

## LIGHT LED M13 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>1</b>	<b>3</b>	<b>7</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

M13: Ceeramic substrate with 13.35x13.35mm square

##### Code 3: Light Emitting Surface

7: 6.3mm excluding dam

##### Code 4: Product Series

10: 10 Series

06: 06 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: 37V, 2700K~4000K MacAdam Ellipse / ANSI Bin

T2: 9V, 2700K~4000K MacAdam Ellipse / ANSI Bin

## LIGHT LED M13 CoB Product Series

### 1.4 Product List

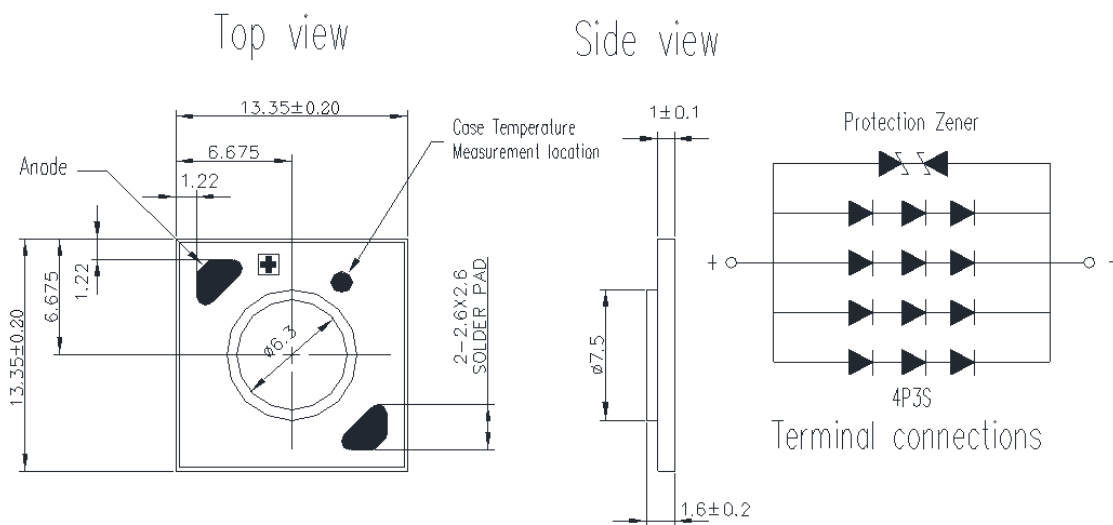
Part Number	Product Series	VF Type	CCT	CRI	Color Bin			Lumen Bin	
					3SDCM	5SDCM	ANSI	-8%~+8%	-15%~+15%
LTPL-M13706ZS27-T0	06	37V	2700K	80	☆	☆	☆	☆	☆
LTPL-M13706ZS30-T0	06	37V	3000K	80	☆	☆	☆	☆	☆
LTPL-M13706ZS40-T0	06	37V	4000K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS27-T0	10	37V	2700K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS30-T0	10	37V	3000K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS40-T0	10	37V	4000K	80	☆	☆	☆	☆	☆
LTPL-M13706ZS27-T2	06	9V	2700K	80	☆	☆	☆	☆	☆
LTPL-M13706ZS30-T2	06	9V	3000K	80	☆	☆	☆	☆	☆
LTPL-M13706ZS40-T2	06	9V	4000K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS27-T2	10	9V	2700K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS30-T2	10	9V	3000K	80	☆	☆	☆	☆	☆
LTPL-M13710ZS40-T2	10	9V	4000K	80	☆	☆	☆	☆	☆

