No. 3, Gongye E. 3rd Road, Hsinchu Science Park, Hsinchu 30075, Taiwan
TEL：886-3-565-8800



# PC13X02 V0

## Product Specification

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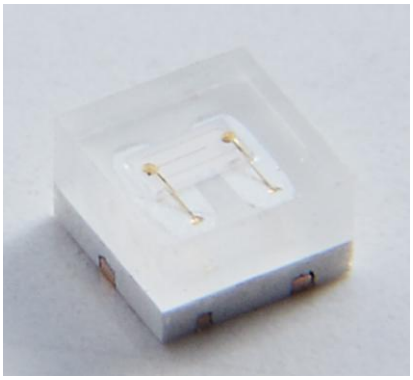
# Approval Sheet

PC13X02 V0
Product Specification

RoHS

| | |
|---|---|
| **Product** | Color CSP LED |
| **Part Number** | PC13X02 V0 |
| **Issue Date** | 2018/09/25 |



## ■ Feature

- ✓ Color 1313 CSP LED (L x W x H) of 1.3 x 1.3 x 0.75 mm
- ✓ Dice Technology : InGaN
- ✓ Qualified according to JEDEC moisture sensitivity Level 3
- ✓ Environmental friendly ; RoHS compliance
- ✓ Packing : 1,000 or 3,000 pcs/reel

## ■ Applications

- ✓ Horticulture Lighting
- ✓ Backlighting
- ✓ Signaling
- ✓ Exterior Automotive Lighting
- ✓ Automotive Interior Lighting

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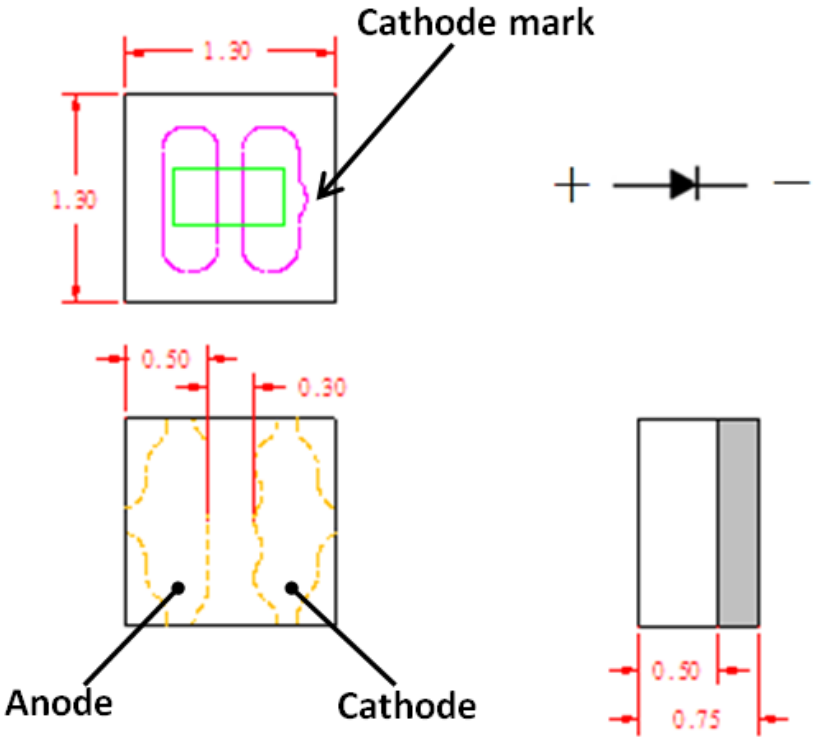
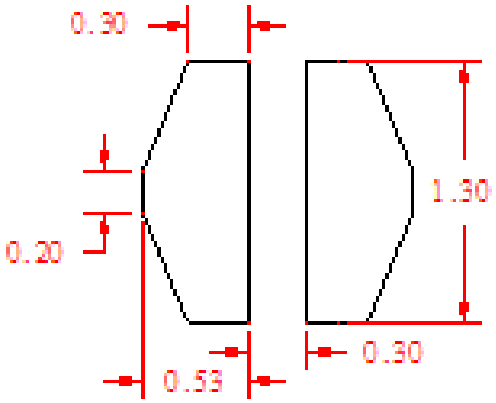
## Outline (Red/Green/Blue)




Unit: mm, Tolerance: ±0.1mm

## Recommended Soldering Pad:



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## Optical Characteristics at 100mA(Tj=25℃)

| Color | P/N | Dominant Wavelength $\lambda_D$ | | |
|---|---|---|---|---|
| | | Min. | Typ. | Max. |
| Red | 95.C1313.RRC000Z | 615 nm | 620 nm | 625 nm |
| Green | 95.C1313.GGC000Z | 518 nm | 523 nm | 528 nm |
| Blue | 95.C1313.BDC000Z | 452 nm | 457 nm | 462 nm |

* Lextar maintains a tolerance of +/-1nm on wavelength measurements

## Electrical Characteristics (Tj=25℃)

| Color | Forward Voltage Vf(V) @100mA | | | View Angle(degrees) $2\theta_{1/2}$ |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| Red | 2.6 | 2.86 | 3.1 | 140 |
| Green | 3.1 | 3.35 | 3.6 | 140 |
| Blue | 3.2 | 3.49 | 3.7 | 140 |

* The Forward Voltage tolerance is ±0.1V
* Thermal resistance is calculated from junction to solder

## Flux Characteristics (Tj=25℃)

| Color | Luminous Flux (lm) or Power (mW) @100mA | | | unit |
|---|---|---|---|---|
| | Min. | Typ. | Max. | |
| Red | 12 | 15.8 | 20 | Lm |
| Green | 33 | 41.3 | 50 | Lm |
| Blue | 5 | 6.84 | 9 | Lm |

* Lextar maintains a tolerance of +/-7% on flux and power measurements
* Please do not drive at rated current more than 1 second without proper heatsink

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## Absolute Maximum Ratings

| Parameter | Symbol | value | Unit |
|---|---|---|---|
| DC Forward Current | $I_F$ | 150 | mA |
| Power Dissipation | Pd | 0.6 | W |
| Pulse Forward Current | $I_{FP}$ | 300 | mA |
| Storage Temperature | Ts | -40 ~ 120 | $^oC$ |
| Operating Temperature | $T_{opr}$ | -40 ~ 90 | $^oC$ |
| Junction Temperature | $T_J$ | 120 | $^oC$ |
| Soldering Temperature | $T_{sol}$ | 260 (max. 5 sec) | $^oC$ |

