LITEON®
OPTOELECTRONICS

Specific Lighting

Product Data Sheet

M13 CoB Product Series

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RELEASE

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SPECIFIC LIGHTING
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

L	T	PL	-	M	1	3	7	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
M13: Ceramic substrate with 13.35x13.35mm square

Code 3: Light Emitting Surface
7: 6.3mm excluding dam

Code 4: Product Series
12: 12 Series

Code5: Color Temperature
27: 2700K at 85degC
30: 3000K at 85degC
40: 4000K at 85degC
50: 5000K 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
F1: 37V, 5000K MacAdam Ellipse / ANSI Bin

SPECIFIC LIGHTING
M13 CoB Product Series

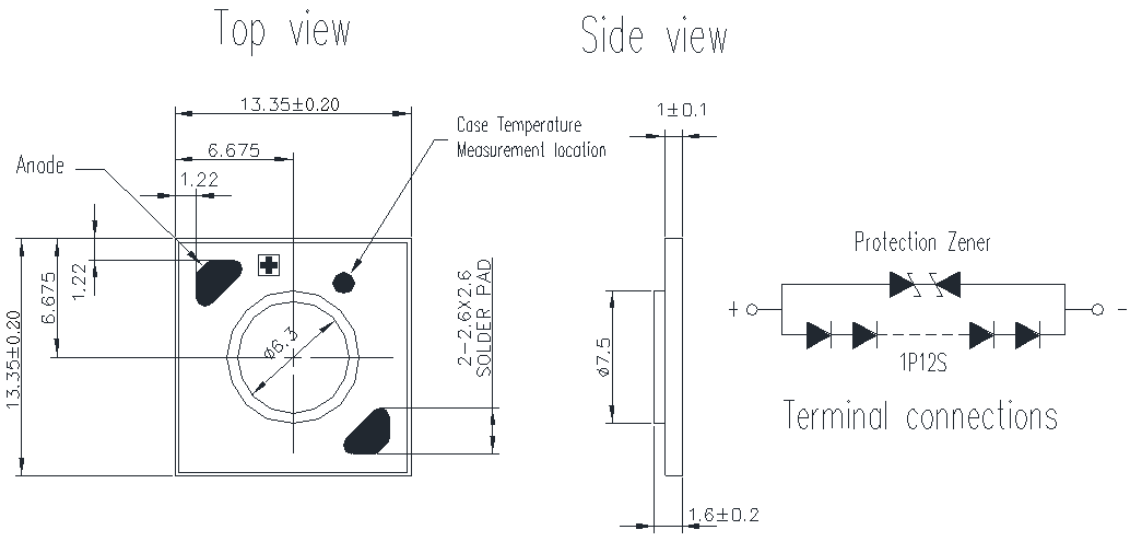
1.4 Product List

Part Number	Product Series	VF Type	CCT	CRI	Color Bin			Lumen Bin	
					3SDCM	5SDCM	ANSI	-8%~+8%	-15%~+25%
LTPL-M13712ZS27-T0	12	37V	2700K	80	☆	☆	☆	☆	☆
LTPL-M13712ZS30-T0	12	37V	3000K	80	☆	☆	☆	☆	☆
LTPL-M13712ZS40-T0	12	37V	4000K	80	☆	☆	☆	☆	☆
LTPL-M13712ZS50-F1	12	37V	5000K	80	-	☆	☆	☆	☆

2. Outline Dimensions

2.1 Form Factor of M137 series CoB

■ 12 Series



Notes

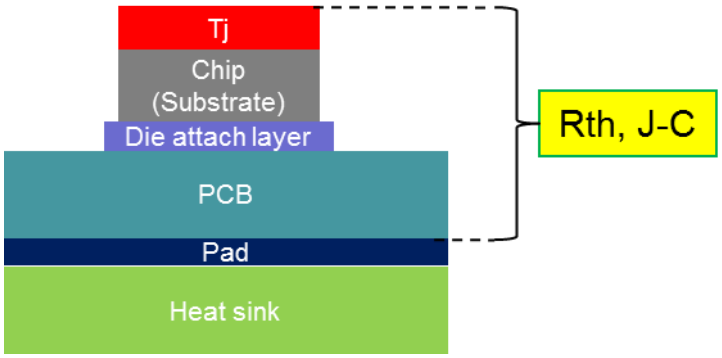
1. All dimensions are in millimeters.
2. Tolerance is ±0.3mm unless otherwise noted.
3. LED of equivalent circuit means all series/parallel in CoB package

3. Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Rating	Unit
Power Dissipation	P_O	12.0	W
Forward Current	I_F	300	mA
Junction Temperature	T_j	125	°C
Thermal Resistance, Junction-Case	$R_{th,\ J\text{-}C}$	2.5	°C/W
Operating Temperature Range	T_{opr}	-40 to 85	°C
Storage Temperature Range	T_{stg}	-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 Rth is °C/W electrical.
5. The M13 CoB is recommended soldering temperature under 350degC and could not over 3.5sec.



