

The background of the page features a light gray grid of dots that recede into the distance, creating a sense of depth. A solid purple rectangle is positioned on the left side, containing the product name and title in white text.

# **PC56H19 V0**

## **Product Specification**

## Approval Sheet

PC56H19 V0  
Product Specification

RoHS

|             |               |
|-------------|---------------|
| Product     | White SMD LED |
| Part Number | PC56H19 V0    |
| Issue Date  | 2015/10/03    |



### ■ Feature

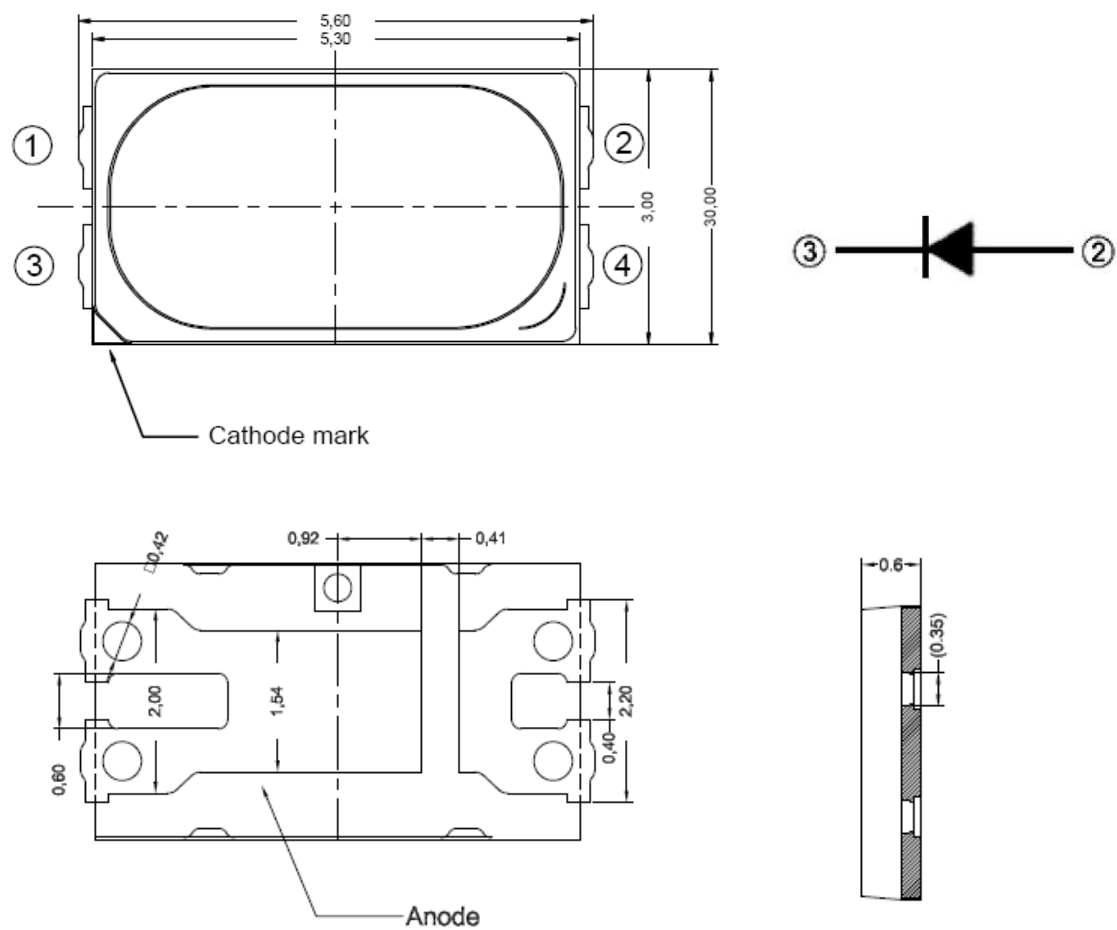
- ✓ White SMD LED (L x W x H) of 5.6 x 3.0 x 0.6 mm
- ✓ ASNI hybrid binning
- ✓ Dice Technology : InGaN
- ✓ Qualified according to JEDEC moisture sensitivity Level 3
- ✓ Environmental friendly ; RoHS compliance
- ✓ Packing : 1,000 or 2,000 pcs/reel

### ■ Applications

- ✓ Portable flashlight
- ✓ Reading lights
- ✓ Security / garden lighting
- ✓ General lighting
- ✓ Indoor and outdoor commercial lighting

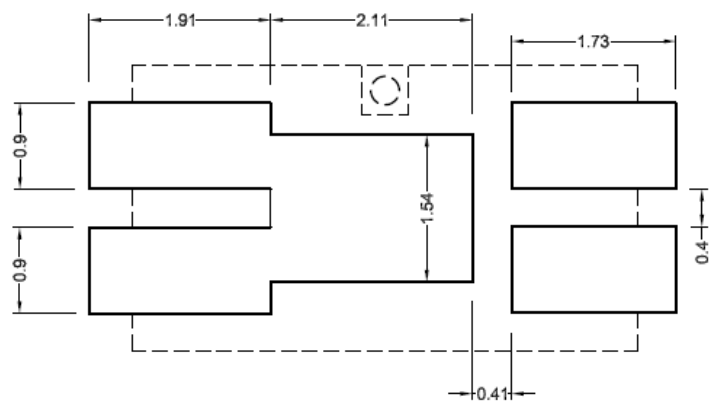
Outline Dimension

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Unit: mm, Tolerance:  $\pm 0.1\text{mm}$

Recommended Soldering Pad



## Performance

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### ■ Electro-Optical Characteristics (Ta=25°C)

| Parameter                            | Symbol          | Condition              | Min. | Typ. | Max. | Unit |
|--------------------------------------|-----------------|------------------------|------|------|------|------|
| Forward Voltage <sup>(1)</sup>       | V <sub>F</sub>  | I <sub>F</sub> = 65 mA | 2.7  | -    | 3.2  | V    |
| Color Rendering Index <sup>(2)</sup> | Ra              |                        | 80   | -    | -    | -    |
| Color Rendering Index <sup>(3)</sup> | R9              |                        | 0    |      |      |      |
| View Angle                           | θ               |                        | -    | 120  | -    | deg  |
| Thermal Resistance <sup>(3)</sup>    | R <sub>th</sub> |                        | -    | 18   | -    | °C/W |

(1) The Forward Voltage tolerance is ±0.1V

(2) The Color Rendering Index tolerance is ±2

(3) The R9 is measured at Ta=85°C with the tolerance of ±6

(4) Thermal resistance is calculated from junction to solder

### ■ Luminous Flux (Ta=25°C)

| CCT         | Condition              | Rank       |
|-------------|------------------------|------------|
| 2600K~3700K | I <sub>F</sub> = 65 mA | VF, VG, VH |
| 3700K~7000K |                        | VG, VH, VI |

\* The luminous flux tolerance is ± 7%

### ■ Absolute Maximum Ratings

| Parameter                            | Symbol           | value           | Unit |
|--------------------------------------|------------------|-----------------|------|
| DC Forward Current <sup>(1)</sup>    | I <sub>F</sub>   | 180             | mA   |
| Power Dissipation                    | Pd               | 0.58            | W    |
| Pulse Forward Current <sup>(2)</sup> | I <sub>FP</sub>  | 300             | mA   |
| Storage Temperature                  | T <sub>S</sub>   | -40 ~ 100       | °C   |
| Operating Temperature                | T <sub>opr</sub> | -40 ~ 85        | °C   |
| Junction Temperature                 | T <sub>J</sub>   | 120             | °C   |
| Assembly Temperature                 | -                | 260 (max. 5sec) | °C   |

(1) Proper current rating must be observed to maintain junction temperature below maximum at all time

