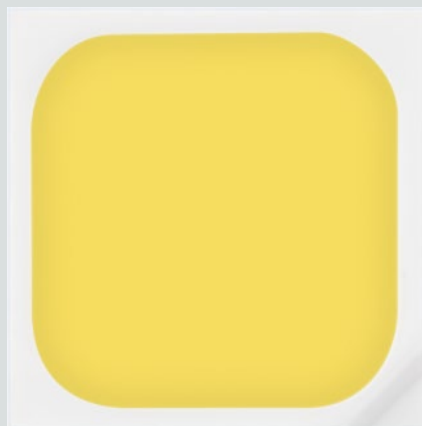


## Middle Power LED Series 3030

# LM302N NITE



### Features & Benefits

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



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## 1. Characteristics

### a) Absolute Maximum Rating

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	-
Pulse Forward Current	$I_{FP}$	300	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	5	kV	-

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

Item	Unit	Rank	Bin	Min.	Typ.	Max.
Forward Voltage (VF)	V	FA	AX	5.8	-	5.9
			AY	5.9	-	6.0
			AZ	6.0	-	6.1
			A1	6.1	-	6.2
Reverse Voltage (@ 5 mA)	V			0.7	-	1.2
Color Rendering Index (Ra)	-	5		80	-	-
Thermal Resistance (junction to solder point)	°C/W			-	12	-
Beam Angle	°			-	120	-

#### Note:

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

## 2. 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	3	3	2	6	F	N	5	F	A	T	0	S	0

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package Middle Power	<b>SPM</b>	
4 5	Color	<b>WH</b>	White
6	Product Version	<b>3</b>	Zener version
7 8 9	Form Factor	<b>326</b>	3.0 x 3.0 x 0.65 mm; 2 pads
10	Sorting Current	<b>F</b>	150 mA
11	Special specification	<b>N</b>	Human-centric Nite
12	CRI	<b>5</b>	Min. 80
13 14	Forward Voltage (V)	<b>FA</b>	5.8~6.2      Bin Code: <b>AX</b> 5.8~5.9 <b>AY</b> 5.9~6.0 <b>AZ</b> 6.0~6.1 <b>A1</b> 6.1~6.2
15 16	CCT (K)	<b>A☆</b> 1800      AN, AP, AQ, AR, AS, AT, AU <b>Y☆</b> 2200      YN, YP, YQ, YR, YS, YT, YU <b>W☆</b> 2700      Bin Code    WN, WP, WQ, WR, WS, WT, WU <b>V☆</b> 3000      VN, VP, VQ, VR, VS, VT, VU <b>U☆</b> 3500      UN, UP, UQ, UR, US, UT, UU <b>T☆</b> 4000      TN, TP, TQ, TR, TS, TT, TU	☆ : "0" ((MacAdam 5-step))    "3" (MacAdam 3- step)    "Y" (Kitting)
17 18	Luminous Flux (lm)	<b>S0</b>	Bin Code: S0

**a) Luminous Flux Bins ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ °C}$ )**

Nominal CCT (K)	CRI Min.	Product Code	Flux Bin	Flux Range ( $\Phi_v$ , lm)
1800	80	SPMWH3326FN5FAA☆S0	S0	80 - 95
2200	80	SPMWH3326FN5FAY☆S0	S0	90 - 105
2700	80	SPMWH3326FN5FAW☆S0	S0	95 - 110
3000	80	SPMWH3326FN5FAV☆S0	S0	105 - 120
3500	80	SPMWH3326FN5FAU☆S0	S0	110 - 125
4000	80	SPMWH3326FN5FAT☆S0	S0	110 - 125

**Note:**

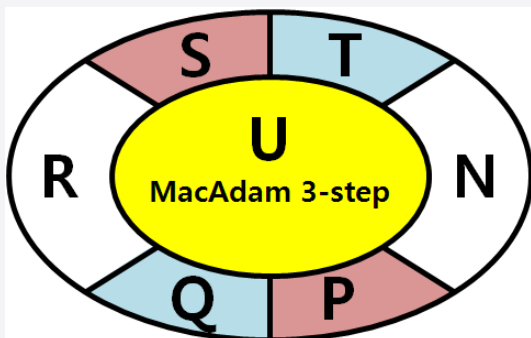
"☆" can be "0" (MacAdam 5-step), "3" (MacAdam 3-step), "Y" (Kitting)

