

SPECIFICATIONS

Middle Power LED Series
3030
LM302Z+ ECO
CRI 70



Features & Benefits

- 0.9 W class middle power LED
- Mold resin for high reliability
- Standard form factor for design flexibility (3.0 × 3.0 mm)

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1. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	P	M	W	H	2	3	2	6	F	P	3	G	A	V	Y	S	0
Digit		PKG Information				Code		Specification									
1 2 3		Dongbu Package Middle Power				SPM		Mddle power									
4 5		Color				WH		White									
6		Product Version				2		Zenerless									
7 8 9		Form Factor				326		3.0 x 3.0 x 0.65 mm 2 pads									
10		Sorting Current (mA)				F		150 mA									
11		Chromaticity Coordinates				P		MacAdam									
12		CRI				3		Min. 70									
13 14		Forward Voltage (V)				GA		6.0~6.4		Bin Code		AZ		6.0~6.1			
												A1		6.1~6.2			
												A2		6.2~6.3			
												A3		6.3~6.4			
15 16		CCT (K)				W☆		3000		Bin Code		WN, WP, WQ, WR, WS, WT, WU					
						V☆		3000				VN, VP, VQ, VR, VS, VT, VU					
						U☆		3500				UN, UP, UQ, UR, US, UT, UU					
						T☆		4000				TN, TP, TQ, TR, TS, TT, TU					
						R☆		5000				RN, RP, RQ, RR, RS, RT, RU					
						Q☆		5700				QN, QP, QQ, QR, QS, QT, QU					
						P☆		6500				PN, PP, PQ, PR, PS, PT, PU					
☆ : "0" (Whole Bin) or "Y"(Y Kitting) or "3"(MacAdam 3 step)																	
17 18		Luminous Flux				S0		Bin Code		S0							

2. Characteristics

(1) Absolute Maximum Ratings

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +85	°C	
Storage Temperature	T_{stg}	-40 ~ +100	°C	
LED Junction Temperature	T_j	125	°C	
Forward Current	I_F	200	mA	
Peak Pulsed Forward Current	I_{FP}	300	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260<10	°C/S	
ESD (HBM)	-	2	KV	

(2) Electro-optical Characteristics ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ °C}$)

Item	Unit	Rank	Bin	Min.	Typ.	Max.
Forward Voltage (VF)	V	GA	AZ	6.0	-	6.1
			A1	6.1	-	6.2
			A2	6.2	-	6.3
			A3	6.3	-	6.4
Color Rendering Index (Ra)	-	3		70	-	-
R9	-			-40	-	-
Thermal Resistance (junction to solder point)	°C/W			-	12	-
Beam Angle	°			-	120	-

* Note

Dongbu maintains measurement tolerance of: forward voltage = $\pm 0.1 \text{ V}$, luminous flux = $\pm 5 \%$, CRI = ± 3

(4) Luminous Flux Bins ($I_F = 150 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Nominal CCT (K)	CRI Min.	Product Code	Flux Bin	Flux Range (Φ_v , lm)
2700	70	SPMWH2326FP3GAW ☆ S0	S0	135 ~ 145
3000	70	SPMWH2326FP3GAV ☆ S0	S0	139 ~ 149
3500	70	SPMWH2326FP3GAU ☆ S0	S0	142 ~ 152
4000	70	SPMWH2326FP3GAT ☆ S0	S0	145 ~ 155
5000	70	SPMWH2326FP3GAR ☆ S0	S0	148 ~ 158
5700	70	SPMWH2326FP3GAQ ☆ S0	S0	148 ~ 158
6500	70	SPMWH2326FP3GAP ☆ S0	S0	148 ~ 158

* Note :

“☆” can be “0” (Whole bin), “3” (MacAdam 3-step), “Y” (Kitting).

(5) Kitting rule

1. Under agreement between customer and Dongbu LED, Dongbu can supply kitting bin (VF, Color, Im).
2. A luminous flux of kitting bin is combined by a pair of IV rank such as (SL+SM) or (SM+SM).

[Binning Information]



[Binning Information]