(2) IFP Condition: Duty 1/10, Pulse within 10msec

Binning

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Bin code definition

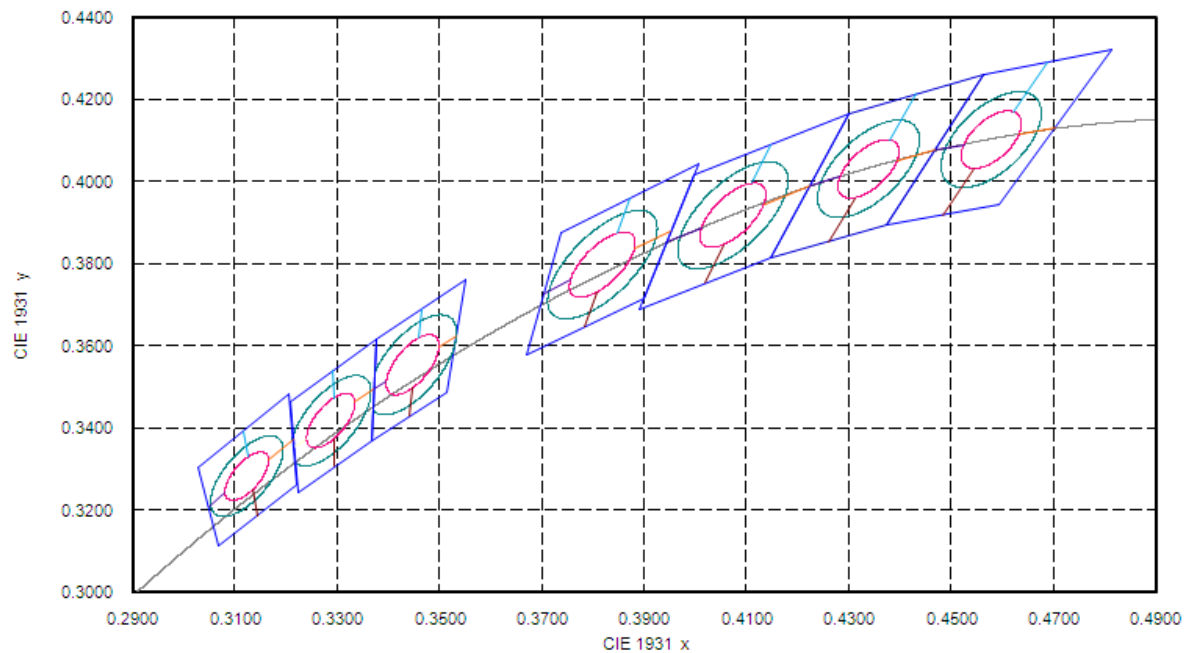
| V <sub>F</sub> Rank | Luminous Flux Rank | CIE Rank |
|---------------------|--------------------|----------|
| 0                   | VH                 | 27A      |

| V <sub>F</sub> Rank | Condition | Min. | Max. |
|---------------------|-----------|------|------|
| 9                   |           | 2.7  | 2.8  |
| 0                   |           | 2.8  | 2.9  |
| 1                   |           | 2.9  | 3.0  |
| 2                   |           | 3.0  | 3.1  |
| 3                   |           | 3.1  | 3.2  |

| Luminous Flux Rank | Condition              | Min  | Max. |
|--------------------|------------------------|------|------|
| VF                 | I <sub>F</sub> = 65 mA | 25   | 28   |
| VG                 |                        | 28   | 31.5 |
| VH                 |                        | 31.5 | 36   |
| VI                 |                        | 36   | 40.5 |

## ■ Chromaticity Coordinates

PC56H19 is hot color targeted so that at 65°C, the color is within ANSI while typical bin structured at 65°C. In application conditions, the LED temperature rises and at 65°C the typical color bins will be as shown.

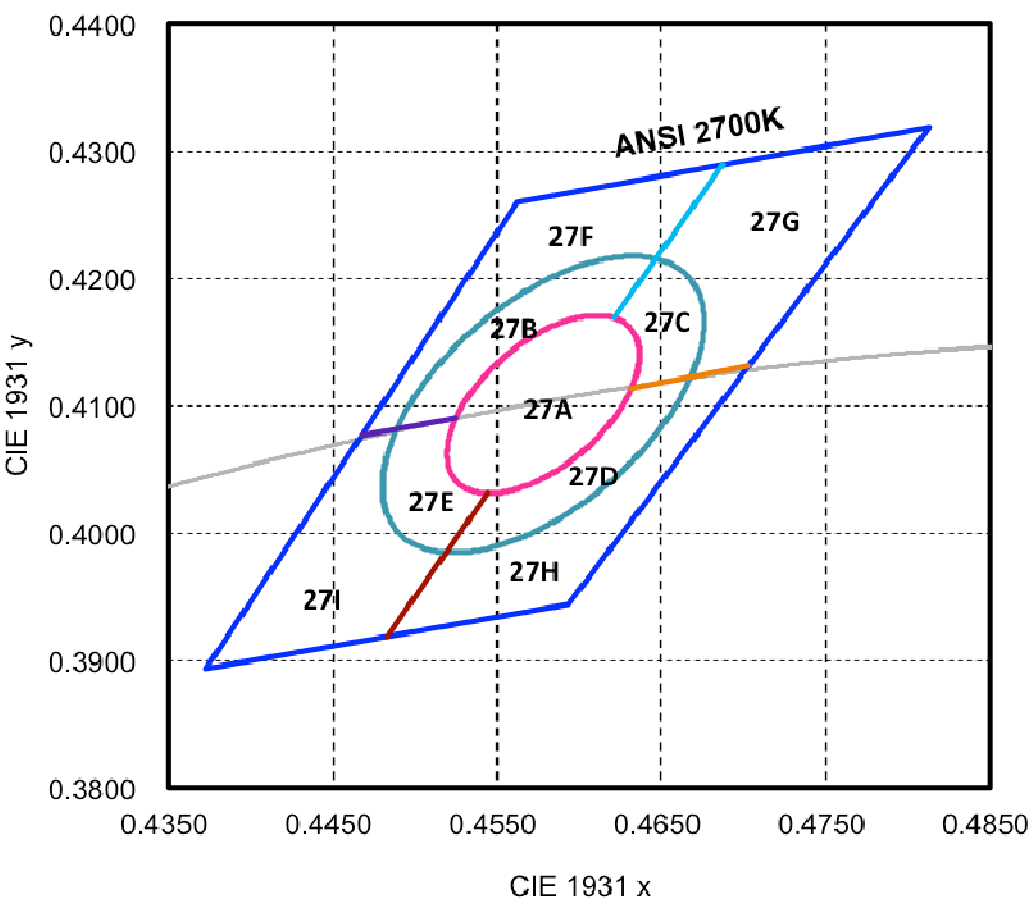


Note:

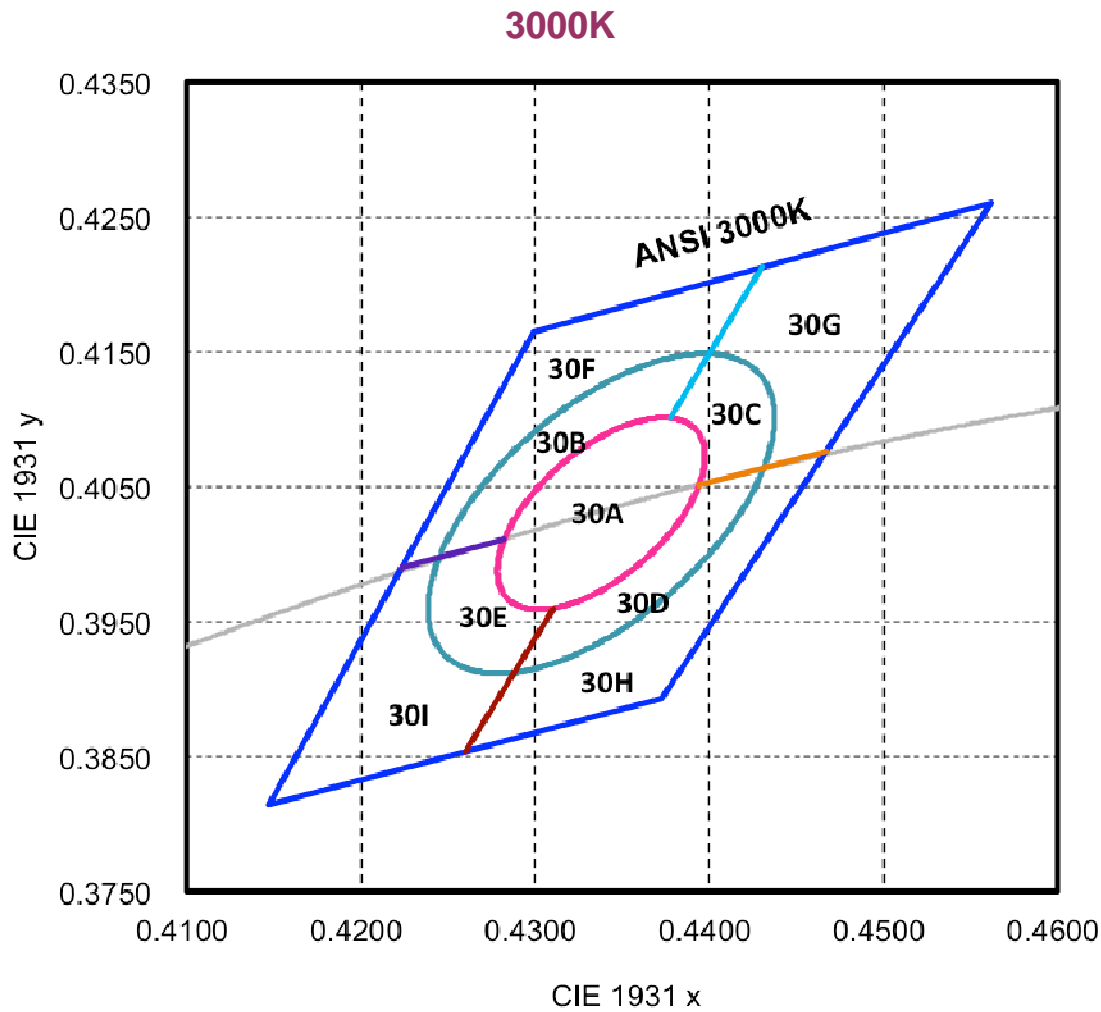
- (1) Correlated color Temperature is derived from the CIE 1931 Chromaticity diagram
- (2) CIE measurement tolerance is  $\pm 0.005$
- (3) The luminous flux tolerance is  $\pm 7\%$
- (4) The Forward Voltage tolerance is  $\pm 0.1V$

