Product Family Data Sheet

LC013B – COB(Chip on Board) LED

Introduction

Features

- 13W COB LED : 17.0 x 17.0 x t 1.9 (mm)
- InGaN/GaN MQW LED with long-time reliability
- Lead (Pd) free product - RoHS compliant

Applications

- Spot / Downlighting
- LED Retrofit Bulbs
- Outdoor illumination
- Other applications

SAMSUNG ELECTRONICS
95, Samsung2-Ro, Giheung-Gu,
Yongin-City, Gyeonggi-Do 446-711, KOREA

Contents

1. Absolute Maximum Rating

1) Operation Forward Current (T_a = 25°C) 660mA
2) LED Junction Temperature (T_J) ..... 150°C
3) Operating Temperature Range (T_{opr}) ..... -40°C ~ 105°C
4) Storage Temperature Range (T_{stg}) ..... -40°C ~ 120°C
5) Power Dissipation (P_D) 25W

2. Characteristics

1) Electro-Optical characteristics (T_a : 25°C)

Item	Unit	Condition	Rank			Min	Typ	Max
Luminous Flux[1]	lm[2]	I_F = 360 mA	2700K	1F	13	1300	-	1400
					14	1400	-	1500
					15	1500	–	1600
					16	1600	–	1700
			3000K	1F	13	1350	-	1450
					14	1450	-	1560
					15	1560	–	1670
					16	1670	–	1780
			3500K	1F	14	1400	–	1510
					15	1510	–	1620
					16	1620	–	1730
					17	1730	–	1840
			4000K	1F	15	1430	-	1540
					16	1540	-	1660
					17	1660	–	1780
					18	1780	–	1900
			5000K	1F	15	1430	-	1560
					16	1560	-	1680
					17	1680	–	1800
					18	1800	–	1920
Forward Voltage	V[3]	I_F = 360 mA	YH			32.5	35.5	38.5
CRI[4]		I_F = 360 mA	-			80	-	-
Thermal Resistance ($R_{th,j-c}$)	℃/W	–	–				1.6	
View Angle	°	I_F = 360 mA	-			-	115°	-

Note :

1) Samsung LED tested in pulsed condition. T_J=25°C, pulse width is 10ms at rated test current.
2) Samsung LED has ±7% tolerance of flux measurements.
3) Samsung LED has ±5% tolerance of forward voltage measurements.
4) Samsung LED has ±1 tolerance of CRI measurements.

3. Binning Structure

(Condition : I_F = 360 mA, T_a : 25°C)

1) VF Binning

CCT	Product Code	VF Rank	VF (V)		
			Min	Typ	Max
2700K	SPHWW1HDNA25**YH**W31F	YH	32.5	35.5	38.5
3000K	SPHWW1HDNA25**YH**V31F	YH	32.5	35.5	38.5
3500K	SPHWW1HDNA25**YH**U31F	YH	32.5	35.5	38.5
4000K	SPHWW1HDNA25**YH**T31F	YH	32.5	35.5	38.5
5000K	SPHCW1HDNA25**YH**RT1F	YH	32.5	35.5	38.5

2) Color Binning

CCT	Product Code	Color Rank	Chromaticity Bins
2700K	SPHWW1HDNA25YH**W3**1F	W3	WA
3000K	SPHWW1HDNA25YH**V3**1F	V3	VA
3500K	SPHWW1HDNA25YH**U3**1F	U3	UA
4000K	SPHWW1HDNA25YH**T3**1F	T3	TA
5000K	SPHCW1HDNA25YH**RT**1F	RT	RW, RX, RY, RZ

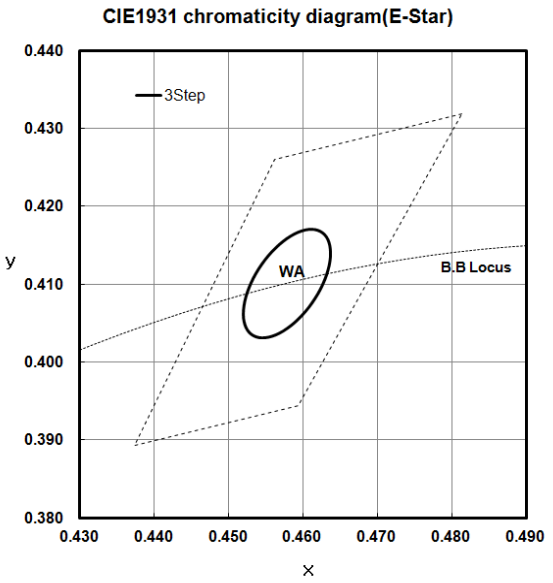
3) Luminous Flux Binning

CCT	Product Code	Flux Rank	Flux Bin	Range (lm)		
				Min	Typ	Max
2700K	SPHWW1HDNA25YHW3**1F**	1F	13	1300	-	1400
			14	1400	-	1500
			15	1500	-	1600
			16	1600	-	1700
3000K	SPHWW1HDNA25YHV3**1F**	1F	13	1350	-	1450
			14	1450	-	1560
			15	1560	-	1670
			16	1670	-	1780
3500K	SPHWW1HDNA25YHU3**1F**	1F	14	1400	-	1510
			15	1510	-	1620
			16	1620	-	1730
			17	1730	-	1840
4000K	SPHWW1HDNA25YHT3**1F**	1F	15	1430	-	1540
			16	1540	-	1660
			17	1660	-	1780
			18	1780	-	1900
5000K	SPHCW1HDNA25YHRT**1F**	1F	15	1430	-	1560
			16	1560	-	1680
			17	1680	-	1800
			18	1800	-	1920

4. Chromaticity Coordinates

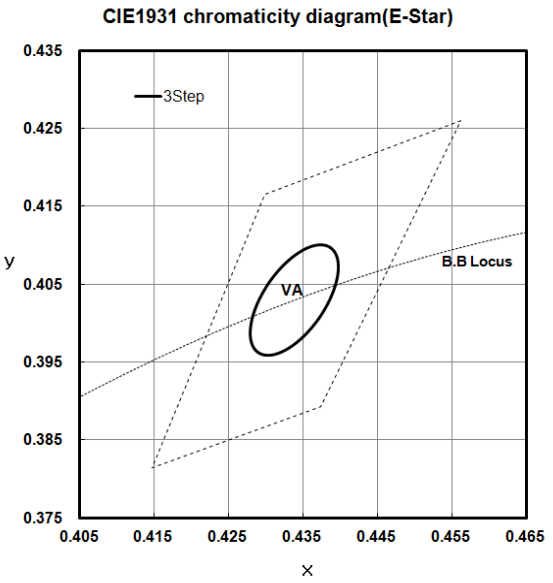
(Condition : I_F = 360 mA, T_a : 25°C)

1) 2700K



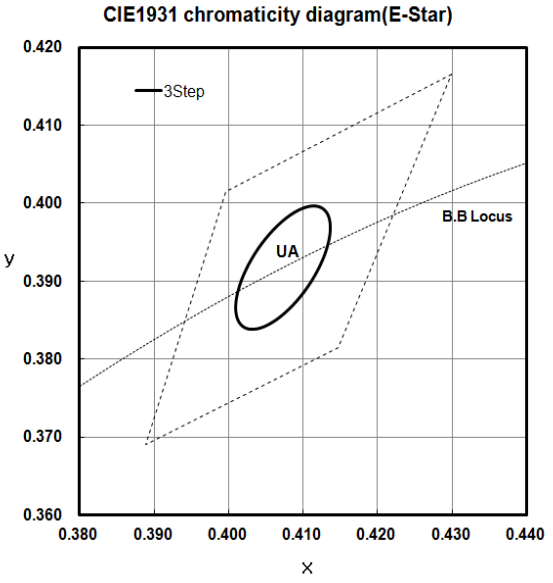
Macadam Ellipse 3step (WA)				
x	y	θ	a	b
0.4578	0.4101	53.7	0.0081	0.0042