## b) Kitting Rule

### 1) Y Kitting bin Concept

1. Under agreement between customer and SAMSUNG ELECTRONICS, SAMSUNG can supply kitting bin (Color).
2. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure.(below kitting simulation)

#### [Kitting example]



#### [Binning Information]

	Bin #1	Bin #2
	U	U
	N	R
CIE	P	S
	Q	T
IV	S0	S0

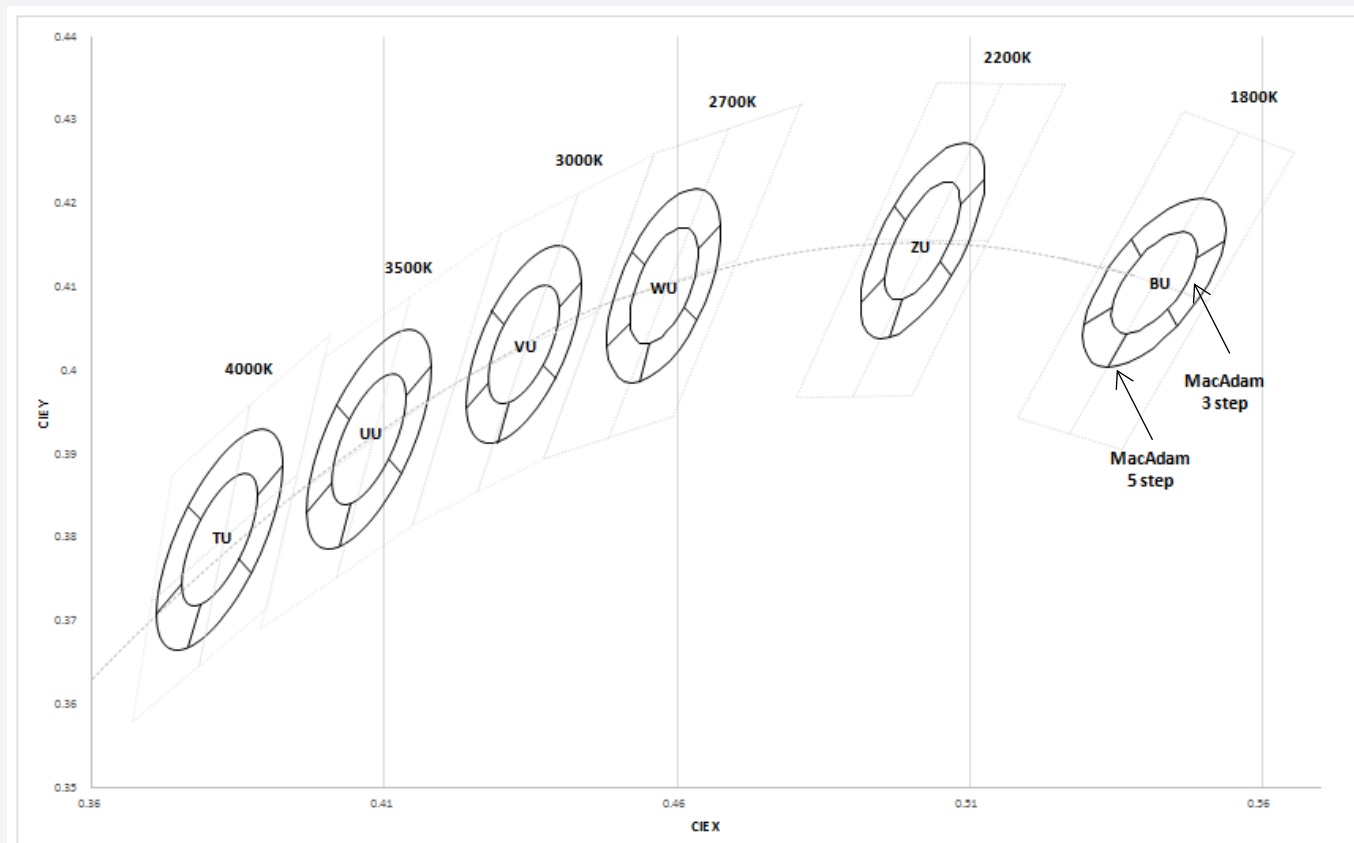
**c) Color Bins** ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

