

LIGHT LED M03 CoB Product Series

1. Description

The LiteON CoB Product series is a revolutionary, energy efficient and ultra-compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

1.1 Features

- Compact high flux density light source
- Uniform high quality illumination
- Streamlined thermal path
- MacAdam compliant binning structure
More energy efficient than incandescent, halogen and fluorescent lamps
- Instant light with unlimited dimming
- RoHS compliant and Pb free

1.2 Benefits Features

- Enhanced optical control
- Clean white light without pixilation
- Uniform consistent white light
- Significantly reduced thermal resistance and increased operating temperatures
- Lower operating costs
- Reduced maintenance costs
- ESD rating is 8KV in HBM

1.3 Naming Rule

L T PL - M 0 3 6 X X Z S X X - X X

Code1
Code2
Code3
Code4
Code5
Code6

Code 1: Product Line

PL: High Power LED.

Code 2: Package Type/Platform

M03: Ceeramic substrate with 15.85x15.85mm square.

Code 3: Light Emitting Surface

6: 9mm excluding dam

Code 4: Product Series

14: 14 Series

22: 22 Series

Code5: Color Temperature

27: 2700K at 85degC

30: 3000K at 85degC

40: 4000K at 85degC

Note: The Color Temperature follow ANSI C78.377A Doc.

Code6: Hue Bin by MacAdam Ellipses Step

T0: 2700~4000K MacAdam Ellipse / ANSI BIN

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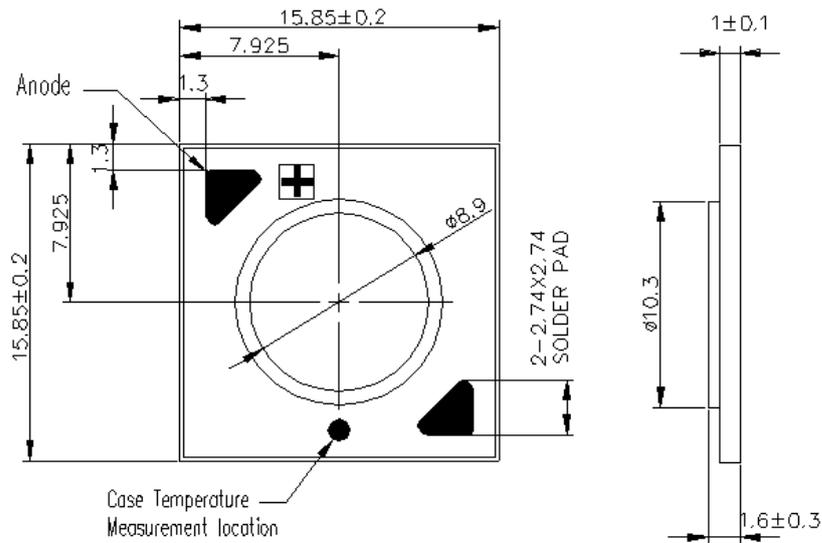
1.4 Product List

| Part Number | Product Series | CCT | CRI | Color Bin | | | Lumen Bin | |
|--------------------|----------------|-------|-----|-----------|-------|------|-----------|-----------|
| | | | | 3SDCM | 5SDCM | ANSI | -8%~+8% | -15%~+15% |
| LTPL-M03614ZS27-T0 | 14 | 2700K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |
| LTPL-M03614ZS30-T0 | 14 | 3000K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |
| LTPL-M03614ZS40-T0 | 14 | 4000K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |
| LTPL-M03622ZS27-T0 | 22 | 2700K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |
| LTPL-M03622ZS30-T0 | 22 | 3000K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |
| LTPL-M03622ZS40-T0 | 22 | 4000K | 80 | ☆ | ☆ | ☆ | ☆ | ☆ |

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2. Outline Dimensions

2.1 Form Factor of M036 series CoB

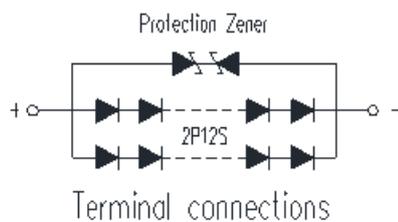


Notes

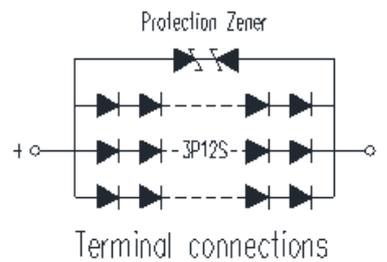
1. All dimensions are in millimeters.
2. Tolerance is ± 0.3 mm unless otherwise noted.
3. LED of equivalent circuit means all series/parallel in CoB package.

2.2 Internal Equivalent Circuit

14 Series Product



22 Series Product



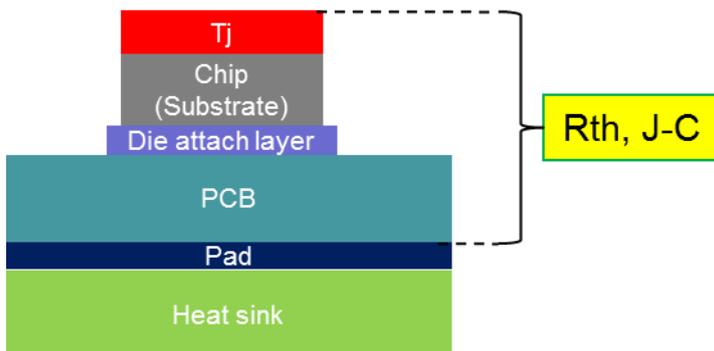
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3. Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Product Series | Rating | Unit |
|-----------------------------------|----------------------|----------------|------------|------|
| Power Dissipation | P _O | 14 | 16 | W |
| | | 22 | 24 | |
| Forward Current | I _F | 14 | 400 | mA |
| | | 22 | 600 | |
| Junction Temperature | T _j | | 125 | °C |
| Thermal Resistance, Junction-Case | R _{th, J-C} | 14 | 1.7 | °C/W |
| | | 22 | 1.2 | |
| Operating Temperature Range | T _{opr} | | -40 to 85 | °C |
| Storage Temperature Range | T _{stg} | | -40 to 100 | °C |
| Breakdown Voltage(DC) | V _B | | 2.25 | KV |
| Electrostatic Discharge | ESD | | 8 | KV |

Notes

1. The pulse mode condition is 1/10 duty cycle with 100 msec pulse width.
2. Forbid to be operated at reverse voltage condition.
3. ESD spec is reference to AEC-Q101-001 HBM.
4. The unit of R_{th} is °C/W electrical.
5. The M03 CoB is recommended soldering temperature under 350degC and could not over 3.5sec.