4. Electro-Optical Characteristics

4.1 Typical Performance

■ 12 Series Product

Dominant CCT	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	200	36.8	930	35.7	828	126	116
3000K	200	36.8	969	35.7	862	132	121
4000K	200	36.8	1027	35.7	914	139	128
5000K	200	36.8	1037	35.7	922	141	129

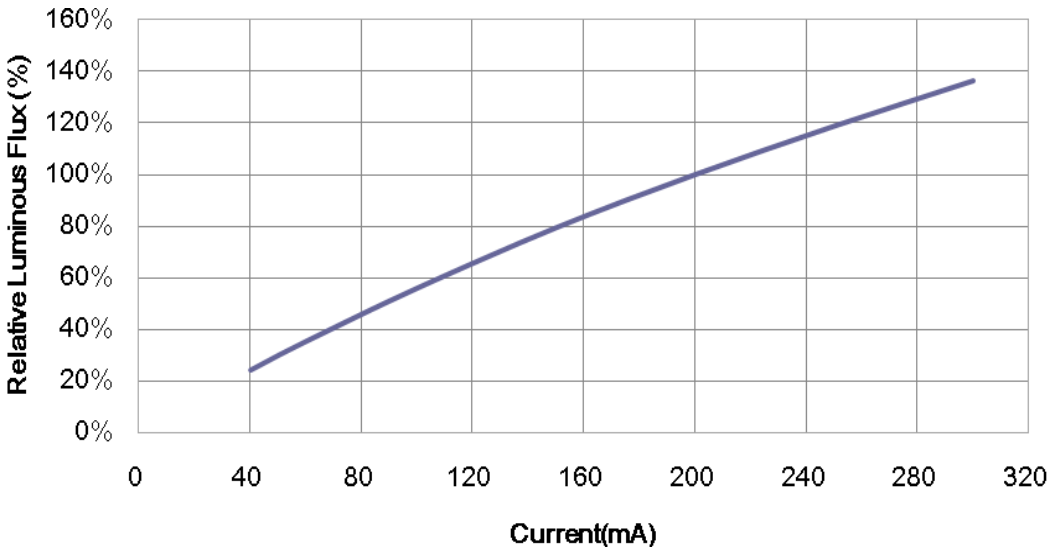
Notes

1. All of V_F value are typical, the real bin range please refer page 19 ” V_F 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_F is ±3%.
4. Typical viewing angle is 120deg.

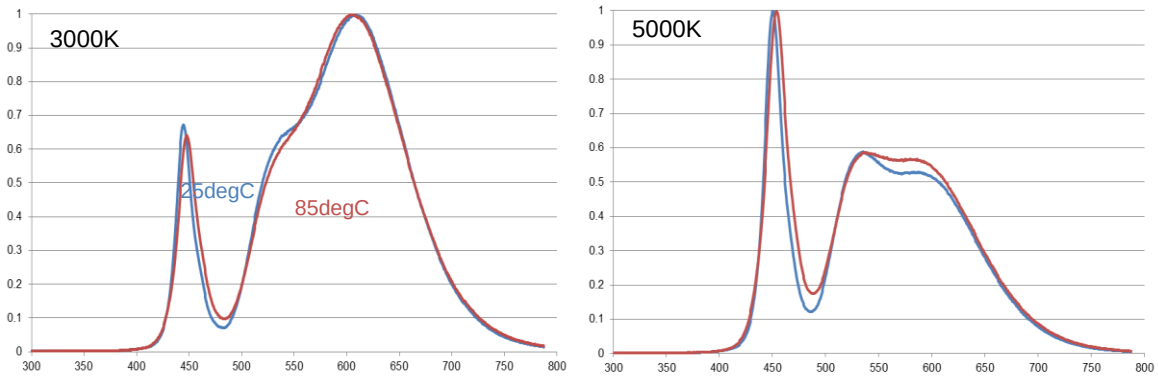
4.2 Forward Current vs. Lumen Voltage

■ 12 Series Product

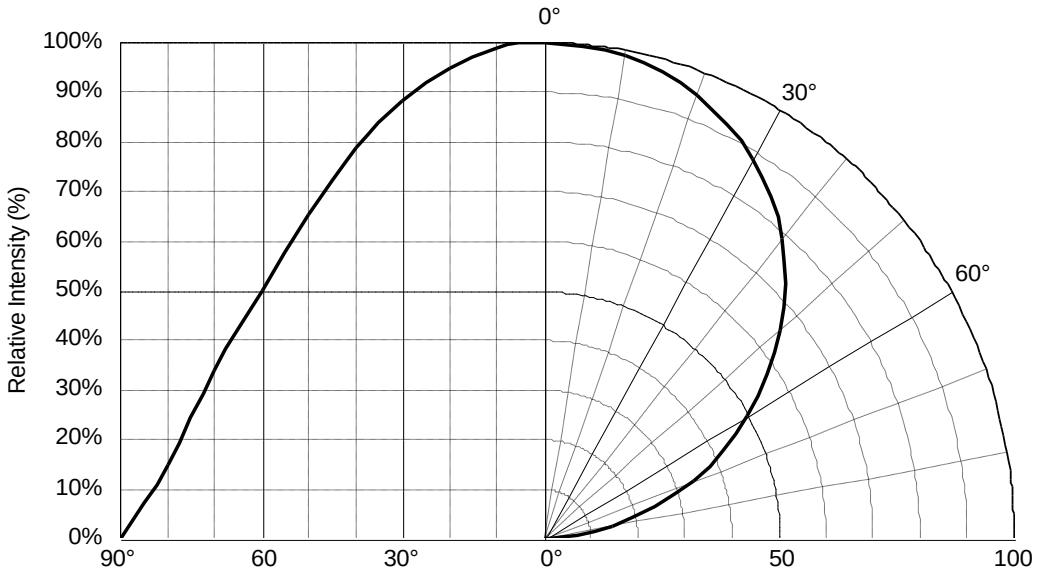
Current (mA)	V_F (V)	Lumen (lm)			
		2700K	3000K	4000K	5000K
40	33.5	219	228	242	244
60	33.8	319	332	352	355
100	34.8	503	524	555	561
150	35.8	713	743	788	795
200	36.8	897	935	990	1000
250	37.6	1066	1111	1177	1189
300	38.4	1222	1274	1349	1362