Nominal CCT (K)	CRI Min.	Product Code	Color Rank	Chromaticity Bins
1800	80	SPMWH3326FN5FAA0S0	A0 (MacAdam 5-step)	AN, AP, AQ, AR, AS, AT, AU
		SPMWH3326FN5FAA3S0	A3 (MacAdam 3-step)	AU
		SPMWH3326FN5FAAYS0	AY (Kitting)	AN, AP, AQ, AR, AS, AT, AU
2200	80	SPMWH3326FN5FAY0S0	Y0 (MacAdam 5-step)	YN, YP, YQ, YR, YS, YT, YU
		SPMWH3326FN5FAY3S0	Y3 (MacAdam 3-step)	YU
		SPMWH3326FN5FAYYS0	YY (Kitting)	YN, YP, YQ, YR, YS, YT, YU
2700	80	SPMWH3326FN5FAW0S0	W0 (MacAdam 5-step)	WN, WP, WQ, WR, WS, WT, WU
		SPMWH3326FN5FAW3S0	W3 (MacAdam 3-step)	WU
		SPMWH3326FN5FAWYS0	WY (Kitting)	WN, WP, WQ, WR, WS, WT, WU
3000	80	SPMWH3326FN5FAV0S0	V0 (MacAdam 5-step)	VN, VP, VQ, VR, VS, VT, VU
		SPMWH3326FN5FAV3S0	V3 (MacAdam 3-step)	VU
		SPMWH3326FN5FAVYS0	VY (Kitting)	VN, VP, VQ, VR, VS, VT, VU
3500	80	SPMWH3326FN5FAU0S0	U0 (MacAdam 5-step)	UN, UP, UQ, UR, US, UT, UU
		SPMWH3326FN5FAU3S0	U3 (MacAdam 3-step)	UU
		SPMWH3326FN5FAUYS0	UY (Kitting)	UN, UP, UQ, UR, US, UT, UU
4000	80	SPMWH3326FN5FAT0S0	T0 (MacAdam 5-step)	TN, TP, TQ, TR, TS, TT, TU
		SPMWH3326FN5FAT3S0	T3 (MacAdam 3-step)	TU
		SPMWH3326FN5FATYS0	TY (Kitting)	TN, TP, TQ, TR, TS, TT, TU

**d) Voltage Bins** ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

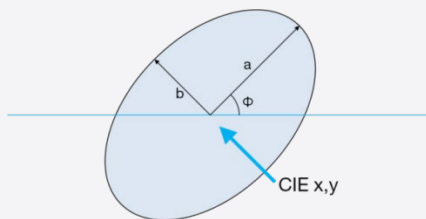
CRI ( $R_a$ ) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-	FA	AX	5.8~5.9
				AY	5.9~6.0
				AZ	6.0~6.1
				A1	6.1~6.2

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





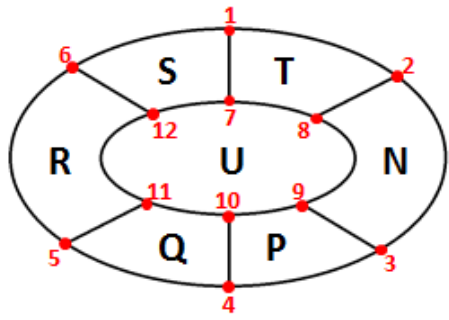
f) Chromaticity Region & Coordinates ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )



MacAdam	CCT (K)	Center point		Major-axis	Minor-axis	Rotation
		CIE x	CIE y	a	b	$\Phi$
3 step	1800	0.5416	0.4105	0.0087	0.0039	37
	2200	0.502	0.4155	0.0087	0.0039	49.27
	2700	0.4578	0.4101	0.0081	0.0042	53.7
	3000	0.4338	0.4030	0.0083	0.0041	53.22
	3500	0.4073	0.3917	0.0093	0.0041	54
	4000	0.3818	0.3797	0.0094	0.0040	53.72
5 step	1800	0.5416	0.4105	0.0145	0.0065	37
	2200	0.502	0.4155	0.0145	0.0065	49.27
	2700	0.4578	0.4101	0.0135	0.007	53.7
	3000	0.4338	0.4030	0.0138	0.0068	53.22
	3500	0.4073	0.3917	0.0155	0.0068	54
	4000	0.3818	0.3797	0.0157	0.0067	53.72

**Note:** Samsung maintains measurement tolerance of:  $C_x, C_y = \pm 0.005$

### g) Chromaticity Region & Coordinates



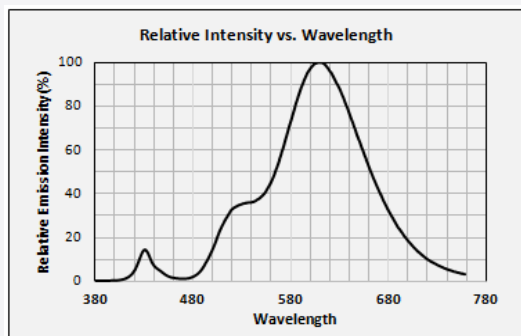
Region	1800K		2200K	
	CIE x	CIE y	CIE x	CIE y
1	0.5377	0.4157	0.4971	0.4197
2	0.5497	0.4207	0.5077	0.4271
3	0.5536	0.4155	0.5127	0.4229
4	0.5455	0.4053	0.5069	0.4113
5	0.5335	0.4003	0.4963	0.4039
6	0.5296	0.4055	0.4913	0.4081
7	0.5393	0.4136	0.4990	0.4180
8	0.5464	0.4166	0.5054	0.4225
9	0.5488	0.4135	0.5084	0.4199
10	0.5439	0.4074	0.5050	0.4130
11	0.5368	0.4044	0.4986	0.4085
12	0.5344	0.4075	0.4956	0.4111

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	0.3957	0.3764	0.3837
2	0.4619	0.4216	0.4382	0.4146	0.4125	0.4046	0.3871	0.3926
3	0.4675	0.4175	0.4437	0.4105	0.418	0.4005	0.3925	0.3887
4	0.4634	0.4059	0.4393	0.3989	0.4128	0.3877	0.3872	0.3758
5	0.4537	0.3986	0.4293	0.3913	0.4022	0.3788	0.3765	0.3668
6	0.4481	0.4028	0.4239	0.3954	0.3966	0.3828	0.3711	0.3707
7	0.4544	0.4126	0.4305	0.4054	0.404	0.3941	0.3786	0.3821
8	0.4603	0.417	0.4364	0.41	0.4104	0.3994	0.385	0.3874
9	0.4636	0.4145	0.4397	0.4075	0.4137	0.397	0.3882	0.3851
10	0.4612	0.4076	0.4371	0.4005	0.4106	0.3893	0.385	0.3773
11	0.4553	0.4032	0.4311	0.396	0.4042	0.384	0.3786	0.372
12	0.452	0.4057	0.4279	0.3984	0.4009	0.3864	0.3754	0.3743

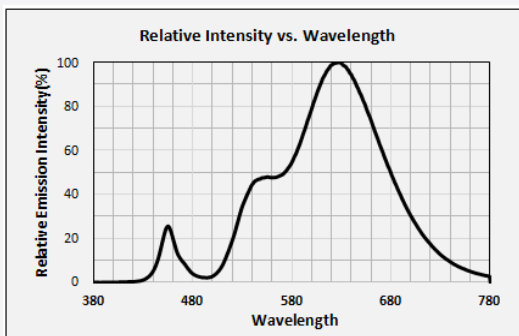
### 3. Typical Characteristics Graphs

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

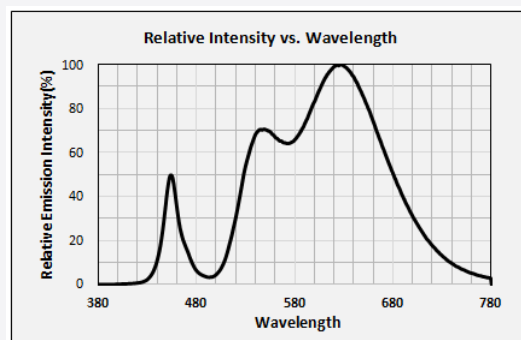
CCT : 1800K (80 CRI)