* Proper current rating must be observed to maintain junction temperature below maximum at all time
* IFP Condition: Duty 1/10, Pulse within 10msec

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# Ordering Code

P C 1 3 X 0 2 0 - R 0 0 R 0 2 L F L I 5 A - 0 0 0

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Item | Pos. | Code | Spec |
|---|---|---|---|
| Model Name | 1-8 | PC13X020 | PC13X02 V0 |
| Wd | 9-14 | R00R02<br>B01B02<br>G00G02 | R00,R01,R02<br>B01,B02<br>G00,G01,G02 |
| IV<br>Bin Group | 15-18 | LFLI<br>LOLS<br>L9LC | Bin code : LF,LG,LH,LI<br>Bin code : LO,LP,LQ,LR,LQ,LR,LS<br>Bin code : L9,LA,LB,LC |
| Vf<br>Bin Group | 19,20 | 5A | Bin code : 5,6,7,8,9,A |
| Special Requirement | 21-23 | 000 | No requirement |

## Standard Ordering Code:

| Color | Ordering Code(1) | Wd Bin Group | IV Bin Group | Vf Bin Group |
|---|---|---|---|---|
| Red | PC13X020-RRR00R02LFLI-570 | R00, R01, R02 | LF, LG, LH, LI | 5, 6, 7 |
| Green | PC13X020-GGG00G02LOLS-790 | G00, G01, G02 | LO, LP, LQ, LR, LS | 7, 8, 9 |
| Blue | PC13X020-BBB01B02L9LC-8A0 | B01, B02 | L9, LA, LB, LC | 8, 9, A |

(1) Only under an agreement between customer and Lextar Electronics, Ordering codes not in “Standard Ordering Code Definitions” can be supplied.

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## Bin code definition(for example)

| $V_F$ Rank | Luminous Flux Rank | Wd |
|---|---|---|
| 5 | LF | R00 |

## Forward Voltage Bin Structure @ 100mA

| Color | Bincode | Voltage (V) | |
|---|---|---|---|
| | | min | max |
| Red | 4 | 2.4 | 2.6 |
| | 5 | 2.6 | 2.8 |
| | 6 | 2.8 | 3.0 |
| | 7 | 3.0 | 3.2 |
| Green | 7 | 3.0 | 3.2 |
| | 8 | 3.2 | 3.4 |
| | 9 | 3.4 | 3.6 |
| Blue | 7 | 3.0 | 3.2 |
| | 8 | 3.2 | 3.4 |
| | 9 | 3.4 | 3.6 |
| | A | 3.6 | 3.8 |

* The Forward Voltage tolerance is ±0.1V

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## Radiometric Luminous Flux Bin Structure @ 100mA

| Color | Bincode | Luminous Flux (Lm) | |
|---|---|---|---|
| | | min | max |
| Red | LF | 12 | 14 |
| | LG | 14 | 16 |
| | LH | 16 | 18 |
| | LI | 18 | 20 |
| Green | LO | 33 | 36 |
| | LP | 36 | 39 |
| | LQ | 39 | 42 |
| | LR | 42 | 46 |
| | LS | 46 | 50 |
| Blue | L9 | 5 | 6 |
| | LA | 6 | 7 |
| | LB | 7 | 8 |
| | LC | 8 | 9 |

* Lextar maintains a tolerance of +/-7% on flux and power measurements
* the flux bin of the product may be modified for improvement without notice.

## Dominant Wavelength Bin Structure @ 100mA

| Color | Bincode | Wavelength (nm) | |
|---|---|---|---|
| | | min | max |
| Red | R00 | 615 | 620 |
| | R01 | 620 | 625 |
| Green | G00 | 515 | 520 |
| | G01 | 520 | 525 |
| | G02 | 525 | 530 |
| Blue | B01 | 457 | 460 |
| | B02 | 460 | 465 |

* Lextar maintains a tolerance of +/-1nm for dominant wavelength measurements

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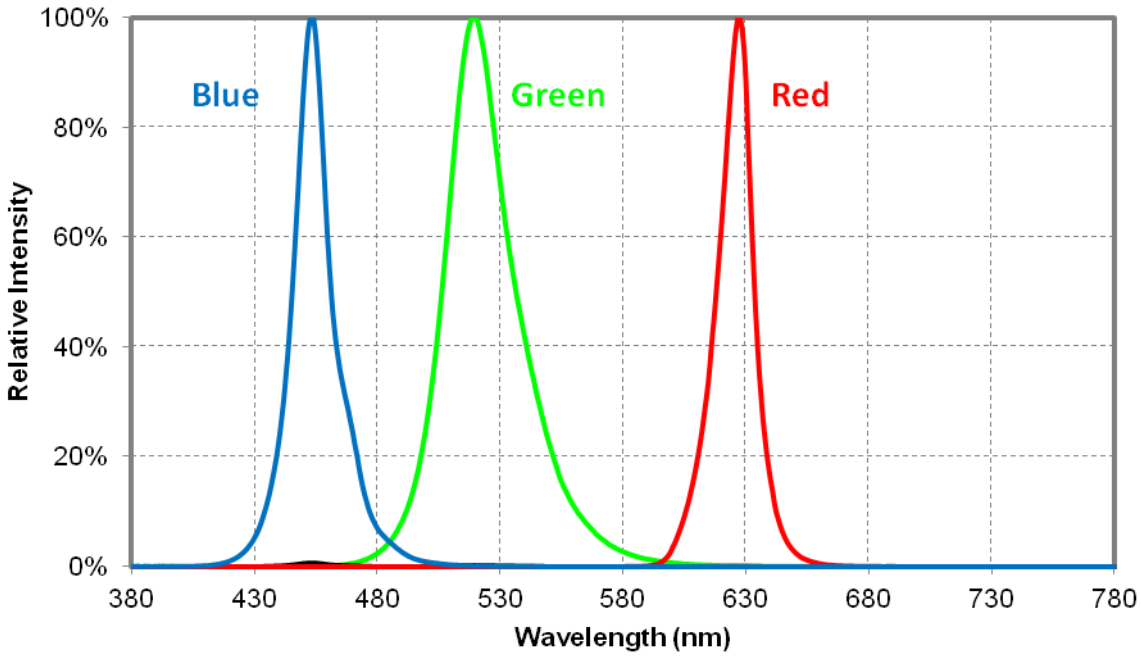
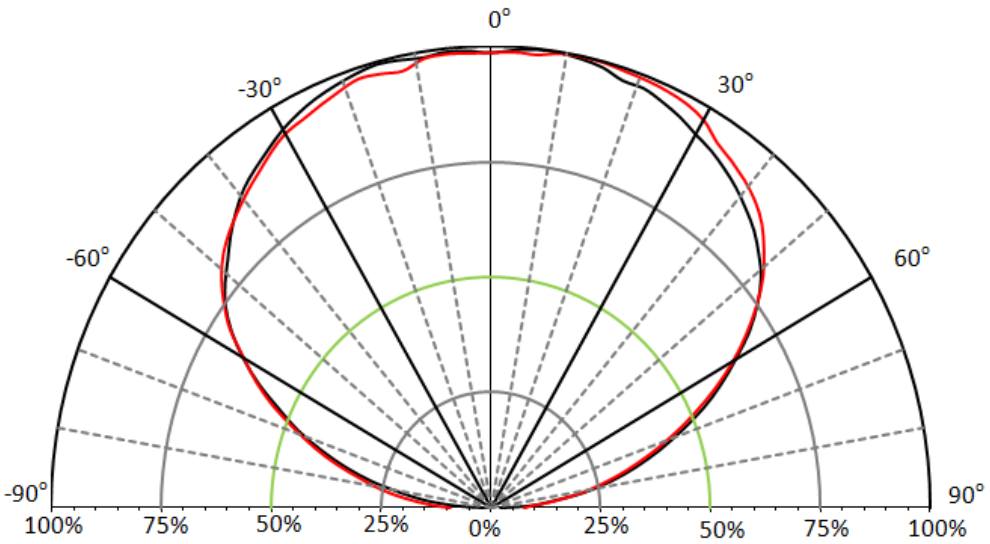
## Color Spectrum, Tj=25C