# LIGHT LED M13 CoB Product Series

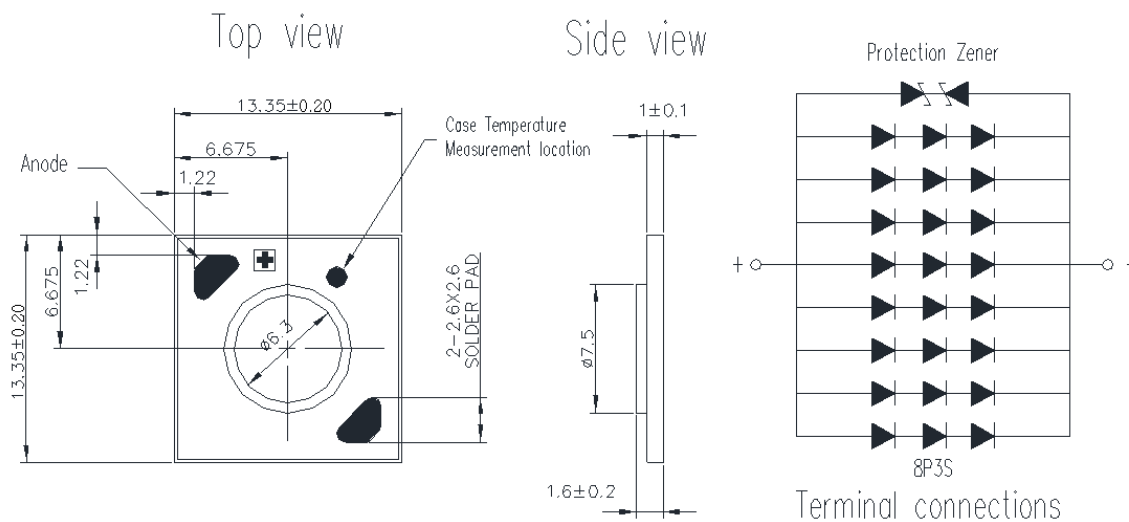
## 2. Outline Dimensions

### 2.1 Form Factor of M137 series CoB

#### ■ 06 Series - 9V

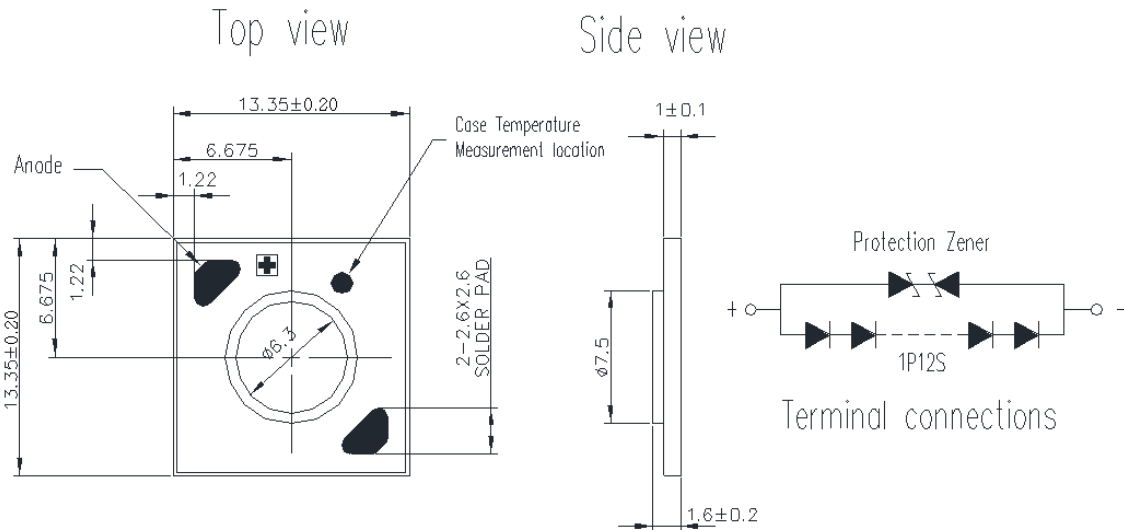


#### ■ 10 Series - 9V

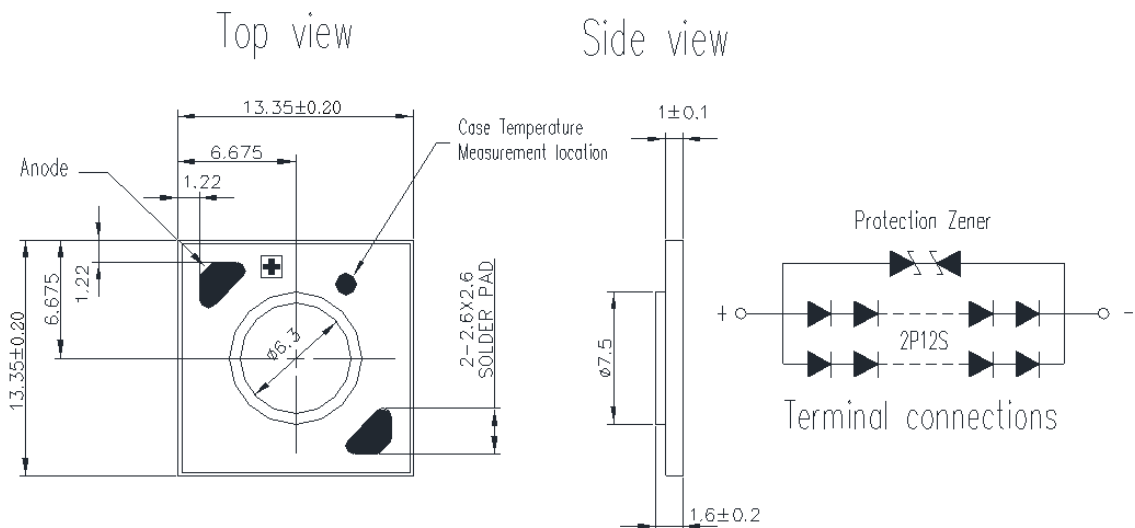


# LIGHT LED M13 CoB Product Series

## ■ 06 Series - 37V



## ■ 10 Series - 37V



### Notes

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

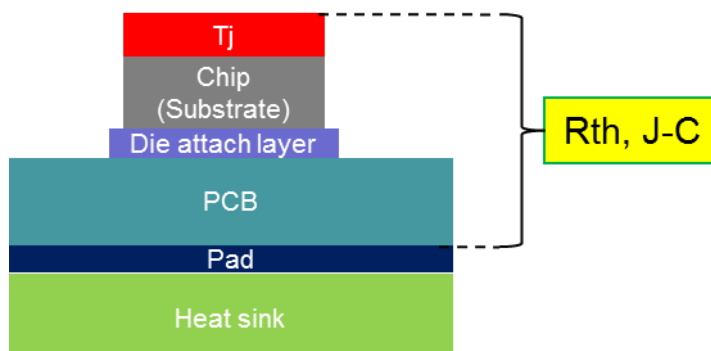
## LIGHT LED M13 CoB Product Series

### 3. Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Product Series	VF	Rating	Unit
Power Dissipation	P <sub>O</sub>	06	37V	6.0	W
		10	37V	12.0	
		06	9V	6.0	
		10	9V	12.0	
Forward Current	I <sub>F</sub>	06	37V	150	mA
		10	37V	300	
		06	9V	600	
		10	9V	1200	
Junction Temperature	T <sub>j</sub>			125	°C
Thermal Resistance, Junction-Case	R <sub>th, J-C</sub>	06		4.0	°C/W
		10		2.5	
Operating Temperature Range	T <sub>opr</sub>			-40 to 85	°C
Storage Temperature Range	T <sub>stg</sub>			-40 to 100	°C
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<sub>th</sub> is °C/W electrical.
5. The M13 CoB is recommended soldering temperature under 350degC and could not over 3.5sec.



## LIGHT LED M13 CoB Product Series

### 4. Electro-Optical Characteristics

#### 4.1 Typical Performance

##### ■ 06 and 10 Series Product - 9V

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	06	400	9.2	442	8.9	398	120.1	111.4
	10	800	9.2	854	8.9	769	116.0	107.7
3000K	06	400	9.2	460	8.9	414	125.0	116.0
	10	800	9.2	890	8.9	801	120.9	112.2
4000K	06	400	9.2	488	8.9	439	132.6	123.0
	10	800	9.2	943	8.9	849	128.1	118.9

##### ■ 06 and 10 Series Product - 37V

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	06	100	36.8	442	35.7	398	120.1	111.4
	10	200	36.8	854	35.7	769	116.0	107.7
3000K	06	100	36.8	460	35.7	414	125.0	116.0
	10	200	36.8	890	35.7	801	120.9	112.2
4000K	06	100	36.8	488	35.7	439	132.6	123.0
	10	200	36.8	943	35.7	849	128.1	118.9