2) 3000K



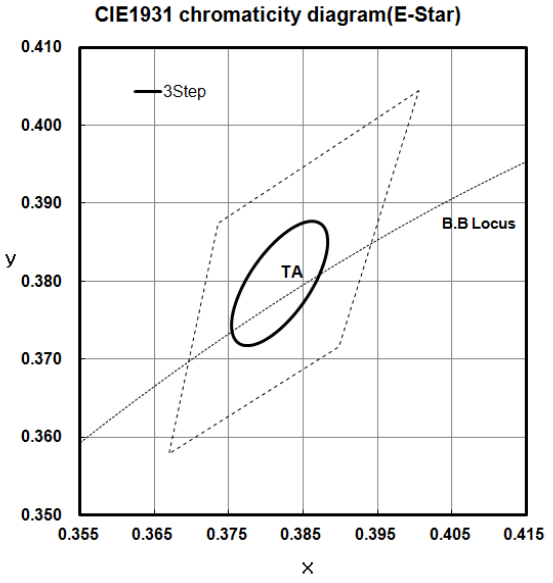
Macadam Ellipse 3step (VA)				
x	y	θ	a	b
0.4338	0.4030	53.22	0.0083	0.0041

3) 3500K



Macadam Ellipse 3step (UA)				
x	y	θ	a	b
0.4037	0.3917	54.0	0.0093	0.0041

4) 4000K



Macadam Ellipse 3step (TA)				
x	y	θ	a	b
0.3818	0.3797	53.72	0.0094	0.0040

5) 5000K

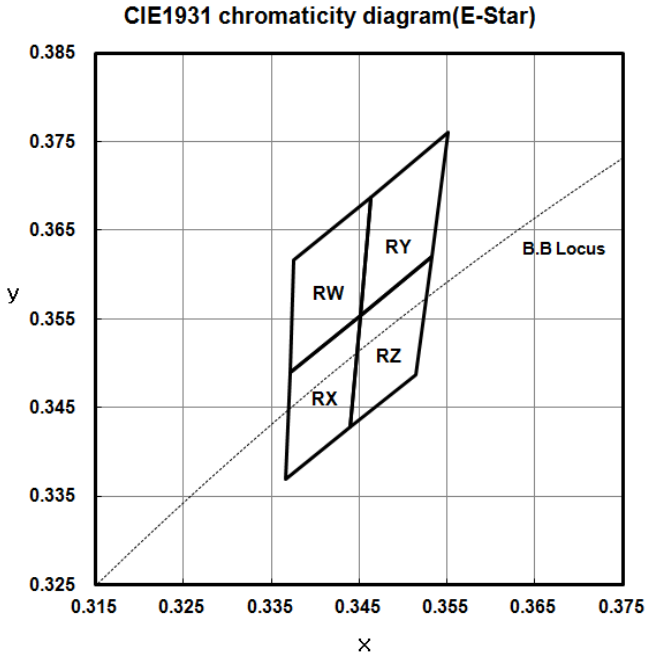


Table	CIE X	CIE Y
RW	0.3376	0.3616
	0.3463	0.3687
	0.3451	0.3554
	0.3371	0.3490
RX	0.3371	0.3490
	0.3451	0.3554
	0.3440	0.3428
	0.3366	0.3369
RY	0.3463	0.3687
	0.3551	0.3760
	0.3533	0.3620
	0.3451	0.3554
RZ	0.3451	0.3554
	0.3533	0.3620
	0.3515	0.3487
	0.3440	0.3428

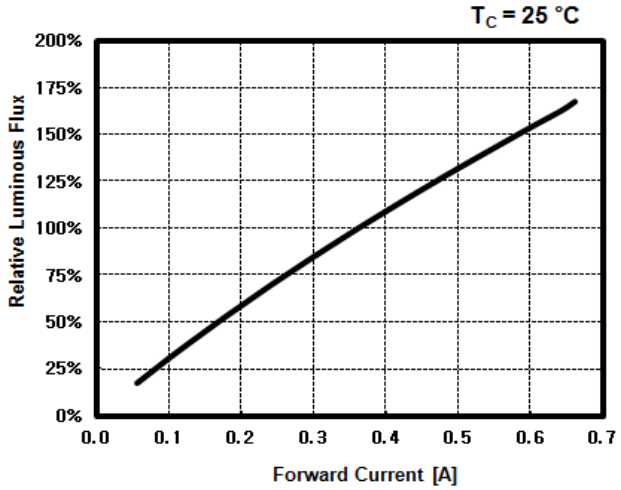
Note :

1) The Chromaticity Coordinates refers to ANSI C78.377-2008
2) Samsung LED has ±0.005 tolerance of chromaticity(x,y).

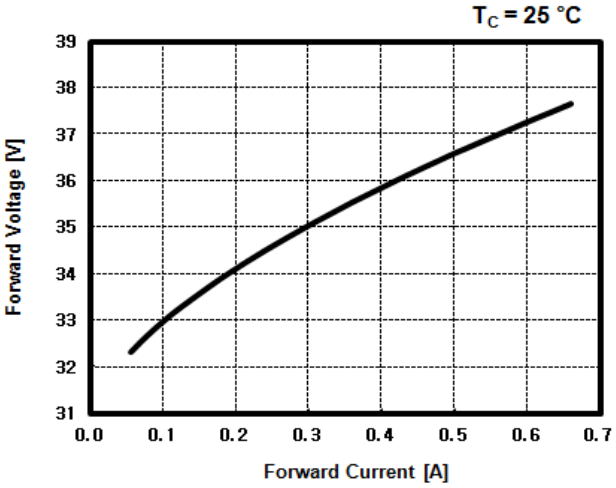
5. Typical Characteristics Graph

*** These graphs show typical values. (Ta : 25°C)**

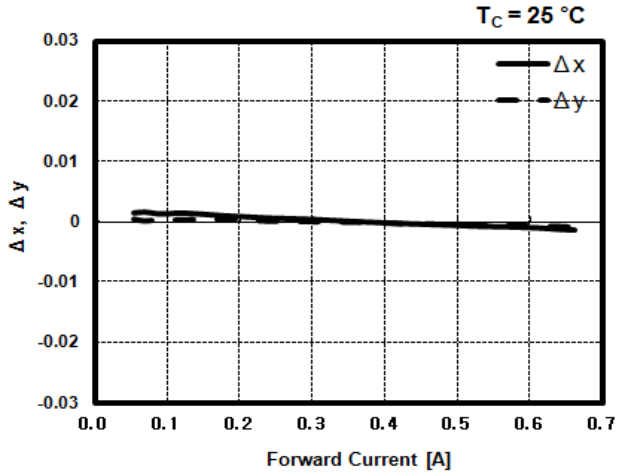
Forward Current vs. Relative Luminous Flux