Item	Bin #1	Bin #2
VF	AZ	AZ
	A1	A1
	A2	A2
	A3	A3
CIE	U	U
	N	R
	P	S
	Q	T
IV	S0	S0

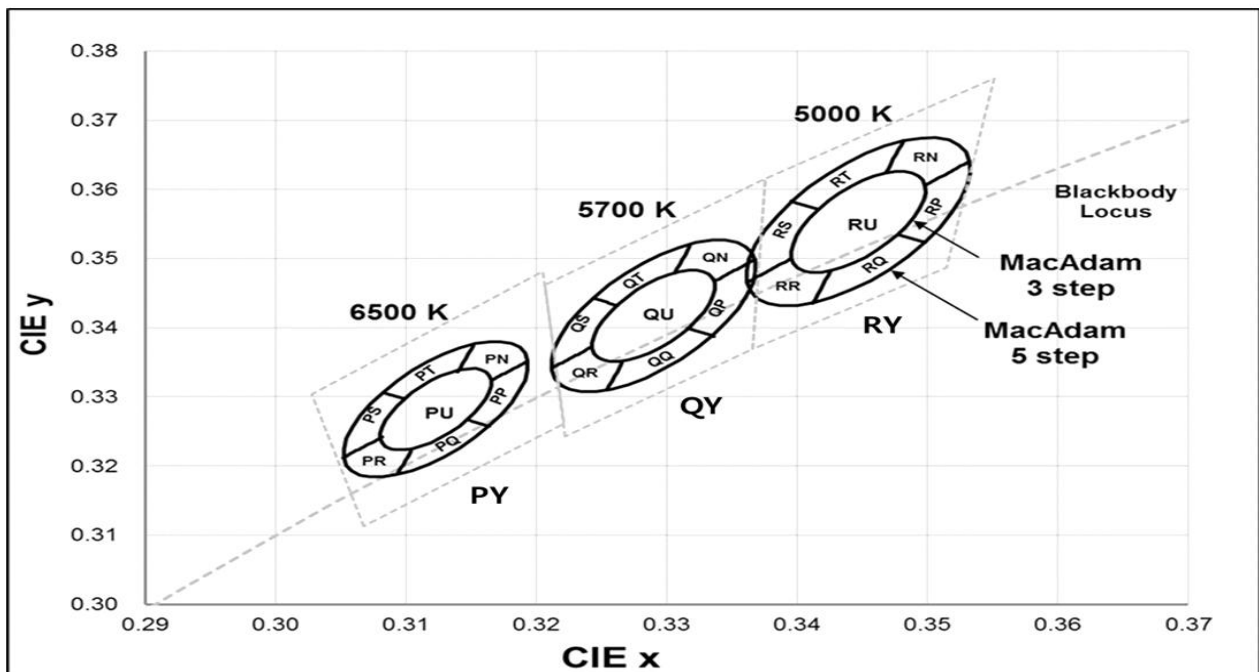
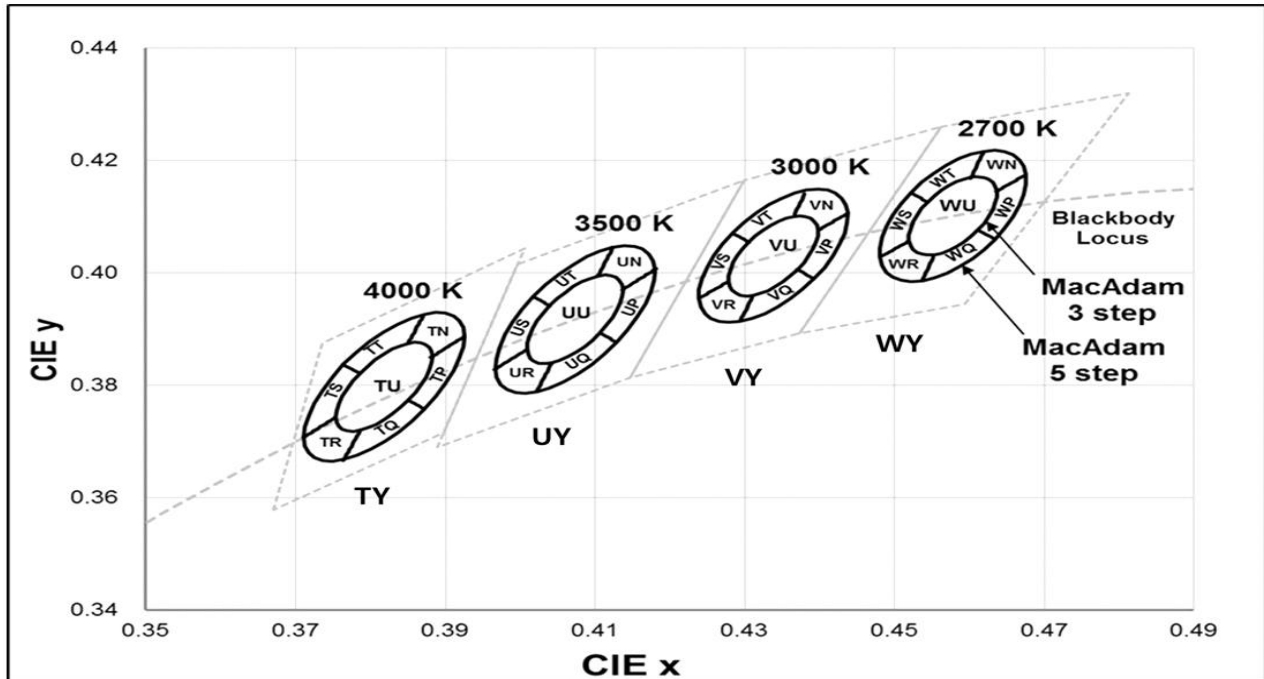
(6) Color Bins ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

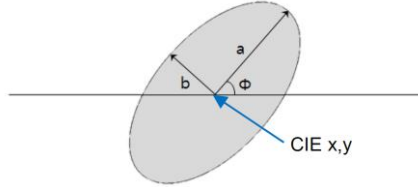
CRI (Ra) Min.	Normal CCT (K)	Product Code	Color Rank	Chromaticity Bins
70	2700	SPMWH2326FP3GAW0S0	W0 Whole bin	WN, WP, WQ, WR, WS, WT, WU
		SPMWH2326FP3GAW3S0	W3 3 step ellipse bin	WU
		SPMWH2326FP3GAWYS0	WY Y Kitting	WN, WP, WQ, WR, WS, WT, WU
	3000	SPMWH2326FP3GAV0S0	V0 Whole bin	VN, VP, VQ, VR, VS, VT, VU
		SPMWH2326FP3GAV3S0	V3 3 step ellipse bin	VU
		SPMWH2326FP3GAVYS0	VY Y Kitting	VN, VP, VQ, VR, VS, VT, VU
	3500	SPMWH2326FP3GAU0S0	U0 Whole bin	UN, UP, UQ, UR, US, UT, UU
		SPMWH2326FP3GAU3S0	U3 3 step ellipse bin	UU
		SPMWH2326FP3GAUYS0	UY Y Kitting	UN, UP, UQ, UR, US, UT, UU
	4000	SPMWH2326FP3GAT0S0	T0 Whole bin	TN, TP, TQ, TR, TS, TT, TU
		SPMWH2326FP3GAT3S0	T3 3 step ellipse bin	TU
		SPMWH2326FP3GATYS0	TY Y Kitting	TN, TP, TQ, TR, TS, TT, TU
	5000	SPMWH2326FP3GAR0S0	R0 Whole bin	RN, RP, RQ, RR, RS, RT, RU
		SPMWH2326FP3GAR3S0	R3 3 step ellipse bin	RU
		SPMWH2326FP3GARYS0	RY Y Kitting	RN, RP, RQ, RR, RS, RT, RU
	5700	SPMWH2326FP3GAQ0S0	Q0 Whole bin	QN, QP, QQ, QR, QS, QT, QU
		SPMWH2326FP3GAQ3S0	Q3 3 step ellipse bin	QU
		SPMWH2326FP3GAQYS0	QY Y Kitting	QN, QP, QQ, QR, QS, QT, QU
	6500	SPMWH2326FP3GAP0S0	P0 Whole bin	PN, PP, PQ, PR, PS, PT, PU
		SPMWH2326FP3GAP3S0	P3 3 step ellipse bin	PU
		SPMWH2326FP3GAPYS0	PY Y Kitting	PN, PP, PQ, PR, PS, PT, PU