#### Notes

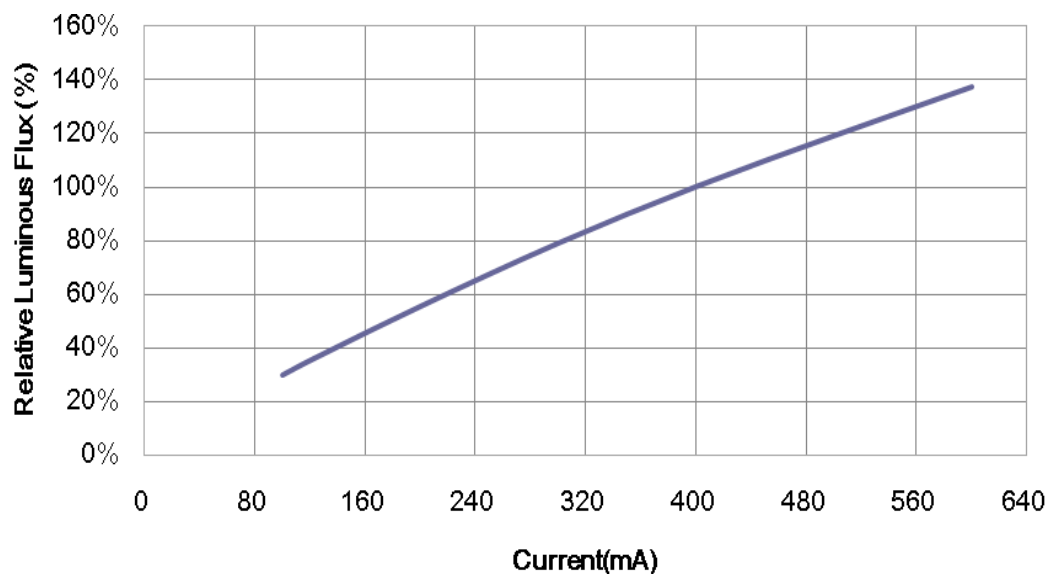
1. All of V<sub>F</sub> value are typical, the real bin range please refer page 19 "V<sub>F</sub> Binning Parameter".
2. All of flux value are typical, the real bin range please refer page 19 "Flux Binning Parameter".
3. Tolerance of flux is ±7%, tolerance of CCX/CCY is ±0.007, tolerance of CRI is ±2, and tolerance of V<sub>F</sub> is ±3%.
4. Typical viewing angle is 120deg.

## LIGHT LED M13 CoB Product Series

### 4.2 Forward Current vs. Lumen Voltage

#### ■ 06 Series Product - 9V

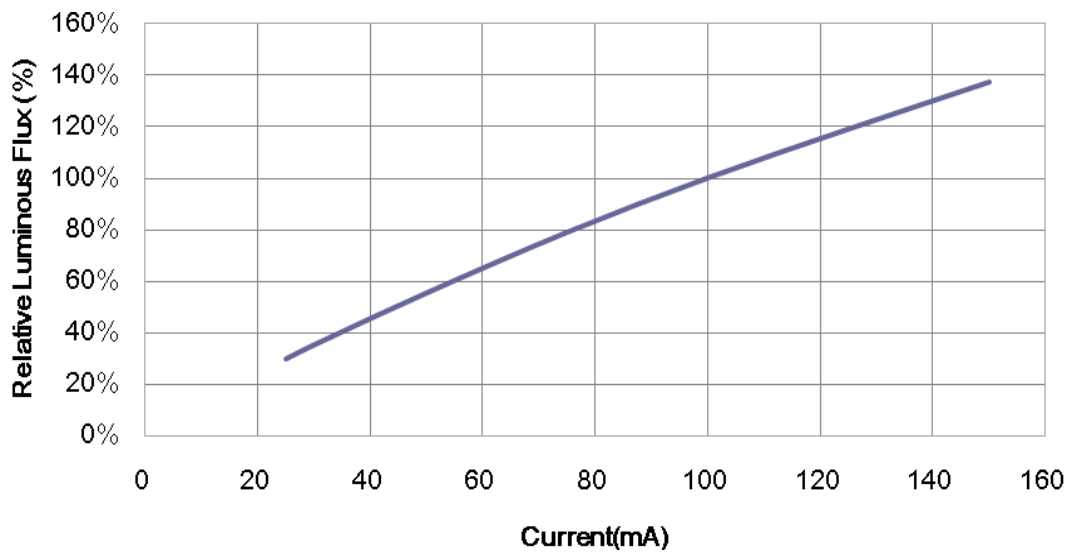
Current (mA)	V <sub>F</sub> (V)	Lumen (lm)		
		2700K	3000K	4000K
100	8.4	131	137	145
120	8.4	155	162	171
200	8.7	244	255	270
300	9.0	349	363	385
400	9.2	442	460	488
500	9.4	526	548	581
600	9.6	606	631	669



# LIGHT LED M13 CoB Product Series

■ 06 Series Product - 37V

Current (mA)	V <sub>F</sub> (V)	Lumen (lm)		
		2700K	3000K	4000K
25	33.5	131	137	145
30	33.8	155	162	171
50	34.8	244	255	270
75	35.8	349	363	385
100	36.8	442	460	488
125	37.6	526	548	581
150	38.4	606	631	669

