

## 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

<b>L</b>	<b>T</b>	<b>PL</b>	<b>-</b>	<b>M</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>X</b>	<b>X</b>	<b>Z</b>	<b>S</b>	<b>X</b>	<b>X</b>	<b>-</b>	<b>X</b>	<b>X</b>
		Code1				Code2	Code3	Code4				Code5			Code6	

##### Code 1: Product Line

PL: High Power LED.

##### Code 2: Package Type/Platform

M03: Ceramic 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

## LIGHT LED M03 CoB Product Series

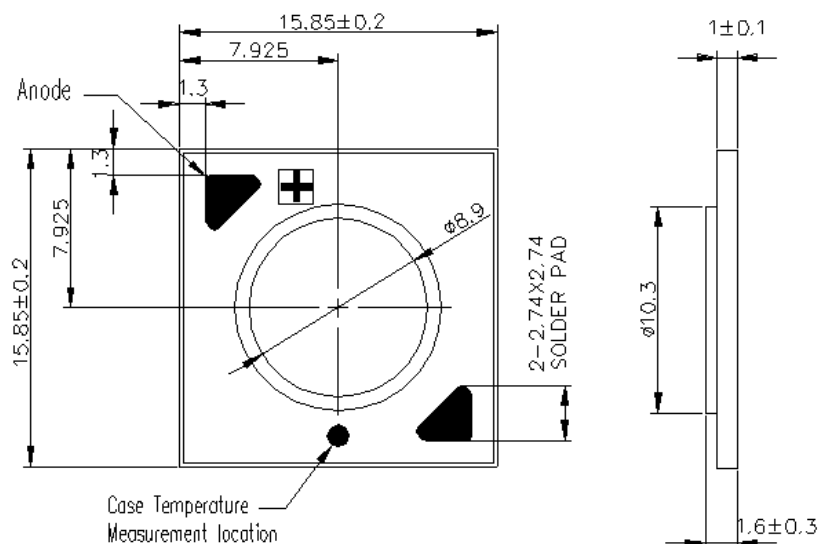
### 1.4 Product List

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	☆	☆	☆	☆	☆

## LIGHT LED M03 CoB Product Series

### 2. Outline Dimensions

#### 2.1 Form Factor of M036 series CoB

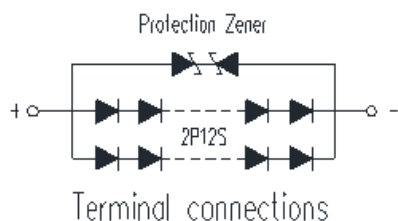


#### Notes

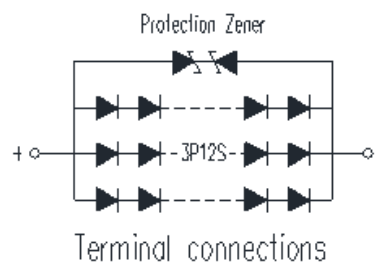
1. All dimensions are in millimeters.
2. Tolerance is  $\pm 0.3$  mm unless otherwise noted.
3. LED of equivalent circuit means all series/parallel in CoB package.

#### 2.2 Internal Equivalent Circuit

##### 14 Series Product



##### 22 Series Product



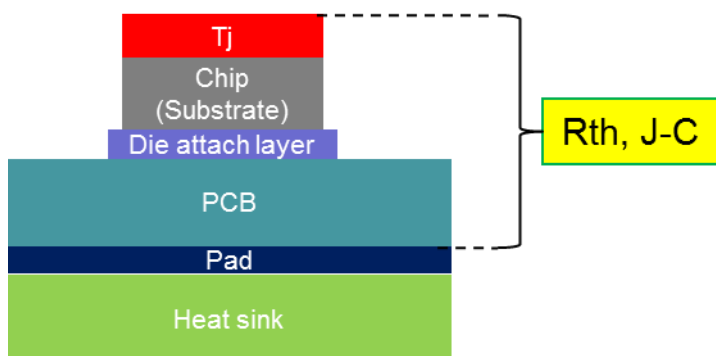
## LIGHT LED M03 CoB Product Series

### 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.



## LIGHT LED M03 CoB Product Series

### 4. Electro-Optical Characteristics

#### 4.1 Typical Performance

##### ■ 14 Series Product

Dominant CCT	Product Series	Current (mA)	V <sub>F</sub> (V) @25°C	Flux(lm) @25°C	V <sub>F</sub> (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 <sub>F</sub> (V) @25°C	Flux(lm) @25°C	V <sub>F</sub> (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