### Blue & Green & Red




## Typical Representative Spatial Radiation Pattern

### Red



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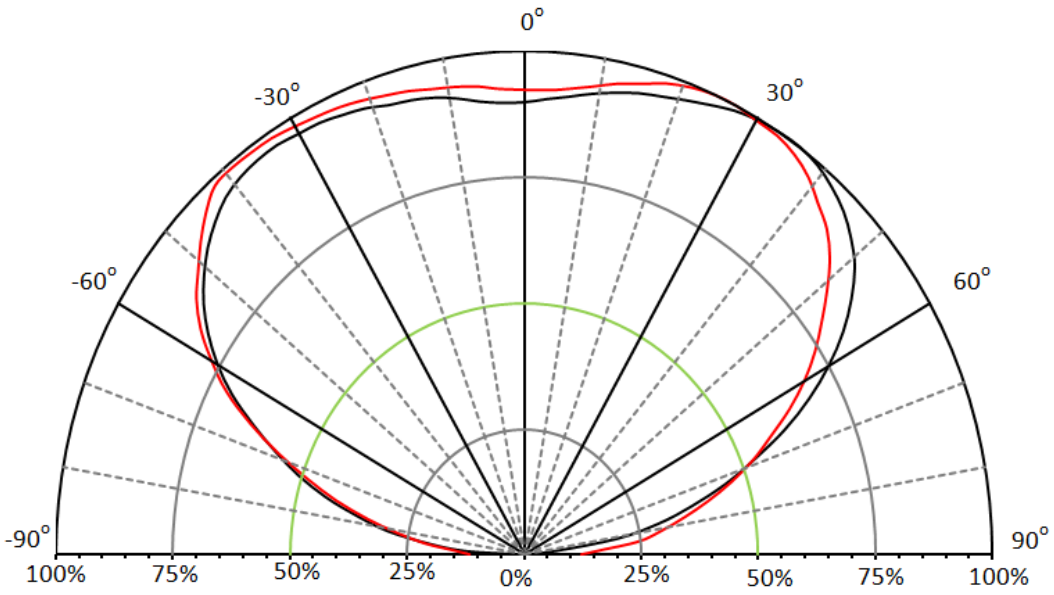
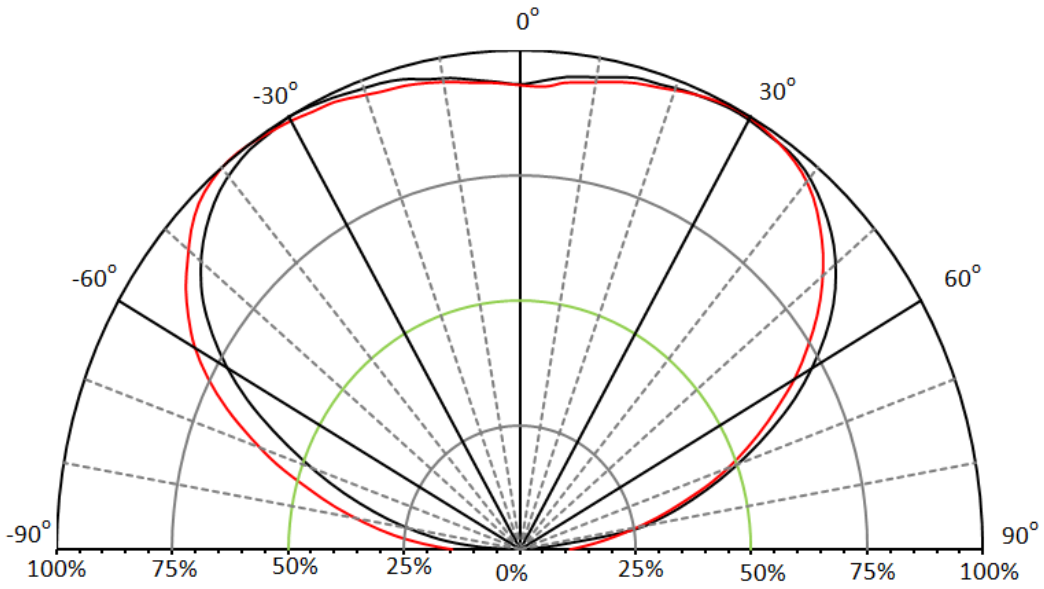
## Green