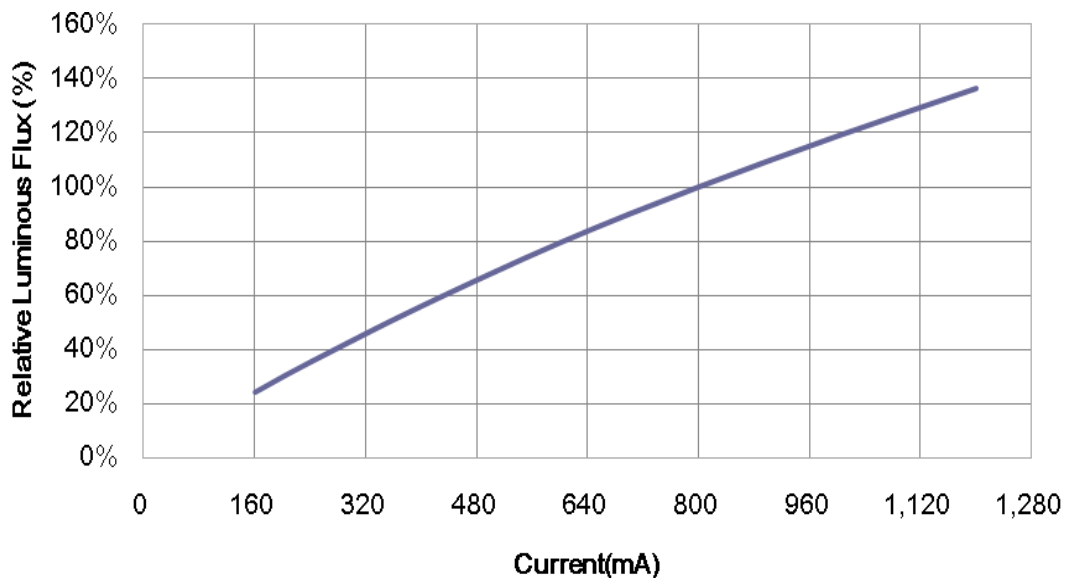




# LIGHT LED M13 CoB Product Series

■ 10 Series Product - 9V

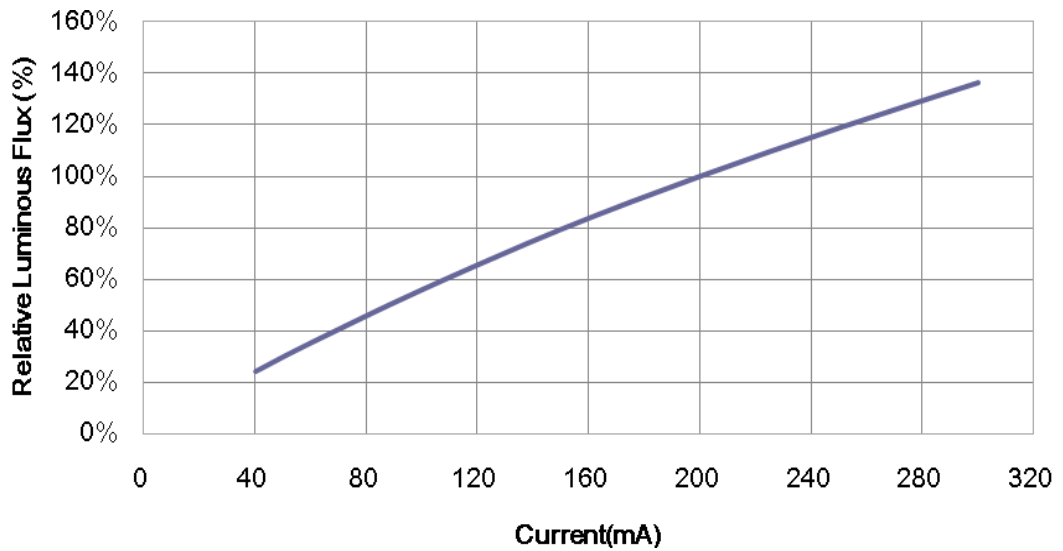
Current (mA)	V <sub>F</sub> (V)	Lumen (lm)		
		2700K	3000K	4000K
160	8.4	209	217	230
240	8.4	304	316	335
400	8.7	479	499	529
600	9.0	679	708	750
800	9.2	854	890	943
1000	9.4	1015	1058	1121
1200	9.6	1164	1213	1285



# LIGHT LED M13 CoB Product Series

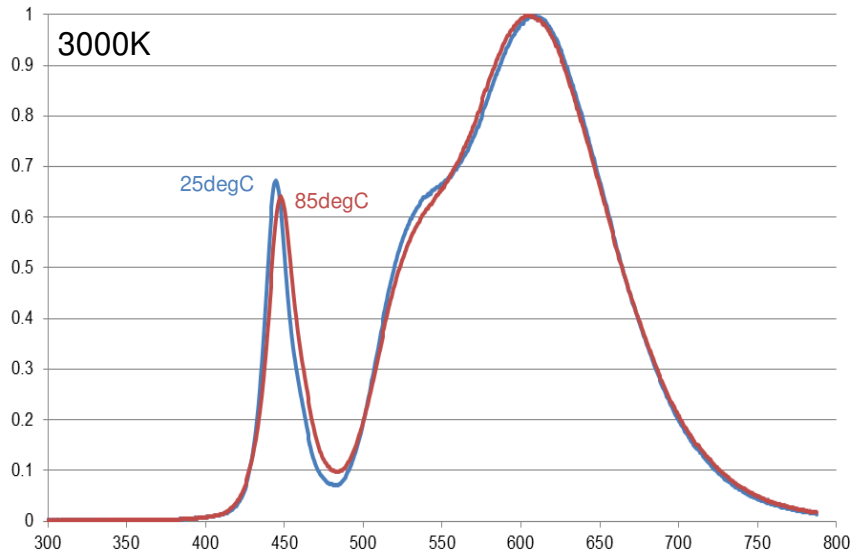
■ 10 Series Product - 37V

Current (mA)	V <sub>F</sub> (V)	Lumen (lm)		
		2700K	3000K	4000K
40	33.5	209	217	230
60	33.8	304	316	335
100	34.8	479	499	529
150	35.8	679	708	750
200	36.8	854	890	943
250	37.6	1015	1058	1121
300	38.4	1164	1213	1285