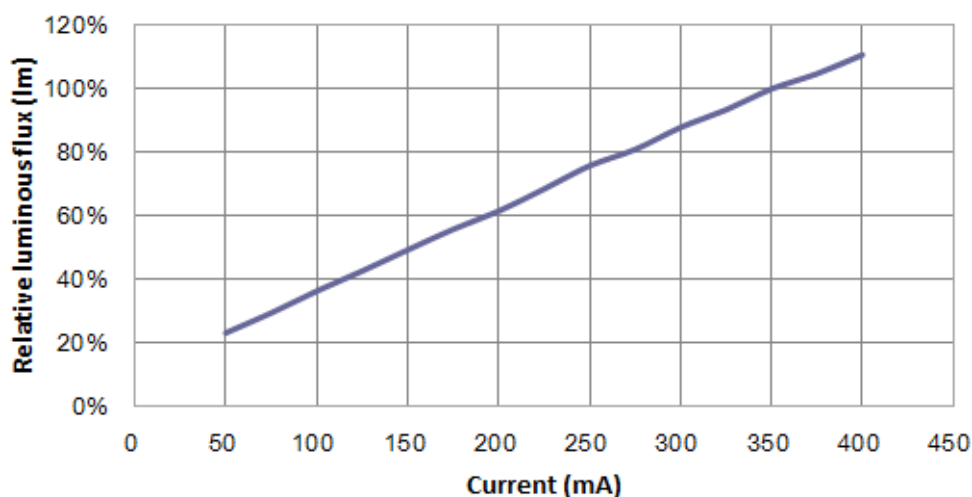
1. All of V<sub>F</sub> value are typical, the real bin range please refer page 14 "V<sub>F</sub> Binning Parameter".
2. All of flux value are typical, the real bin range please refer page 13 "Flux Binning Parameter".
3. Tolerance of flux is ±7%, tolerance of CCX/CCY is ±0.007, tolerance of CRI is ±2,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

## LIGHT LED M03 CoB Product Series

### 4.2 Forward Current vs. Lumen and Voltage

#### ■ 14 Series Product

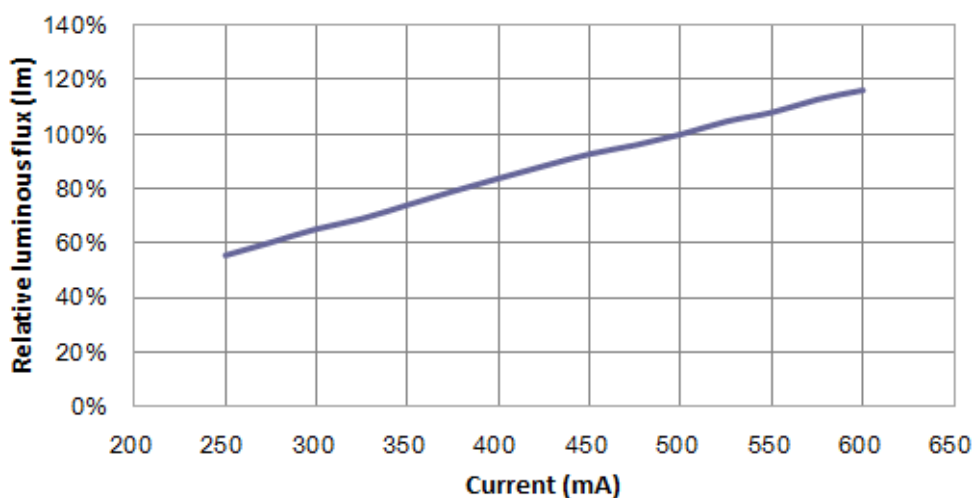
Current (mA)	V <sub>F</sub> (V)	Flux (lm)		
		2700K	3000K	4000K
		CRI>80	CRI>80	CRI>80
50	33.0	355	374	390
75	33.5	457	475	506
100	33.9	553	586	613
125	34.4	657	687	732
150	34.9	766	794	847
175	35.3	857	899	955
200	35.8	962	991	1067
225	36.3	1073	1103	1168
250	36.7	1172	1221	1293
275	37.2	1271	1303	1398
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

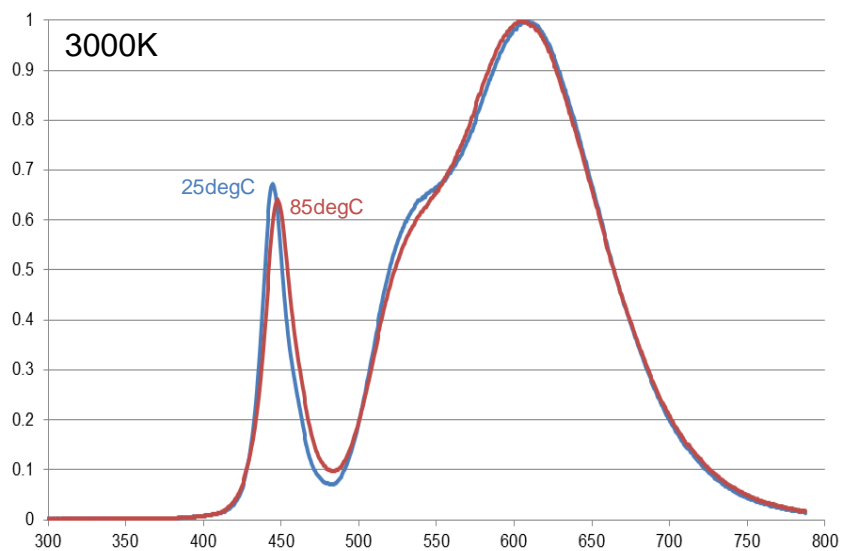
### ■ 22 Series Product

Current (mA)	V <sub>F</sub> (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