## Blue



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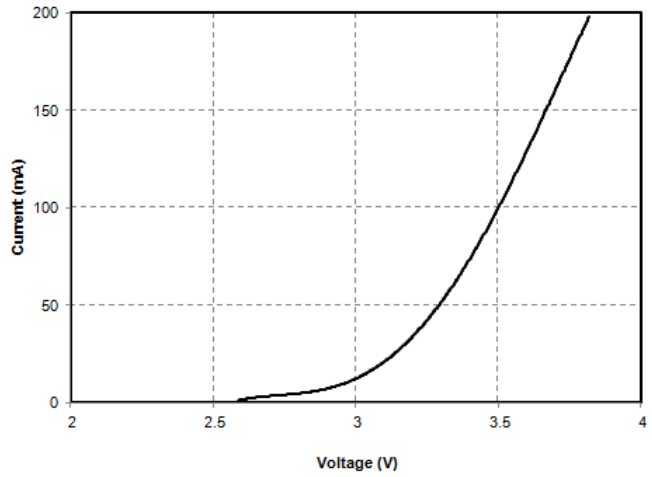
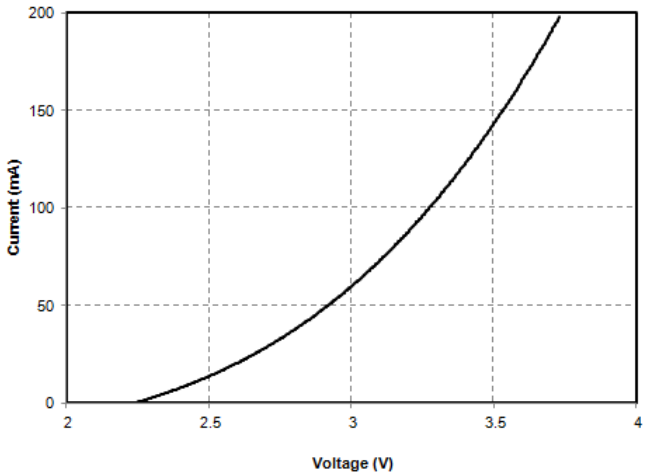
## Forward Voltage Vs. Forward Current , Tj=25C

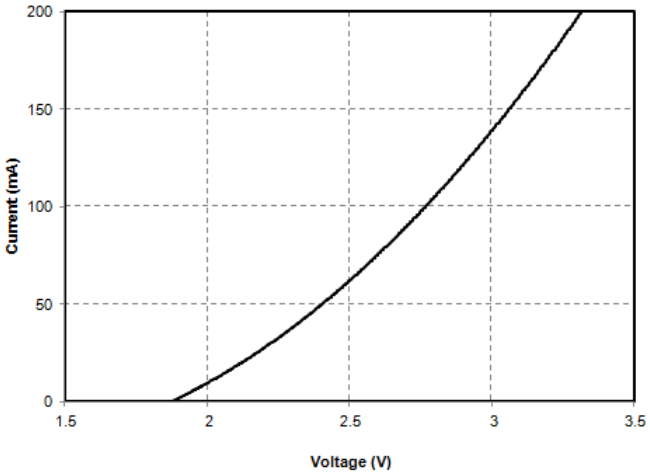
### Blue




### Green




### Red



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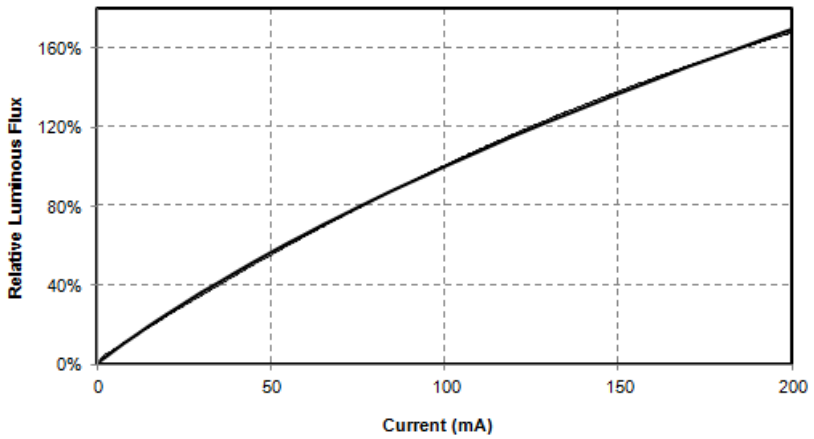
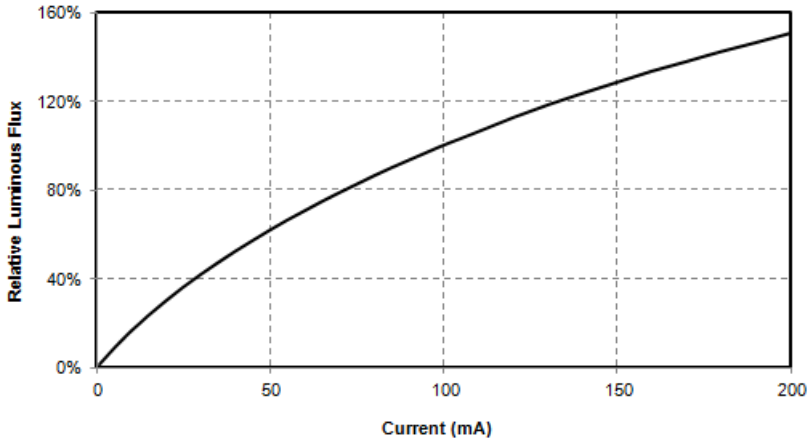
## Forward Current Vs. Normalized Relative Luminous Flus, Tj=25C