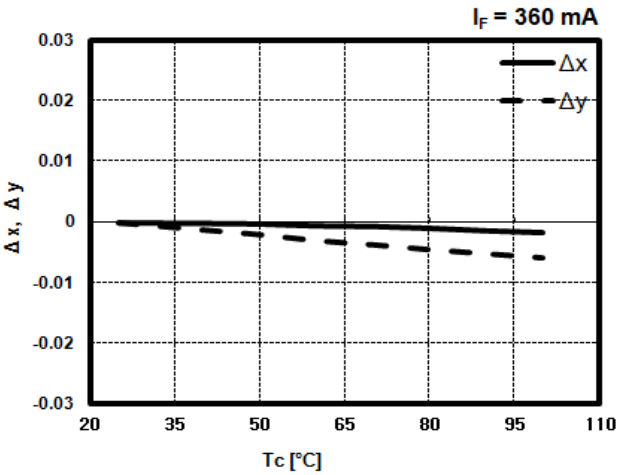
Forward Current vs. Forward Voltage



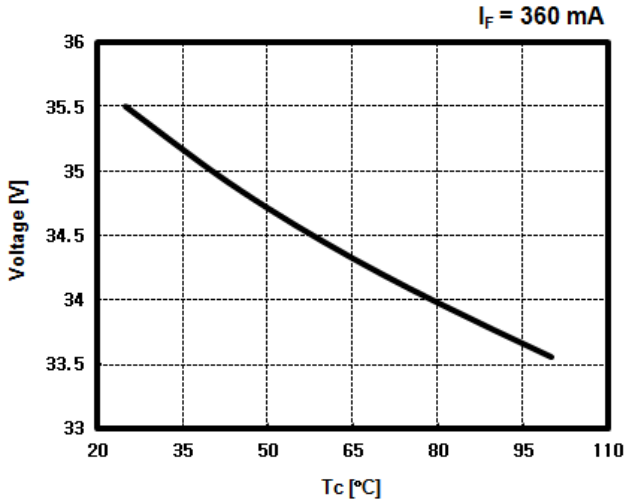
Forward current vs. Chromaticity Coordination



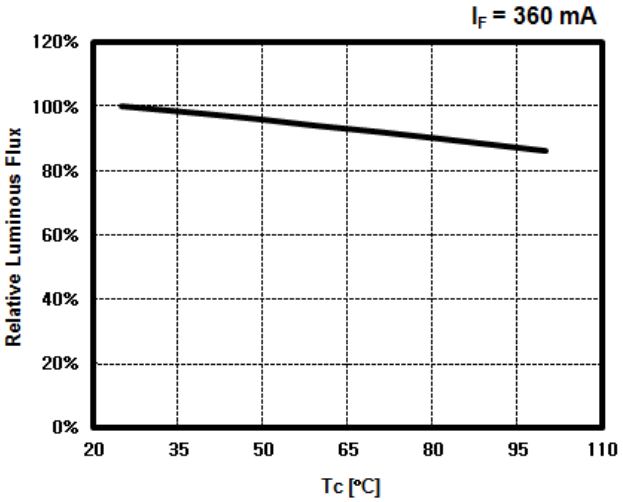
Temperature vs. Chromaticity Coordination



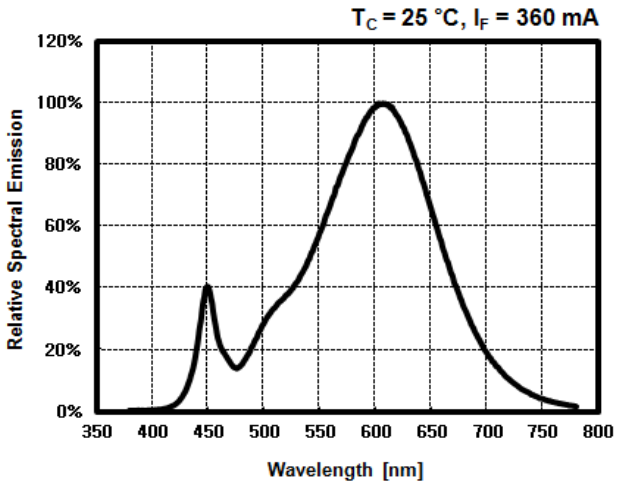
Temperature vs. Voltage



Temperature vs. Relative Luminous Flux



Relative Spectral Emission



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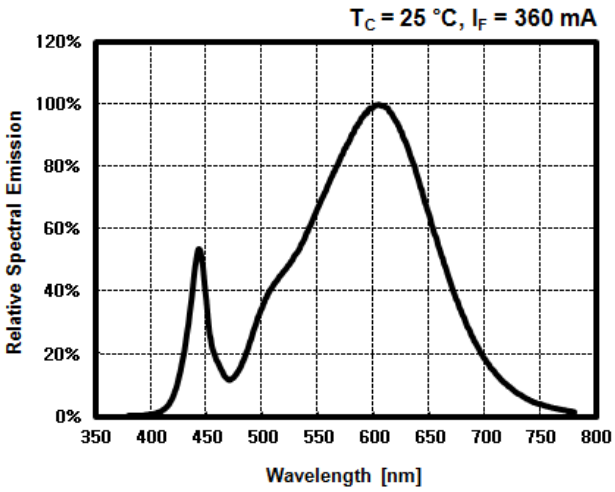

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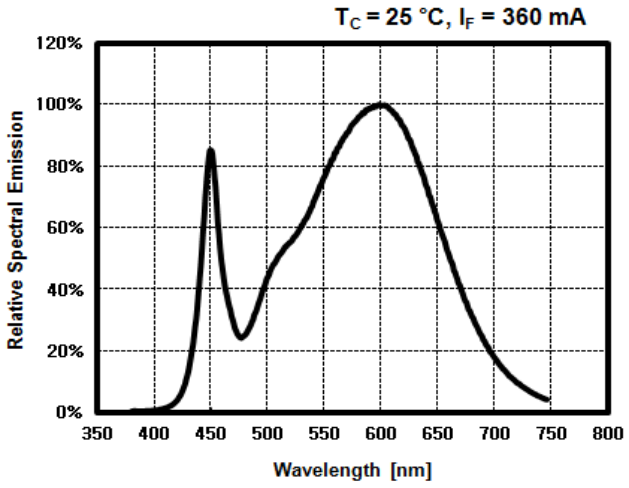

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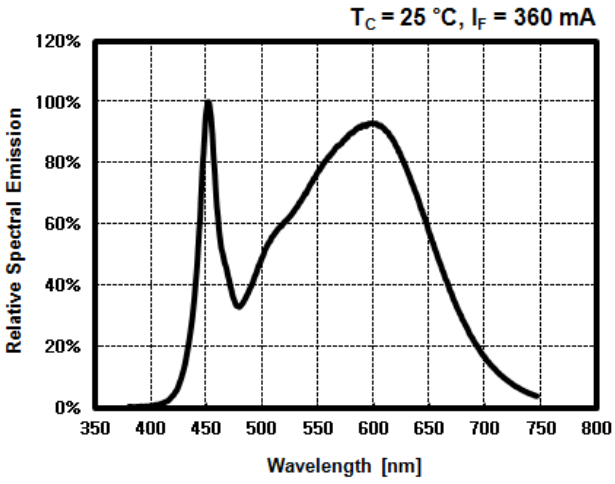