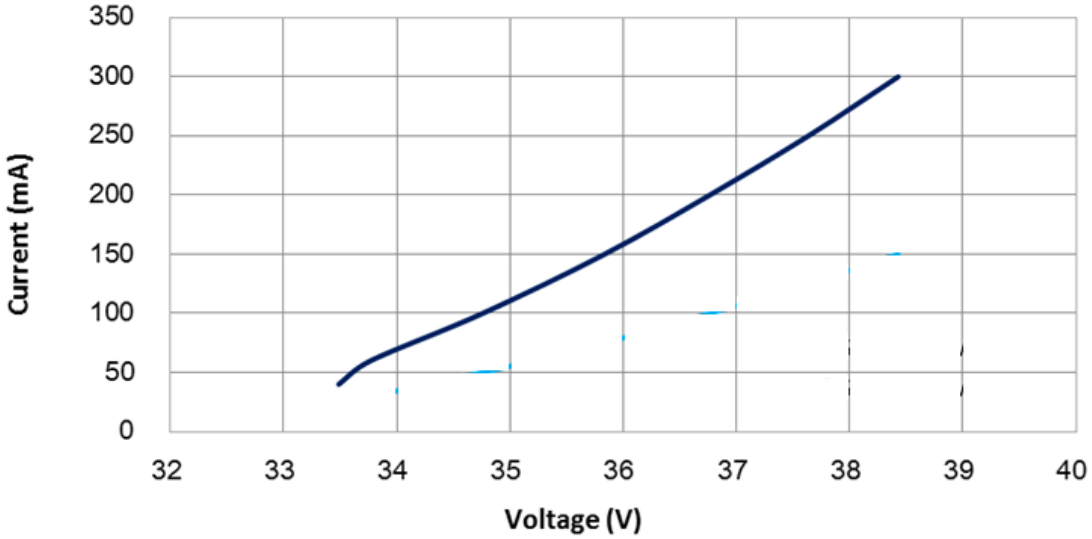
4.3 Relative Spectral Power Distribution at Typical Current