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4. Electro-Optical Characteristics

4.1 Typical Performance

■ 14 Series Product

| Dominant CCT | Product Series | Current (mA) | V _F (V) @25°C | Flux(lm) @25°C | V _F (V) @85°C | Flux(lm) @85°C | Eff.(lm/W) @25°C | Eff.(lm/W) @85°C |
|--------------|----------------|--------------|--------------------------|----------------|--------------------------|----------------|------------------|------------------|
| 2700K | 14 | 350 | 38.5 | 1546 | 37.7 | 1391 | 115 | 105 |
| 3000K | 14 | 350 | 38.5 | 1610 | 37.7 | 1448 | 119 | 110 |
| 4000K | 14 | 350 | 38.5 | 1707 | 37.7 | 1535 | 127 | 116 |

■ 22 Series Product

| Dominant CCT | Product Series | Current (mA) | V _F (V) @25°C | Flux(lm) @25°C | V _F (V) @85°C | Flux(lm) @85°C | Eff.(lm/W) @25°C | Eff.(lm/W) @85°C |
|--------------|----------------|--------------|--------------------------|----------------|--------------------------|----------------|------------------|------------------|
| 2700K | 22 | 500 | 38.3 | 2284 | 37.5 | 2055 | 119 | 110 |
| 3000K | 22 | 500 | 38.3 | 2360 | 37.5 | 2123 | 123 | 113 |
| 4000K | 22 | 500 | 38.3 | 2500 | 37.5 | 2249 | 131 | 120 |

Notes

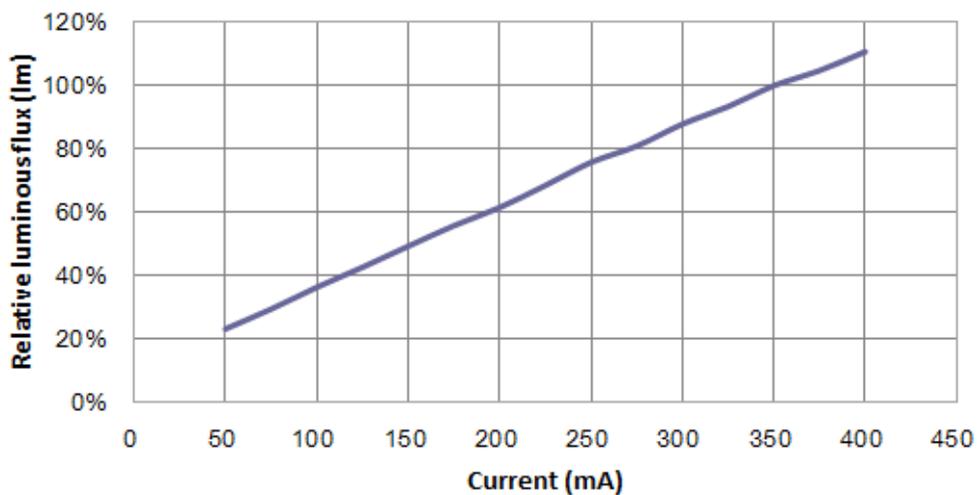
1. All of V_F value are typical, the real bin range please refer page 14 "V_F Binning Parameter".
2. All of flux value are typical, the real bin range please refer page 13 "Flux Binning Parameter".
3. Tolerance of flux is ±7%, tolerance of CCX/CCY is ±0.007, tolerance of CRI is ±2, and tolerance of V_F is ±3%.
4. Typical viewing angle is 120deg.

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4.2 Forward Current vs. Lumen and Voltage

■ 14 Series Product

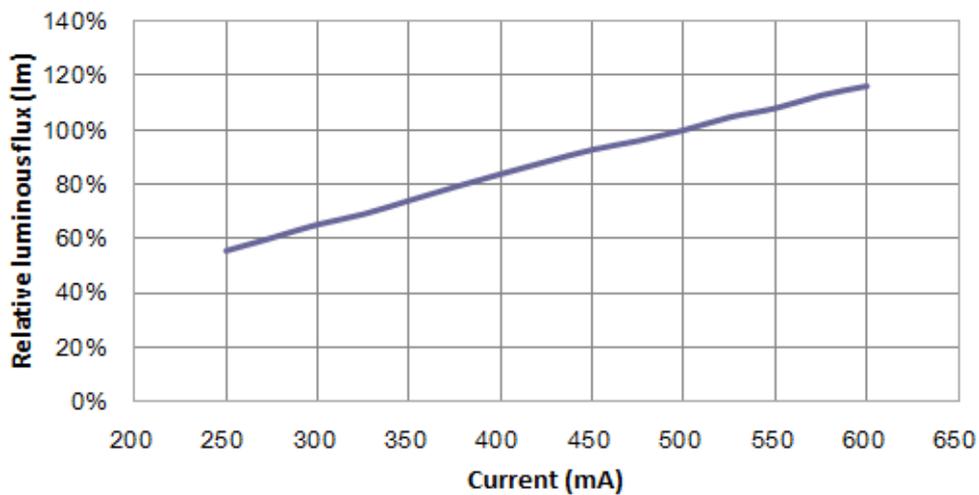
| Current (mA) | V _F (V) | Flux (lm) | | |
|--------------|--------------------|-----------|--------|--------|
| | | 2700K | 3000K | 4000K |
| | | CRI>80 | CRI>80 | CRI>80 |
| 50 | 33.0 | 355 | 374 | 390 |
| 75 | 33.5 | 457 | 475 | 506 |
| 100 | 33.9 | 553 | 586 | 613 |
| 125 | 34.4 | 657 | 687 | 732 |
| 150 | 34.9 | 766 | 794 | 847 |
| 175 | 35.3 | 857 | 899 | 955 |
| 200 | 35.8 | 962 | 991 | 1067 |
| 225 | 36.3 | 1073 | 1103 | 1168 |
| 250 | 36.7 | 1172 | 1221 | 1293 |
| 275 | 37.2 | 1271 | 1303 | 1398 |
| 300 | 37.6 | 1347 | 1415 | 1516 |
| 325 | 38.1 | 1457 | 1504 | 1589 |
| 350 | 38.5 | 1546 | 1610 | 1707 |
| 375 | 38.9 | 1642 | 1687 | 1786 |
| 400 | 39.3 | 1711 | 1782 | 1893 |