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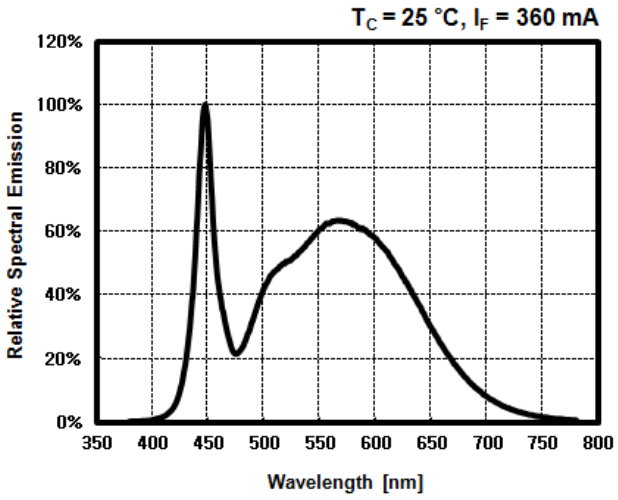
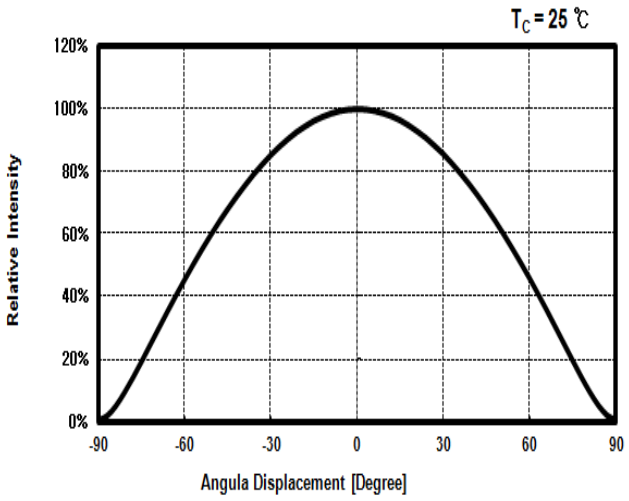
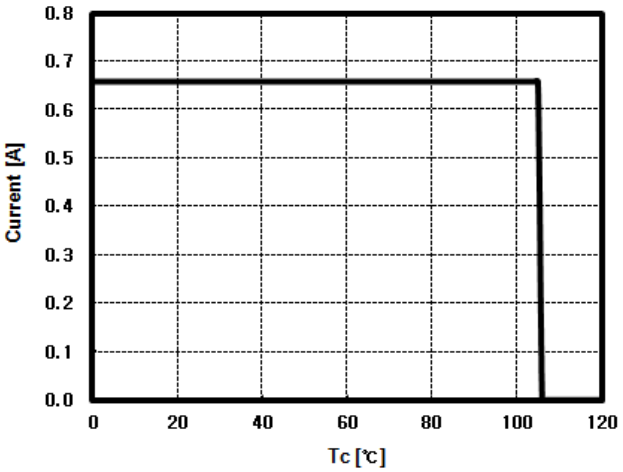


<5000K>

Radiation Pattern



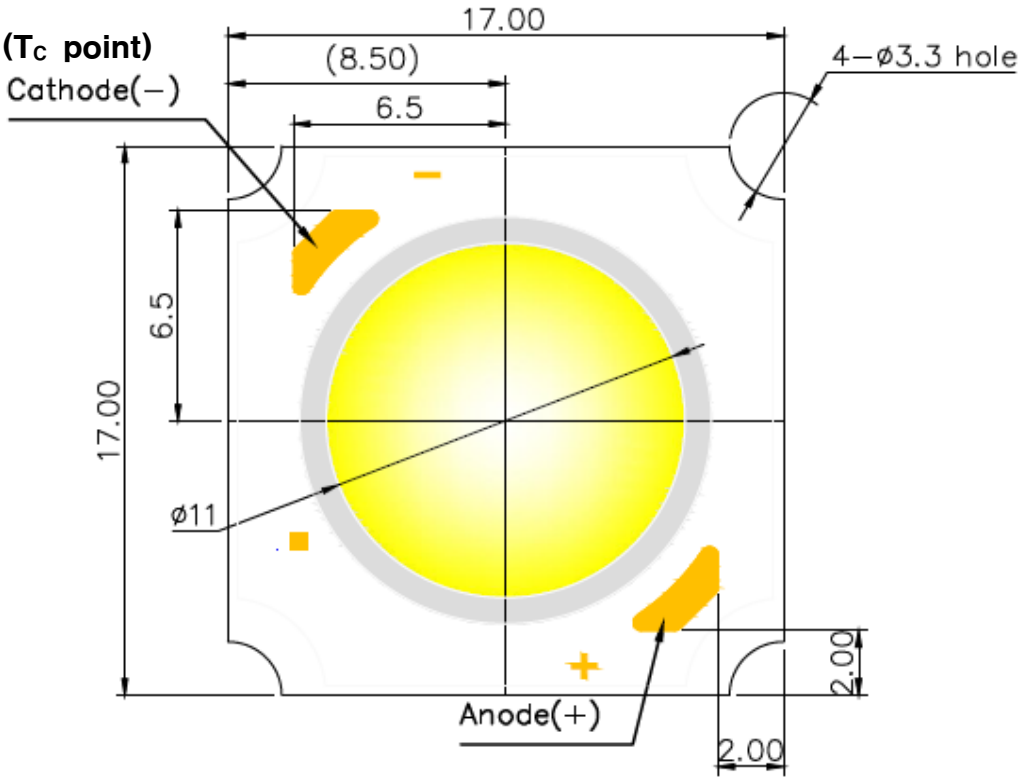
Derating Curve

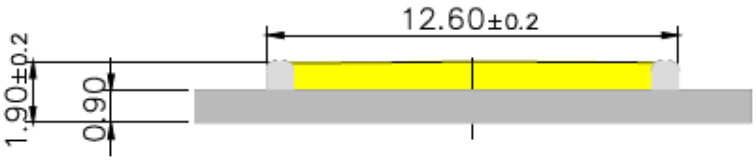


6. Outline Drawing & Dimension

unit : mm

Tolerance : ± 0.15





7. Reliability Test Items and Conditions

1) Test Items

Test Items	Test Conditions	Test Hours/Cycles
Room Temperature life test	25°C, I_F = Max	1,000 h
High Temperature humidity life test	85°C, 85% RH, DC Derating I_F = Max	1,000 h
High Temperature life test	105°C, DC Derating I_F = Max	1,000 h
Low Temperature life test	-40°C, DC 660 mA	1,000 h
High Temperature Storage	120°C	1,000 h
Low Temperature Storage	-40°C	1,000 h
Thermal Shock	-45°C/15min → 125°C/15min Temperature changes in 5min.	200 cycles
Temperature Cycle On/Off test	-40 / 85°C, each 20min, 100min transfer Power On/off each 5min, DC 360 mA	100 cycles
Temperature humidity Cycle Storage	-10°C↔25°C, 95%RH ↔ 85°C, 95%RH [24h/1Cycle]	100 cycles
ESD(HBM)	R1 : 10 ㏁, R2 : 1.5 ㏀, C : 100 pF	5 times (± 5 kV)
ESD(MM)	R1 : 10 ㏁, R2 : 0 ㏀, C : 200 pF	5 times (± 0.5 kV)
Vibration	20~80㎐(Displacement:0.06inch, Max 20G) 80~2㎑ (Max 20G) Min. Frequency ↔ Max. Frequency 4min transfer	4 times
Shock	1500G, 0.5ms, Every 6faces (3axis X 2faces)	5 times
Salt Spray	35°C, salt water 5% 8h spray → 16h leaving alone	2 cycles