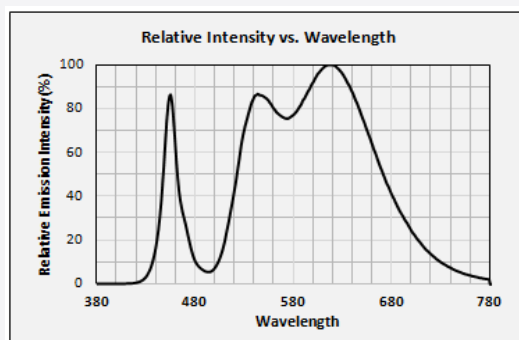
CCT : 2200K (80 CRI)



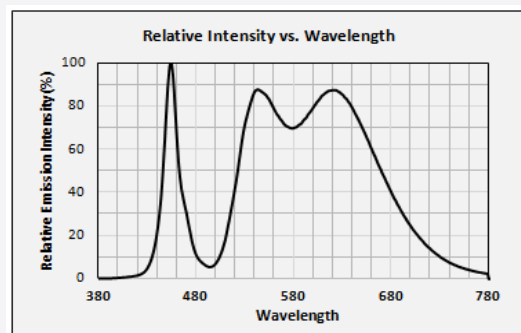
CCT : 2700K (80 CRI)



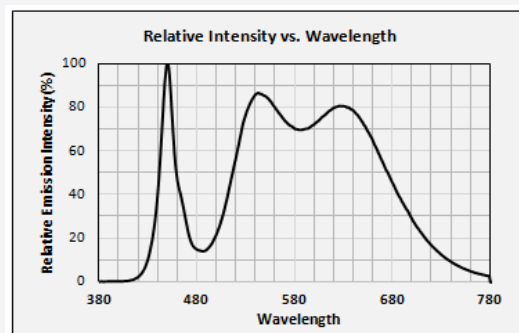
CCT : 3000K (80 CRI)



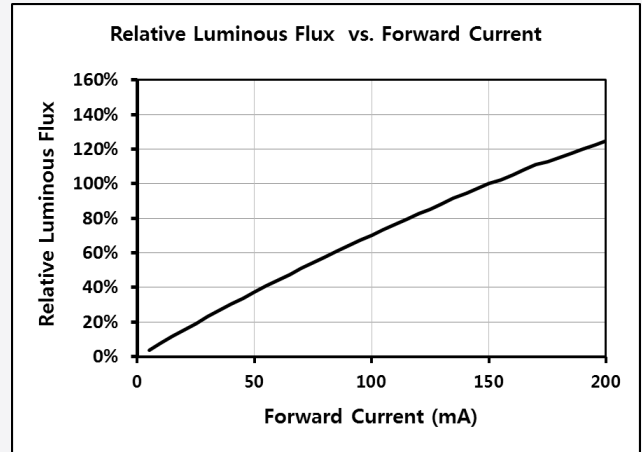
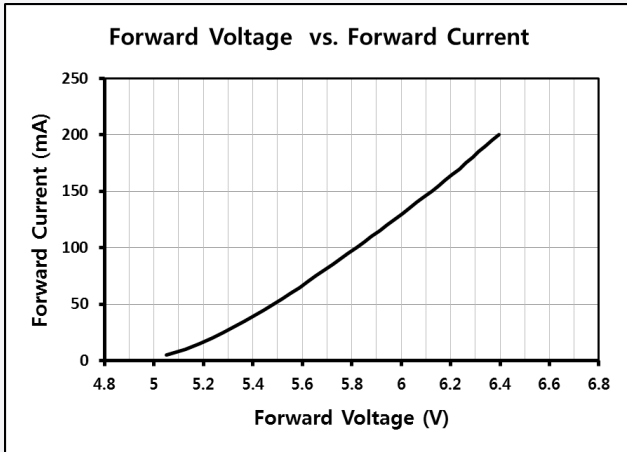
CCT : 3500K (80 CRI)