LIGHT LED M03 CoB Product Series

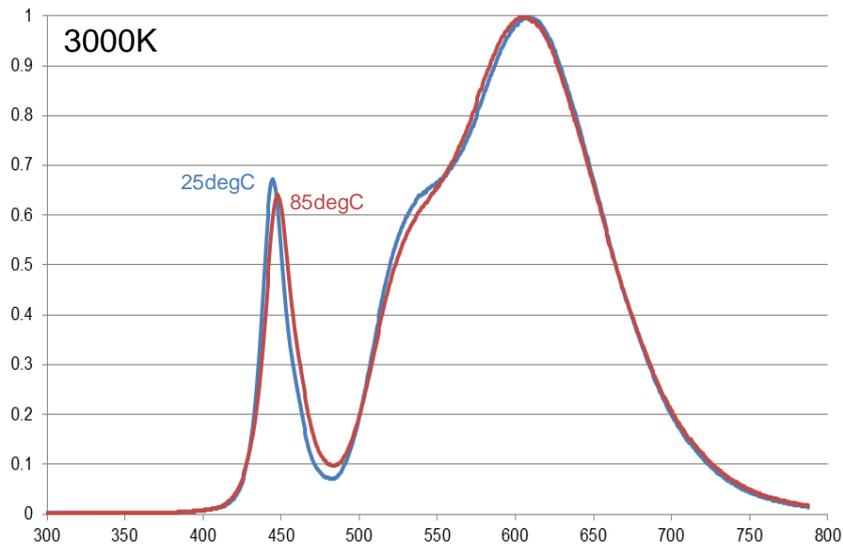
■ 22 Series Product

| Current (mA) | V _F (V) | Flux (lm) | | |
|--------------|--------------------|-----------|--------|--------|
| | | 2700K | 3000K | 4000K |
| | | CRI>80 | CRI>80 | CRI>80 |
| 250 | 35.2 | 1248 | 1311 | 1381 |
| 275 | 35.6 | 1369 | 1423 | 1490 |
| 300 | 35.9 | 1483 | 1538 | 1610 |
| 325 | 36.2 | 1530 | 1629 | 1704 |
| 350 | 36.5 | 1676 | 1748 | 1853 |
| 375 | 36.8 | 1772 | 1867 | 1953 |
| 400 | 37.1 | 1872 | 1977 | 2087 |
| 425 | 37.4 | 1980 | 2086 | 2185 |
| 450 | 37.7 | 2096 | 2190 | 2289 |
| 475 | 38 | 2161 | 2267 | 2398 |
| 500 | 38.3 | 2284 | 2360 | 2500 |
| 525 | 38.6 | 2378 | 2473 | 2594 |
| 550 | 38.9 | 2448 | 2550 | 2703 |
| 575 | 39.1 | 2555 | 2661 | 2801 |
| 600 | 39.4 | 2627 | 2742 | 2877 |

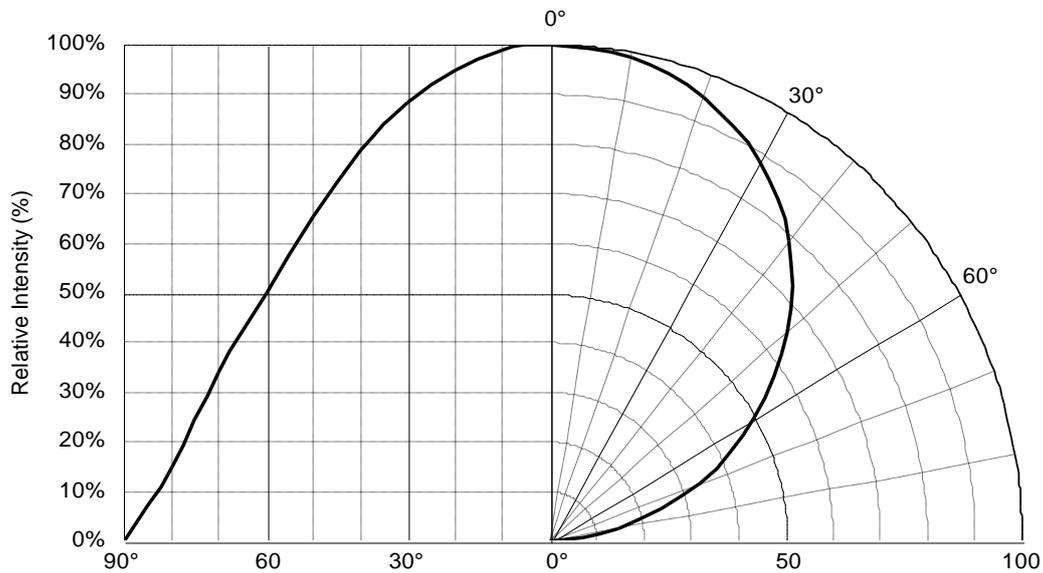


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4.3 Relative Spectral Power Distribution at Typical Current