■ Bin code definition

2700K



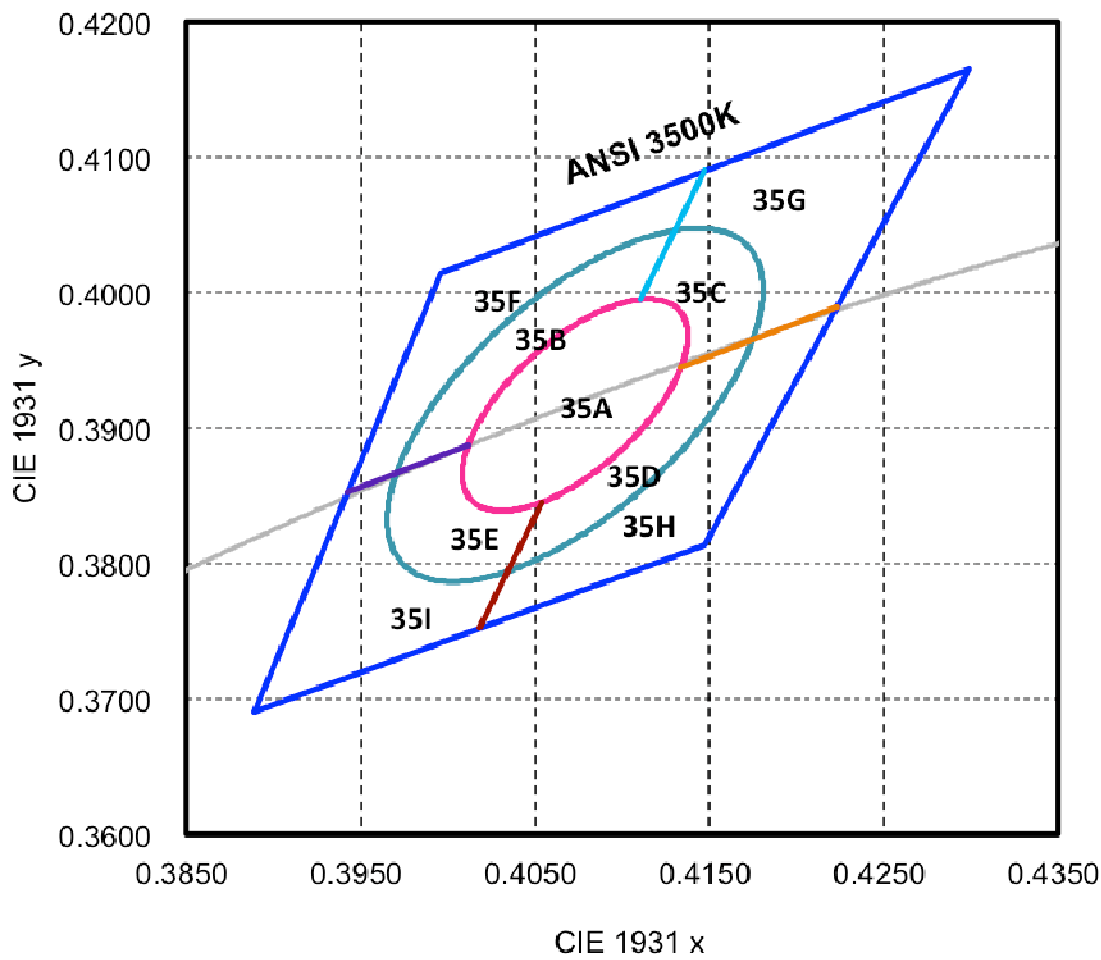
| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 2700K               | Single 3-step<br>MacAdam ellipse | (0.4578,<br>0.4101)             | 0.00810          | 0.00420          | 53.70°                    |
| 2700K               | Single 5-step<br>MacAdam ellipse | (0.4578,<br>0.4101)             | 0.01350          | 0.00700          | 53.70°                    |



| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 3000K               | Single 3-step<br>MacAdam ellipse | (0.4338, 0.403)                 | 0.00834          | 0.00408          | 53.22°                    |
| 3000K               | Single 5-step<br>MacAdam ellipse | (0.4338, 0.403)                 | 0.01390          | 0.00680          | 53.22°                    |