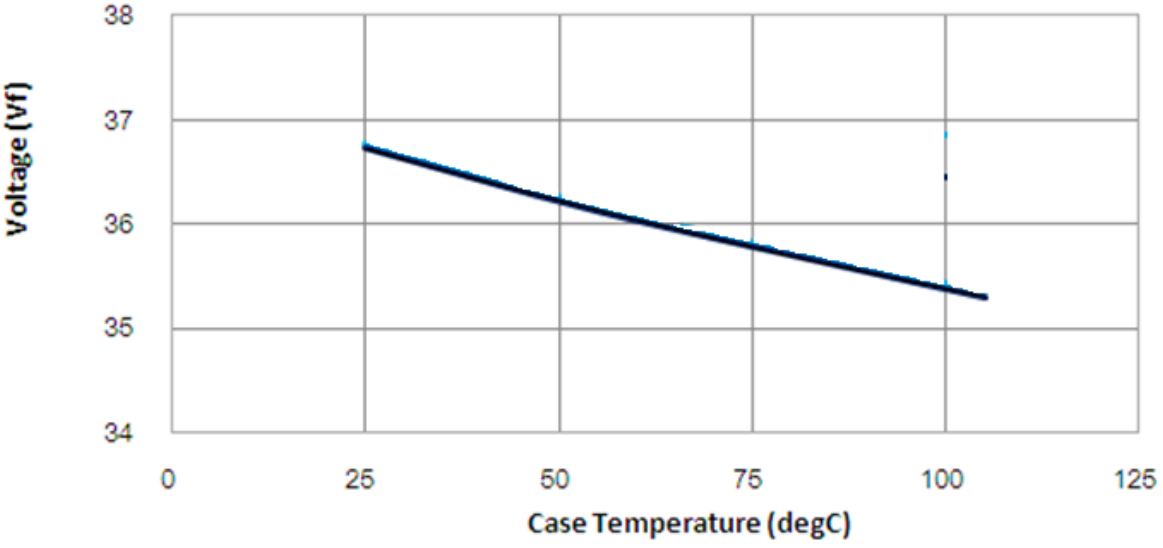
4.4 Radiation Characteristics



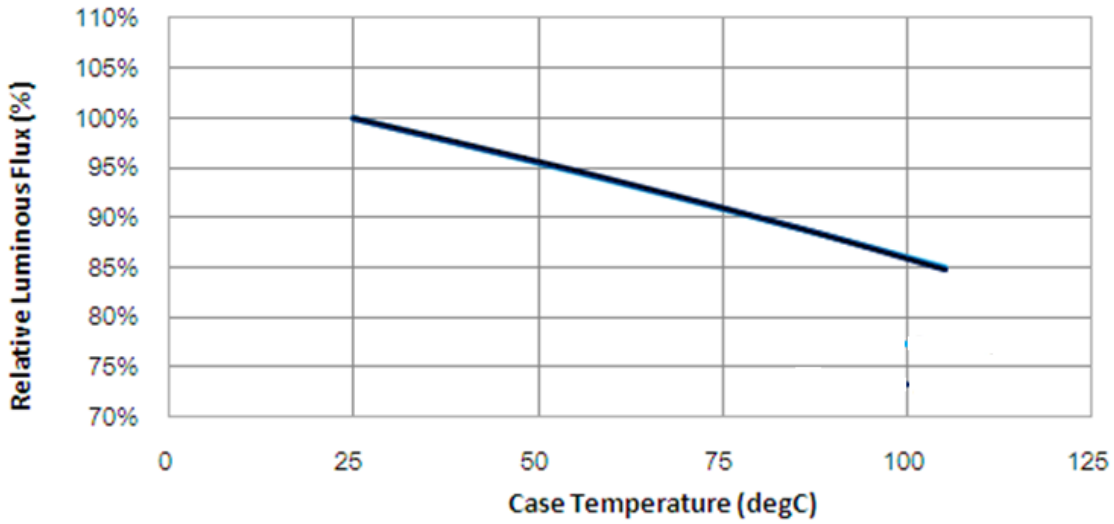
4.5 Forward Current vs. Forward Voltage



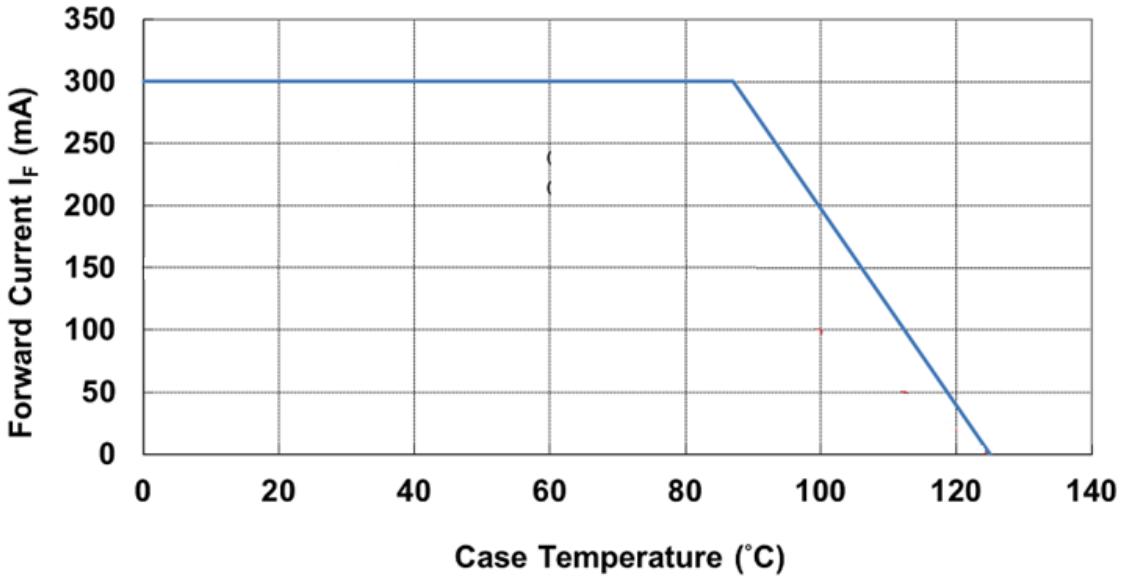
4.6 Forward Voltage vs. Case Temperature



4.7 Relative Intensity vs. Case Temperature



4.8 Forward Current Degrading Curve



5. CoB Binning Definition

■ Flux Binning Parameter (25degC)