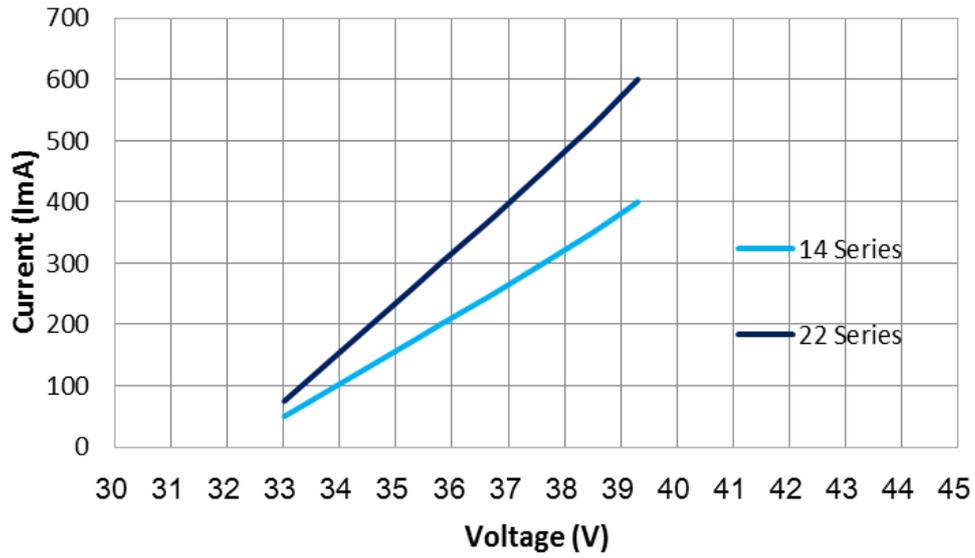


4.4 Radiation Characteristics



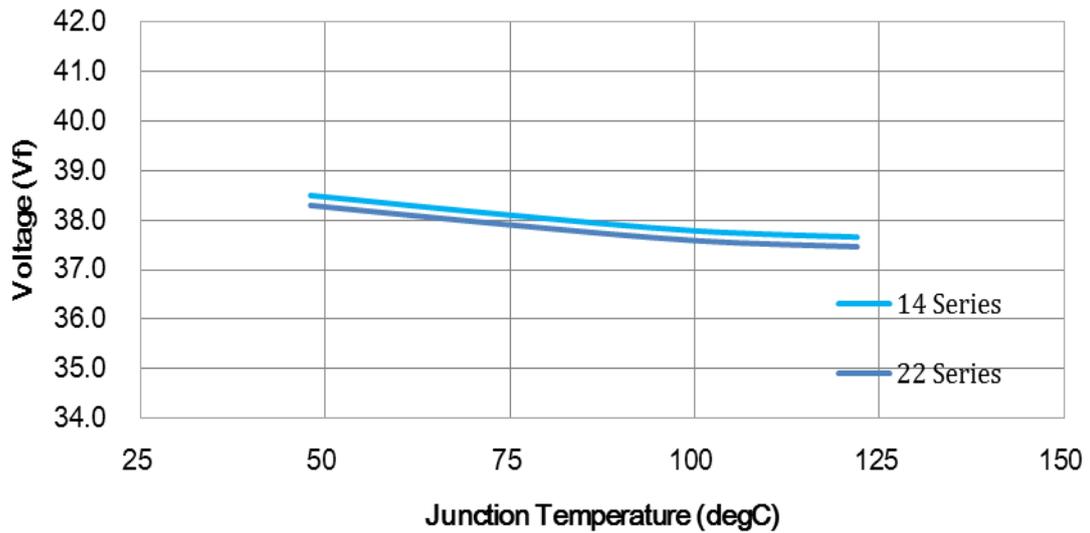
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4.5 Forward Current vs. Forward Voltage

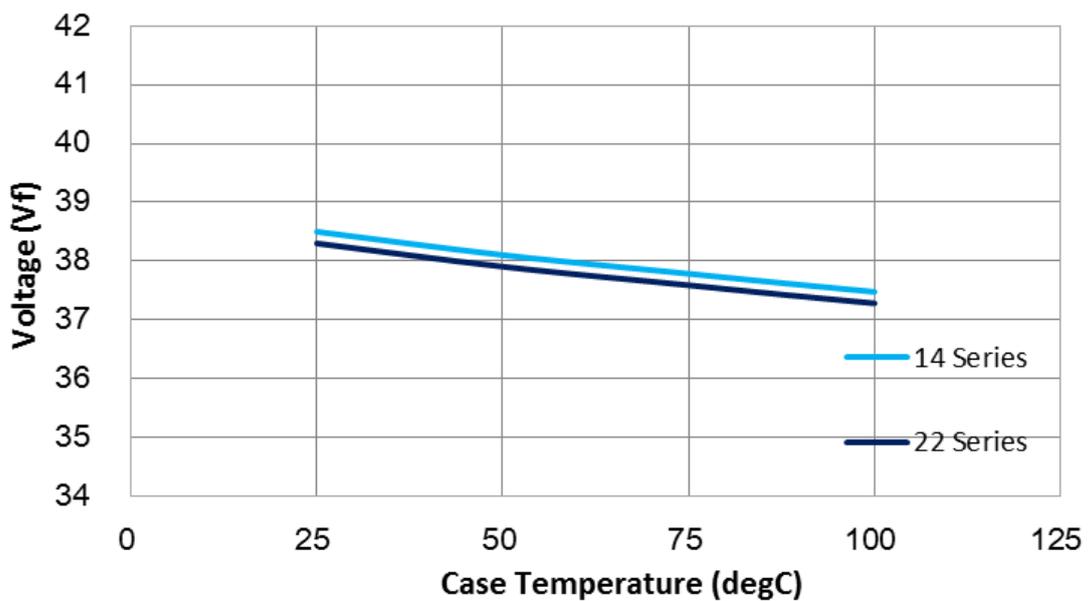


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4.6 Forward Voltage vs. Junction Temperature