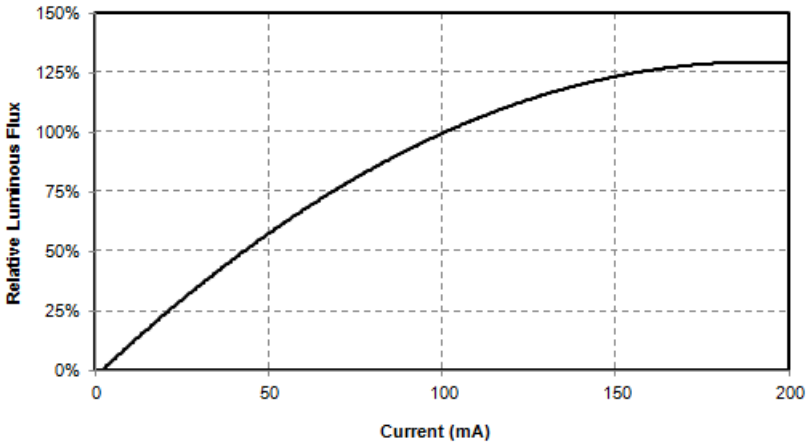
### Blue




### Green




### Red



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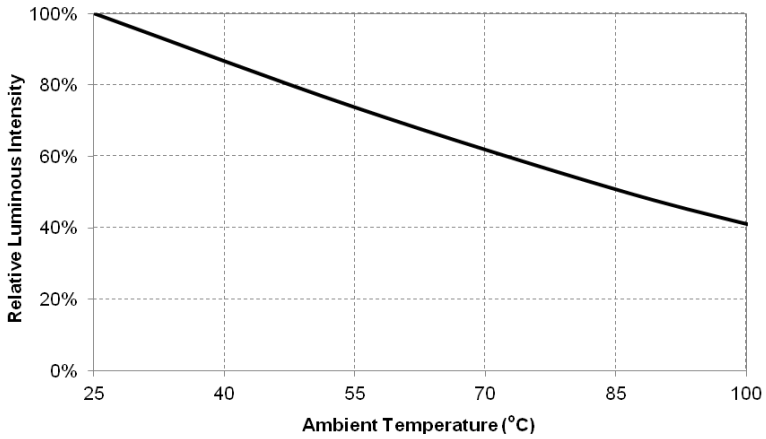
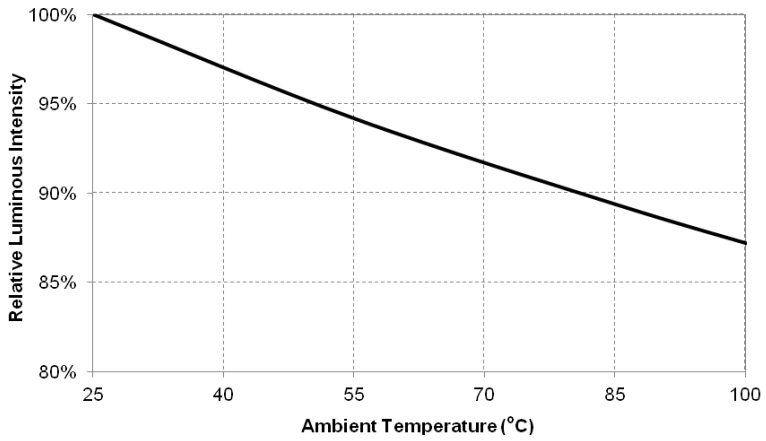
## Relative Luminous Intensity vs. Ambient Temperature

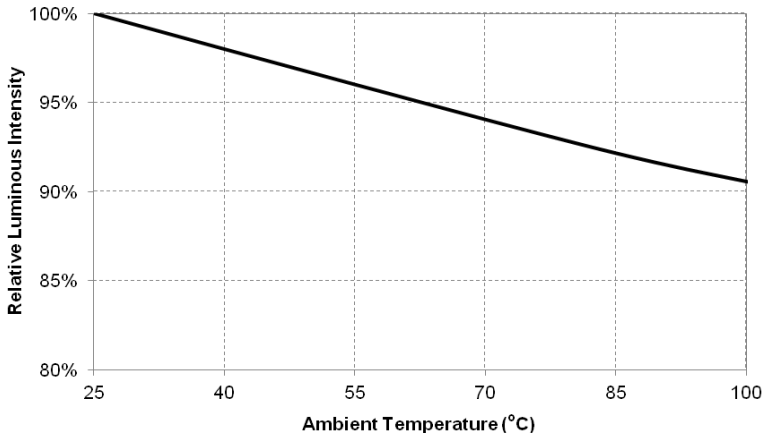
### Red




### Green




### Blue



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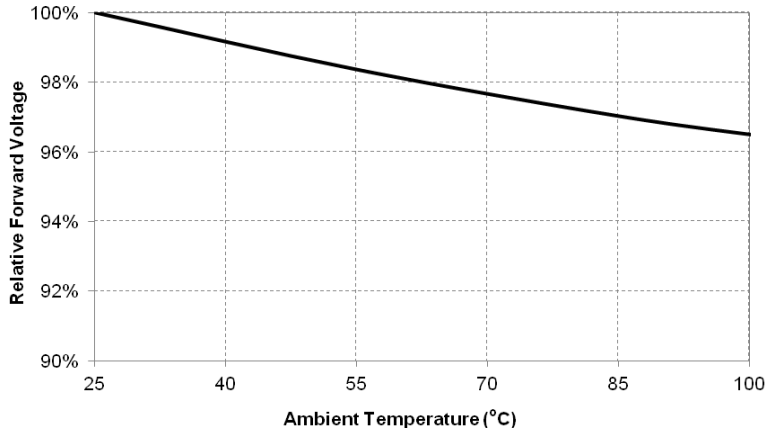
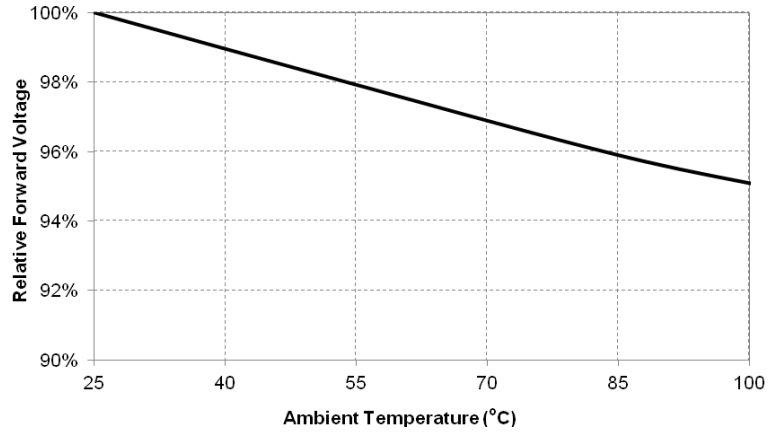
## Ambient Temp. Vs Max. Forward Current