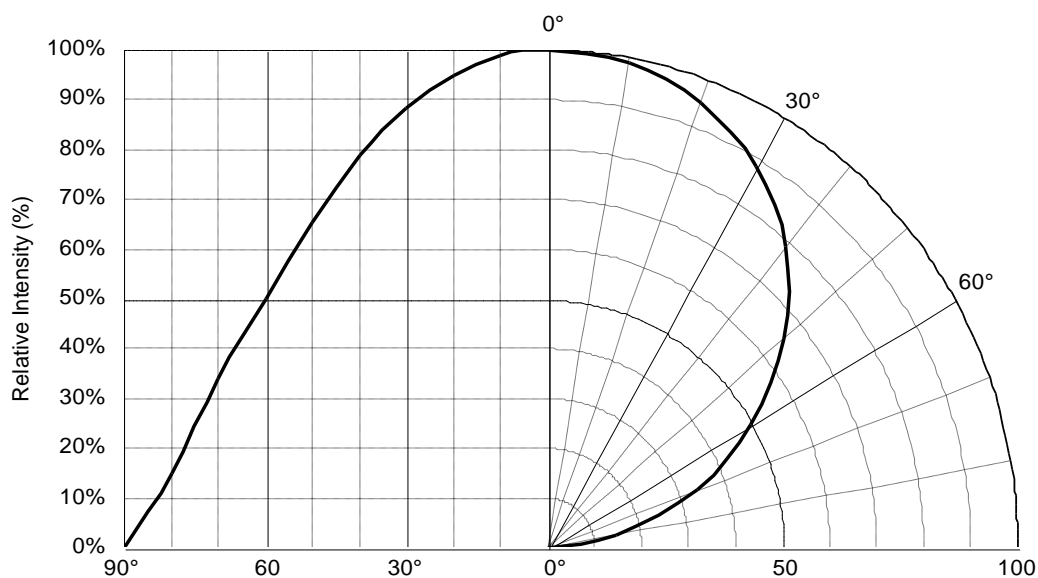


## LIGHT LED M03 CoB Product Series

### 4.3 Relative Spectral Power Distribution at Typical Current



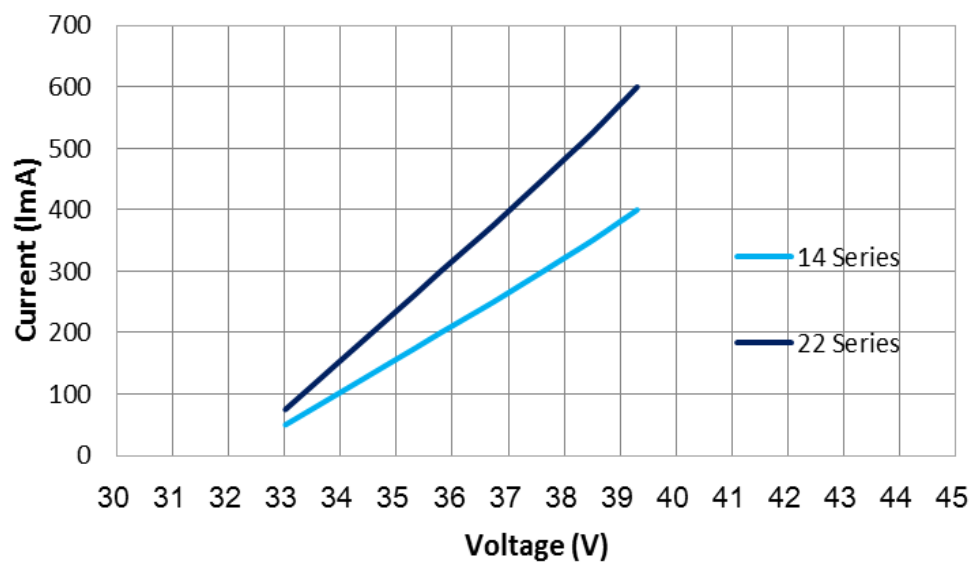
### 4.4 Radiation Characteristics





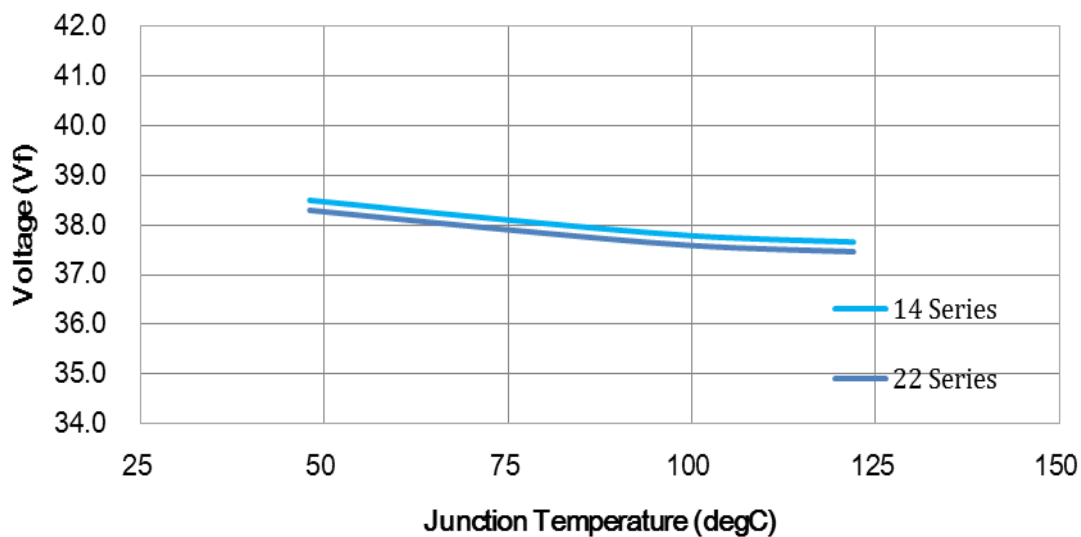
## LIGHT LED M03 CoB Product Series

### 4.5 Forward Current vs. Forward Voltage

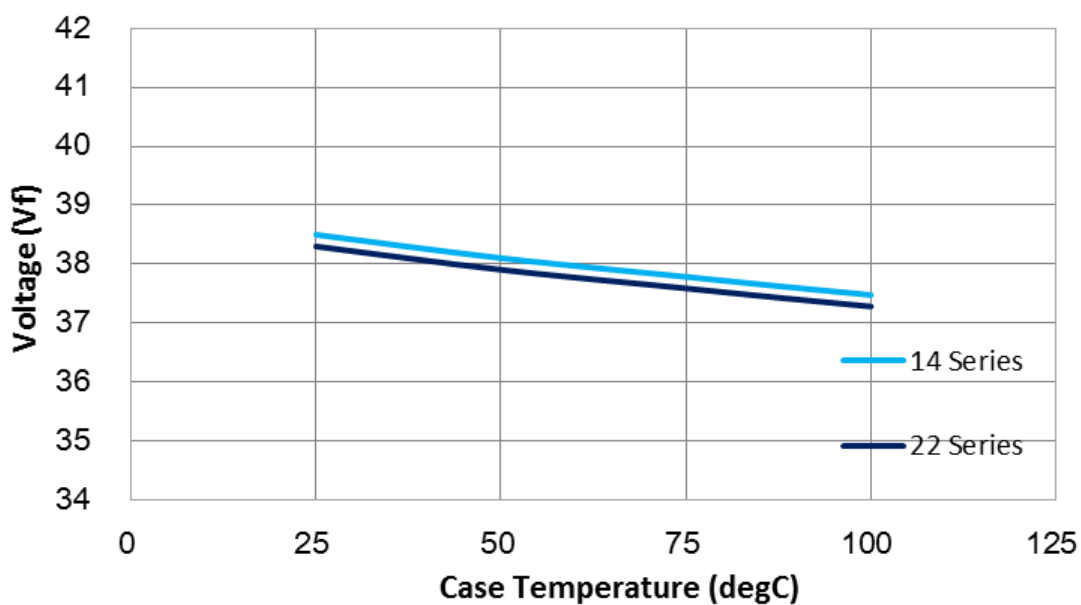