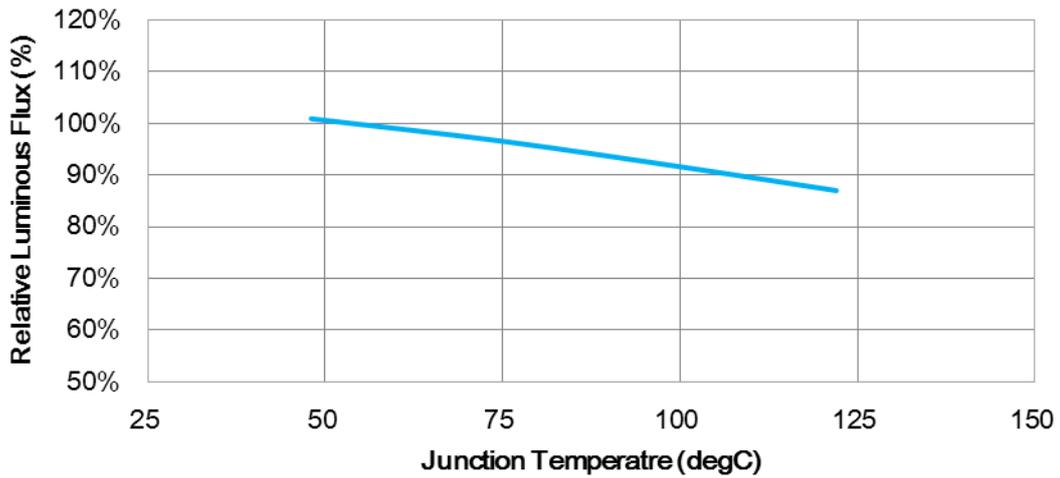


Forward Voltage vs. Junction Temperature

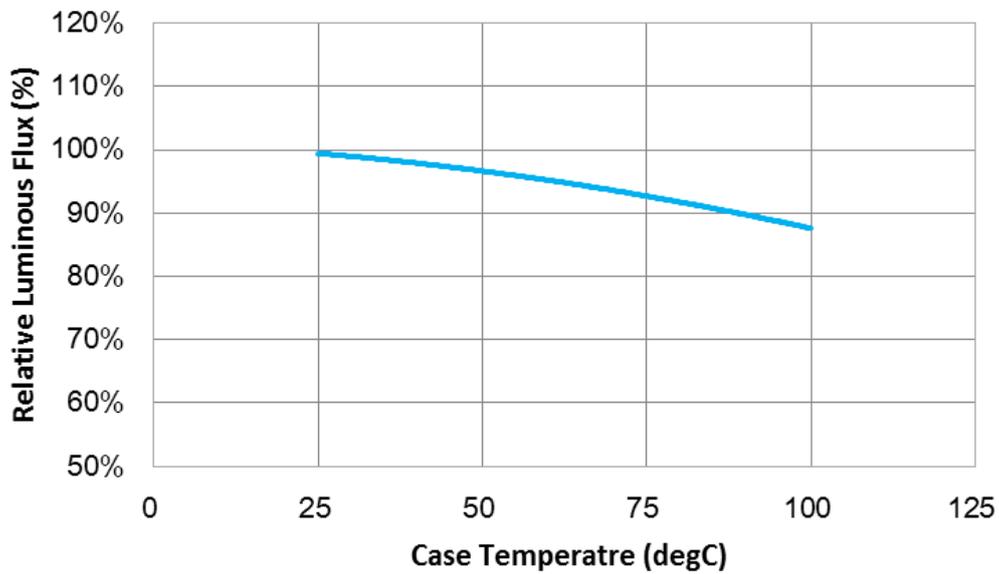


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4.7 Relative Intensity vs. Junction Temperature

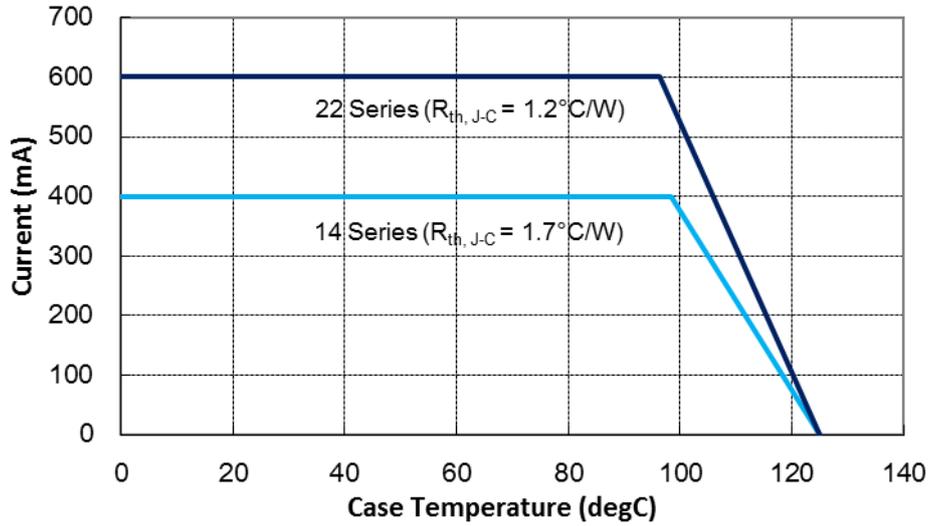


Relative Intensity vs. Case Temperature



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4.8 Forward Current Degrading Curve



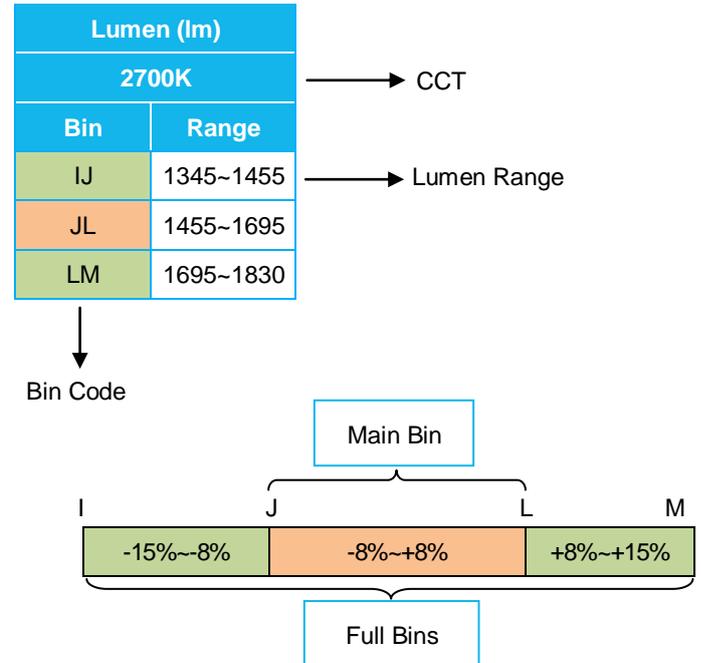
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5. CoB Binning Definition