Lumen CODE 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

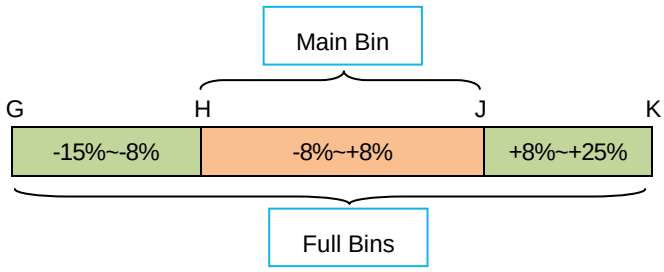
■ Example of M137 Series Product Bin

Lumen (lm)	
2700K	
Bin	**Range**
OP	730~790
PR	790~920
RT	920~1070

CCT

Lumen Range

Bin Code



■ 12 Series Lumen Bin

Lumen (lm)							
2700K		3000K		4000K		5000K	
Bin	Range	Bin	Range	Bin	Range	Bin	Range
OP	730~790	OP	730~790	PQ	790~850	PQ	790~850
PQ	790~850	PQ	790~850	QR	850~920	QR	850~920
QR	850~920	QR	850~920	RS	920~990	RS	920~990
RS	920~990	RT	920~990	ST	990~1070	ST	990~1070
ST	990~1070	ST	990~1070	TU	1070~1155	TU	1070~1155

■ Forward Voltage Binning Parameter (25degC)

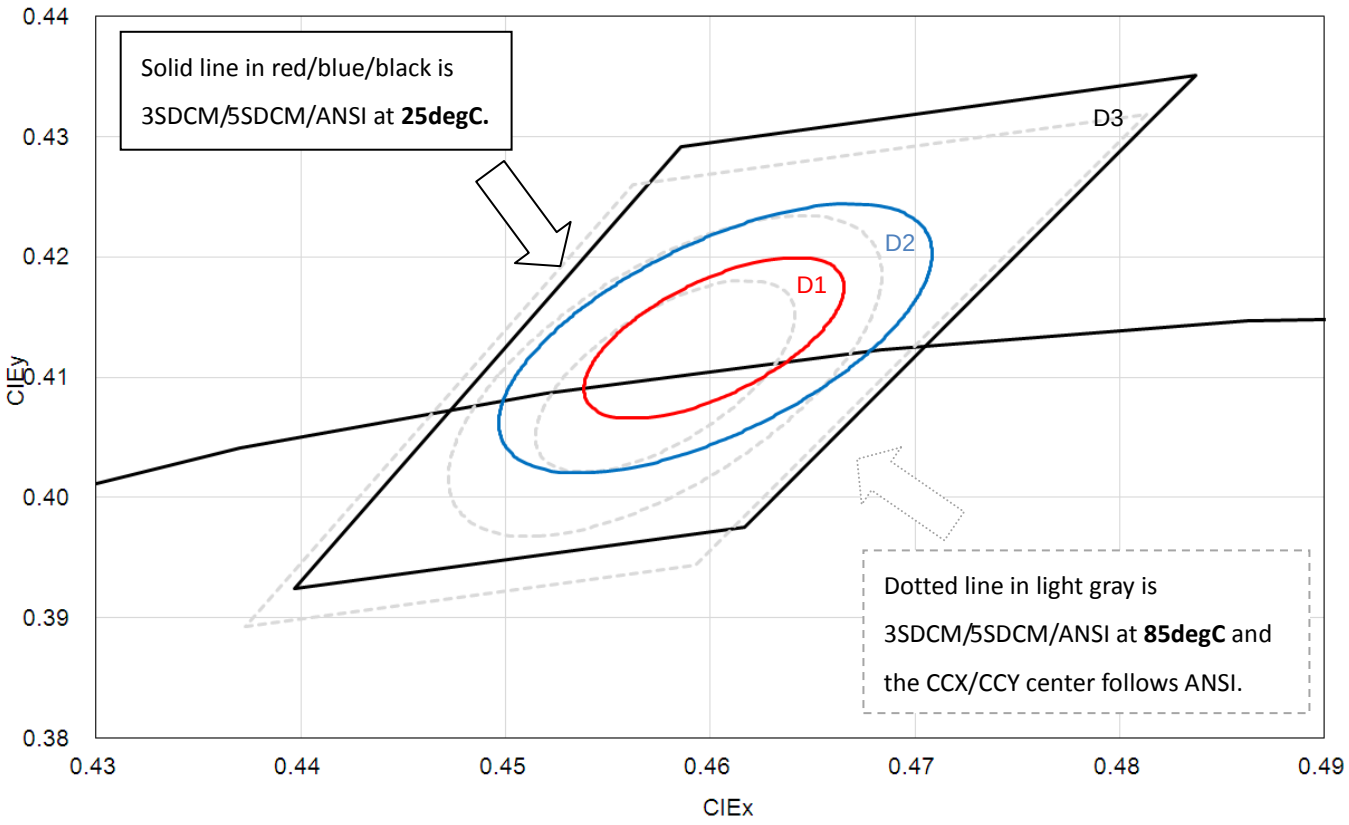
Parameter	Bin	Symbol	Min	Max	Unit	Condition
Forward Voltage	V1	VF	33	39	V	IF =Typical Current