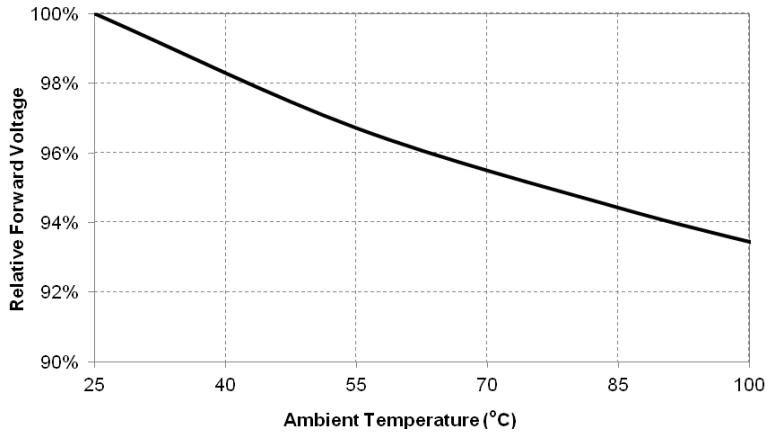
### Red




### Green




### Blue



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## Reliability test

| Item | Condition | Time/Cycle |
|---|---|---|
| Steady State Operating Life of High Temperature 25℃ | 25℃ Operating | 1000 Hrs |
| High Humidity Heat 85℃85% s Operating | 85℃/85% Operating | 1000 Hrs |
| Low temperature storage -40℃ | -40℃ Storage | 1000 Hrs |
| High temperature storage 100℃ | 100℃ Storage | 1000 Hrs |
| High Humidity Heat 85℃85% storage | 85℃/85% Storage | 1000 Hrs |
| Resistance to soldering heat on PCB (JEDEC MSL3) | pre-store@60℃, 60%RH for 52hrs Tsld max.=260℃ 10sec | 1 cycle<br>3 Times |
| Thermal shock | -40℃/20minr ~5minr ~ 100℃/20min | 200 Cycles |

## Judgment Criteria

| Item | Symbol | Test Condition | Judgment Criteria |
|---|---|---|---|
| Forward Voltage | Vf | 100 mA | ΔVf < 10 % |
| Luminous Flux | Iv | 100 mA | ΔIv < 30 % |

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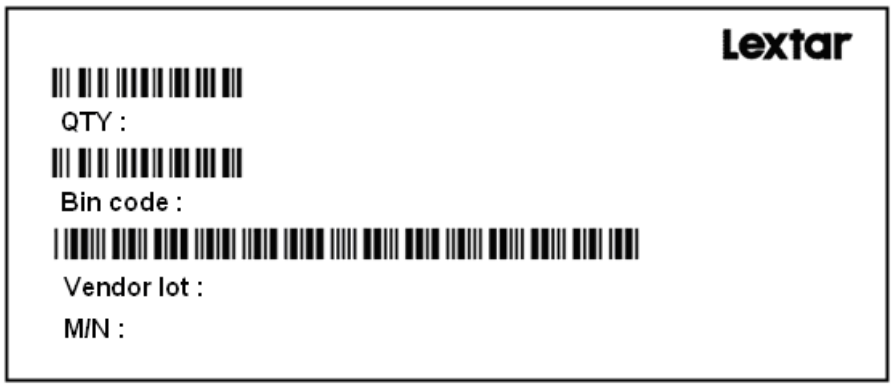
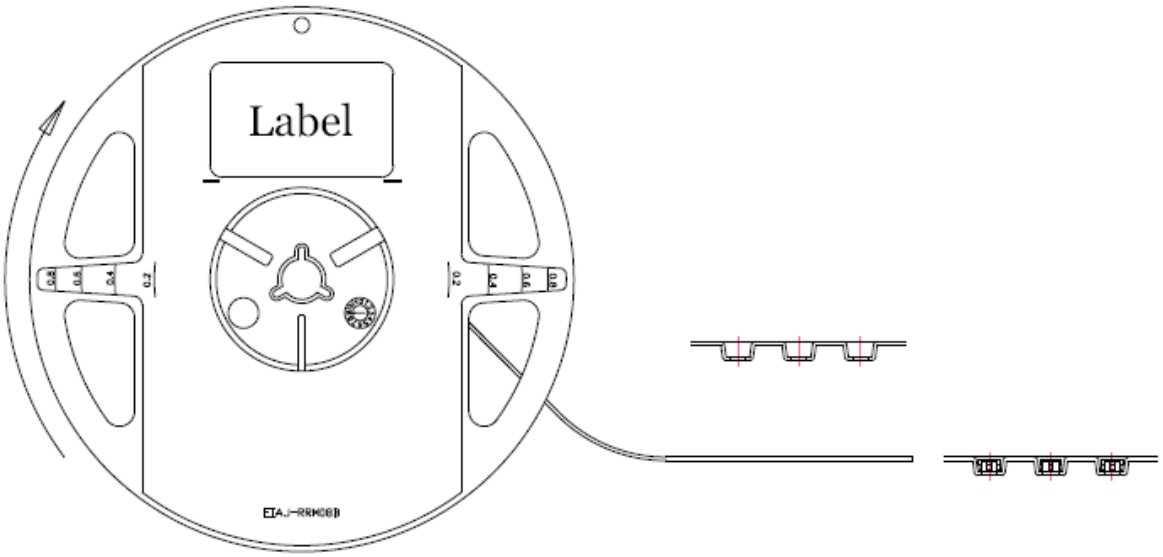
## Label