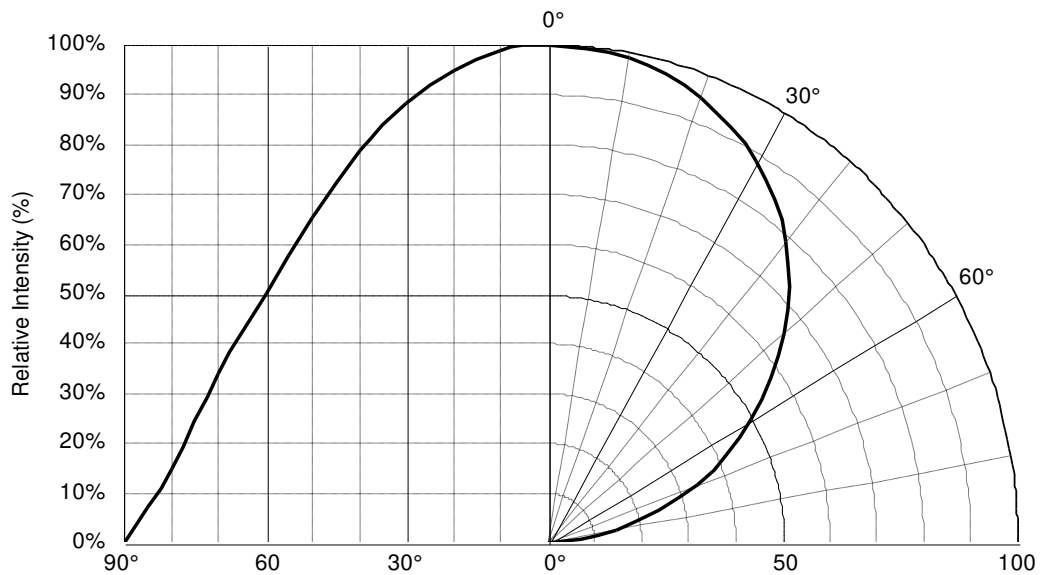


**LIGHT LED  
M13 CoB Product Series**

**4.3 Relative Spectral Power Distribution at Typical Current**

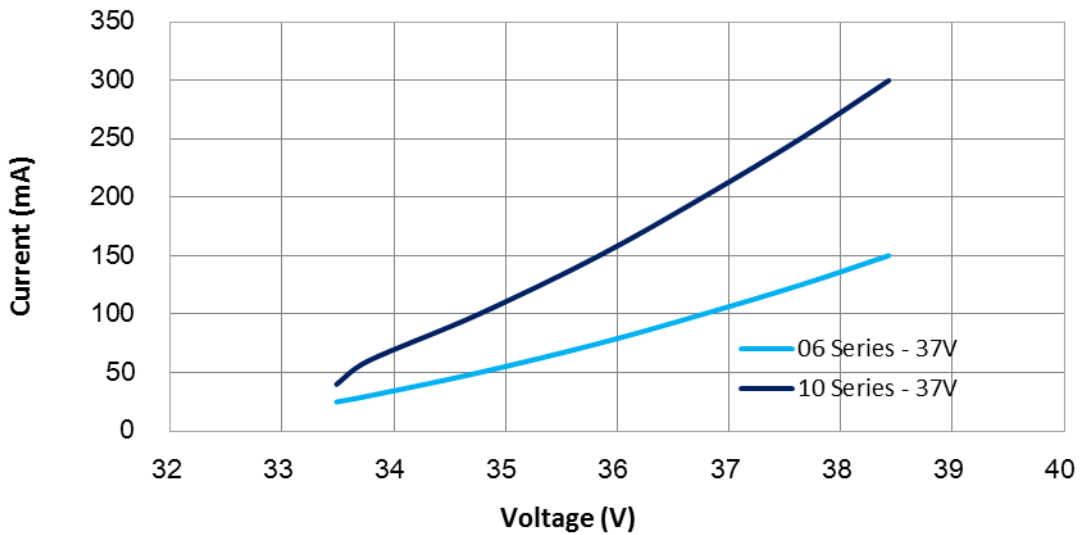
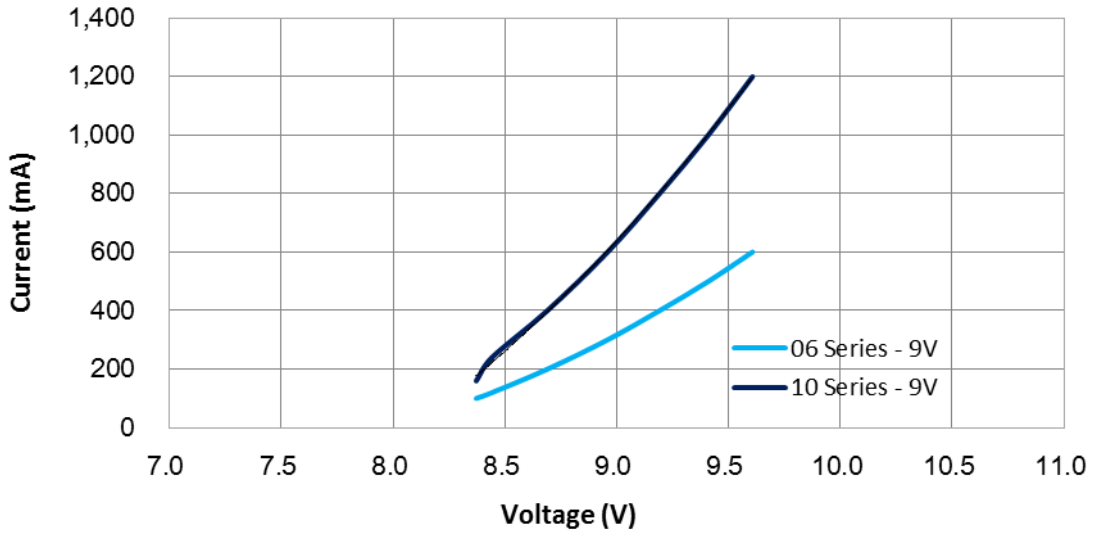