(7) Voltage Bins ($I_F = 150 \text{ mA}$, $T_a = 25 \text{ }^\circ\text{C}$)

CRI (Ra) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-	GA	AZ	6.0 ~ 6.1
				A1	6.1 ~ 6.2
				A2	6.2 ~ 6.3
				A3	6.3 ~ 6.4

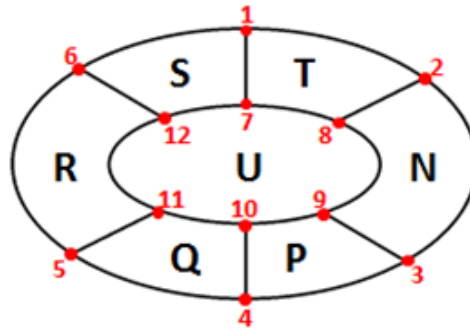
(8) Chromaticity Region & Coordinates ($I_F = 150$ mA, $T_s = 25$ °C)



(9) Chromaticity Region & Coordinates ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)


MacAdam	CCT (K)	Center point		Major-axis	Minor-axis	Rotation
		CIE x	CIE y	a	b	Φ
3 step	2700	0.4578	0.4101	0.0081	0.0042	53.70
	3000	0.4338	0.4030	0.0083	0.0041	53.22
	3500	0.4073	0.3917	0.0093	0.0041	54.00
	4000	0.3818	0.3797	0.0094	0.0040	53.72
	5000	0.3447	0.3553	0.0082	0.0035	59.62
	5700	0.3287	0.3417	0.0075	0.0032	59.10
	6500	0.3123	0.3282	0.0067	0.0029	58.57
5 step	2700	0.4578	0.4101	0.0135	0.0070	53.70
	3000	0.4338	0.4030	0.0138	0.0068	53.22
	3500	0.4073	0.3917	0.0155	0.0068	54.00
	4000	0.3818	0.3797	0.0157	0.0067	53.72
	5000	0.3447	0.3553	0.0137	0.0058	59.62
	5700	0.3287	0.3417	0.0125	0.0053	59.10
	6500	0.3123	0.3282	0.0112	0.0048	58.57

Dongbu maintains measurement tolerance of: $C_x, C_y = \pm 0.005$

(10) Chromaticity Region & Coordinates


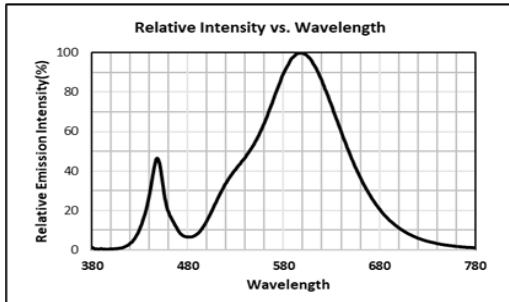
Region	2700K		3000K		3500K		4000K	
	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
1	0.4521	0.4142	0.4283	0.4071	0.4018	0.4283	0.4071	0.4018
2	0.4619	0.4216	0.4382	0.4146	0.4125	0.4382	0.4146	0.4125
3	0.4675	0.4175	0.4437	0.4105	0.4180	0.4437	0.4105	0.4180
4	0.4634	0.4059	0.4393	0.3989	0.4128	0.4393	0.3989	0.4128
5	0.4537	0.3986	0.4293	0.3913	0.4022	0.4293	0.3913	0.4022
6	0.4481	0.4028	0.4239	0.3954	0.3966	0.4239	0.3954	0.3966
7	0.4544	0.4126	0.4305	0.4054	0.4040	0.4305	0.4054	0.4040
8	0.4603	0.4170	0.4364	0.4100	0.4104	0.4364	0.4100	0.4104
9	0.4636	0.4145	0.4397	0.4075	0.4137	0.4397	0.4075	0.4137
10	0.4612	0.4076	0.4371	0.4005	0.4106	0.4371	0.4005	0.4106
11	0.4553	0.4032	0.4311	0.3960	0.4042	0.4311	0.3960	0.4042
12	0.4520	0.4057	0.4279	0.3984	0.4009	0.4279	0.3984	0.4009

Region	5000K		5700K		6500K	
	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
1	0.3397	0.3583	0.3242	0.3445	0.3082	0.3307
2	0.3482	0.3670	0.3320	0.3524	0.3153	0.3377
3	0.3532	0.3640	0.3365	0.3496	0.3194	0.3352
4	0.3497	0.3524	0.3333	0.3390	0.3164	0.3257
5	0.3412	0.3436	0.3254	0.3310	0.3093	0.3187
6	0.3362	0.3465	0.3209	0.3338	0.3052	0.3212
7	0.3417	0.3571	0.3260	0.3434	0.3098	0.3297
8	0.3468	0.3623	0.3307	0.3481	0.3141	0.3339
9	0.3498	0.3605	0.3334	0.3464	0.3166	0.3324
10	0.3477	0.3535	0.3314	0.3401	0.3148	0.3267
11	0.3426	0.3483	0.3267	0.3353	0.3105	0.3225
12	0.3396	0.3500	0.3240	0.3369	0.3080	0.3240