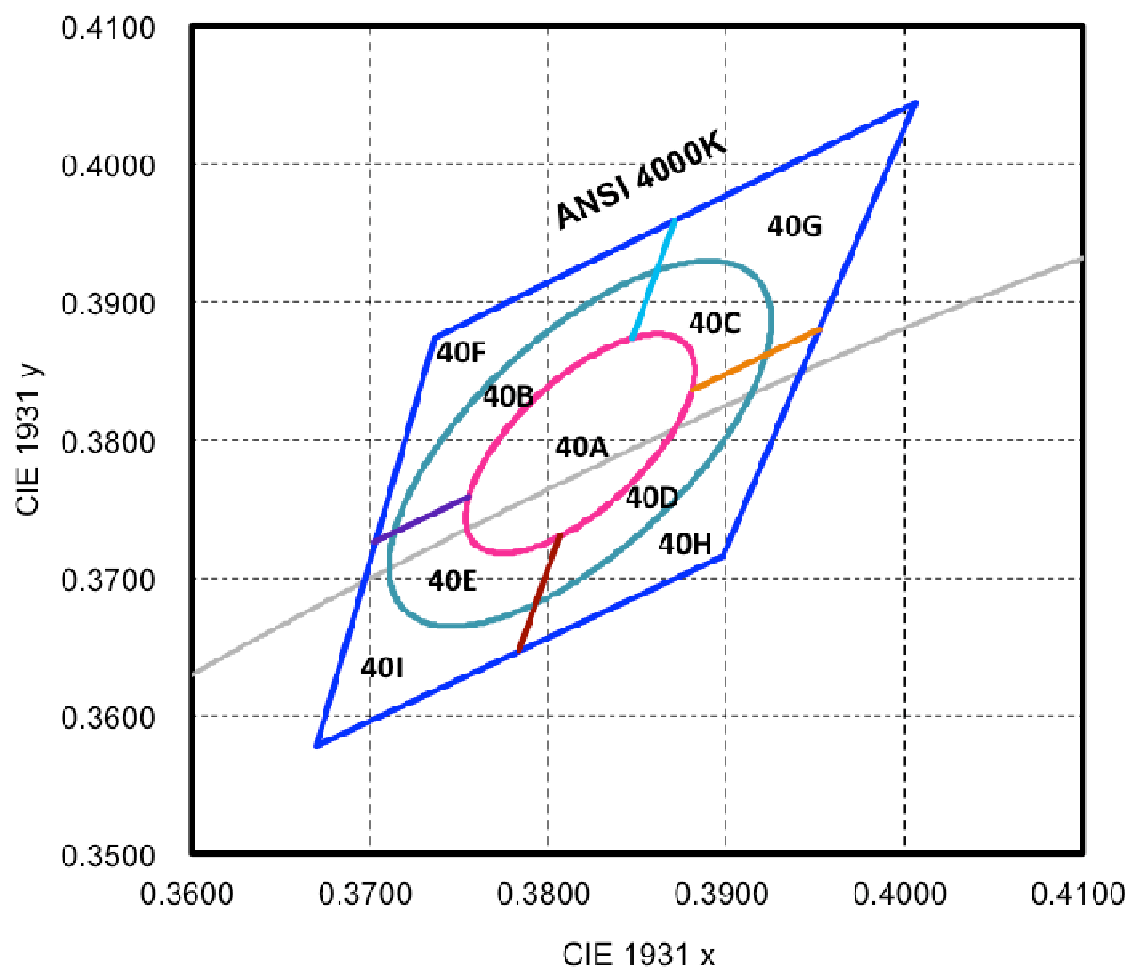


3500K

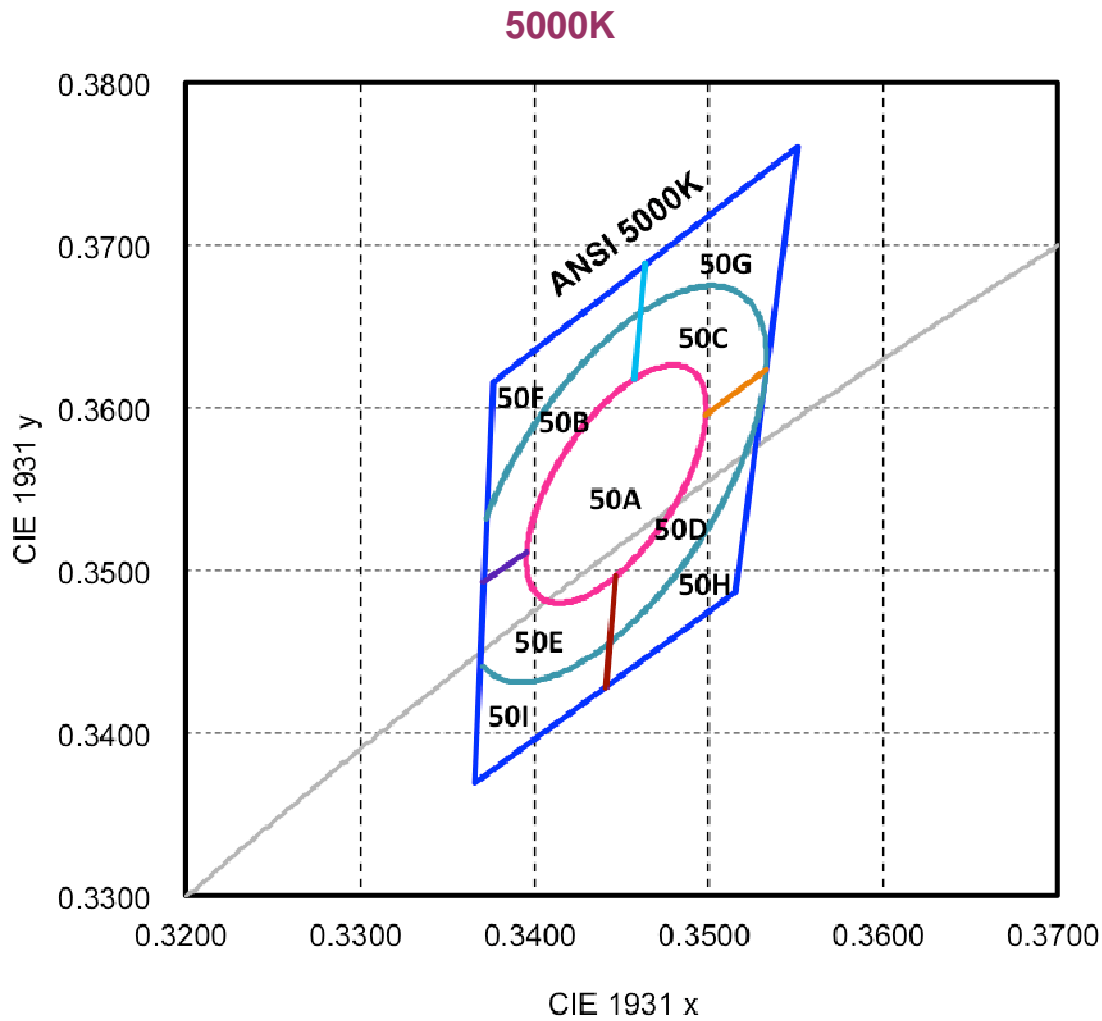


| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 3500K               | Single 3-step<br>MacAdam ellipse | (0.4073,<br>0.3917)             | 0.00927          | 0.00414          | 53.22°                    |
| 3500K               | Single 5-step<br>MacAdam ellipse | (0.4073,<br>0.3917)             | 0.01545          | 0.00690          | 53.22°                    |

4000K

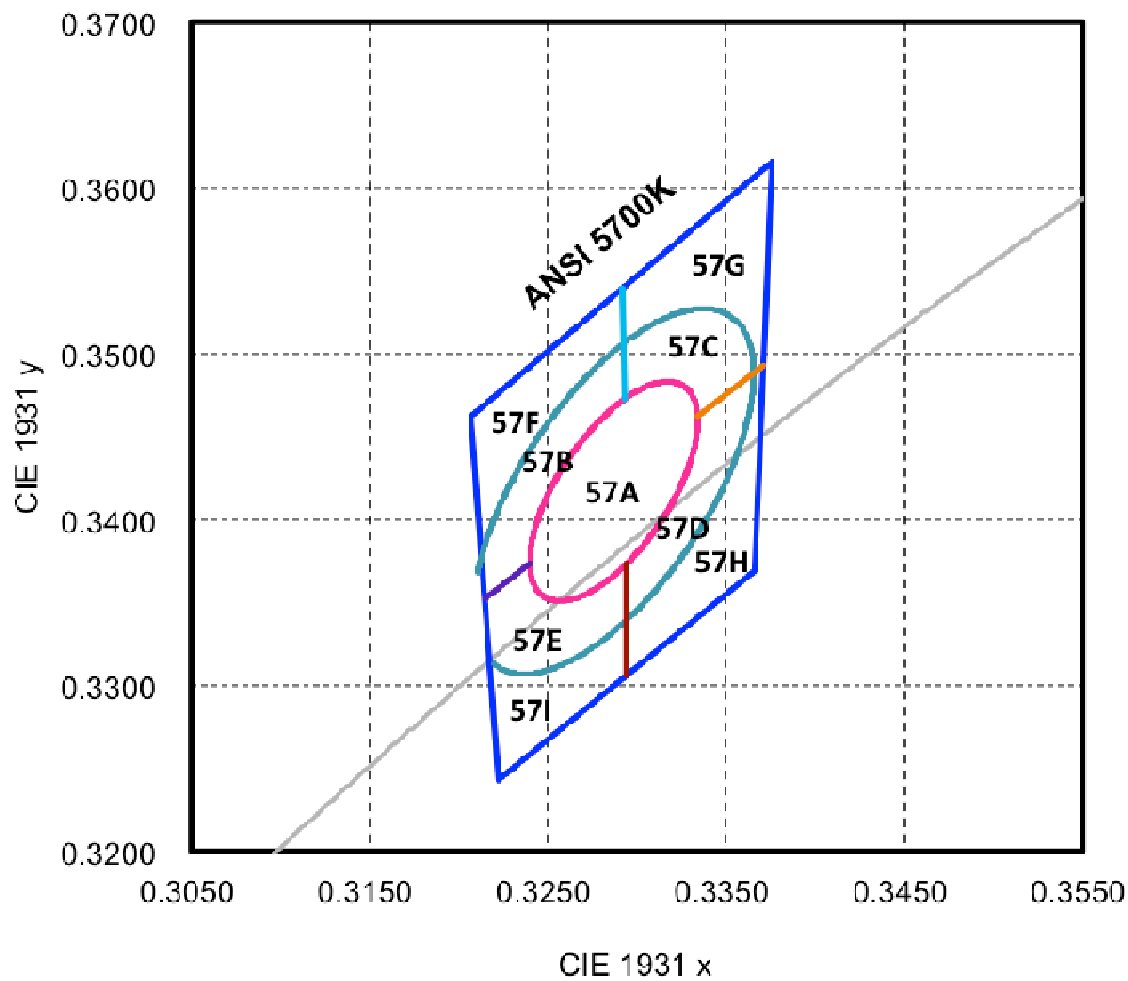


| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 4000K               | Single 3-step<br>MacAdam ellipse | (0.3818,<br>0.3797)             | 0.00939          | 0.00402          | 53.72°                    |
| 4000K               | Single 5-step<br>MacAdam ellipse | (0.3818,<br>0.3797)             | 0.01565          | 0.00670          | 53.72°                    |



| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 5000K               | Single 3-step<br>MacAdam ellipse | (0.3447,<br>0.3553)             | 0.00822          | 0.00354          | 59.62°                    |
| 5000K               | Single 5-step<br>MacAdam ellipse | (0.3447,<br>0.3553)             | 0.01370          | 0.00590          | 59.62°                    |

5700K



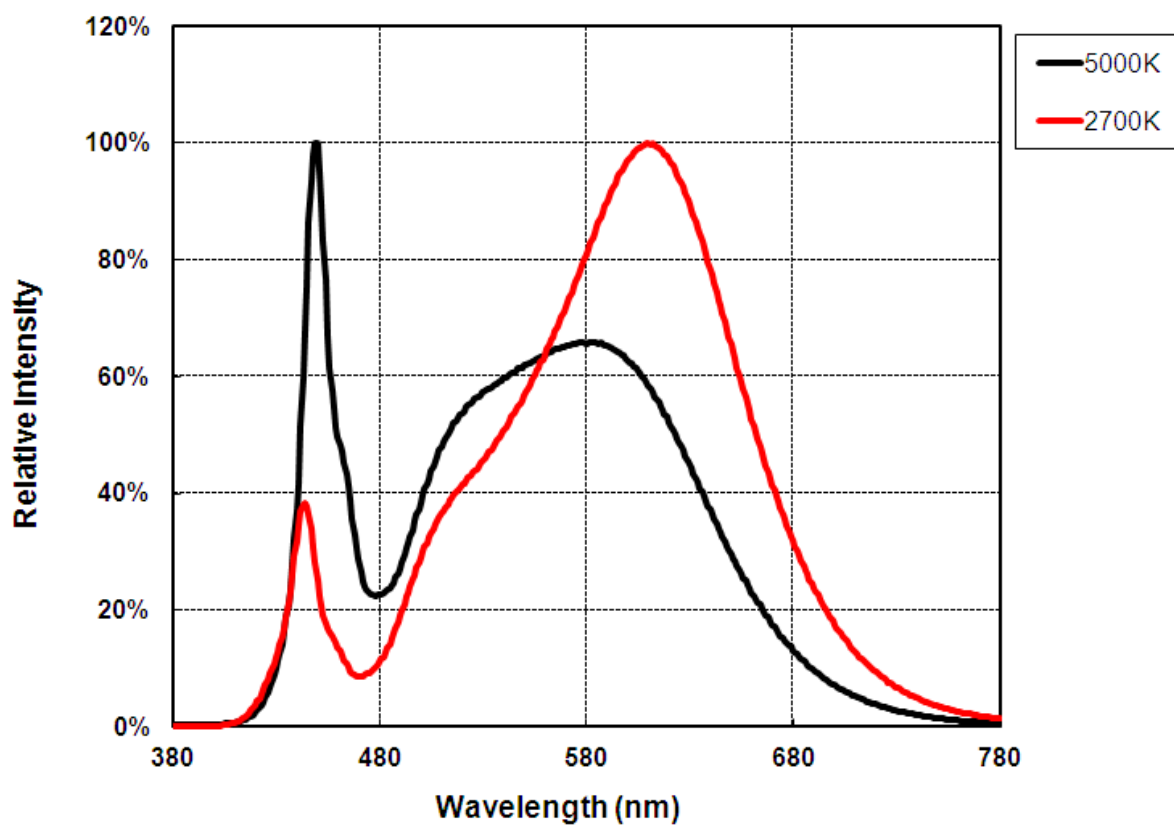
| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 5700K               | Single 3-step<br>MacAdam ellipse | (0.3287,<br>0.3417)             | 0.00746          | 0.00320          | 59.09°                    |
| 5700K               | Single 5-step<br>MacAdam ellipse | (0.3287,<br>0.3417)             | 0.01243          | 0.00533          | 59.09°                    |