**4.4 Radiation Characteristics**



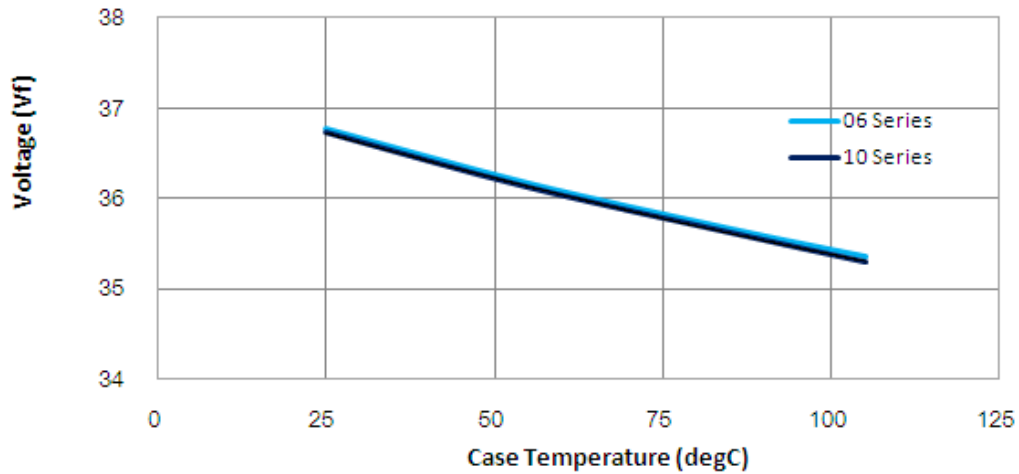
# LIGHT LED M13 CoB Product Series

## 4.5 Forward Current vs. Forward Voltage

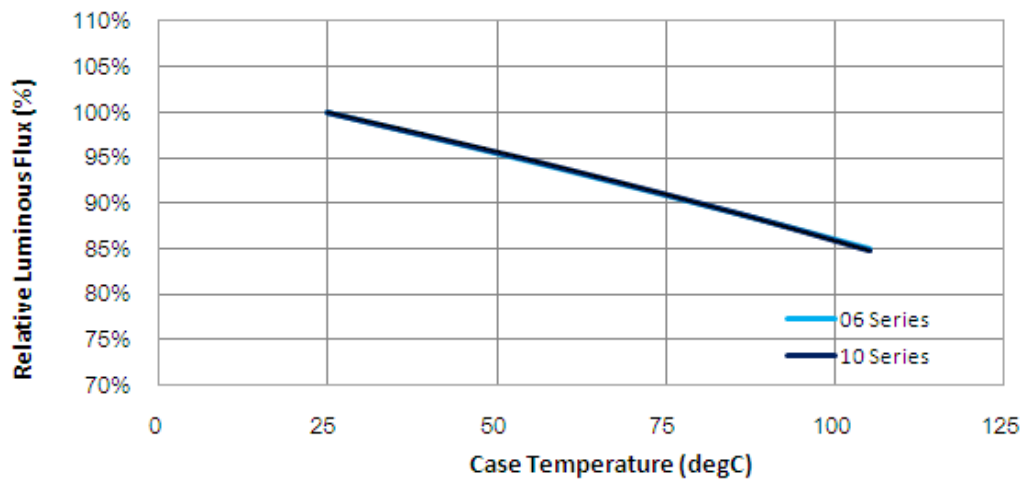


# LIGHT LED M13 CoB Product Series

## 4.6 Forward Voltage vs. Case Temperature

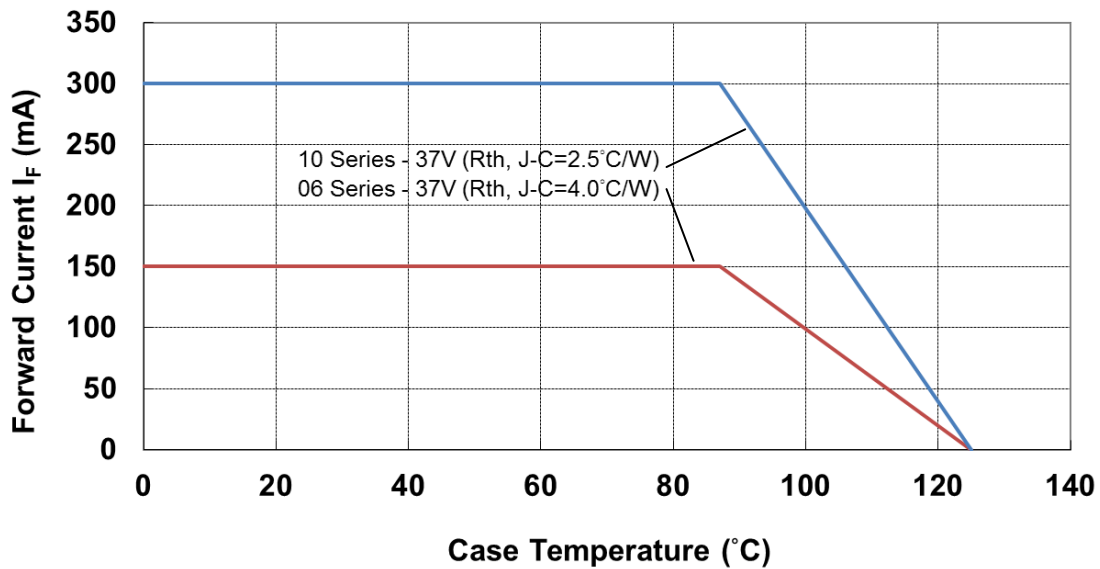
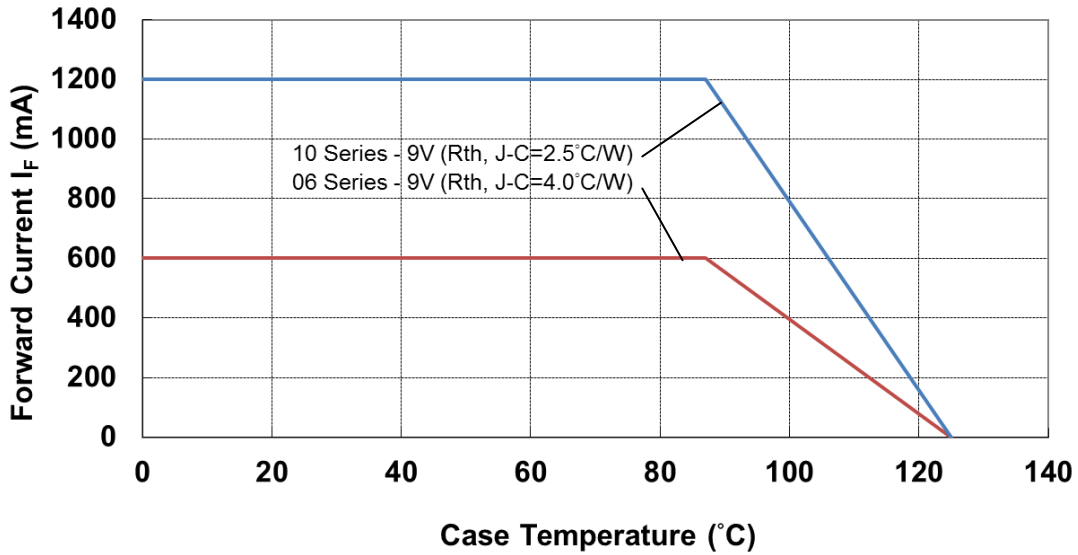


## 4.7 Relative Intensity vs. Case Temperature



# LIGHT LED M13 CoB Product Series

## 4.8 Forward Current Degrading Curve



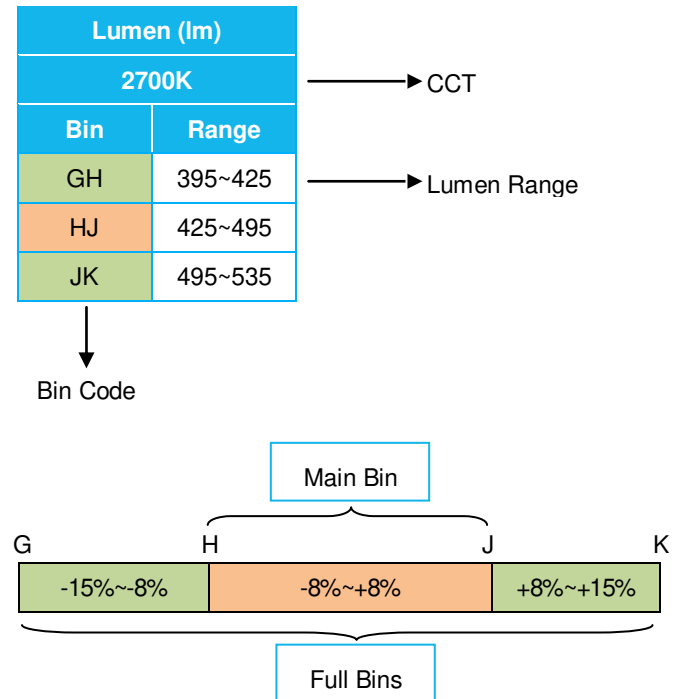
## LIGHT LED M13 CoB Product Series

### 5. CoB Binning Definition

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

Lumen <b>CODE</b> List of M13 Series Product			
Parameter	Code	Unit	Lumen
Luminous Flux	G	lm	395
	H		425
	I		460
	J		495
	K		535
	L		580
	M		625
	N		675
	O		730
	P		790
	Q		850
	R		920
	S		990
	T		1070
	U		1155

#### ■ Example of M137 Series Product Bin (2700K 06 series)



## LIGHT LED M13 CoB Product Series

### 06 Series Lumen Bin - 9V and 37V

Lumen (lm)					
2700K		3000K		4000K	
Bin	Range	Bin	Range	Bin	Range
GH	395~425	GH	395~425	HI	425~460
HJ	425~495	HJ	425~495	IK	460~535
JK	495~535	JK	495~535	KL	535~580