## Carrier Taping



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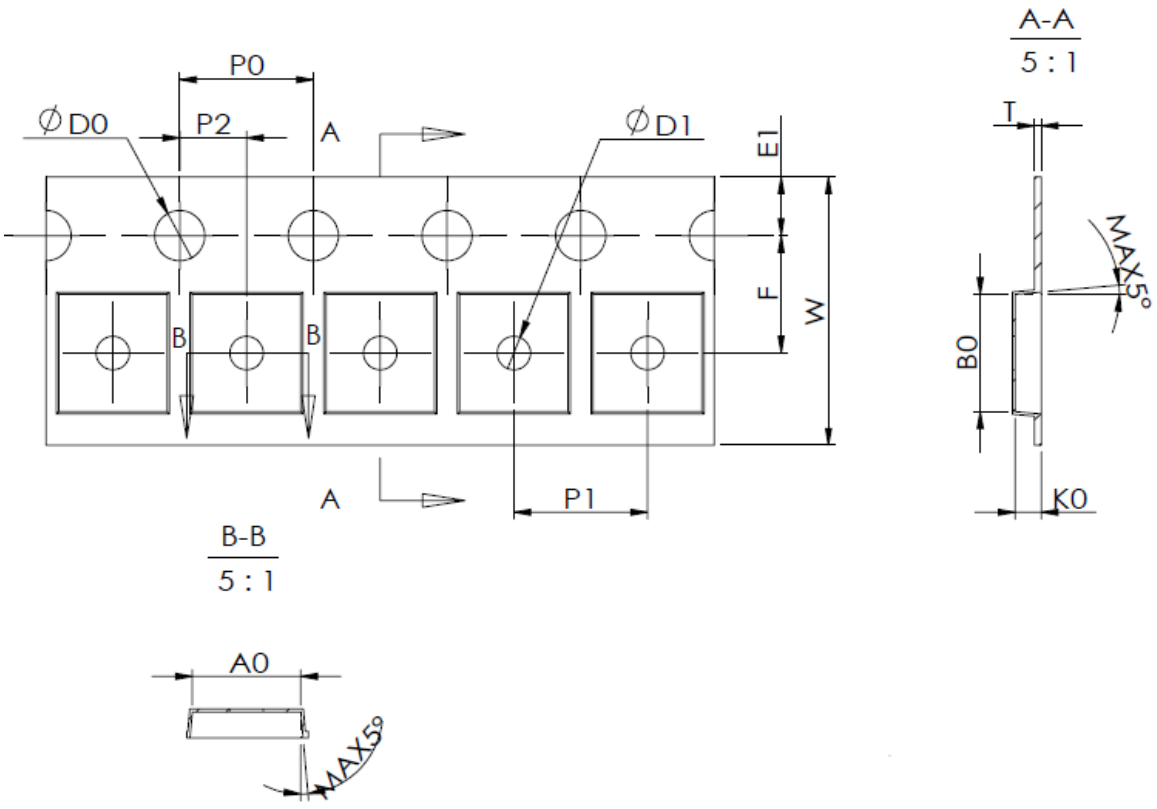


| W | P1 | E1 | F | D0 | D1 |
|---|---|---|---|---|---|
| 8.0 | 4.0 | 1.75 | 3.5 | 1.5 | 1.0 |
| **P0** | **P2** | **A0** | **B0** | **K0** | **T** |
| 4.0 | 2.0 | 3.25 | 3.5 | 0.8 | 0.22 |

PS : unit : mm

Notice:

1. 10 Sprocket hole pitch cumulative tolerance is ±0.20mm.
2. Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
3. Ao & Bo measured on a place in the middle of the corner radii.
4. Ko measured from a place on the inside bottom of the pocket to top surface of carrier.
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
6. Surface resisivity $10^4$ ~$10^8$ ohm/sq.

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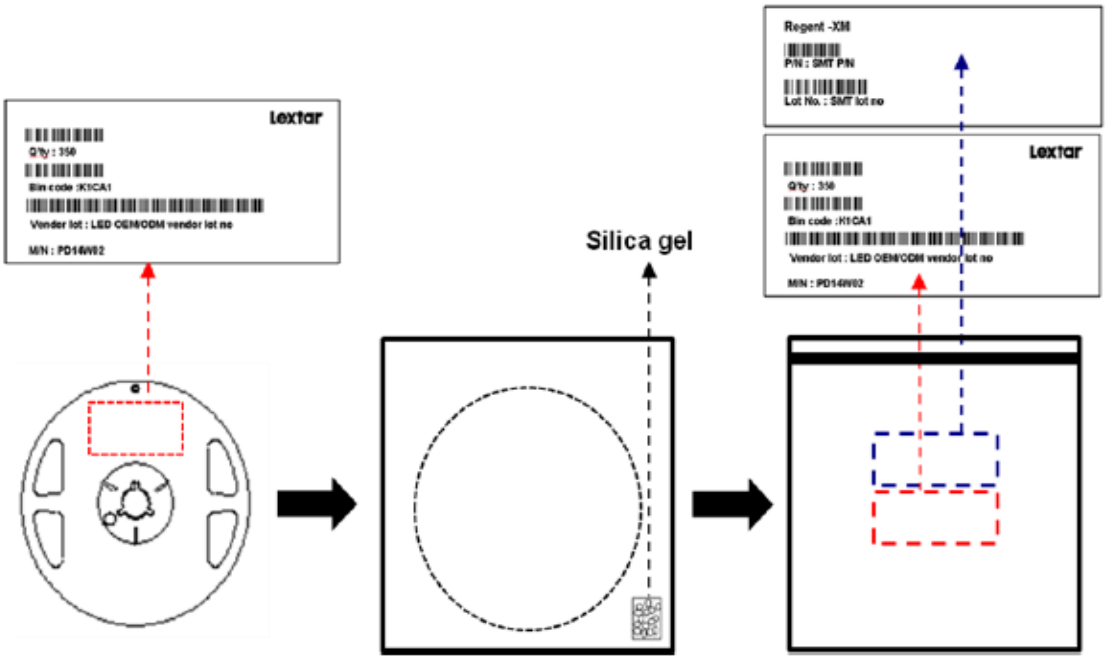
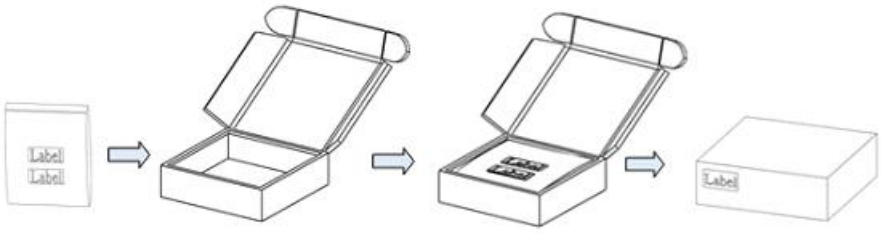
## Shield Bag Taping




## Packing Box

| Type | Large Box | | Medium Box | | Small Box | |
|---|---|---|---|---|---|---|
| Dimension | 541X511X276mm | | 385X303X260mm | | 283X235x70mm | |
| Maximum Reels | 7"X8mm Reel | 64/R | 7"X8mm Reel | 21/R | 7"X8mm Reel | 4/R |
| Minimum Reels | 7"X8mm Reel | 32/R | 7"X8mm Reel | 9/R | 7"X8mm Reel | 1/R |