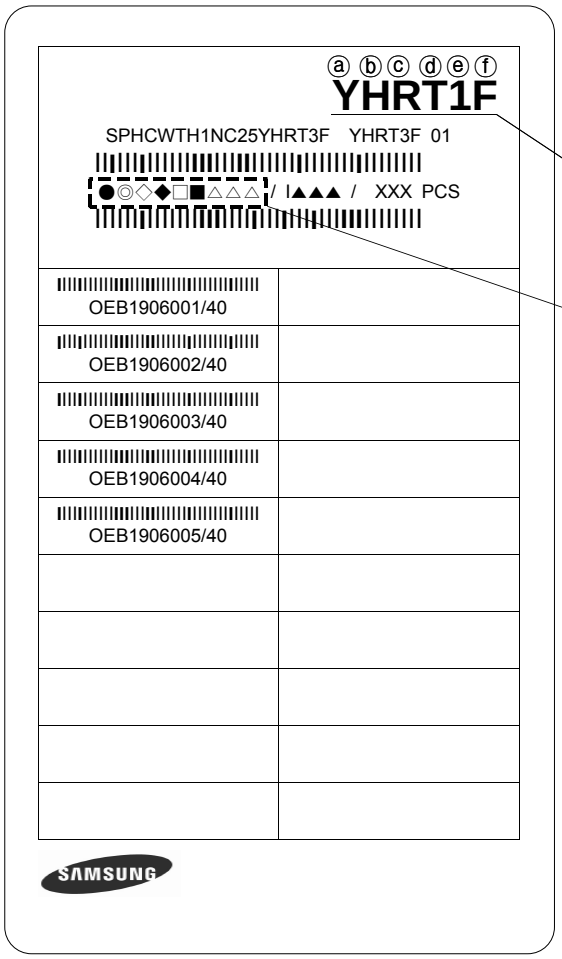
2) Criteria for Failure

Item	Symbol	Test Condition [T_a = 25°C]	Limit	
			Min.	Max.
Forward Voltage	V_F	660 mA	L.S.L. × 0.9	U.S.L. × 1.1
Luminous flux	Im	660 mA	L.S.L. × 0.7	U.S.L. × 1.3

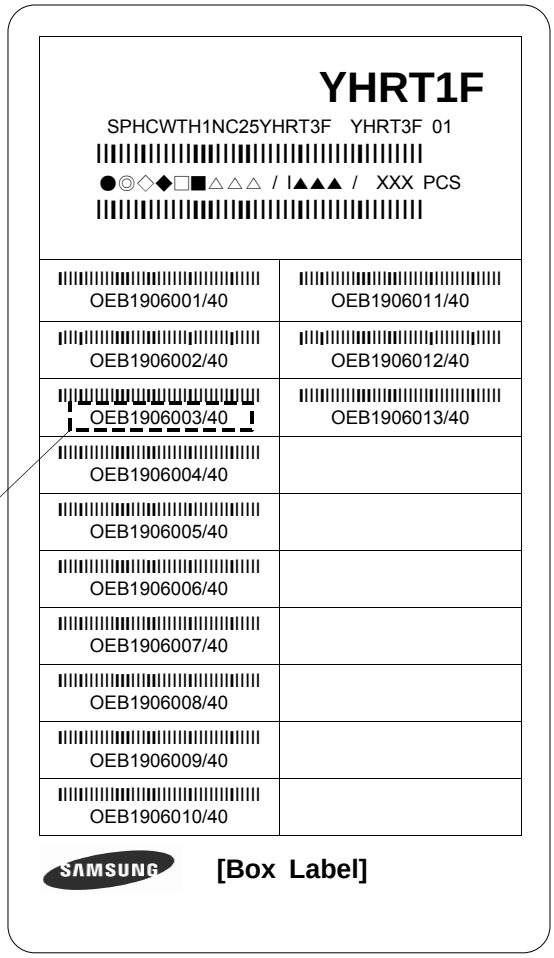
* U.S.L. : Upper Standard Level L.S.L. : Lower Standard Level

8. Label Structure

* Bag & Inner box



* Box



Rank Code

Lot number

Tray number /Q'ty

[Box Label]

N.B) Denoted rank is the only example.

Rank Code

ⓐⓑ : Forward Voltage (V_F) Rank (refer to page. 4)

ⓒⓓ : Chromaticity Coordinate Rank (refer to page. 5)

ⓔⓕ : Luminous Flux (Φ_V) Rank (refer to page. 4)

9. Lot Number

The Lot number is composed of the following characters

●◎◇◆□■△△△ / I▲▲▲ / xxx PCS

● : Production Site (S:SAMSUNG ELECTRONICS, G:Gosin China, A:Aprosystems)

◎ : L (LED)

◇ : Product State (A:Normality, B: Bulk, C:First Production, R:reproduction, S:Sample)

◆ : Year (U:2010, V:2011, W:2012, X:2013...)

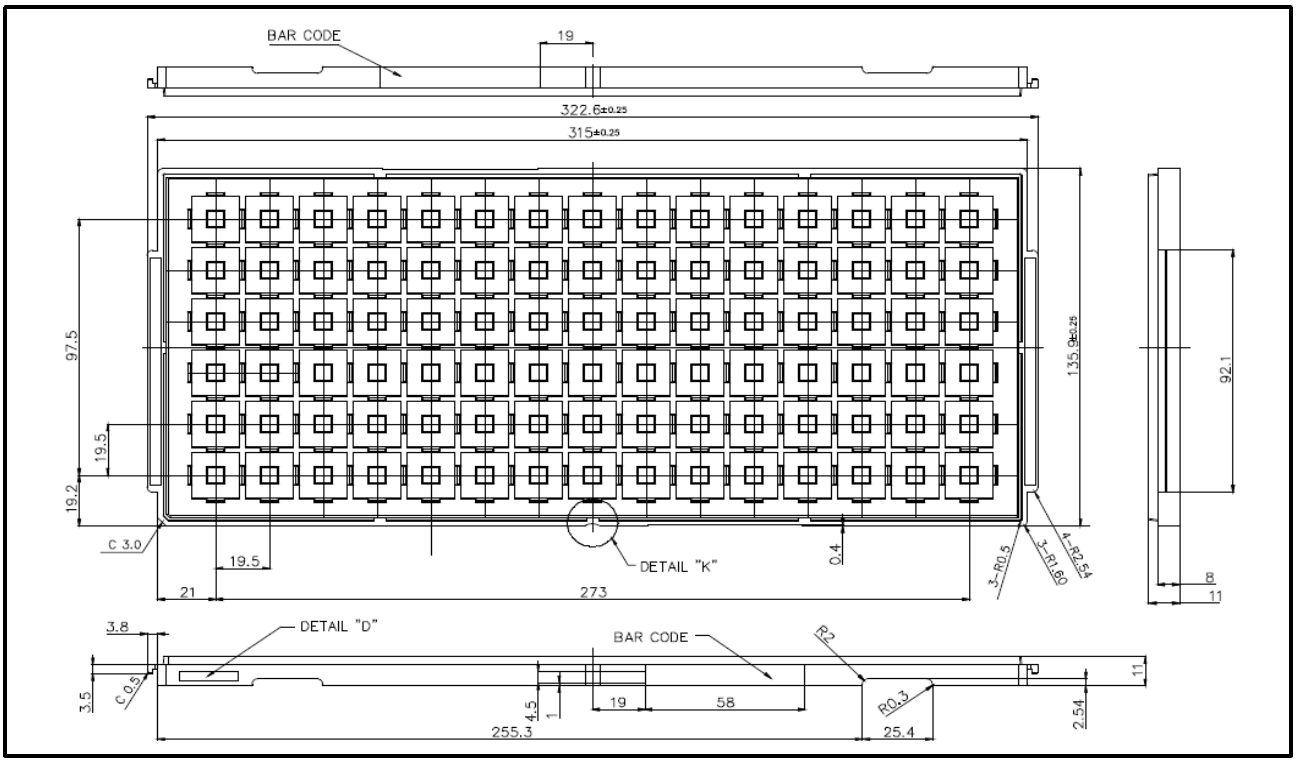
□ : Month (1 ~ 9, A~C)