| Nominal<br>ANSI CCT | Color Space                      | Target Center<br>Point (cx, cy) | Major Axis,<br>a | Minor Axis,<br>b | Ellipse Rotation<br>Angle |
|---------------------|----------------------------------|---------------------------------|------------------|------------------|---------------------------|
| 6500K               | Single 3-step<br>MacAdam ellipse | (0.3123,<br>0.3282)             | 0.00669          | 0.00285          | 58.57°                    |
| 6500K               | Single 5-step<br>MacAdam ellipse | (0.3123,<br>0.3282)             | 0.01115          | 0.00475          | 58.57°                    |

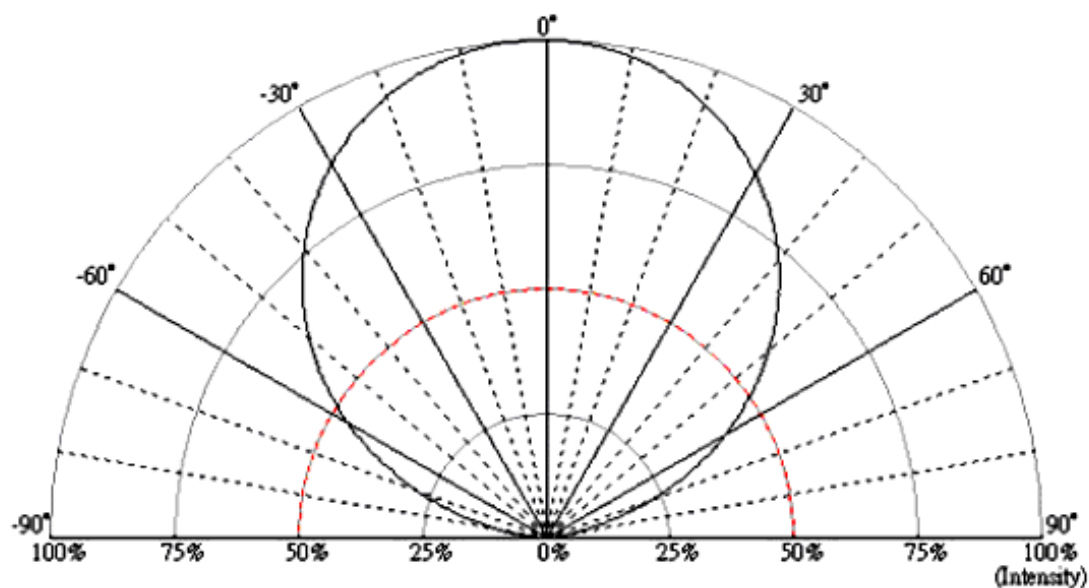
## Characteristics

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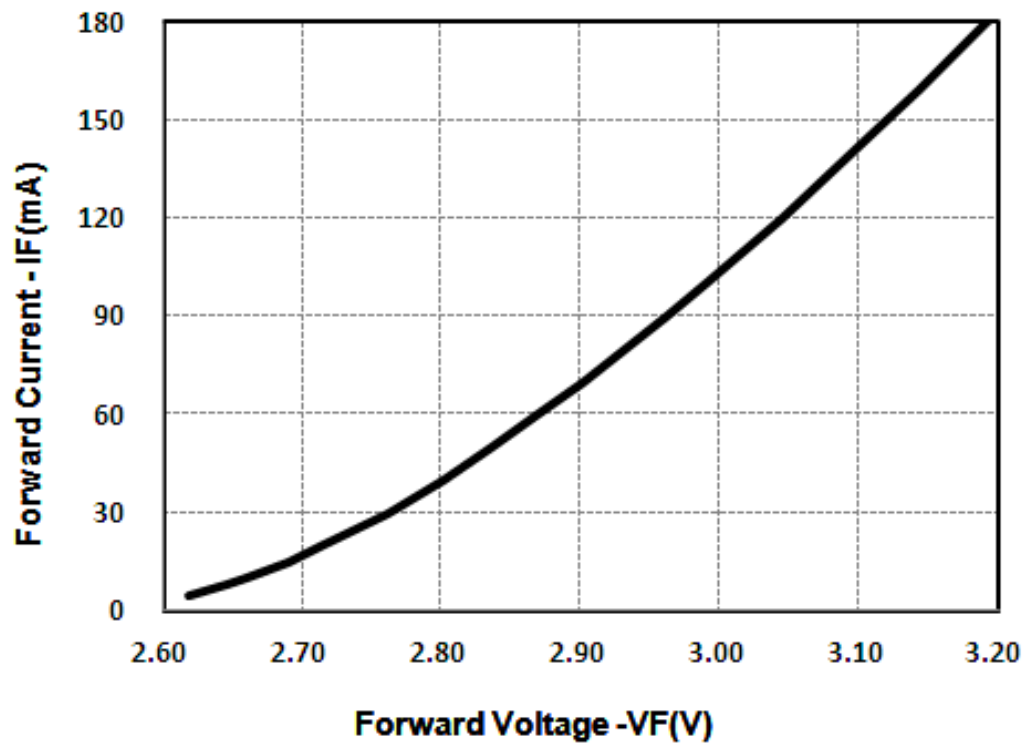
### Spectrum