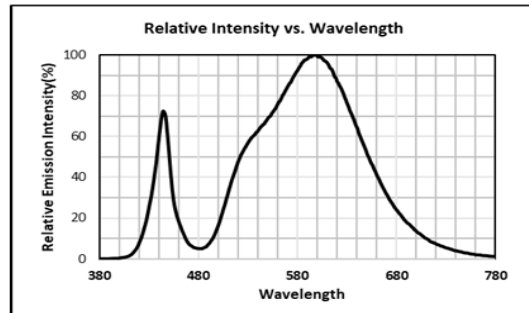
3. Typical Characteristics Graphs

(1) Spectrum Distribution ($I_F = 150 \text{ mA}$, $T_s = 25^\circ\text{C}$)

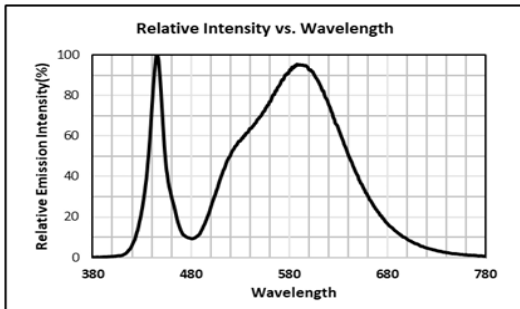
CCT : 2700 K (70 CRI)



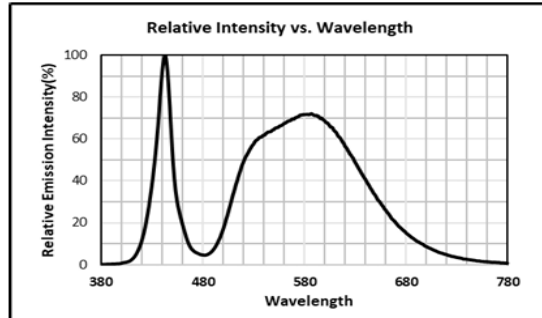
CCT : 3000 K (70 CRI)



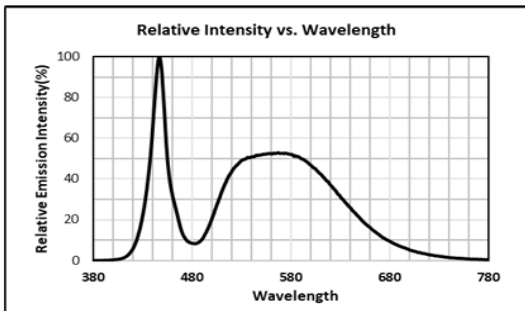
CCT : 3500 K (70 CRI)



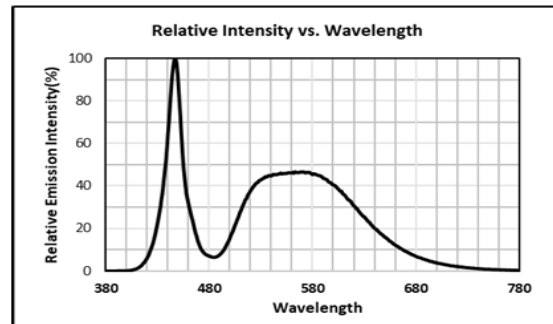
CCT : 4000 K (70 CRI)



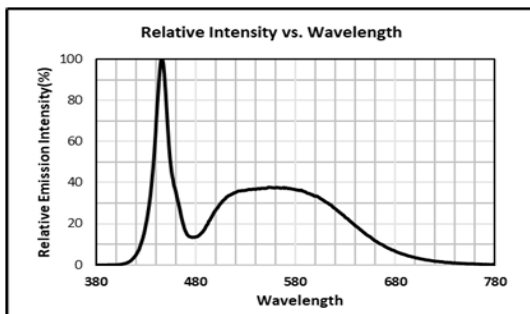
CCT : 5000 K (70 CRI)



CCT : 5700 K (70 CRI)

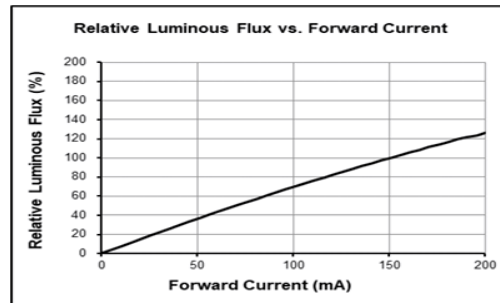
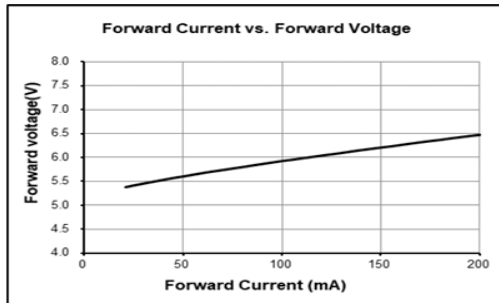


CCT : 6500 K (70 CRI)

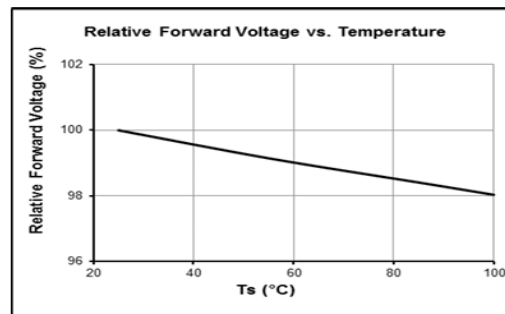
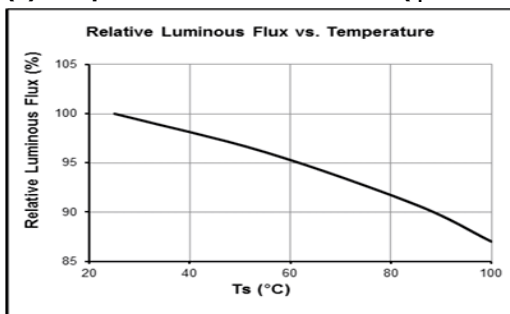