## LIGHT LED M03 CoB Product Series

### 4.6 Forward Voltage vs. Junction Temperature

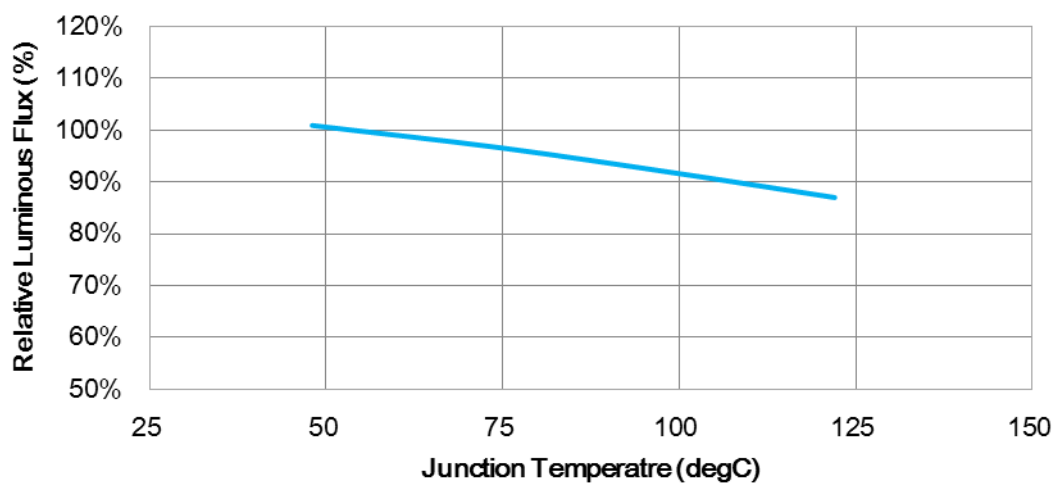


### Forward Voltage vs. Junction Temperature

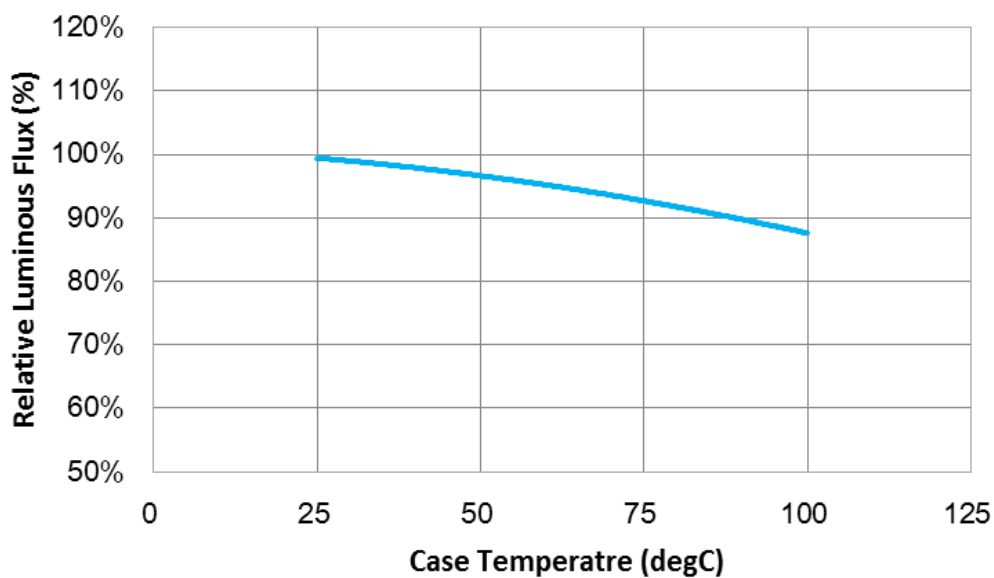


## LIGHT LED M03 CoB Product Series

### 4.7 Relative Intensity vs. Junction Temperature

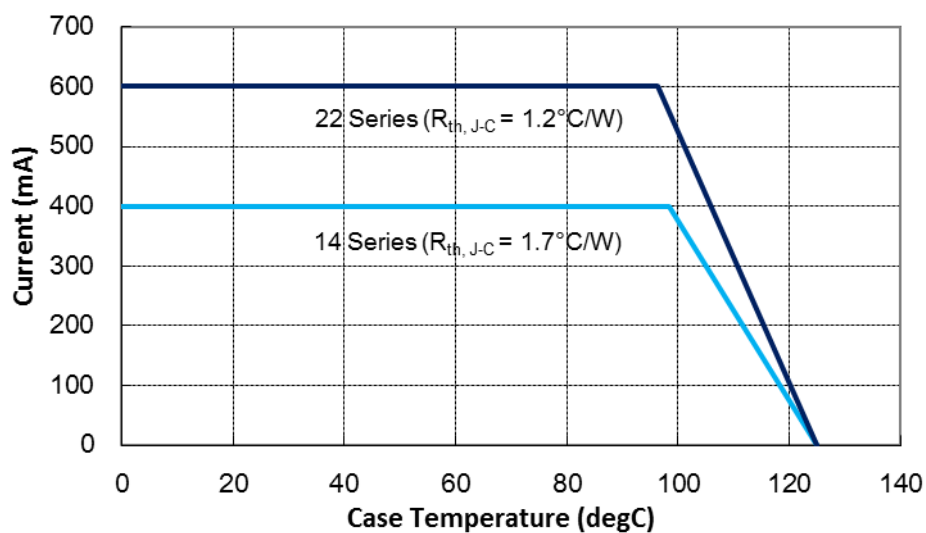


### Relative Intensity vs. Case Temperature



## LIGHT LED M03 CoB Product Series

### 4.8 