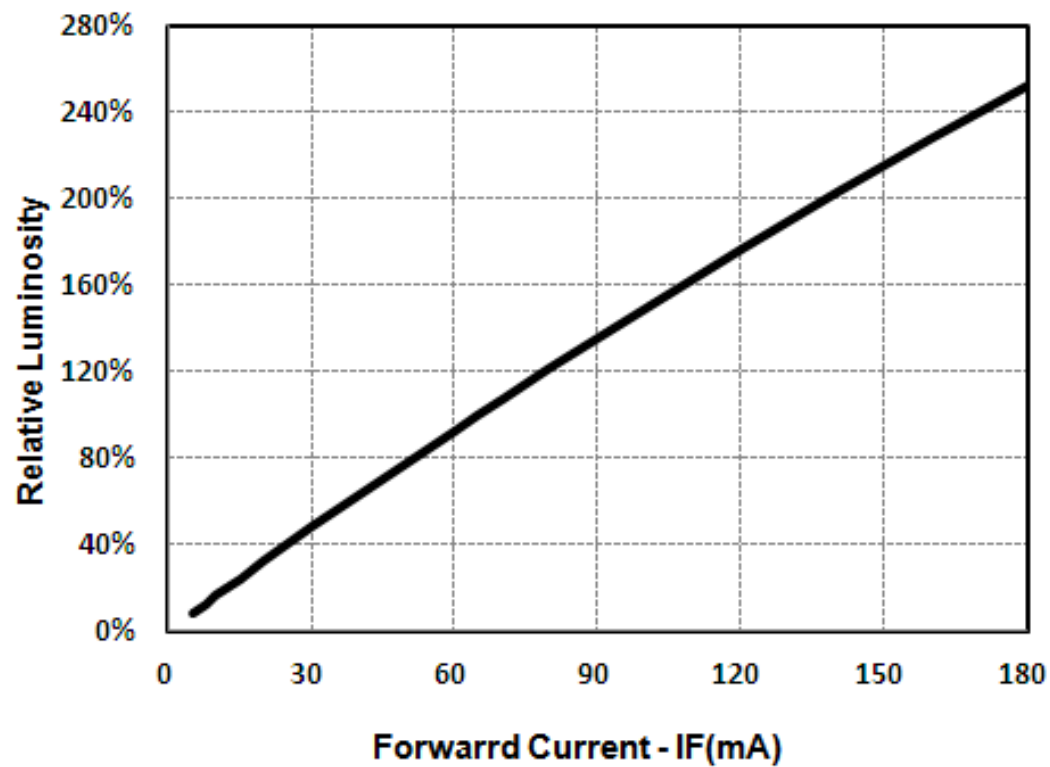
### Radiation Pattern



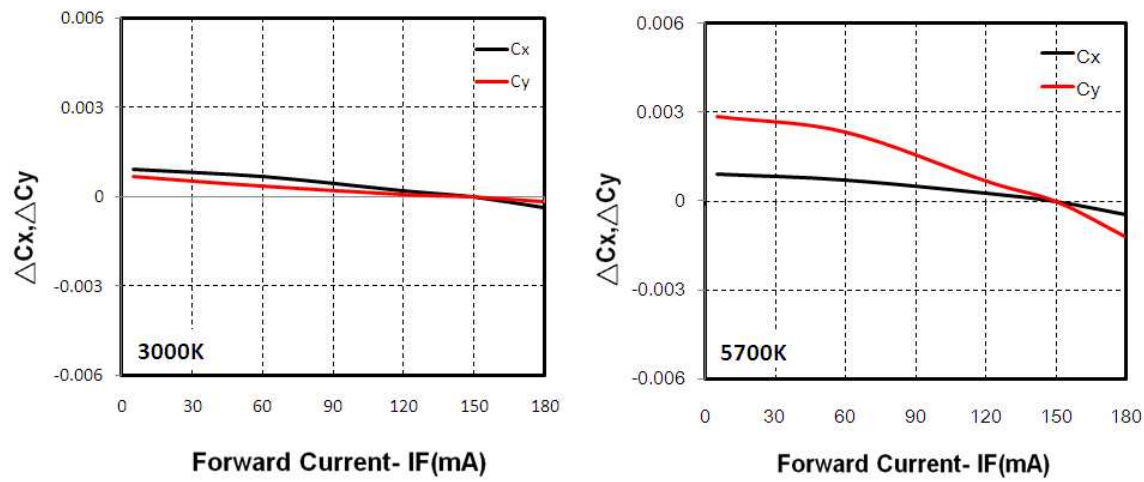
### ■ Forward Voltage vs. Forward Current



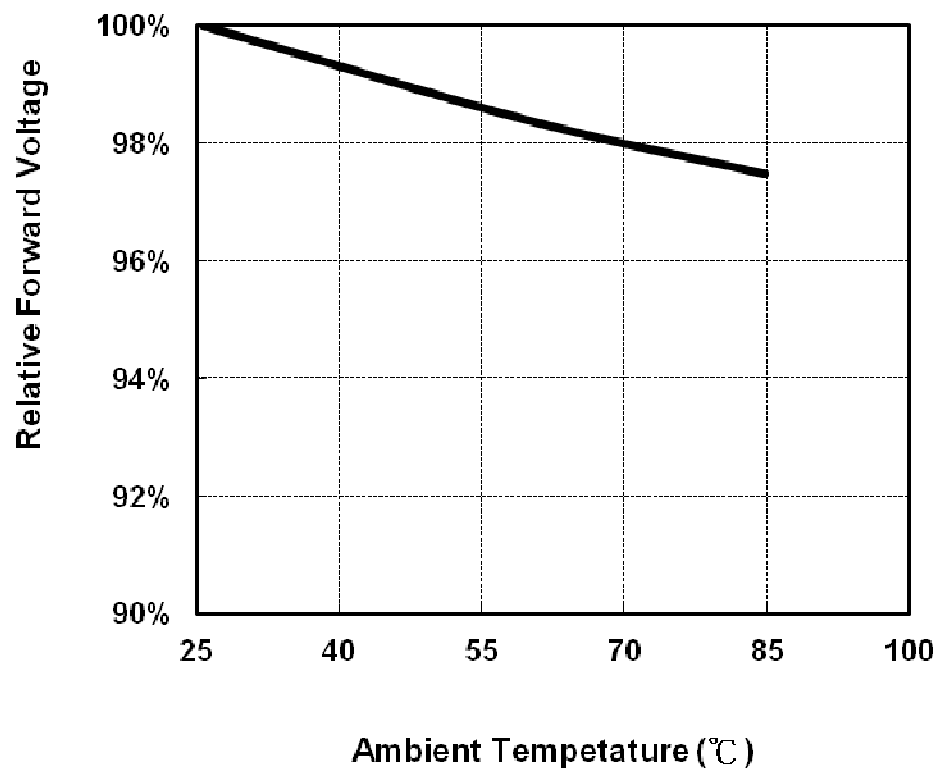
### ■ Forward Current vs. Relative Luminosity



■ Forward Current vs. Chromaticity Coordinate

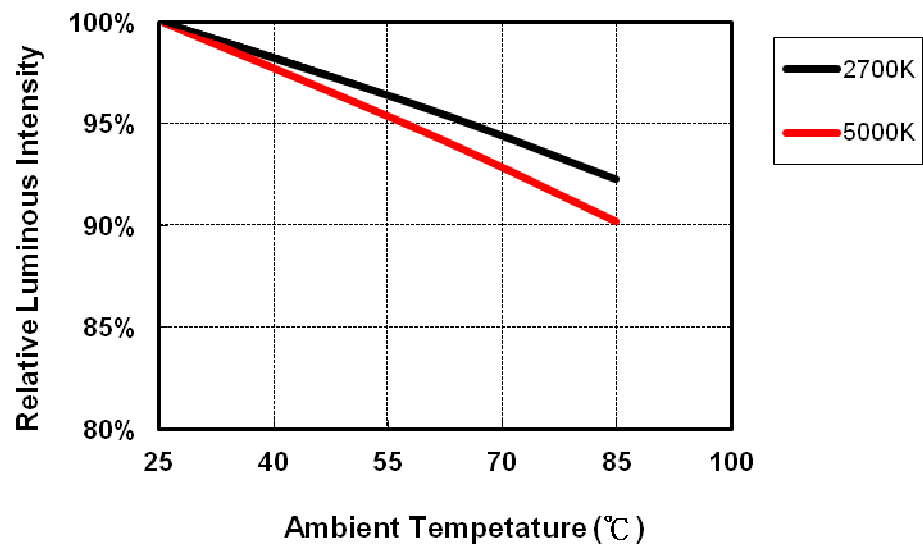


■ Relative Forward Voltage vs. Ambient Temperature

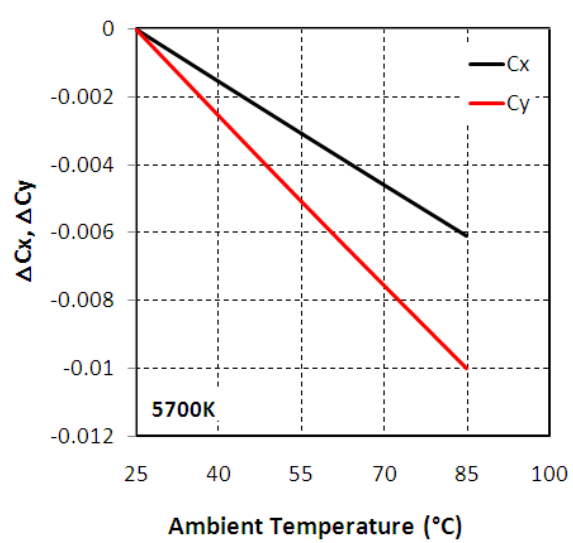
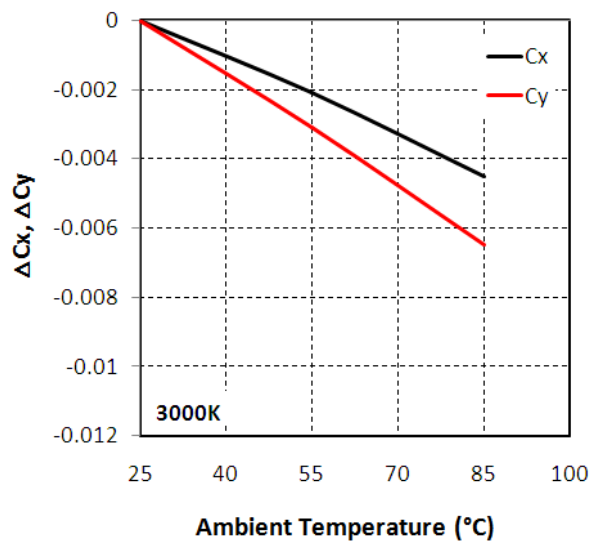




■ Relative Luminous Intensity vs. Ambient Temperature



■ Chromaticity vs. Ambient Temperature



## Reliability

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### Reliability test

| Item  | Condition   | Current | Time/Cycle |
|---|---|---------|------------|
| Steady State Operating Life of Low Temperature -40℃       | -40℃ Operating  | 180mA   | 1000 Hrs   |
| Steady State Operating Life of High Temperature 60℃       | 60℃ Operating   | 180mA   | 1000 Hrs   |
| Steady State Operating Life of High Temperature 85℃       | 85℃ Operating   | 180mA   | 1000 Hrs   |
| Low temperature storage -40℃                              | -40℃ Storage  | NA      | 1000 Hrs   |
| High temperature storage 100℃                             | 100℃ Storage  | NA      | 1000 Hrs   |
| Steady State Operating Life of High Humidity Heat 60℃ 90% | 60℃/90% Operating   | 180mA   | 1000 Hrs   |
| Resistance to soldering heat on PCB (JEDEC MSL3)          | pre-store@60℃, 60%RH<br>for 52hrs Tsld max.=260℃<br>10sec | NA      | 3 Times    |
| Thermal shock   | -40℃/20minr ~5minr ~<br>100℃/20min                        | NA      | 300 Cycles |