### 10 Series Lumen Bin - 9V and 37V

Lumen (lm)					
2700K		3000K		4000K	
Bin	Range	Bin	Range	Bin	Range
OP	730~790	OP	730~790	PQ	790~850
PR	790~920	PR	790~920	QS	850~990
RS	920~990	RS	920~990	ST	990~1070

### Forward Voltage Binning Parameter (25degC)

#### 06 and 10 series products (9V)

Parameter	Bin	Symbol	Min	Max	Unit	Condition
Forward Voltage	V1	VF	8	10	V	$I_F$ = Typical Current

#### 06 and 10 series products (37V)

Parameter	Bin	Symbol	Min	Max	Unit	Condition
Forward Voltage	V1	VF	33	42	V	$I_F$ = Typical Current

### Note: Full Rank on Label

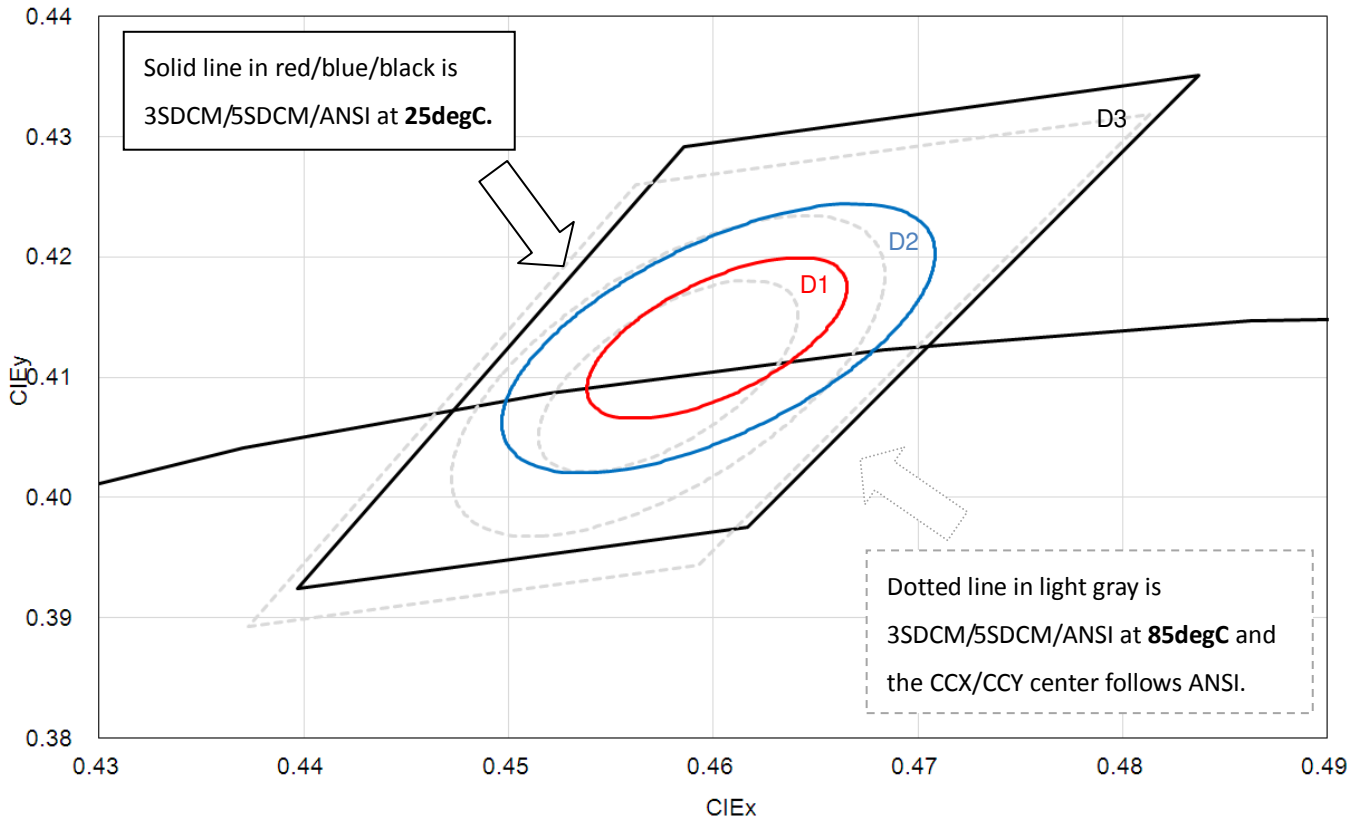
Example: V1/HJ/D1

Forward Voltage Rank	Luminous Flux Rank	Color Rank
V1	HJ	D1



# LIGHT LED M13 CoB Product Series

■ Example of LiteOn CoB MacAdam Ellipse Color Definition (EX: 2700K)



CIE Center Point						
CCT	25degC (LiteOn Spec.)		85degC (ANSI)		Hot/Cold Factor	
	CCX	CCY	CCX	CCY	CCX	CCY
2700	0.4602	0.4133	0.4578	0.4101	-0.0024	-0.0032
3000	0.4352	0.4090	0.4338	0.4030	-0.0014	-0.0060
4000	0.3841	0.3872	0.3818	0.3797	-0.0023	-0.0075