3. Typical Characteristics Graphs

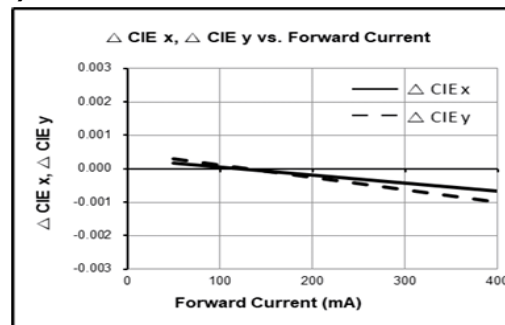
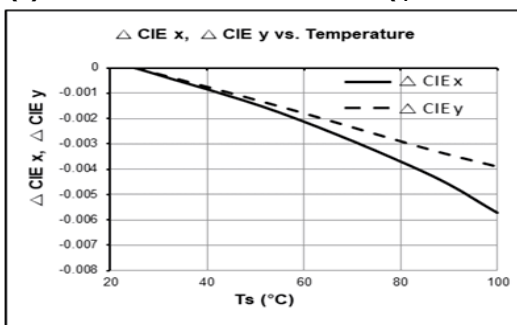
(2) Forward Current Characteristics ($T_s=25^\circ\text{C}$)



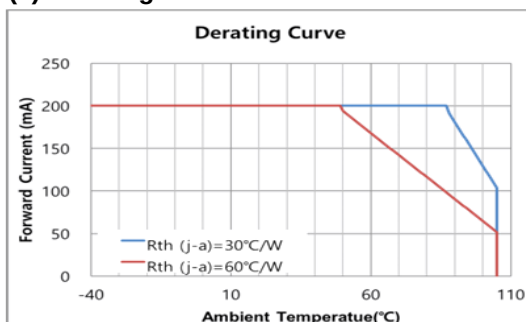
(3) Temperature Characteristics ($I_F=150\text{ mA}$)



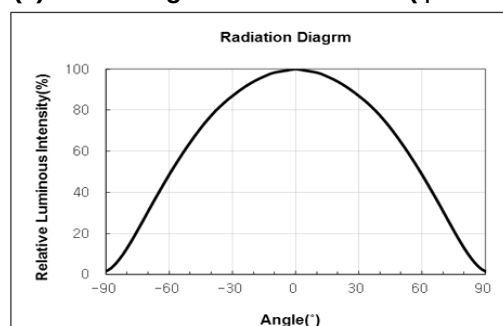
(4) Color Shift Characteristics ($I_F=150\text{ mA}$, $T_a=25^\circ\text{C}$)



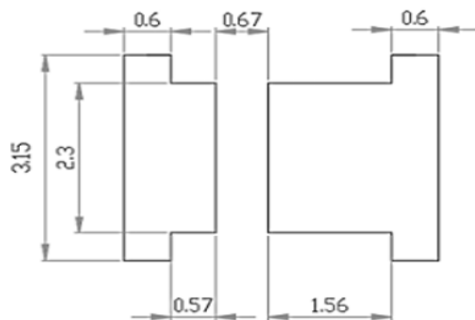
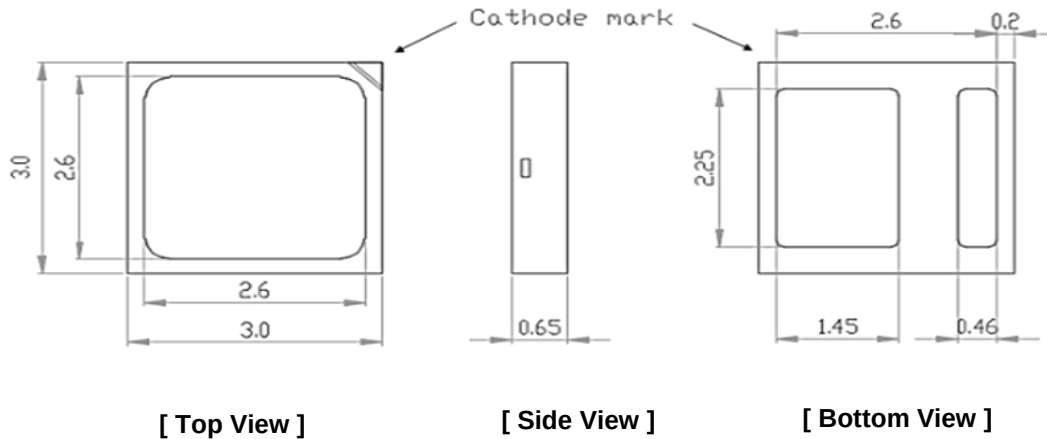
(5) Derating Curve



(6) Beam Angle Characteristics ($I_F=150\text{ mA}$, $T_a=25^\circ\text{C}$)



4. Outline Drawing & Dimension



- Measurement unit : mm
- Tolerance : $\pm 0.1\text{mm}$

[Recommended PCB Solder Pad]

*** Note :**

- 1) This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).
- 2) T_s point and measurement method:
 - ① Measure one point at the cathode pad, if necessary remove PSR of PCB to reach T_s point.
 - ② All pads must be soldered to the PCB to dissipate heat properly, otherwise the LED can be damaged

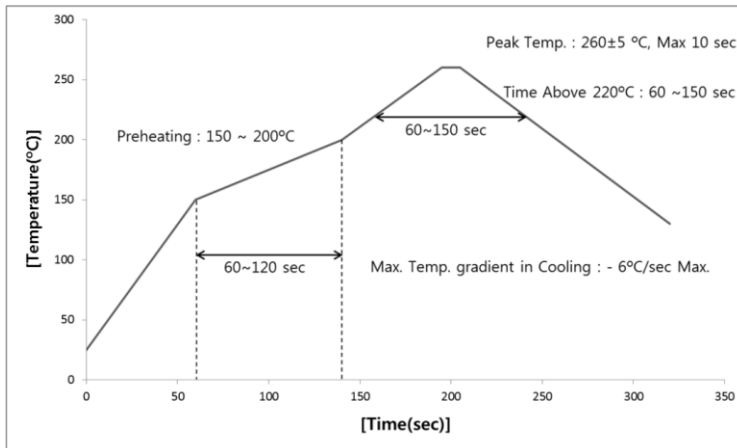
Precautions:

- 1) Pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid strong pressure on the LEDs. Do not put stress on the LEDs during heating.
- 2) Re-soldering should not be done after the LEDs have been soldered. If re-soldering is unavoidable, LED's characteristics should be carefully checked before and after such repair.
- 3) Do not stack assembled PCBs together. Since materials of LEDs is soft, abrasion between two PCB assembled with LED might cause catastrophic failure of the LEDs.