Note: Full Rank on Label

Example: V1/HJ/D1

Forward Voltage Rank	Luminous Flux Rank	Color Rank
V1	OP	D1

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



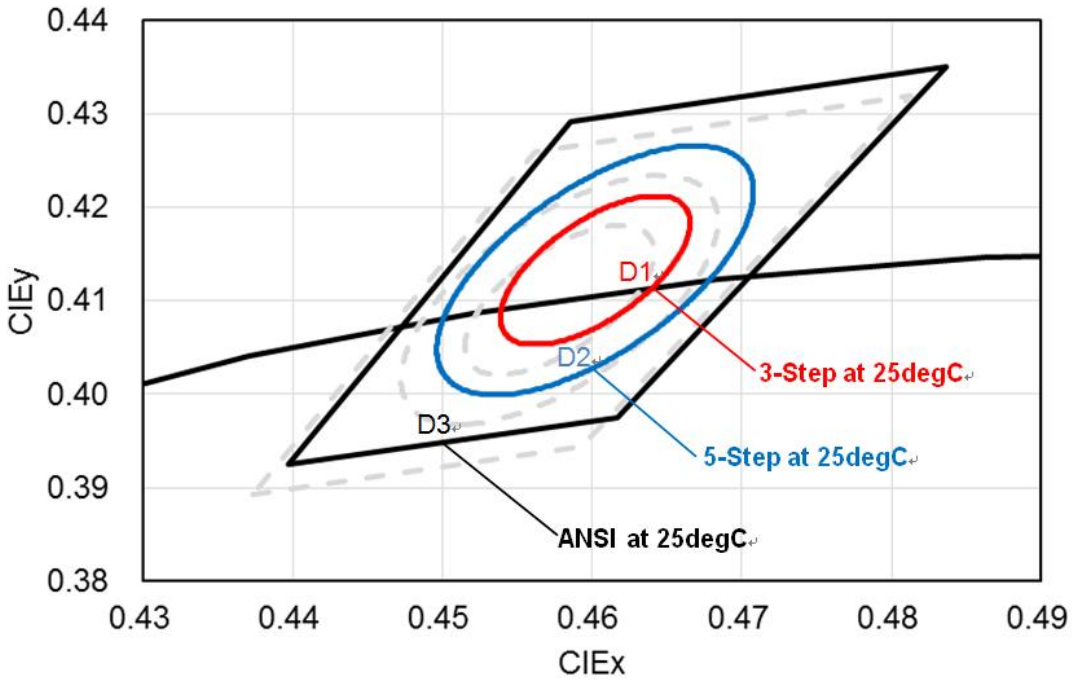
CIE Center Point						
CCT	25degC (LiteOn Spec.)		85degC (ANSI)		Hot/Cold Factor	
	CCX	CCY	CCX	CCY	CCX	CCY
2700	0.4602	0.4133	0.4578	0.4101	-0.0024	-0.0032
3000	0.4352	0.4090	0.4338	0.4030	-0.0014	-0.0060
4000	0.3841	0.3872	0.3818	0.3797	-0.0023	-0.0075
5000	0.3485	0.3655	0.3447	0.3553	-0.0038	-0.0102