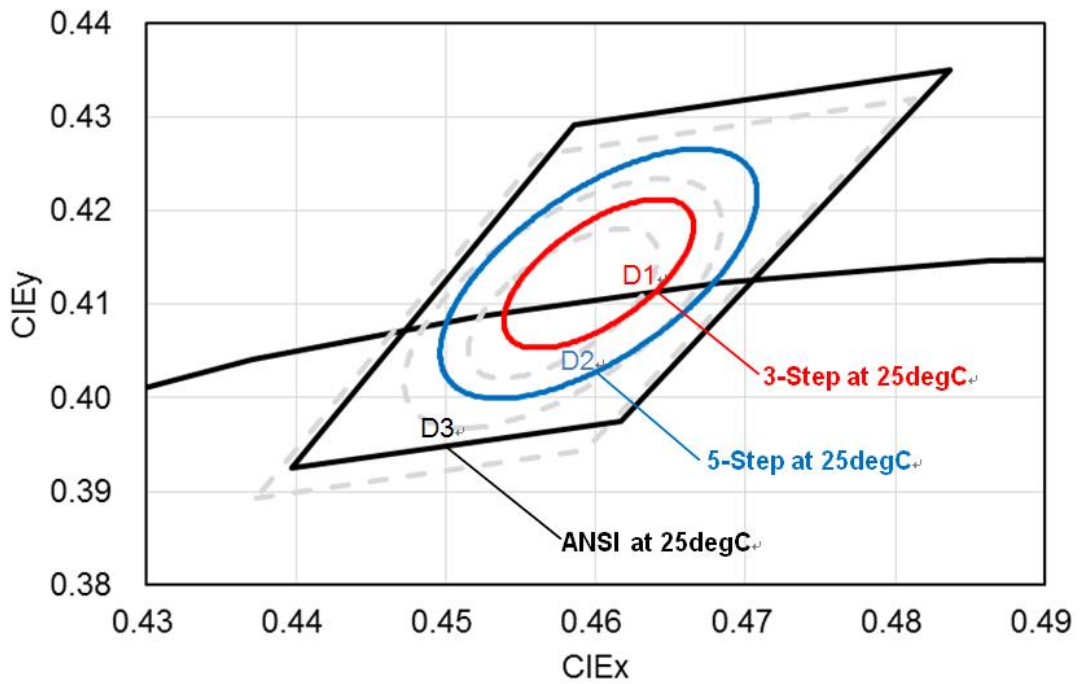
**Notes**

1. LiteOn tester and shipping spec follow the color bin with 25degC CCX/CCY center.
2. The Hot/Cold factor means the CCX/CCY shift from 25degC to 85degC.
3. The Hot/Cold shift is measured by LiteOn CAS 140B instrument system.
4. 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 M13 CoB Product Series

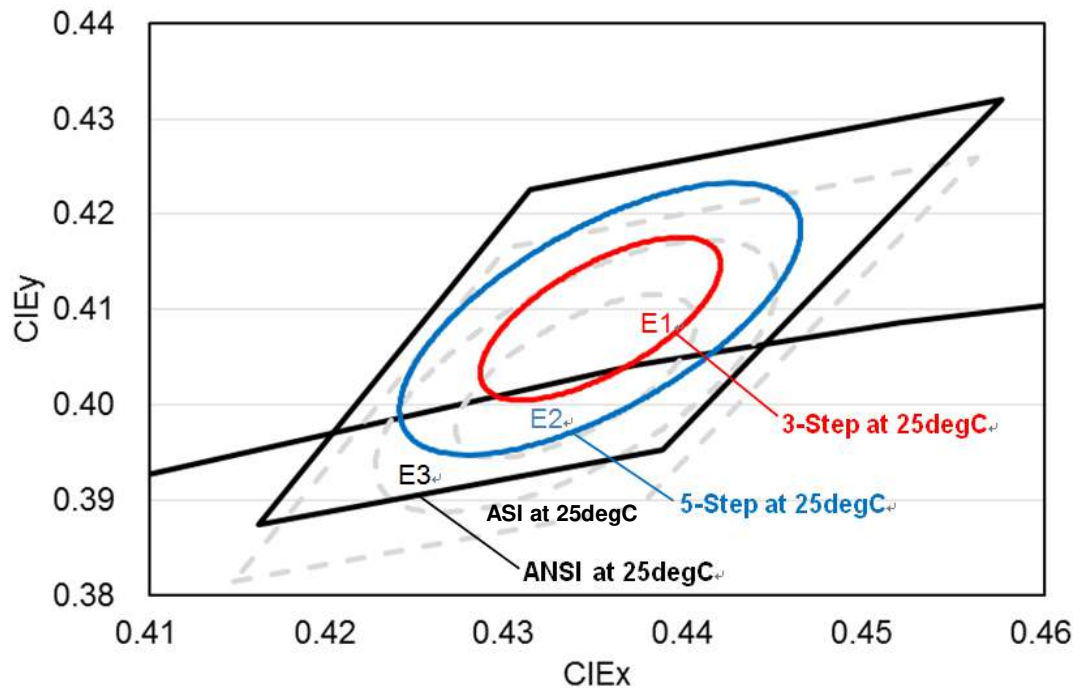
■ M13 CRI80 2700K

PN: LTPL-M137XXZS27-T0 and LTPL-M137XXZS27-T2



■ M13 CRI80 3000K

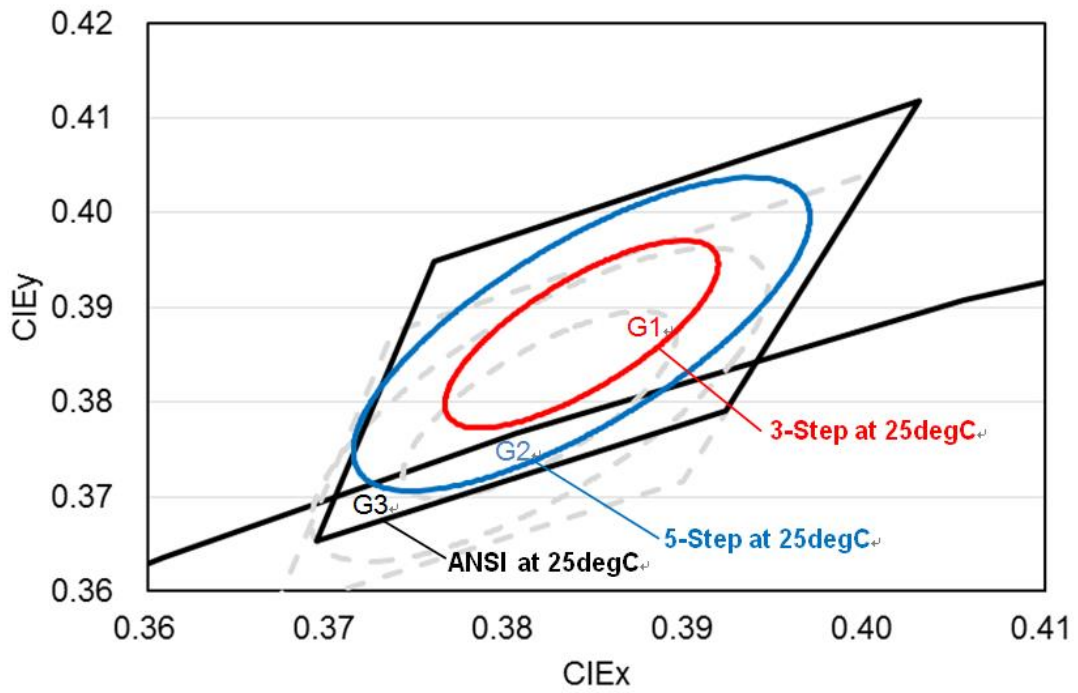
PN: LTPL-M137XXZS30-T0 and LTPL-M137XXZS30-T2



# LIGHT LED M13 CoB Product Series

■ M13 CRI80 4000K

PN: LTPL-M137XXZS40-T0 and LTPL-M137XXZS40-T2



## LIGHT LED M13 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

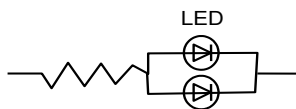
**Notes:** 1.Operating life tests are mounted on thermal heat sink  
2..Storage items are only component, not put on heat sink.



# LIGHT LED M13 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>, NO<sub>x</sub>, 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.