Forward Current Degrading Curve



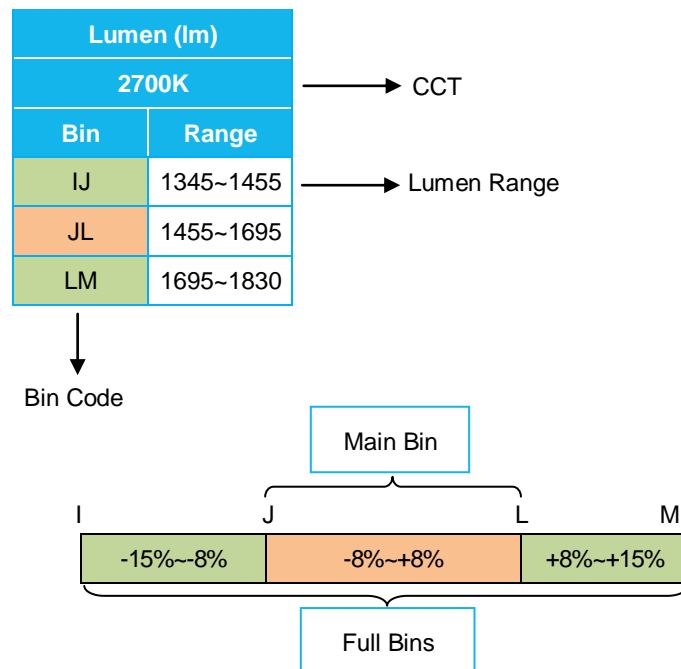
## LIGHT LED M03 CoB Product Series

### 5. CoB Binning Definition

#### ■ Flux Binning Parameter (25degC)

Lumen <b>CODE</b> 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

## LIGHT LED M03 CoB Product Series

### ■ 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 <sub>F</sub>	33.6	42	V	I <sub>F</sub> =Typical current

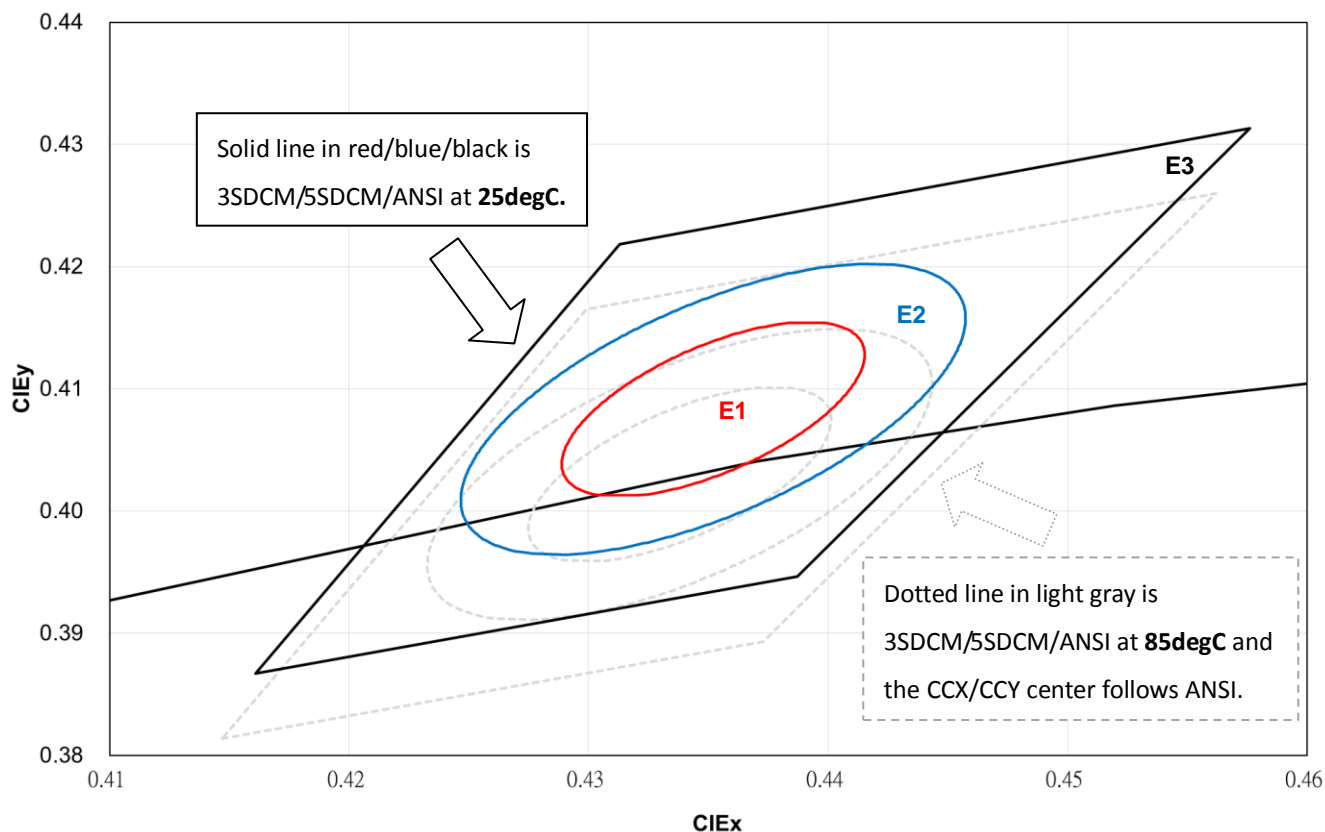