Flux Binning Parameter (25degC)

| Lumen CODE List of M03 Series Product | | | |
|--|------|------|-------|
| Parameter | Code | Unit | Lumen |
| Luminous Flux | I | lm | 1345 |
| | J | | 1455 |
| | K | | 1570 |
| | L | | 1695 |
| | M | | 1830 |
| | N | | 1975 |
| | O | | 2130 |
| | P | | 2300 |
| | Q | | 2485 |
| | R | | 2680 |
| | S | | 2890 |

Example of M03 Series Product Bin (2700K 14 series)



14 Series Lumen Bin

| Lumen (lm) | | | | | |
|------------|-----------|-------|-----------|-------|-----------|
| 2700K | | 3000K | | 4000K | |
| Bin | Range | Bin | Range | Bin | Range |
| IJ | 1345~1455 | IJ | 1345~1455 | JK | 1455~1570 |
| JL | 1455~1695 | JL | 1455~1695 | KM | 1570~1830 |
| LM | 1695~1830 | LM | 1695~1830 | MN | 1830~1975 |

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■ 22 Series Lumen Bin

| Lumen (lm) | | | | | |
|------------|-----------|-------|-----------|-------|-----------|
| 2700K | | 3000K | | 4000K | |
| Bin | Range | Bin | Range | Bin | Range |
| NO | 1975~2130 | NO | 1975~2130 | OP | 2130~2300 |
| OQ | 2130~2485 | OQ | 2130~2485 | PR | 2300~2680 |
| QR | 2485~2680 | QR | 2485~2680 | RS | 2680~2890 |

■ Forward Voltage Binning Parameter (25degC)

| Parameter | Bin | Symbol | Min | Max | Unit | Condition |
|-----------------|-----|----------------|------|-----|------|---------------------------------|
| Forward Voltage | V1 | V _F | 33.6 | 42 | V | I _F =Typical current |

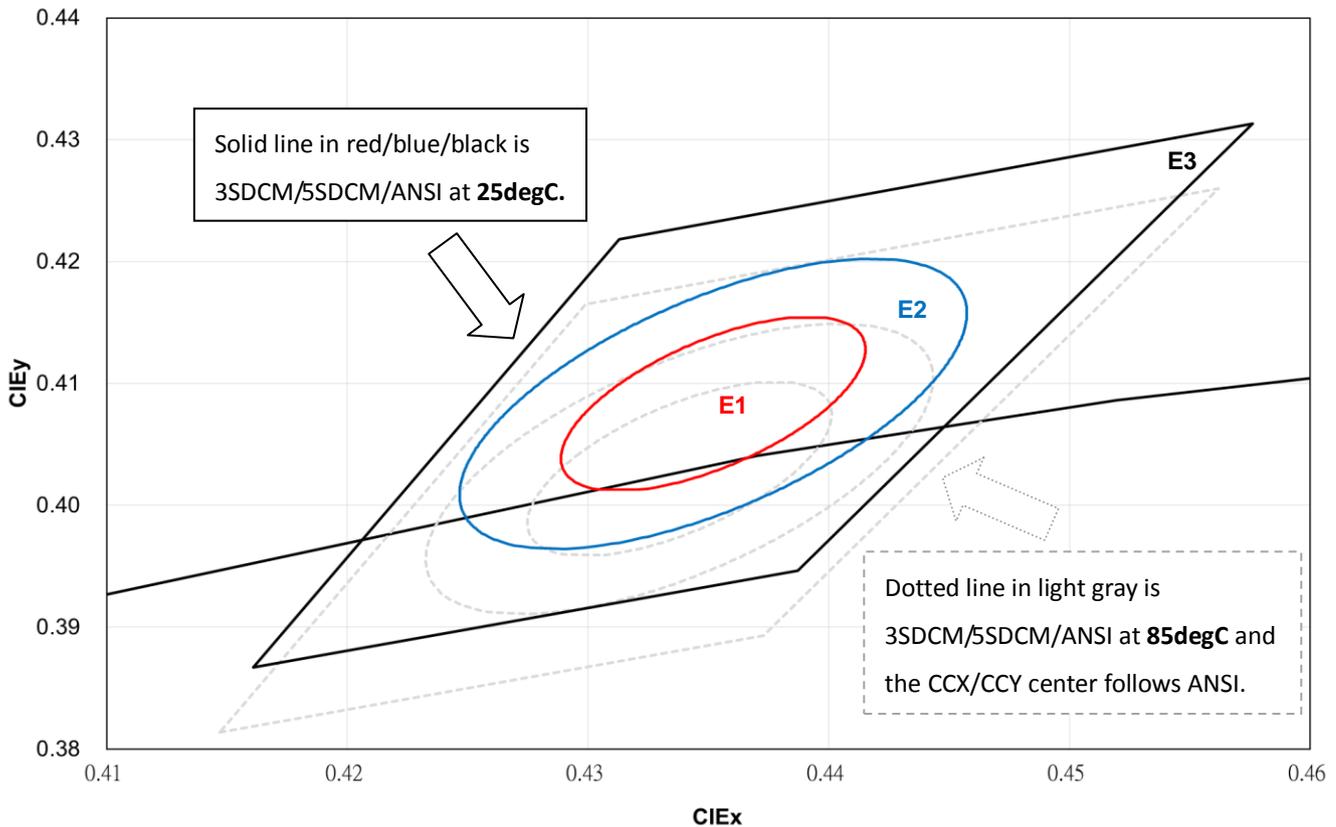
Note: Full Rank on Label

Example: V1/DF/D1

| Forward Voltage Rank | Luminous Flux Rank | Color Rank |
|----------------------|--------------------|------------|
| V1 | DF | D1 |