5. Soldering Conditions

(1) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



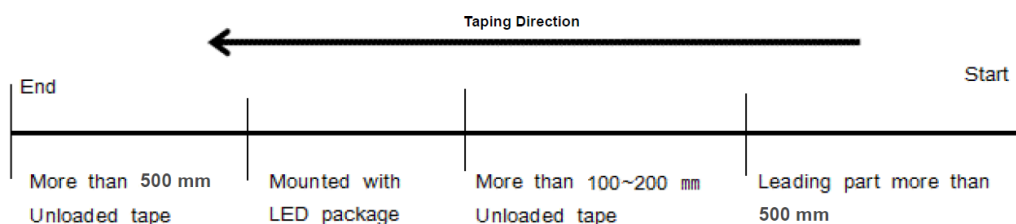
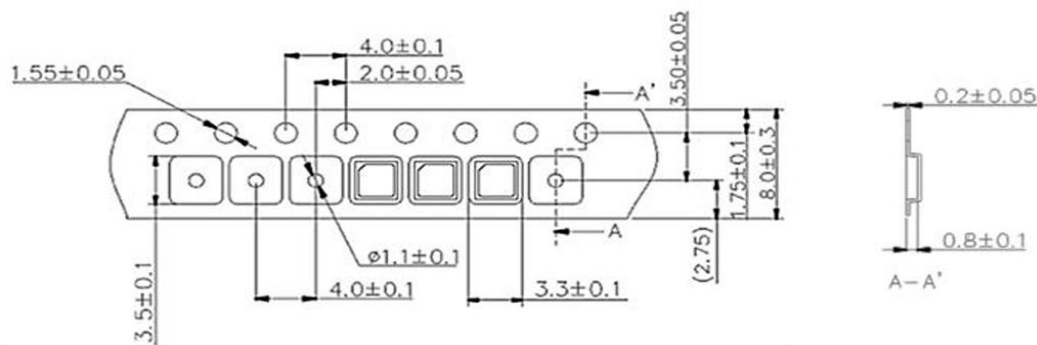
(2) Manual Soldering Conditions

Not more than 5 seconds @ max. 300 °C, under soldering iron.

6. Tape & Reel

(1) Taping Dimension

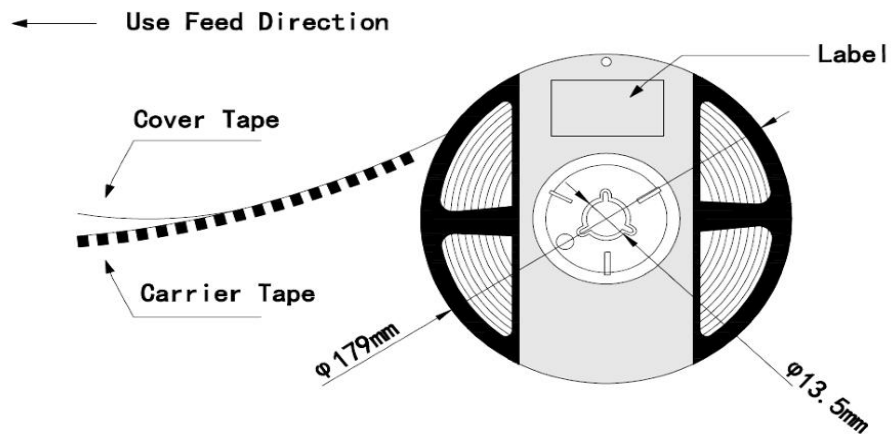
(unit : mm)



6. Tape & Reel

(2) Reel Dimension (Max 4,000 pcs)

(unit : mm)

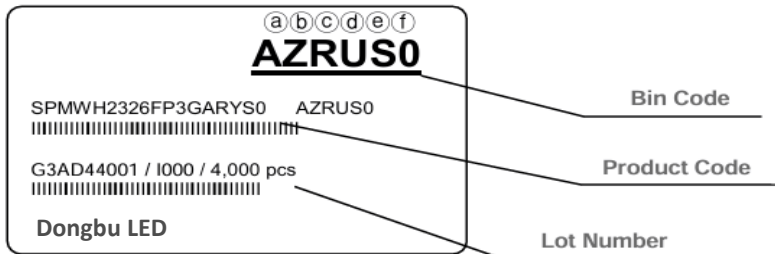


*** Note :**

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) Cumulative Tolerance: Cumulative tolerance / 10 pitches is ± 0.2 mm
- 3) Adhesion Strength of Cover Tape: Adhesion strength is 0.1-0.7 N when the cover tape is turned off from the carrier tape at 10° angle to the carrier tape
- 4) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

7. Label Structure

(1) Label Structure



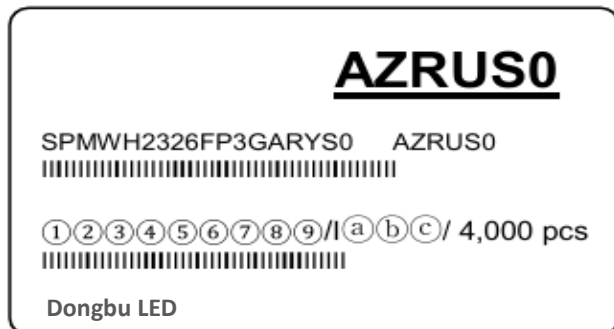
* Note : Denoted bin code and product code above is only an example (see description on page 3)

