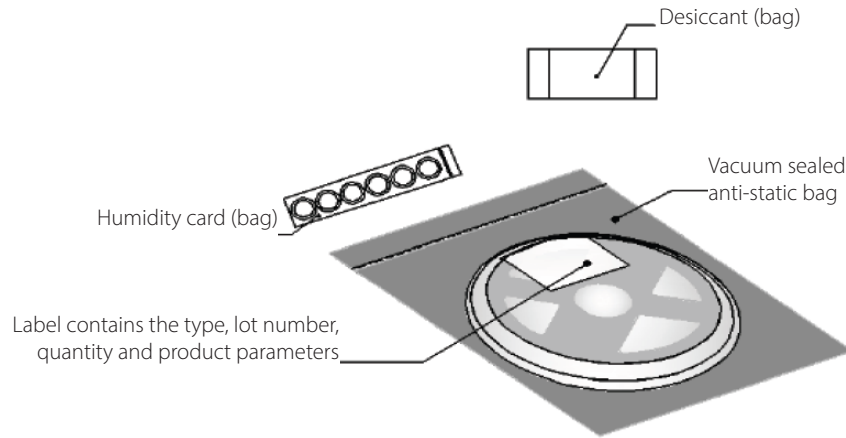


#### Label Fields:

- CPN**: Luminus ordering part number
- MPN**: For Luminus internal use
- QTY**: Quantity of parts per reel
- Flux**: Bin as defined on page 3
- Voltage**: Bin as defined on page 3
- Color**: Bin as defined on page 4 and 5
- CRI**: NA
- Lot ID & Reel ID**: For Luminus internal use

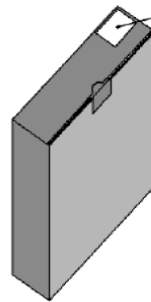
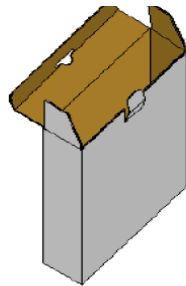
## Packaging

### Packaged Reel



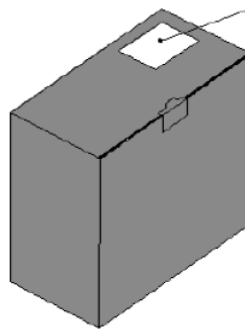
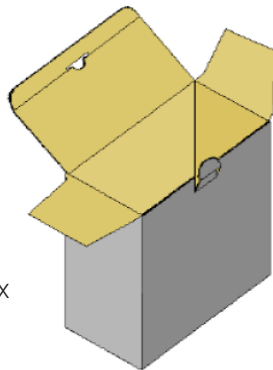
### Packaging boxes

**Box Size 1** - 5 reels per box  
Size: 22.5 x 24.5 x 6.5 cm



Label contains the type, lot number, quantity and product parameters

**Box Size 2** - 10 reels per box  
Size: 22.5 x 24.5 x 13 cm



Label contains the type, lot number, quantity and product parameters

### Packing Configuration:

- 500 units per reel
- Each reel is enclosed in anti-static bag
- Shipping label is placed on top of each reel
- Multiple labels are attached to the box (one label per reel inside the box)



## Notes

### Environmental Compliance

Luminus complies with RoHS and REACH. Luminus is committed to selling environmentally friendly and sustainable products. We do not use harmful or hazardous substances in our composites and products. Luminus will not intentionally add the following restricted materials to our products: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), or polybrominated diphenyl ethers (PBDE).

### Static Electricity

1. The products are sensitive to static electricity, and care should be taken when handling them.
2. Static electricity or surge voltage will damage the LEDs. It is recommended to wear anti-electrostatic gloves or wristband when handling the LEDs.
3. All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.

Reference: [APN-002815](#) Electrical Stress Damage to LEDs and How to Prevent It

### Storage

Please follow J-STD-033D guidance on safe storage and bake treatment.

1. Before opening the package

The LEDs should be kept at a temperature lower than 40°C and relative humidity lower than 90%. The LEDs should be used within a year. When storing the LEDs, moisture proof package with absorbent material (silica gel) is recommended.

2. After opening the package

The LEDs should be kept at a temperature lower than 30°C and relative humidity lower than 60%. The LEDs should be soldered within 168 hours (7 days) after opening the moisture proof package.

If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with moisture absorbent material (silica gel). It is also recommended to return the unused LEDs to the original moisture proof package and to seal it again.

If the moisture absorbent material (silica gel) vaporizes or passes the expiration date, baking treatment should be performed by using the following conditions : 60°C for 20 hours.

The LED's electrode and lead frame comprise a silver plated copper alloy. The silver surface may be affected by environments. Please avoid conditions which may cause the LEDs to corrode or discolor. The corrosion or discoloration might lower solderability or affect optical characteristics.

Please avoid rapid transition in ambient temperature, especially in high humidity environments where condensation can occur.