## Small Box



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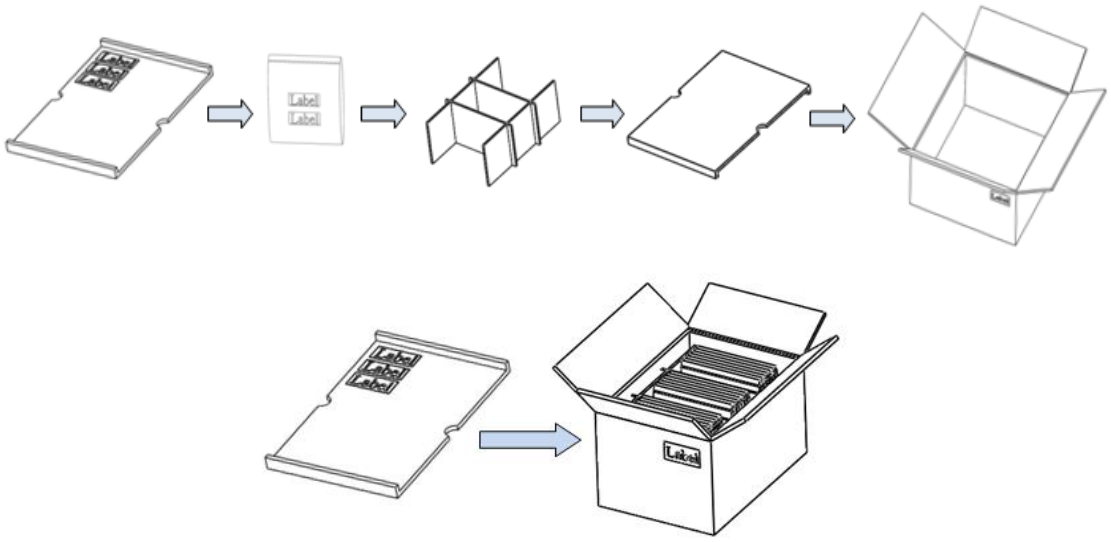
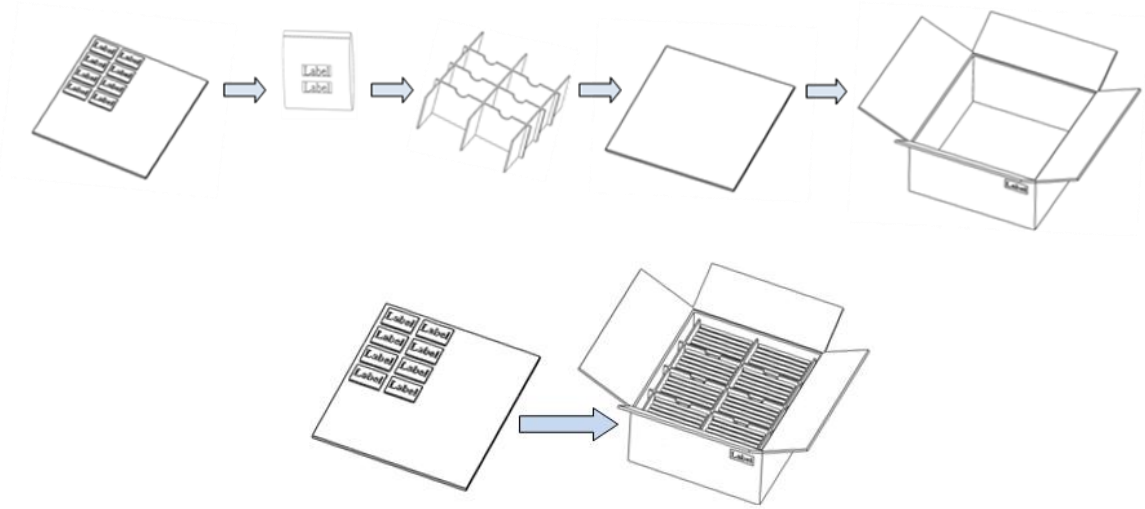
## Medium Box



## Large Box



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## Safety Precautions

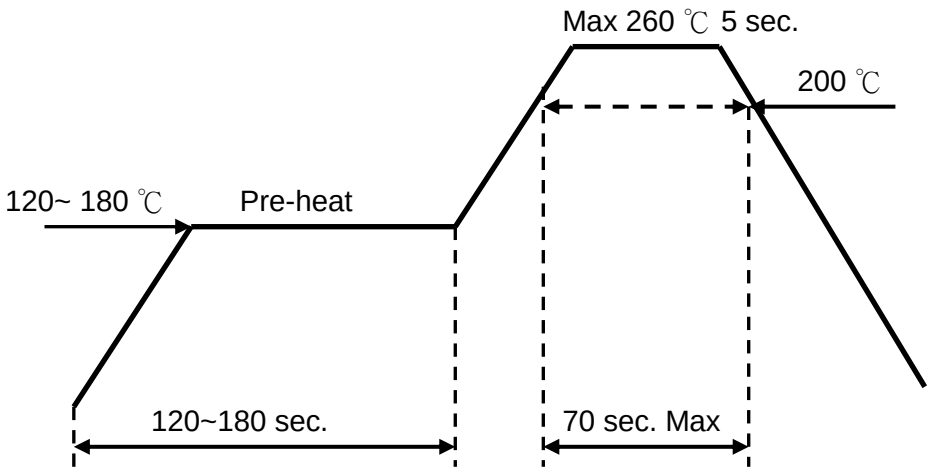
- The LED light output is too strong for human eyes without shield. Prevent eye contact directly more than seconds.
- Ensure operating under maximum rating.

## Storage

- Before opening the package, the LEDs should storage under 30℃, 70% RH.
- After opening the package bag, the LEDs should be keep under 30℃, 70% RH. Recommend to use within 168 hours. 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℃, 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 ℃ max , 3 sec. max.
  Reflow soldering: Pre-heat 180 ℃ max , 180 sec. max.
  Peak 260℃ 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.

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# Revision History

| Date | Contents | Writer | Approved |
|---|---|---|---|
| 2018.09.28 | Preliminary edition | Bug Huang | Ching Chen |
| 2018.12.10 | Formal edition | Bug Huang | Ching Chen |
| 2018.12.19 | Add ordering code | Bug Huang | Ching Chen |
| 2019.01.25 | Add Vf bin: 4 | Bug Huang | Ching Chen |
| 2019.03.18 | Revise ordering code | Bug Huang | Ching Chen |

*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.