### Judgment Criteria



| Item            | Symbol | Test Condition | Judgment Criteria    |
|-----------------|--------|----------------|----------------------|
| Forward Voltage | Vf     | 180mA          | $\Delta V_f < 10 \%$ |
| Luminous Flux   | Iv     | 180mA          | $\Delta I_v < 30 \%$ |

## Packing

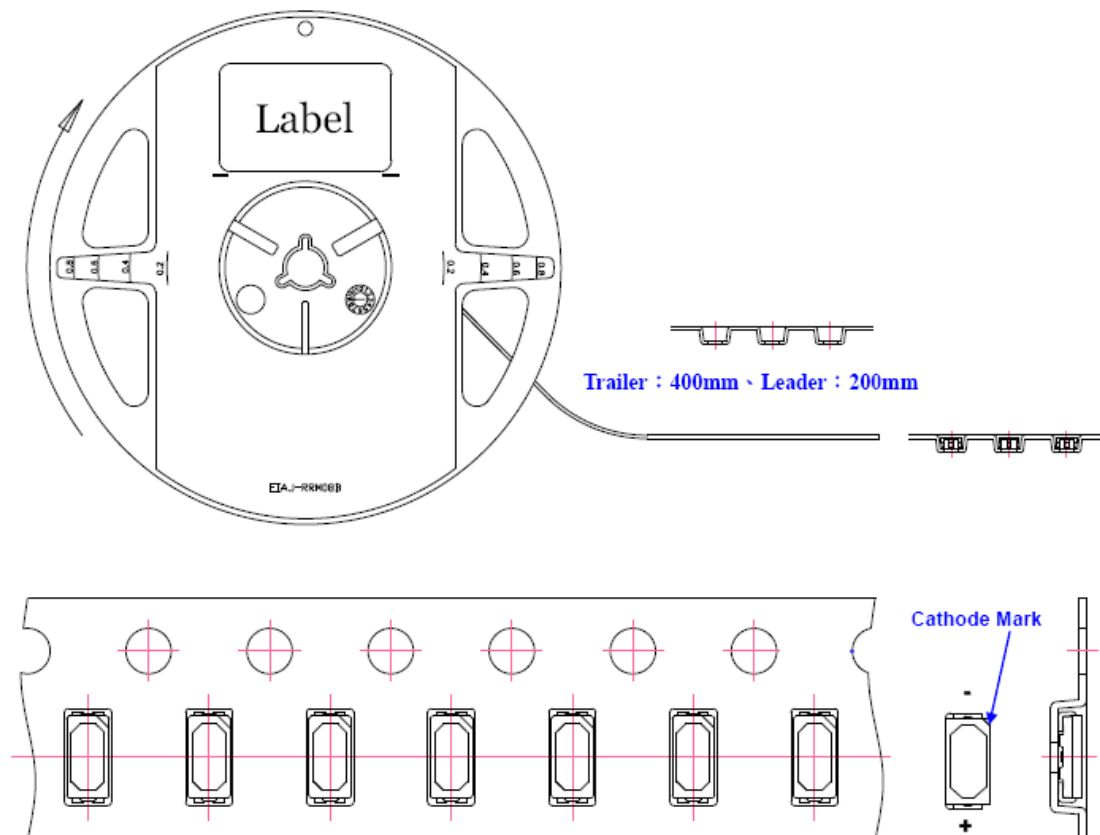
PC56H19 V0

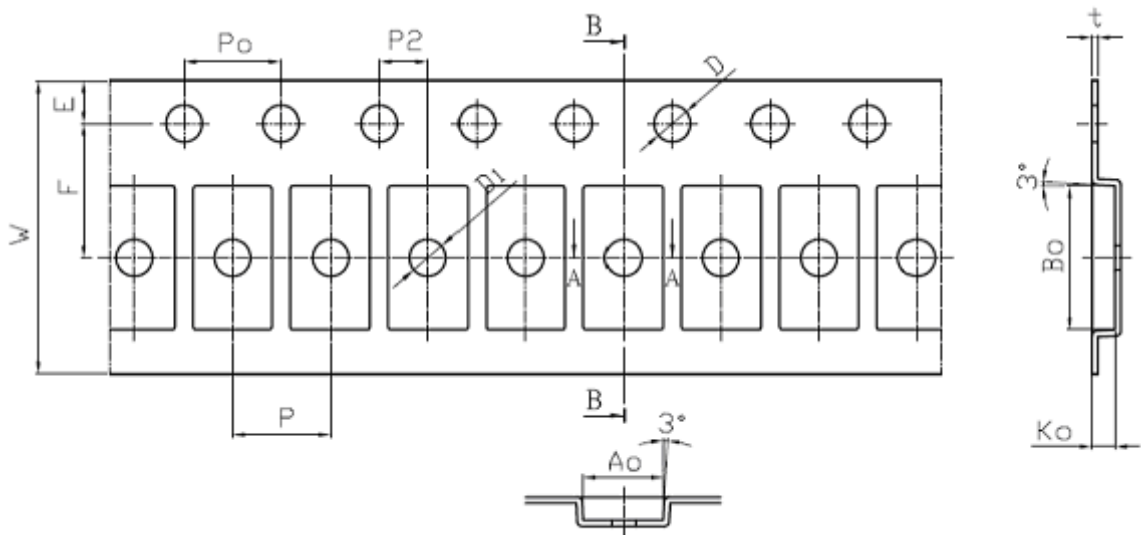
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### Label

|   |               |
|---|---------------|
| <br>QTY :<br><br>Bin code :<br><br>Vendor lot :<br>M/N : | <b>Lextar</b> |
|---|---------------|

### Carrier Taping

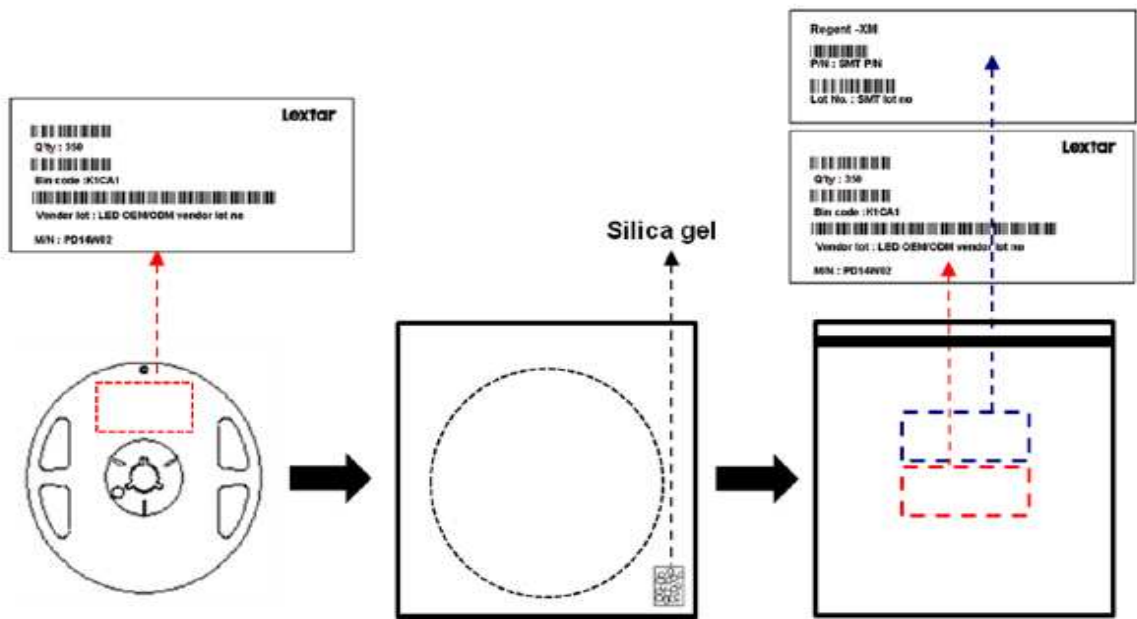




Unit: mm

| Item  | Spec  | To1.(+/- )  | Item    | Spec  | To1.(+/- ) |
|-------|-------|-------------|---------|-------|------------|
| W     | 12.00 | ±0.10       | P2      | 2.00  | ±0.05      |
| E     | 1.75  | ±0.10       | P0 x 10 | 40.00 | ±0.20      |
| F     | 5.50  | ±0.05       | t1      | 0.25  | ±0.05      |
| D     | 1.50  | +0.10,-0.00 | A0      | 3.25  | ±0.10      |
| D1    | 1.50  | ±0.10       | B0      | 5.90  | ±0.10      |
| P0、P1 | 4.00  | ±0.20       | K0      | 0.95  | ±0.10      |