■ : Day (1 ~ 9, A, B ~ V)

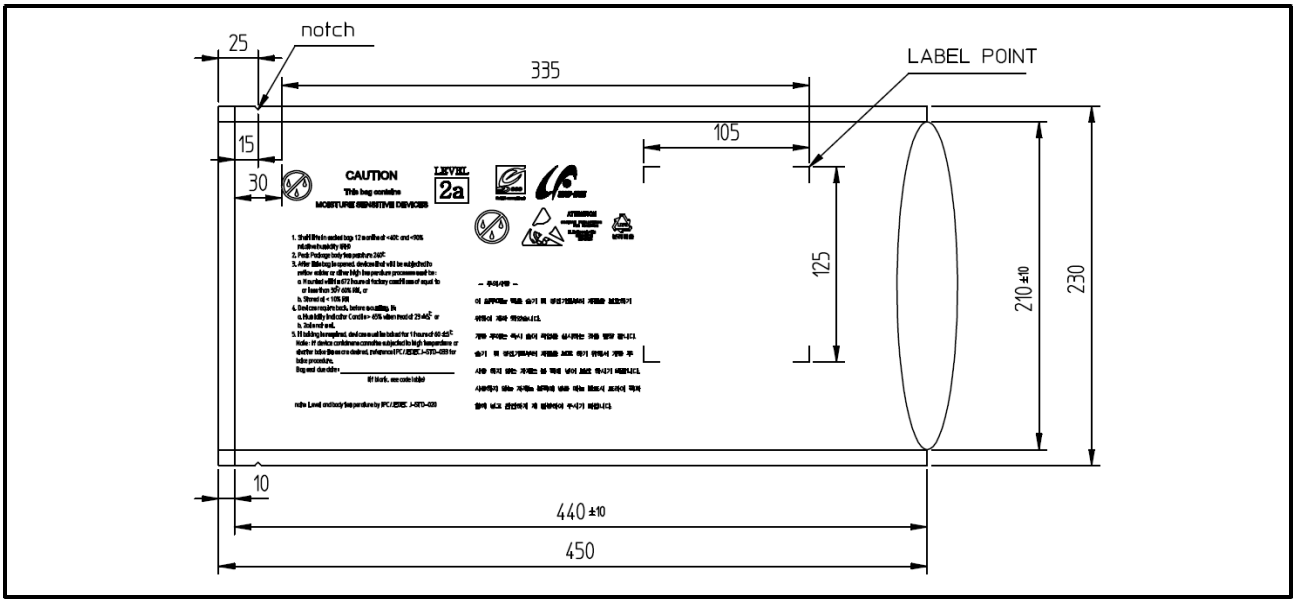
△ : SAMSUNG LED Product number (1 ~ 999)

▲ : Tray Number (1 ~ 999)