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■ Example of LiteOn CoB MacAdam Ellipse Color Definition (Ex: 3000K)



| CIE Center Point | | | | | | |
|------------------|-----------------------|--------|---------------|--------|-----------------|---------|
| CCT | 25degC (LiteOn Spec.) | | 85degC (ANSI) | | Hot/Cold Factor | |
| | CCX | CCY | CCX | CCY | CCX | CCY |
| 2700 | 0.4582 | 0.4150 | 0.4578 | 0.4101 | -0.0004 | -0.0049 |
| 3000 | 0.4352 | 0.4083 | 0.4338 | 0.403 | -0.0014 | -0.0053 |
| 4000 | 0.3849 | 0.3856 | 0.3818 | 0.3797 | -0.0031 | -0.0059 |

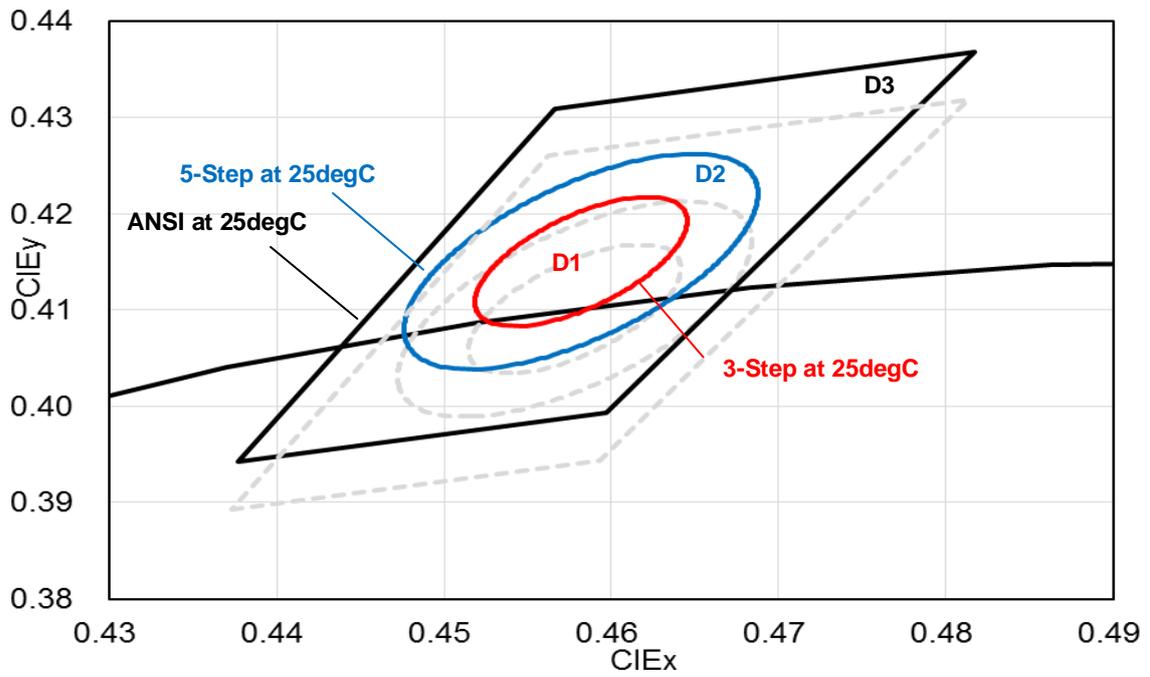
Notes

- LiteOn tester and shipping spec follow the color bin with 25degC CCX/CCY center.
- The Hot/Cold factor means the CCX/CCY shift from 25degC to 85degC.
- The Hot/Cold shift is measured by LiteOn CAS 140B instrument system.
- The ellipse equation expression: $SDCM = (g11*(x-x_0)^2 + 2*g12*(x-x_0)*(y-y_0) + g22*(y-y_0)^2)^{0.5}$