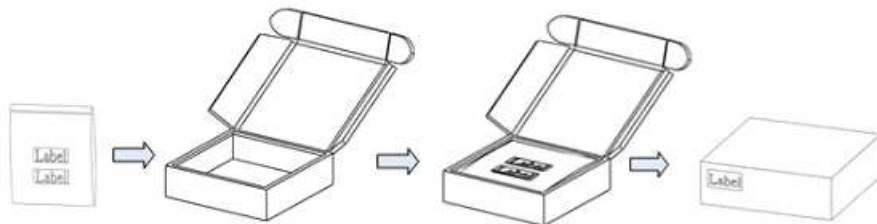
Shield Bag Taping



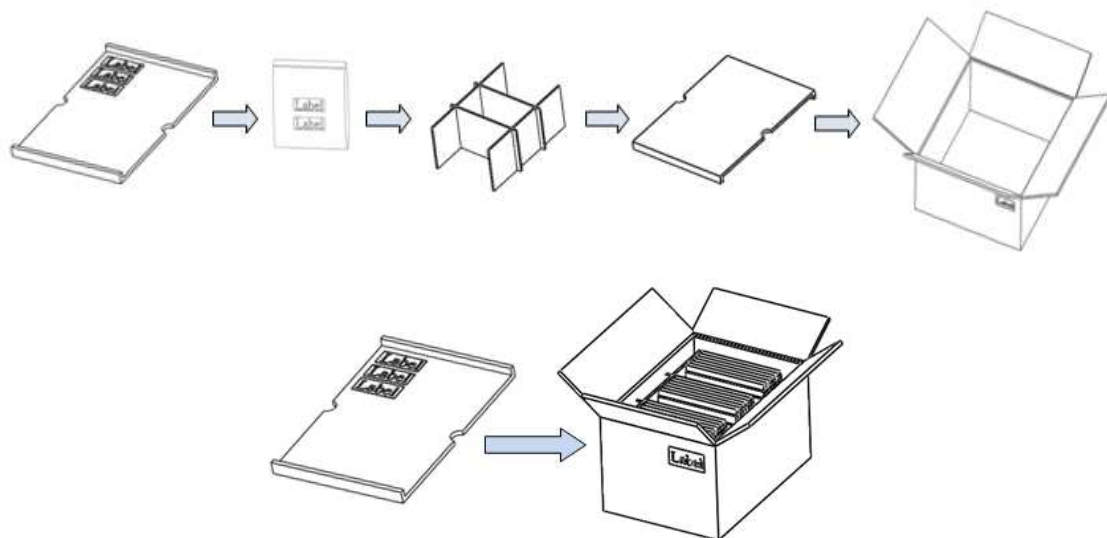
## ■ Packing Box

| Type          | Large Box     |      | Medium Box    |      | Small Box    |     |
|---------------|---------------|------|---------------|------|--------------|-----|
| Dimension     | 541X511X276mm |      | 385X303X260mm |      | 283X235x70mm |     |
| Maximum Reels | 7"X12mm Reel  | 64/R | 7"X12mm Reel  | 21/R | 7"X12mm Reel | 4/R |
| Minimum Reels | 7"X12mm Reel  | 32/R | 7"X12mm Reel  | 9/R  | 7"X12mm Reel | 1/R |

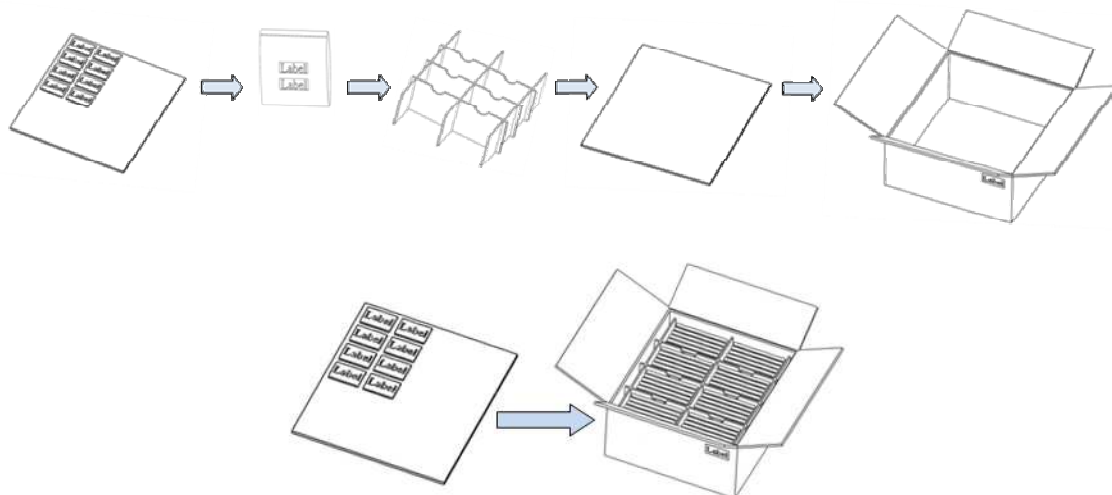
## ■ Small Box



## ■ Medium Box



## ■ Large Box



## Precautions

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### ■ Safety Precautions

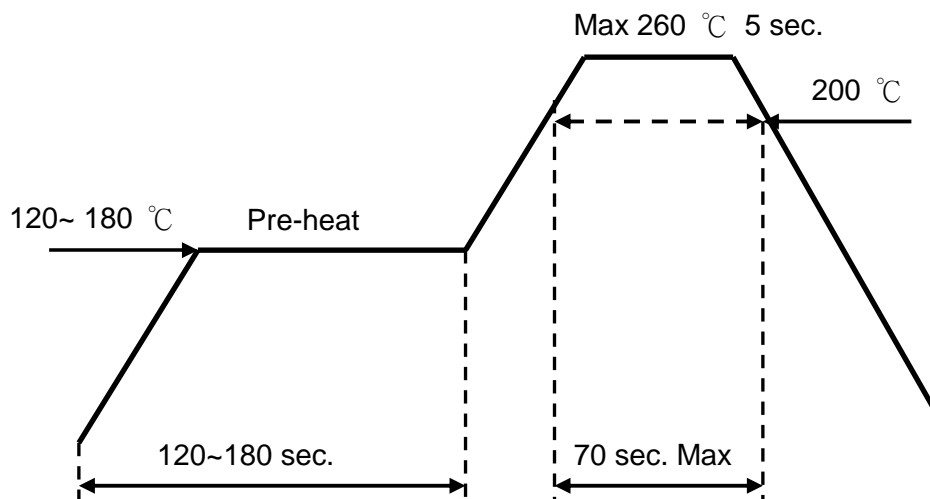
- The LED light output is too strong for human eyes without shield. Prevent eye contact directly more than seconds.
- Ensure operating under maximum rating.

### ■ Storage

- Before opening the package, the LEDs should storage under 30°C , 60% RH.
- After opening the package bag, the LEDs should be keep under 30°C , 60% RH.  
Recommend to use within 168 hrs. If unused LEDs remain, suggest to store into moisture proof bag or original package bag with moisture absorbent material such as silica gel. Reseal well is necessary.
- If the product exceeded the storage period or the moisture absorbent material faded away, baking treatment should be done by following conditions.  
Bake condition: 60°C , 12hours (One time only).

### ■ Soldering Notice and Conditions

- When soldering LEDs,
- Do not solder/reflow the same LED over two times.
- Recommend soldering conditions:  
Hand soldering: 350 °C max , 3 sec. max.  
Reflow soldering: Pre-heat 180 °C max , 180 sec. max.  
Peak 260 °C max , 5 sec. max.
- Reflow temperature profile as below: (lead-free solder)



- When soldering, don't put stress on the LEDs
- After LEDs have been soldered, strongly recommend not to repair to keep the LEDs performance.

### ■ Static Electricity

- LED package is extremely sensitive to static electricity. It's recommended that anti-electrostatic glove and wrist band is necessary when handling the LEDs. All devices are also be grounded properly as well.
- Protection devices design should be considered in the LED driving circuit.

### ■ Cleaning

- If washing is required, recommend to use alcohol as a solvent.
- Recommend to avoid cleaning the LEDs by ultrasonic. If necessary, pre-test the LED is necessary to confirm whether any damage occur after the process.

**Revision History**

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Product Specification

| Date       | Contents    | Writer     | Approved     |
|------------|-------------|------------|--------------|
| 2015.10.26 | New version | Louis Chou | Berris Huang |

*Smart Lighting*  
*Amazing Life*

Lextar Electronics Corp. is the leading LED (Light Emitting Diode) maker integrating upper stream epitaxial, middle stream chip, and downstream package, SMT and LED lighting applications. Founded in May, 2008, Lextar is a subsidiary of AU Optronics, the leading TFT-LCD and solar PV manufacturer. Lextar's product applications include lighting and LCD backlight. Lextar's manufacturing sites include Hsinchu and Chunan in Taiwan, and Suzhou in China. The company turnover in 2012 is 340 million USD.