10. Tray Dimension



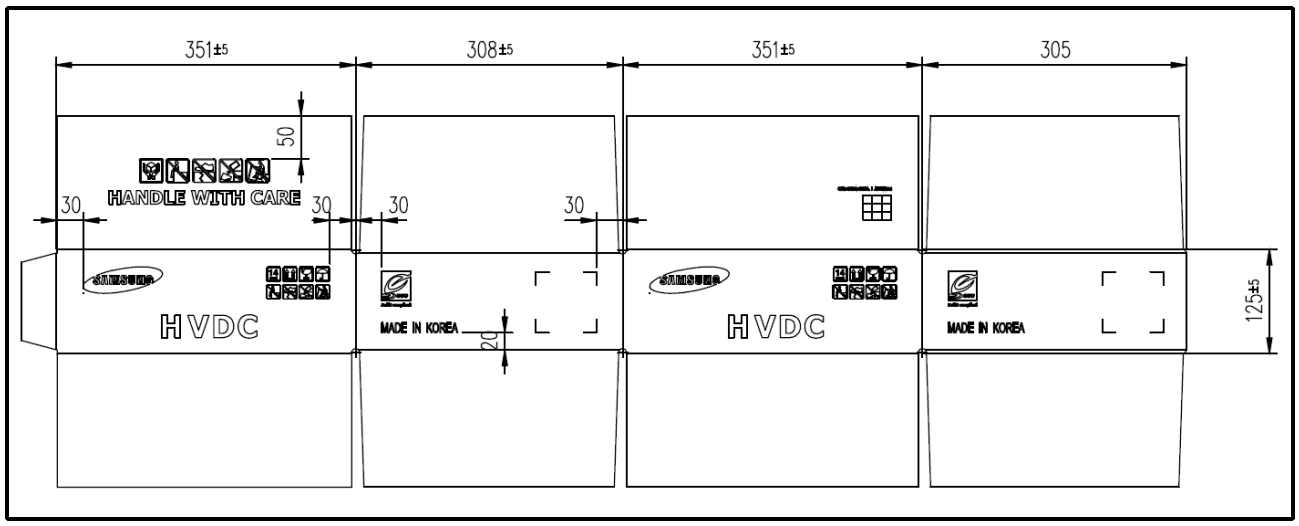
11. Aluminum Bag Dimension



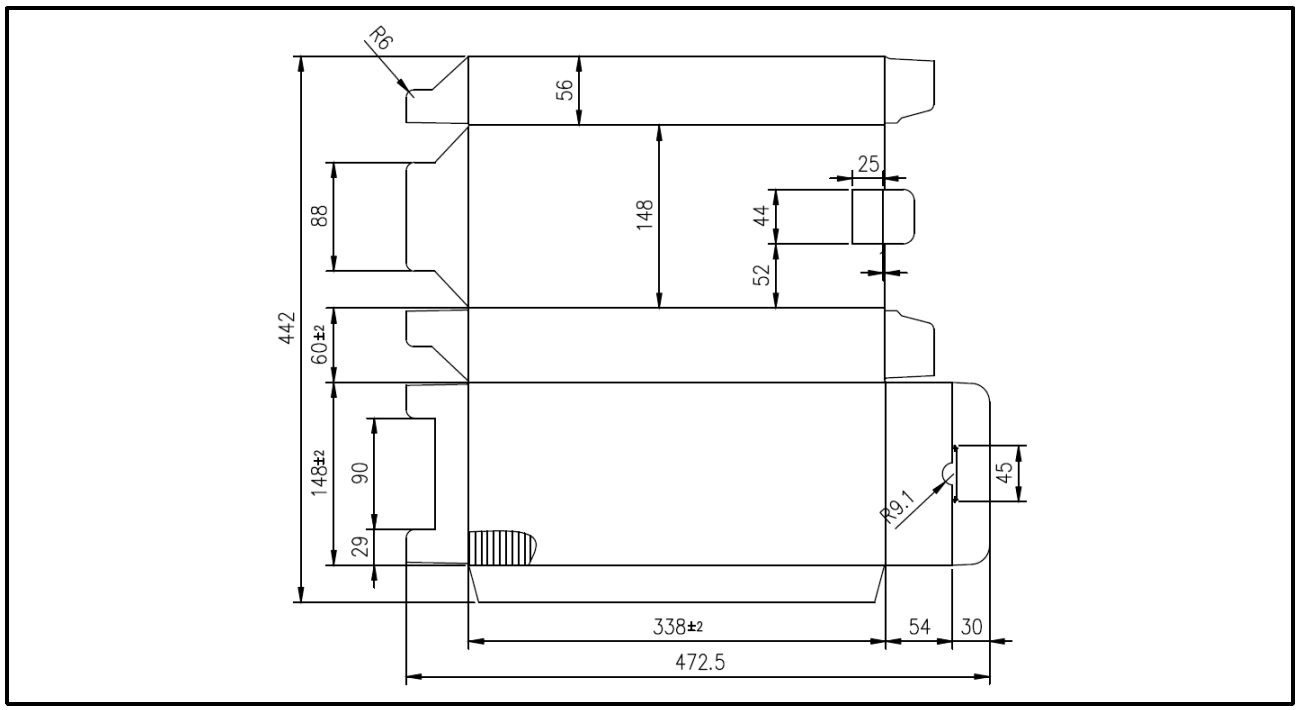
Silica gel & Humidity Indicator Card in Aluminum Bag