Bin Code

- ⒶⒷ: Forward Voltage bin (refer to page 4)
- ⒸⒹ: Chromaticity bin (refer to page 9)
- ⒺⒻ: Luminous Flux bin (refer to page 4, 5)

(2) Lot Number

The lot number is composed of the following characters:



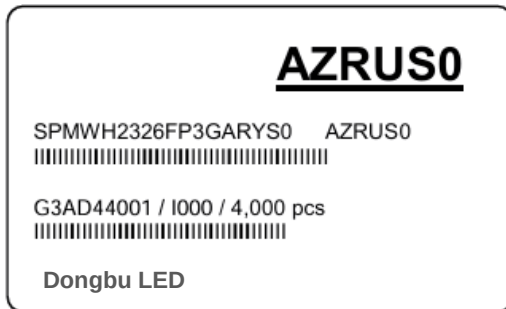
①②③④⑤⑥⑦⑧⑨ / 1000 / 4,000 pcs

- ①② : Production site (GL: Tianjin, China , G4: Guangzhou, China, E EH : HanoiHanoi, Vietnam)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (C: 2018, D: 2019, E: 2020, F: 2021, G: 2022...)
- ⑤ : Month (1~9, A, B, C)
- ⑥ : Day (1~9, A, B~V)
- ⑦⑧⑨ : Serial number (001 ~ 999)
- ⒶⒷⒸ : Reel number (001 ~ 999)

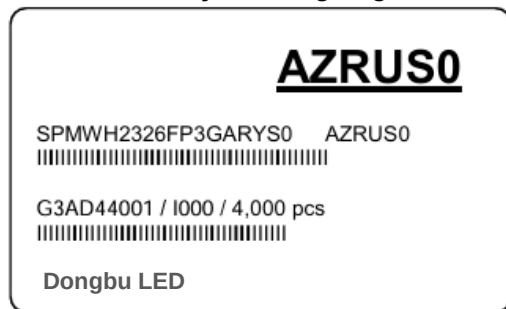
8. Packing Structure

(1) Packing Process (The quantity of PKG on the Reel to be Max 4,000 pcs)

Reel



Aluminum Vinyl Packing Bag

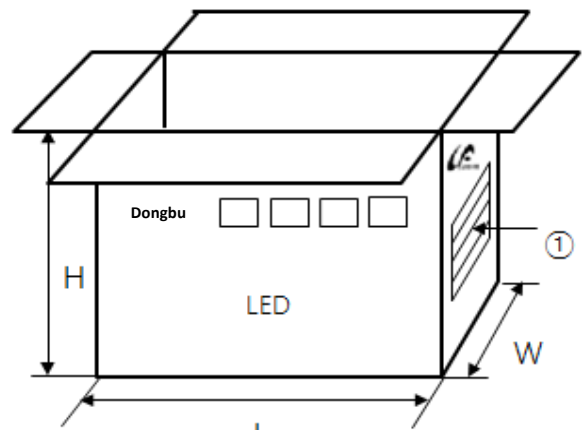
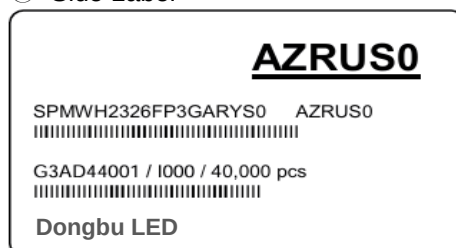


Outer Box

Material: Paper (SW3B(B))

Type	Size (mm)			Note
	L	W	H	
7 inch L	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels
7 inch S	245 ± 5	220 ± 5	86 ± 5	Up to 5 reels

① Side Label

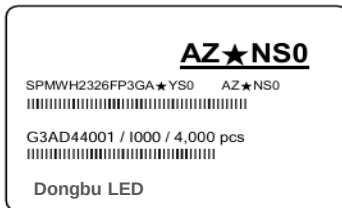


8. Packing Structure

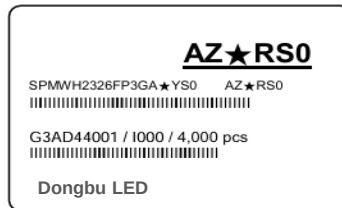
(3) Packing Process for kitting (The quantity of PKG on the Reel to be Max 4,000 pcs)

Reel

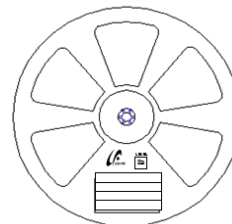
Kitting 'A'



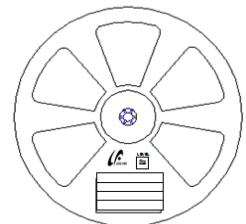
Kitting 'B'



Kitting 'A'

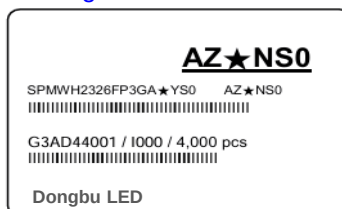


Kitting 'B'

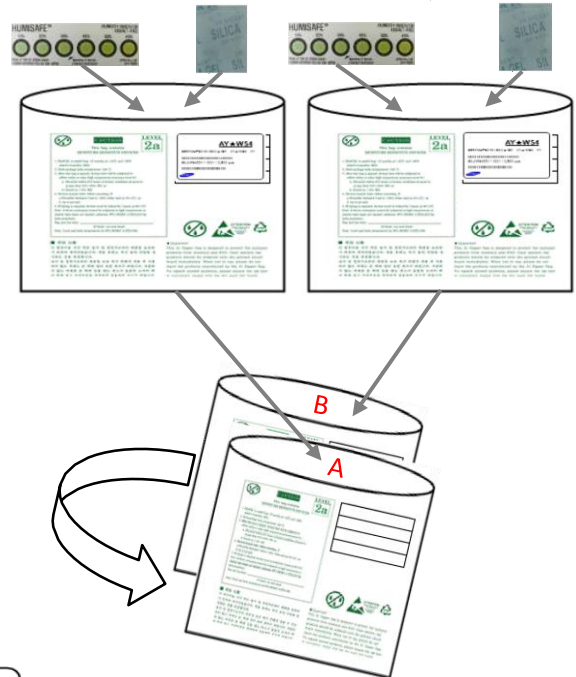
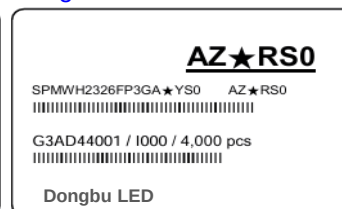