**Note: Full Rank on Label**

Example: V1/DF/D1

Forward Voltage Rank	Luminous Flux Rank	Color Rank
V1	DF	D1

## LIGHT LED M03 CoB Product Series

### ■ 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

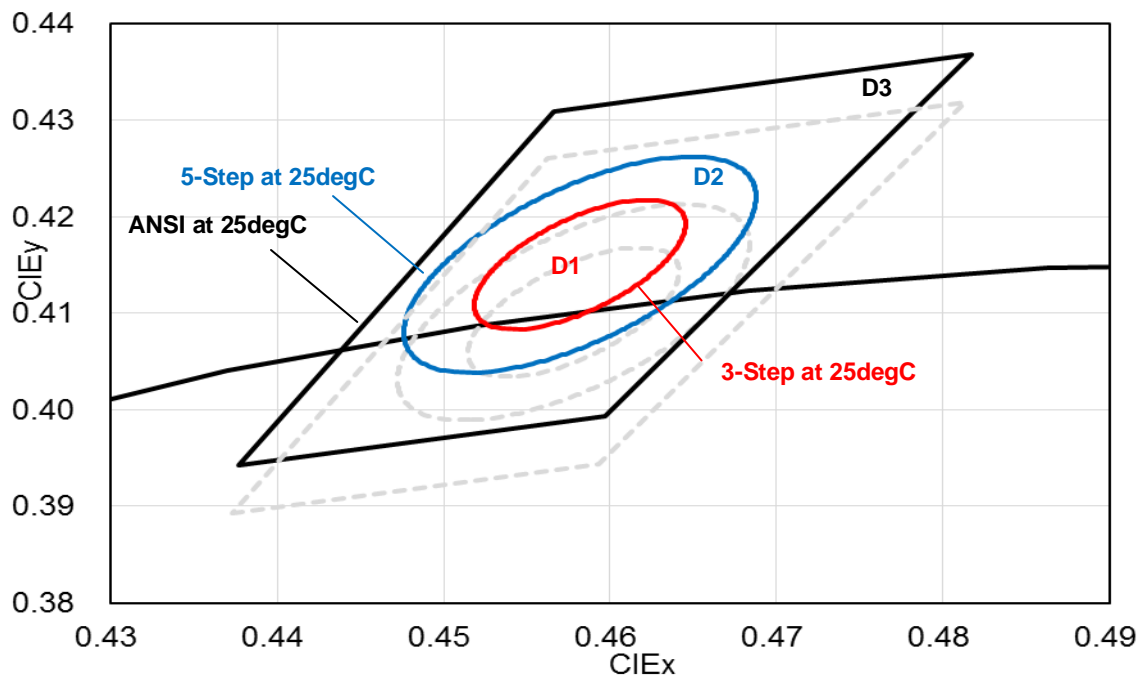
### Notes

- 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:  $SDCM = (g11*(x-x_0)^2 + 2*g12*(x-x_0)*(y-y_0) + g22*(y-y_0)^2)^{0.5}$