12. Box & Pad Dimension

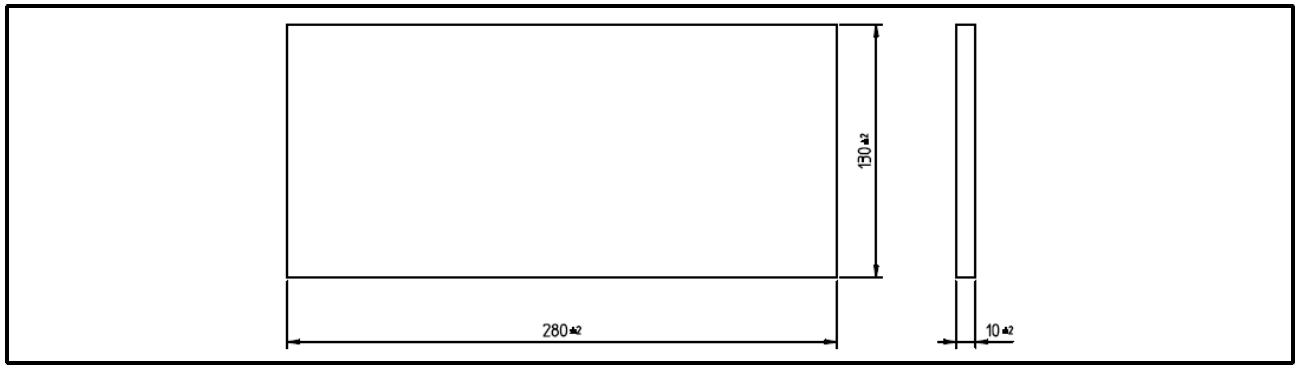
1) Out BOX



2) Inner BOX



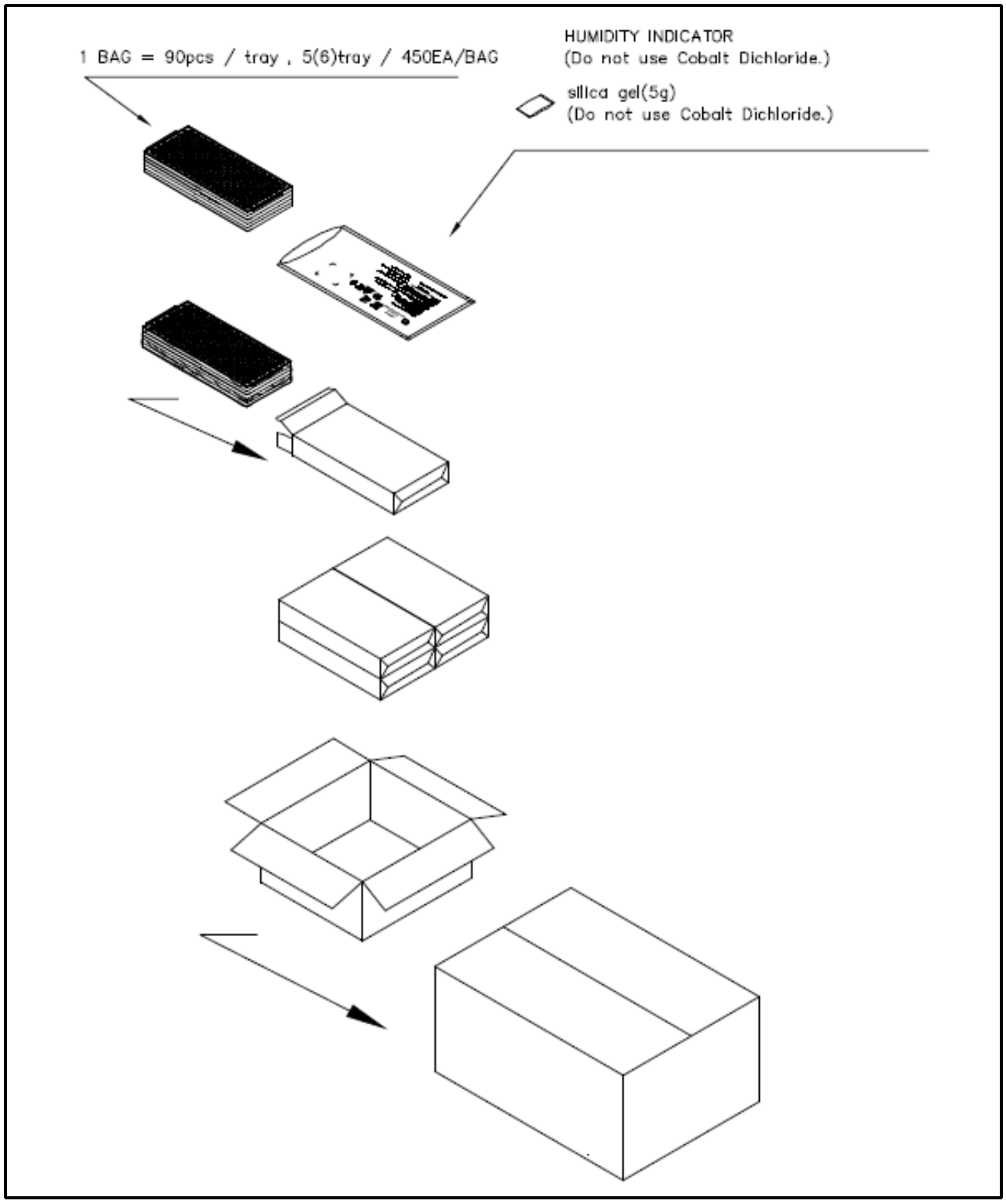
3) Pe-foam PAD



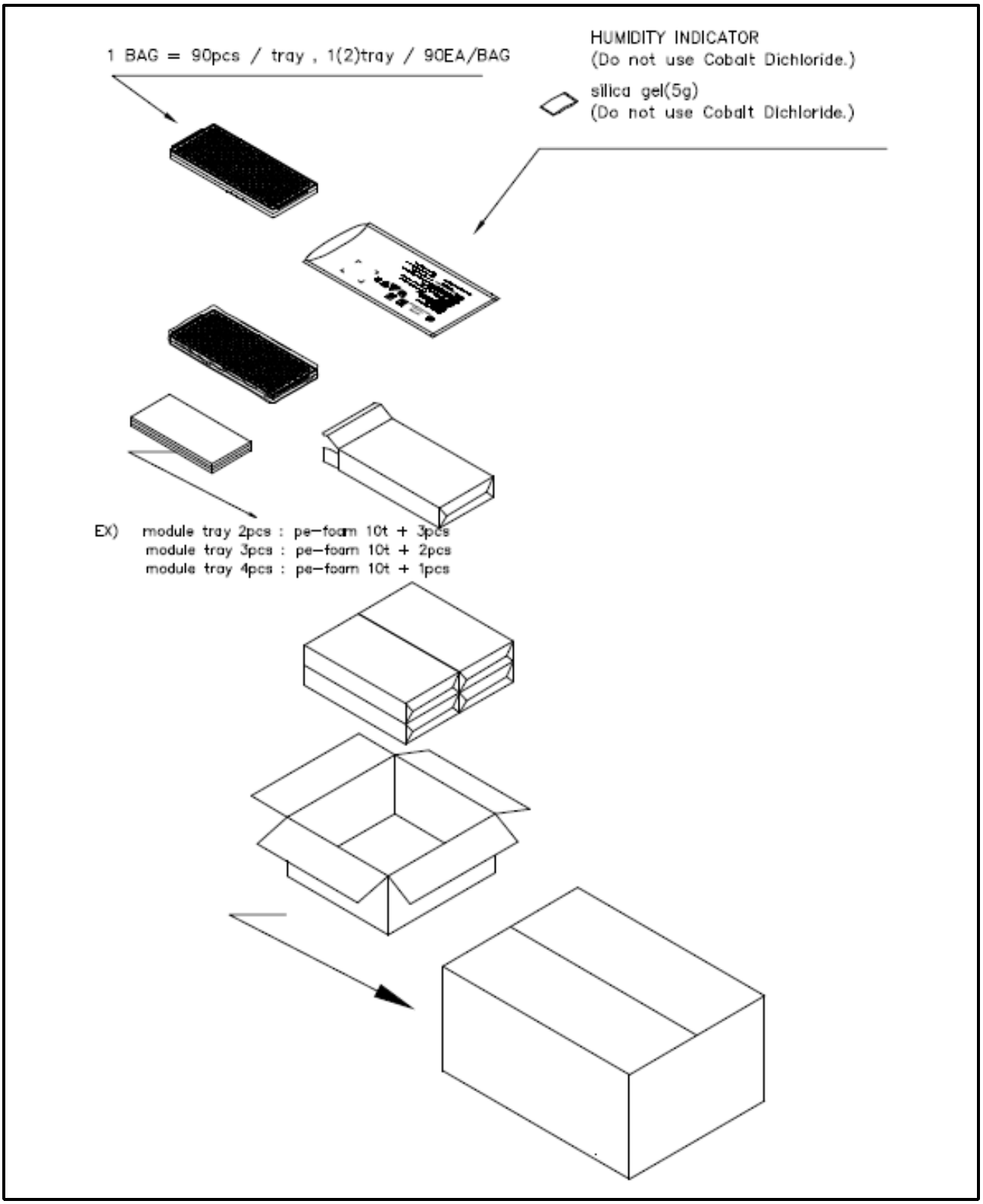
13. Packing Structure

1-1). Tray Packing (When 5 Trays)

Max Amount(pcs)		
Tray	Al Bag	Box
90	450	1800



1-2). Tray Packing (When Less than 5 Trays)



EX) Module tray 2pcs : Pe-foam(10t) * 3pcs
Module tray 3pcs : Pe-foam(10t) * 2pcs
Module tray 4pcs : Pe-foam(10t) * 1pcs

14. Precaution for use

1) Shelf life in sealed bag : 12 months at < 40˚C and < 90% relative humidity(RH)

2) Peak package body temperature : 240˚C.

3) After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be :
   a. Mounted within 672 hours at factory conditions of equal to or less than 30˚C / 60% RH, or
   b. Stored at < 10% RH

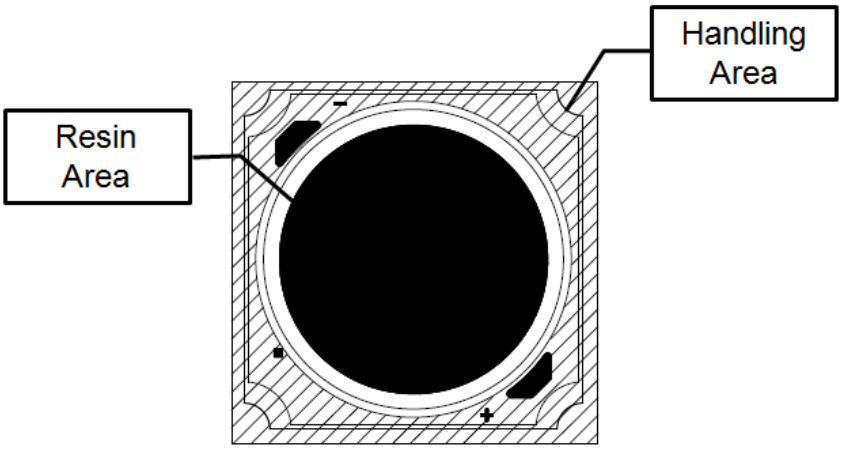
4) Devices require bake, before mounting, if :
   a. Humidity Indicator Card is > 65% when read at 23 ± 5˚C, or
   b. 2a is not met.

5) If baking is required, devices must be baked for 1 hours at 60 ± 5˚C
   Note : If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC / JEDEC J-STD-033 for bake procedure.

6) The LEDs are sensitive to the static electricity and surge current. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs. If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices.

   Damaged LEDs may show some unusual characteristics such as increase in leakage current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.

7) Please do not following behavior in resin area.
(Handling, Pressing, Touching, Rubbing, Contacting tweezers, Cleaning)
But it's ok in handling area.



8) VOCs (volatile organic compounds) may be occurred by adhesives, flux, hardener or organic additives which is used in luminaires (fixture) and LED silicone bags are permeable to it. It may lead a discoloration when LED expose to heat or light.

This phenomenon can give a significant loss of light emitted(output) from the luminaires (fixtures).

In order to prevent these problems, we recommend you to know the physical properties for the materials used in luminaires, It requires to select carefully.

Revision History
(LC013B)

Date	Revision History	Writer	
		Drawn	Approved
2013.10.07	1st Version	SH.AN	HK.KIM
2013.10.21	2nd Version	SH.AN	HK.KIM
2013.10.31	3rd Version	SH.AN	HK.KIM
2014.01.08	4th Version	SH.AN	MY.SON
2014.02.19	5th Version	SH.AN	MY.SON

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