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

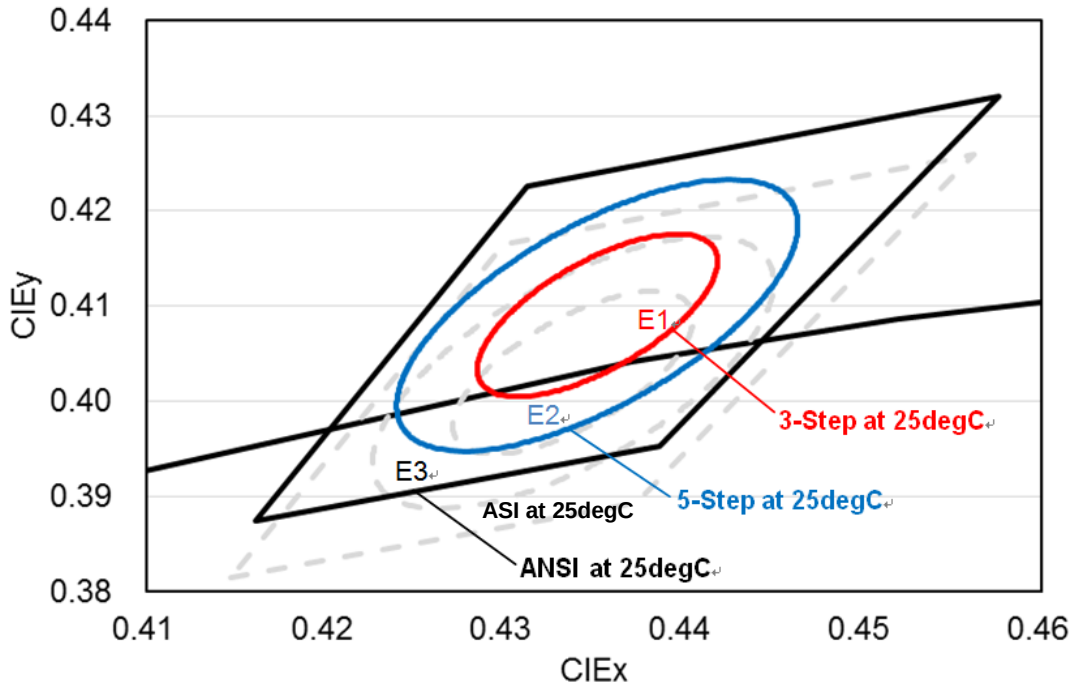
■ M13 CRI80 2700K

PN: LTPL-M13712ZS27-T0



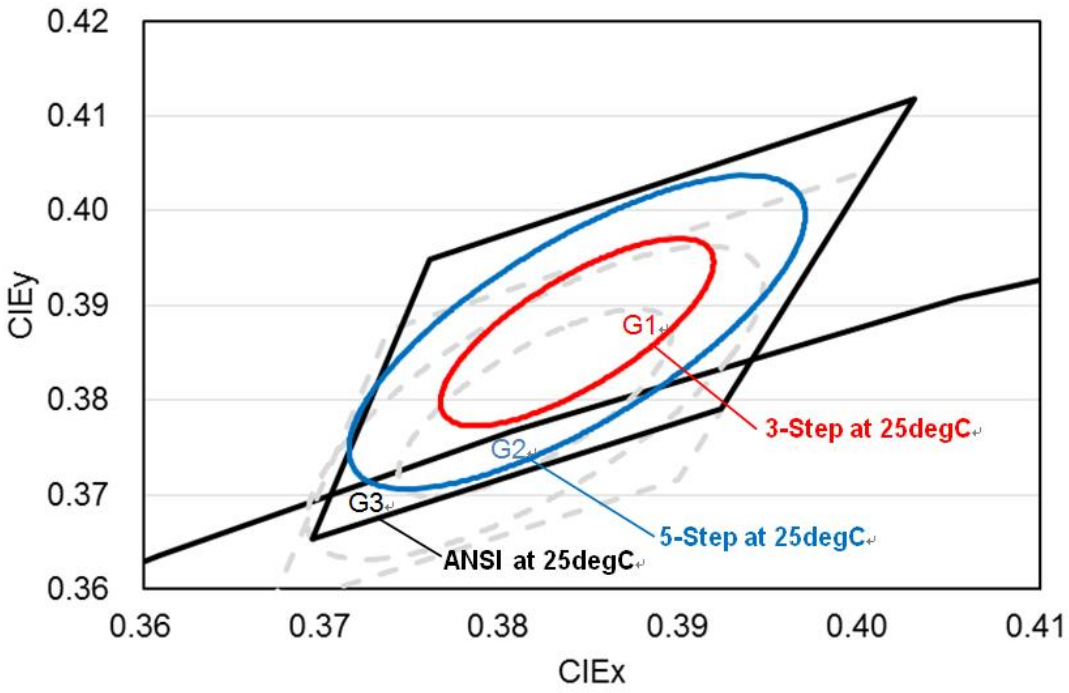
■ M13 CRI80 3000K

PN: LTPL-M13712ZS30-T0



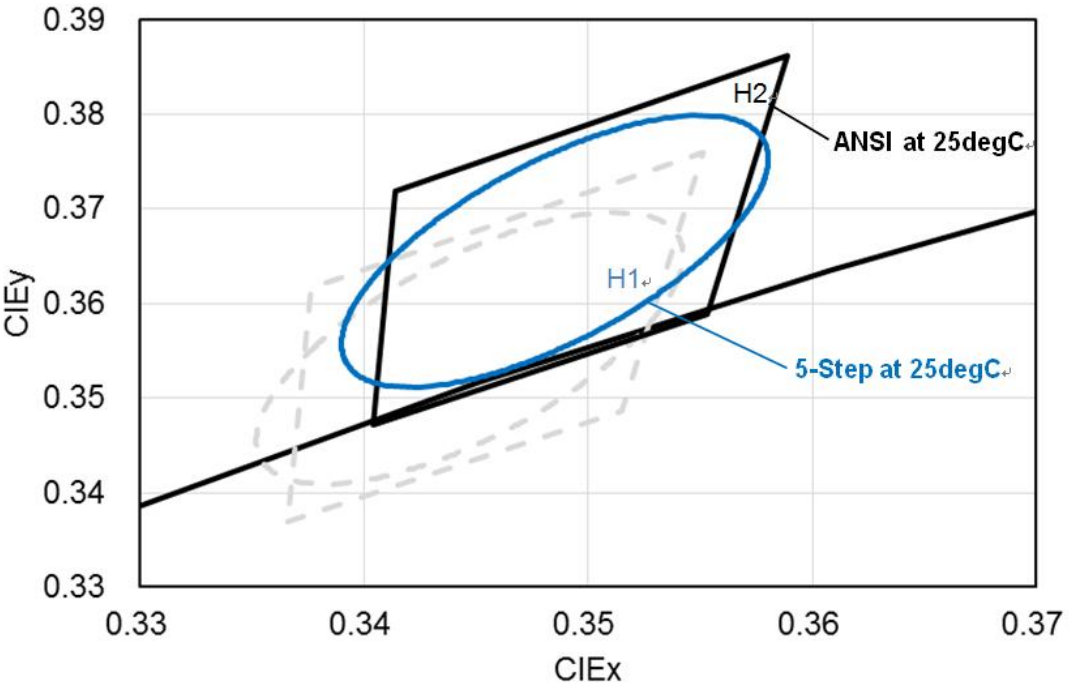
■ M13 CRI80 4000K

PN: LTPL-M13712ZS40-T0



■ M13 CRI80 5000K

PN: LTPL-M13712ZS50-F1



6. Reliability Test Plan

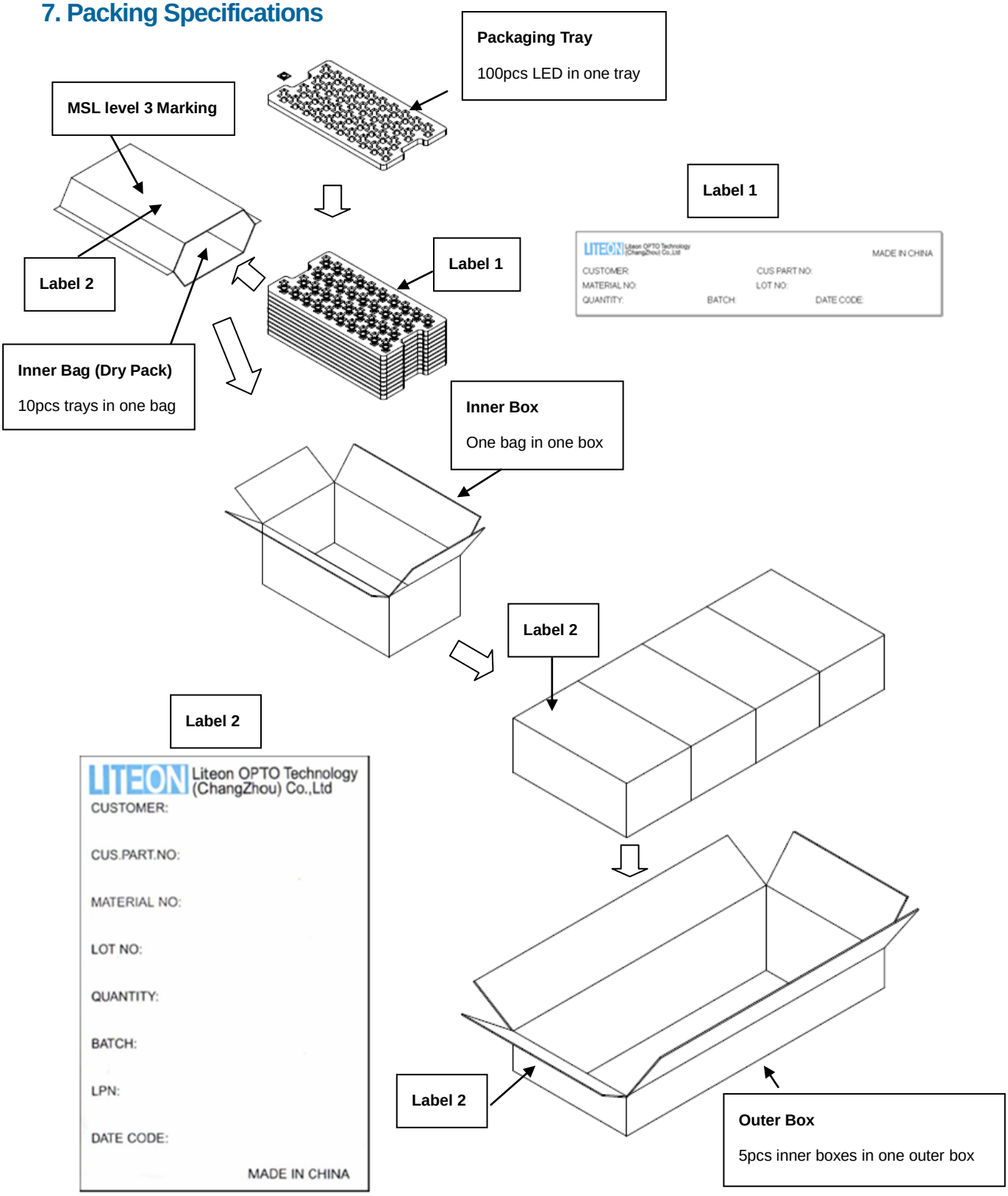
No	Test item	Condition	Duration	Number of Failed	Result
1	High Temperature Operating Life	Tc=85°C, I_F =Typical Current	1K hours	0/10	Pass
2	Wet High Temperature Operating Life	60°C/90%RH, I_F =Typical Current(DC) 30 mins ON/OFF	1K hours	0/10	Pass
3	Thermal Shock	-40°C to 125°C, 15minutes dwell, <10 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˚C+/-5˚C), measurement in every 5000 cycles	40K cycles	0/10	Pass
5	High Temperature Storage Life	Ta=120°C	1K hours	0/10	Pass
6	Low Temperature Storage Life	Ta=-55°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

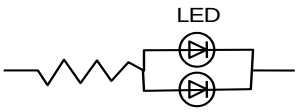
Notes: 1.Operating life tests are mounted on thermal heat sink
2..Storage items are only component, not put on heat sink.

7. Packing Specifications



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.