Aluminum Vinyl Packing Bag

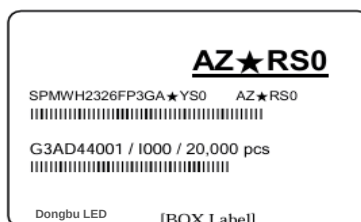
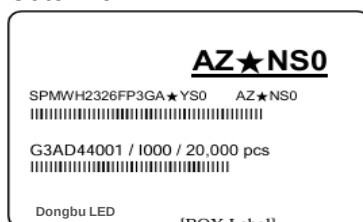
Kitting 'A'



Kitting 'B'



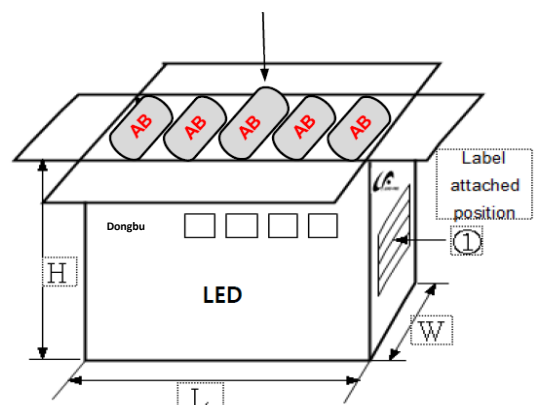
Outer Box



* Note : "★" can be Nominal CCT code.

Material : Paper (SW3B(B))

Type	Size (mm)			Note
	L	W	H	
7 inch L	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels



8. Packing Structure

(5) Aluminum Vinyl Packing Bag



CAUTION
This bag contains
MOISTURE SENSITIVE DEVICES

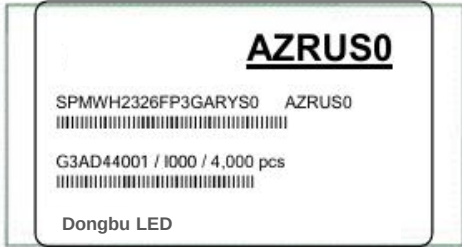
LEVEL 2a

- Shelf life in sealed bag: 12 months at < 40°C and < 90% relative humidity (RH)
- Peak package body temperature: 240 °C
- After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
 - Mounted within 672 hours at factory conditions of equal to or less than 30°C / 60% RH, or
 - Stored at < 10% RH
- Devices require bake, before mounting, if:
 - Humidity Indicator Card is > 60% when read at 23±5°C, or
 - 2a is not met.
- If baking is required, devices must be baked for 10 ~ 24 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.

Bag seal due date: _____
(if blank, see code label)

Note: Level and body temperature by IPC/JEDEC J-STD-020



AZRUS0

SPMWH2326FP3GARYS0 AZRUS0
G3AD44001 / 1000 / 4,000 pcs

Dongbu LED






주의 사항

이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

Important

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

(6) Silica Gel & Humidity Indicator Card inside Aluminum Vinyl Bag

(This image is for reference only. Silica gel and humidity indicator shapes may be different.)



9. Precautions in Handling & Use

- (1) For over-current protection, users are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of forward voltage.
- (2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When cleaning is required, IPA is recommended as the cleaning agent. Some solvent-based cleaning agent may damage the silicone resins used in the device.
- (3) When the device is in operation, the forward current should be carefully determined considering the maximum ambient temperature and corresponding junction temperature.
- (4) LEDs must be stored in a clean environment.
(shelf life of sealed bags is 12 months at temperature 0~40 °C, 0~90 % RH).
- (5) After storage bag is opened, device subjected to soldering, solder reflow, or other high temperature processes must be:
 - a. Mounted within 672 hours (28 days) at an assembly line with a condition of no more than 30 °C / 60 % RH*_{Note 1}, or
 - b. Mounted within 24 hours (1 day) at an assembly line with a condition of more than 30 °C / 70 % RH*_{Note 2}, or
 - c. Stored at <10 % RH

*Note 1, 2: IPC/JEDEC J-STD-033A, Recommended Equivalent Total Floor Life Table

Package Type and Body Thickness	Moisture Sensitivity Level	Maximum Percent Relative Humidity						Temperature
		40%	50%	60%	70%	80%	90%	
Body Thickness <2.1mm	Level2a	∞	∞	28	1	1	1	30°C
		∞	∞	∞	2	1	1	25°C
		∞	∞	∞	2	2	1	20°C

- (6) Repack unused devices with anti-moisture packing, fold to close any opening and then store in a dry place.
- (7) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 °C.
- (8) Devices must be baked for 10~24 hours at 60 ± 5 °C, if baking is required.
- (9) 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.
- (10) VOCs (Volatile Organic Compounds) can be generated from adhesives, flux, hardener or organic additives used in luminaires (fixtures). Transparent LED silicone encapsulant is permeable to those chemicals and they may lead to a discoloration of encapsulant when they exposed to heat or light. This phenomenon can cause a significant loss of light emitted (output) from the luminaires. In order to prevent these problems, we recommend users to know the physical properties of materials used in luminaires and they must be carefully selected.

9. Precautions in Handling & Use

(11) Risk of sulfurization (or tarnishing)

The LED from Dongbu uses a silver-plated lead frame and its surface color may change to black (or dark colored) when it is exposed to sulfur (S), chlorine (Cl) or other halogen compound. Sulfurization of lead frame may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of lead frame, LED should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.