# LIGHT LED M03 CoB Product Series

## ■ M03 CRI80 2700K

PN: LTPL-M036xxZS27-T0

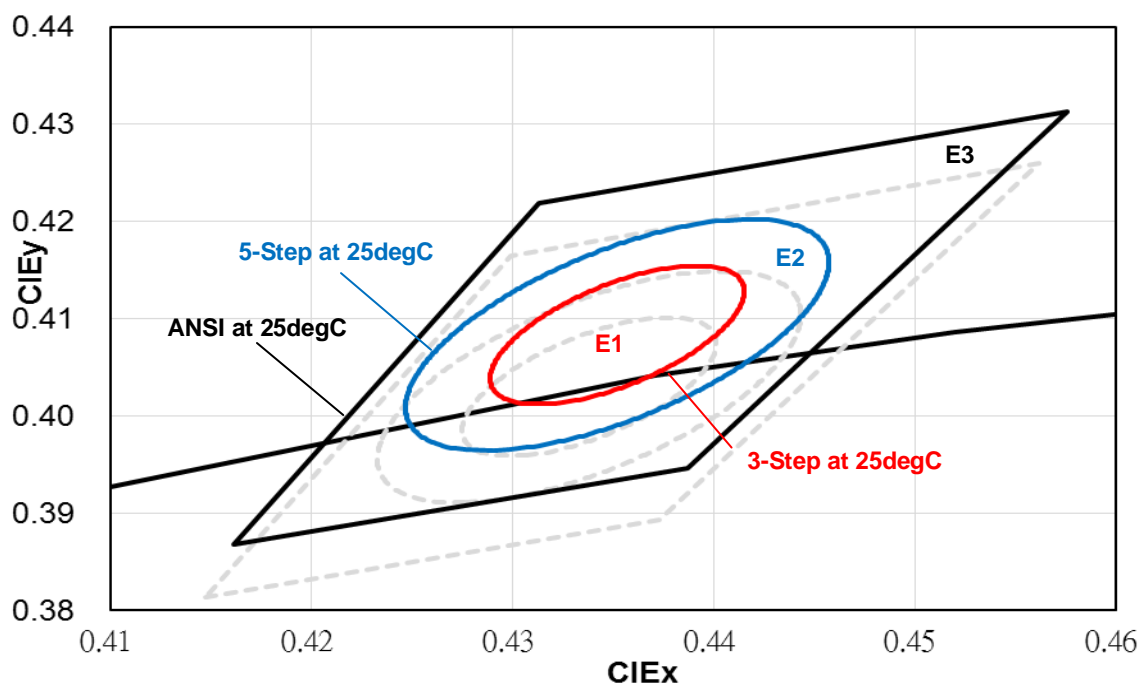




# LIGHT LED M03 CoB Product Series

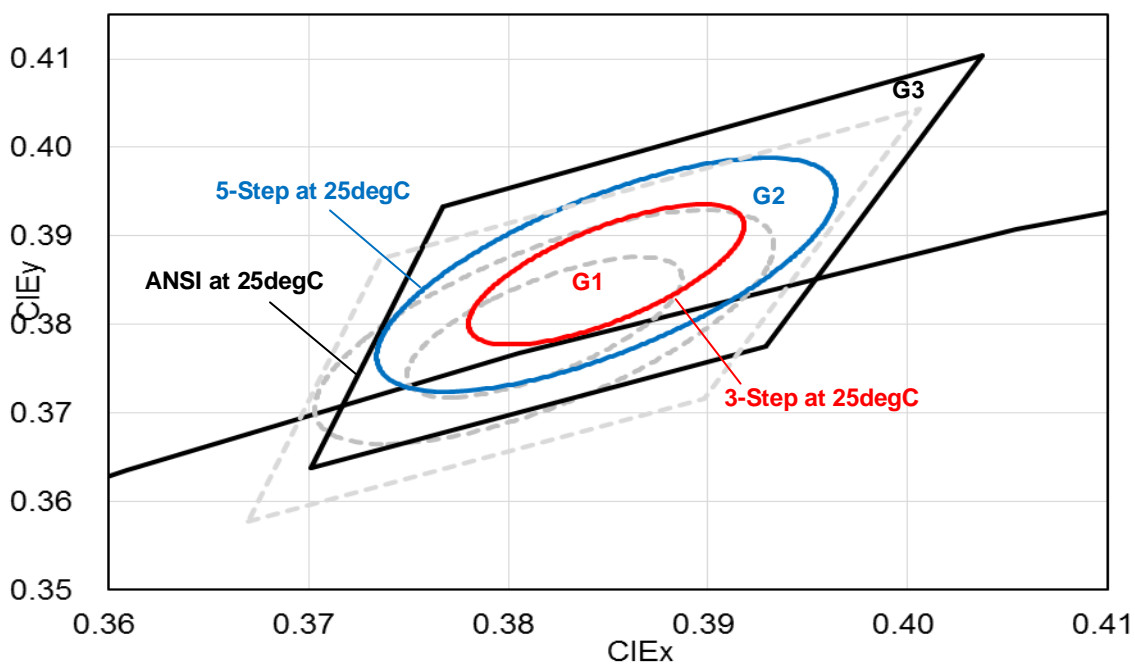
## ■ M03 CRI80 3000K

PN: LTPL-M036xxZS30-T0



## ■ M03 CRI80 4000K

PN: LTPL-M036xxZS40-T0



# LIGHT LED M03 CoB Product Series

## 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	$-40^{\circ}\text{C}$ to $125^{\circ}\text{C}$ , 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( $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ), 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

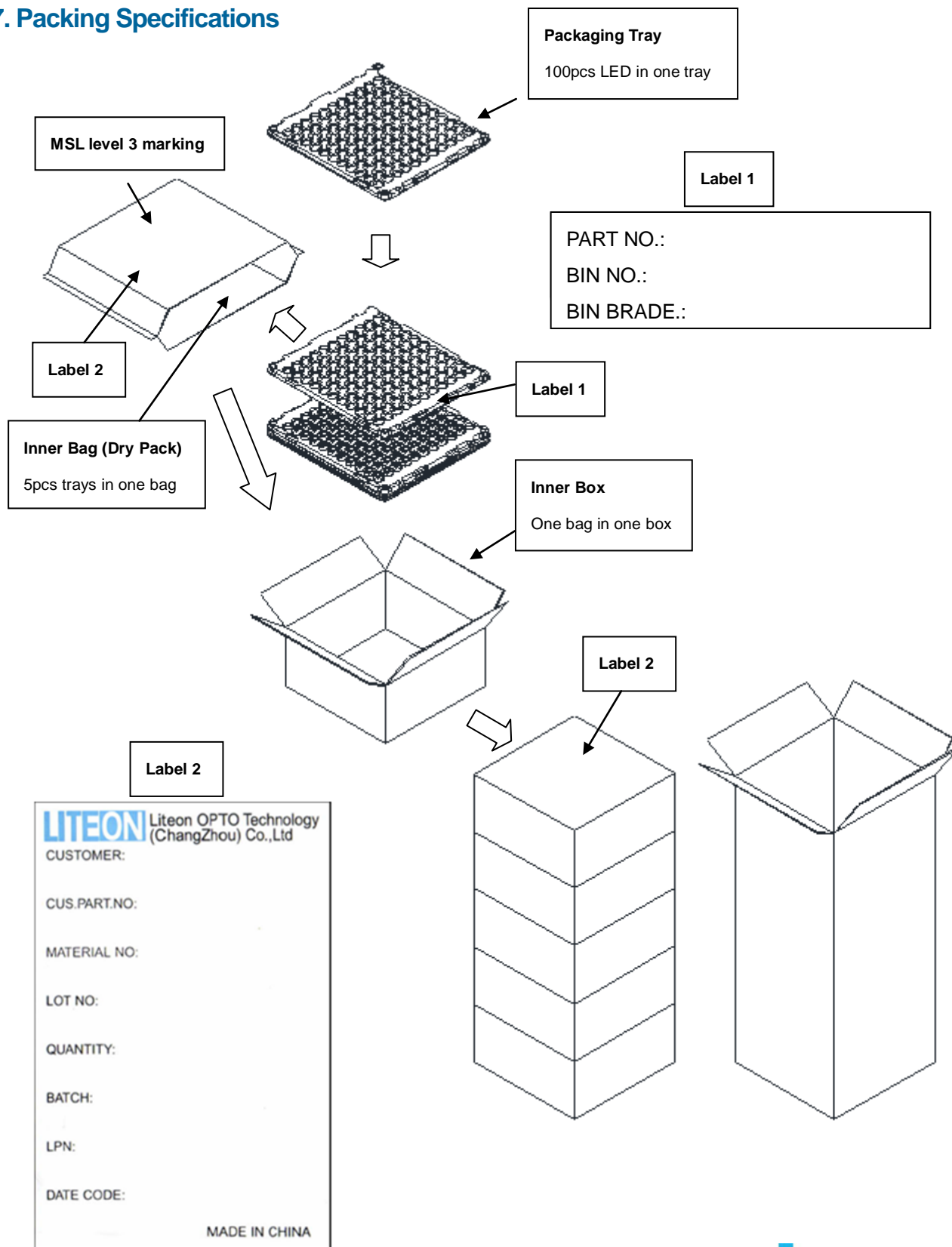
Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	$V_F$	$I_F$ =Typical Current		U.S.L. x 1.1
Luminous Flux	Lm	$I_F$ =Typical Current	L.S.L. x 0.7	
CCX & CCY	X,Y	$I_F$ =Typical Current		Shift<0.02

### Notes

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

# LIGHT LED M03 CoB Product Series

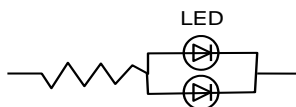
## 7. Packing Specifications



## LIGHT LED M03 CoB Product Series

### 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, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, 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.