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■ M03 CRI80 2700K

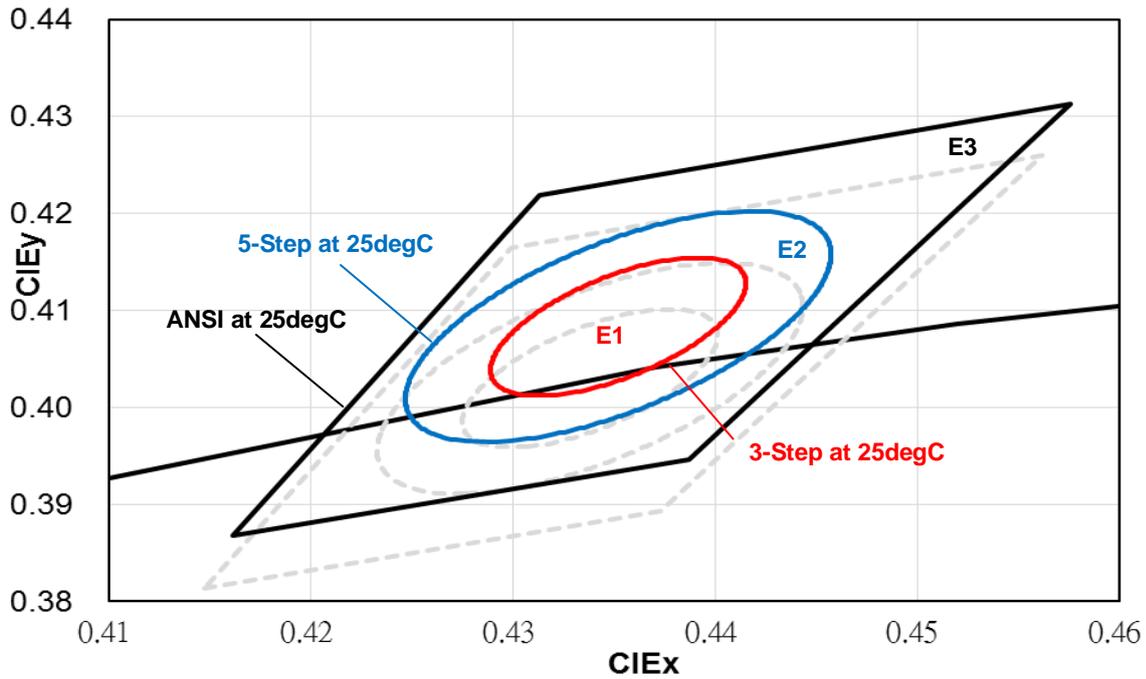
PN: LTPL-M036xxZS27-T0



LIGHT LED M03 CoB Product Series

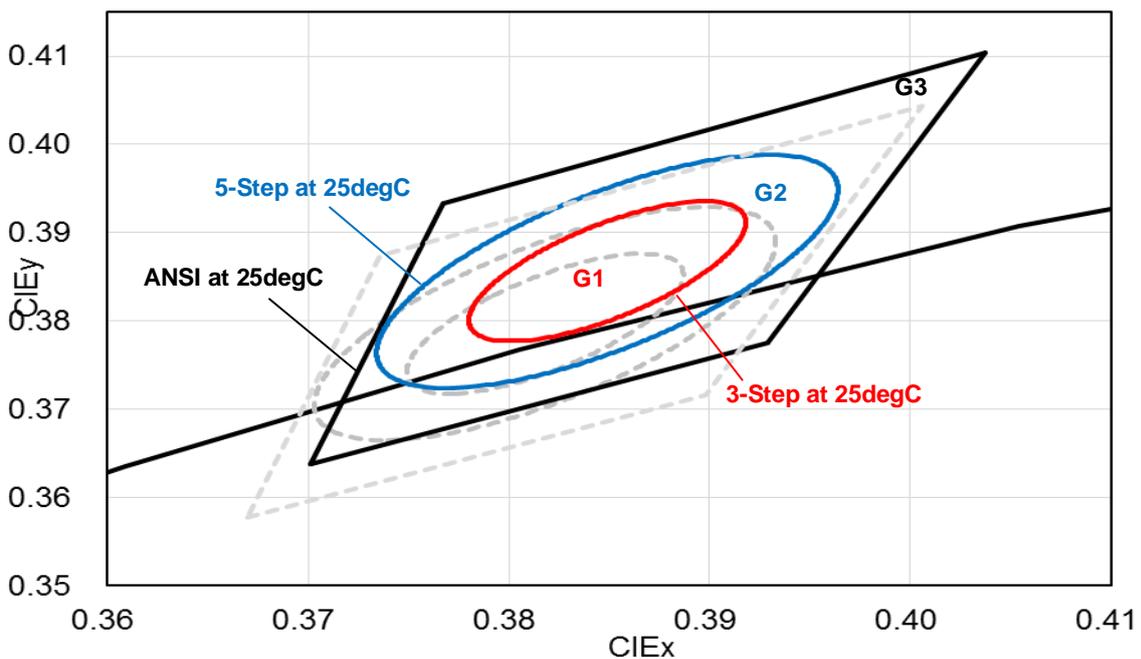
■ M03 CRI80 3000K

PN: LTPL-M036xxZS30-T0



■ M03 CRI80 4000K

PN: LTPL-M036xxZS40-T0



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6. Reliability Test Plan

| No | Test item | Condition | Duration | Number of Failed | Result |
|----|-------------------------------------|--|---|------------------|--------|
| 1 | High Temperature Operating Life | $T_c=85^{\circ}\text{C}$, I_F =Typical Current | 1K hours | 0/10 | Pass |
| 2 | Wet High Temperature Operating Life | $60^{\circ}\text{C}/90\%\text{RH}$, I_F =Typical Current(DC) 30 mins ON/OFF | 1K hours | 0/10 | Pass |
| 3 | Thermal Shock | -40°C to 125°C , 15minutes dwell, <10 seconds transfer, measurement in every 250 cycles | 500 cycles | 0/10 | Pass |
| 4 | Fast Switch Cycling Test | 40000cycles, 2 mins On/Off, Room temperature($25^{\circ}\text{C}+/-5^{\circ}\text{C}$), measurement in every 5000 cycles | 40K cycles | 0/10 | Pass |
| 5 | High Temperature Storage Life | $T_a=120^{\circ}\text{C}$ | 1K hours | 0/10 | Pass |
| 6 | Low Temperature Storage Life | $T_a=-55^{\circ}\text{C}$ | 1K hours | 0/10 | Pass |
| 7 | Mechanical Shock | 1500G, 0.5ms pulse, 5 shocks each 6 axis | 30 Times (5 shocks each 6 axis) | 0/10 | Pass |
| 8 | Variable Vibration Frequency | 10-2000-10 Hz, log or linear sweep rate, 20G for approximately minute 1.5mm, each applied three times per axis over 6 hrs. | 18 hrs (3 times per axis over 6 hrs) | 0/10 | Pass |

■ Criteria for Judging the Damage

| Item | Symbol | Test Condition | Criteria for Judgment | |
|-----------------|--------|------------------------|-----------------------|--------------|
| | | | Min. | Max. |
| Forward Voltage | V_F | I_F =Typical Current | | U.S.L. x 1.1 |
| Luminous Flux | Lm | I_F =Typical Current | L.S.L. x 0.7 | |
| CCX & CCY | X,Y | I_F =Typical Current | | Shift<0.02 |

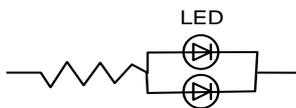
Notes

1. Operating life tests are mounted on thermal heat sink
2. Storage items are only component, not put on heat sink.

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8. Cautions

8.1 An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in circuit below.



(A) Recommended circuit.

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

8.2 Do not put any pressure on the light emitting surface either by finger or any hand tool and do not stack the COB products. Stress or pressure may cause damage to the wires of the LED array.

8.3 This product is not designed for the use under any of the following conditions, please confirm the performance and reliability are well enough if you use it under any of the following conditions

- Do not use sulfur-containing materials in commercial products including the materials such as seals and adhesives that may contain sulfur.
- Do not put this product in a place with a lot of moisture (over 85% relative humidity), dew condensation, briny air, and corrosive gas (Cl, H₂S, NH₃, SO₂, NOX, etc.), exposure to a corrosive environment may affect silver plating.

ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no light up” at low currents.

To verify for ESD damage, check for “light up” and V_F of the suspect LEDs at low currents.