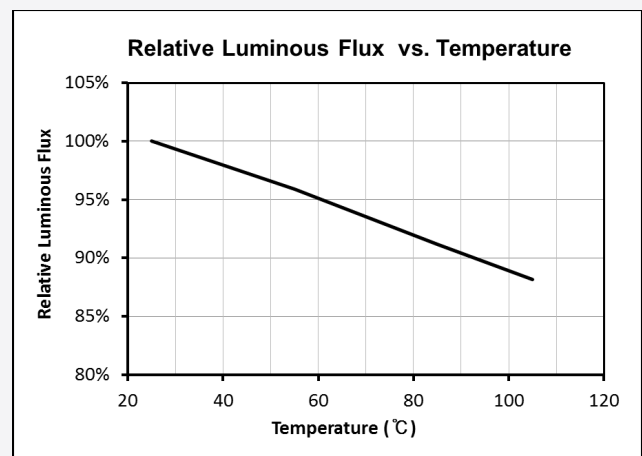
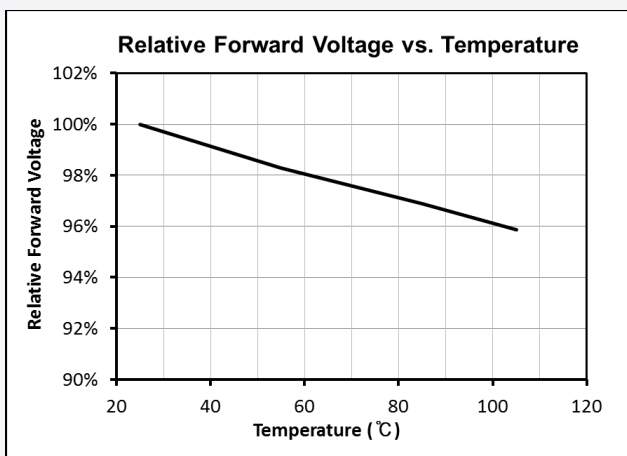
CCT : 4000K (80 CRI)



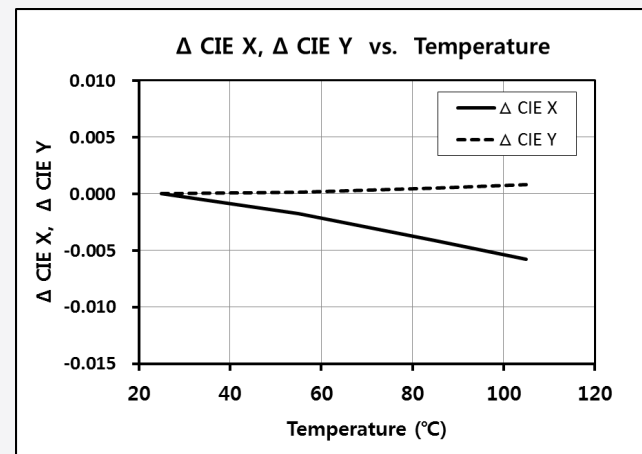
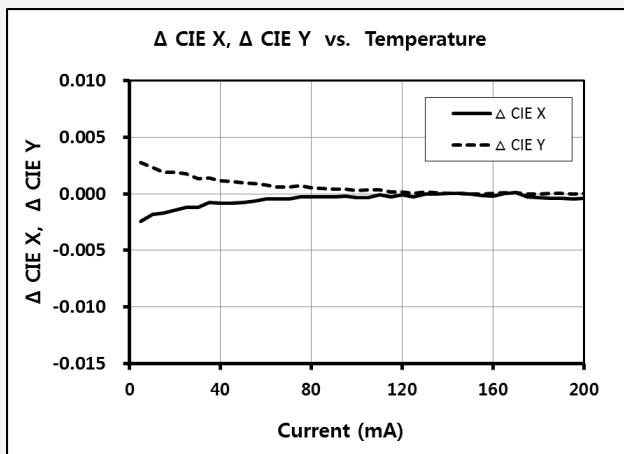
### b) Forward Current Characteristics ( $T_s = 25^\circ\text{C}$ )



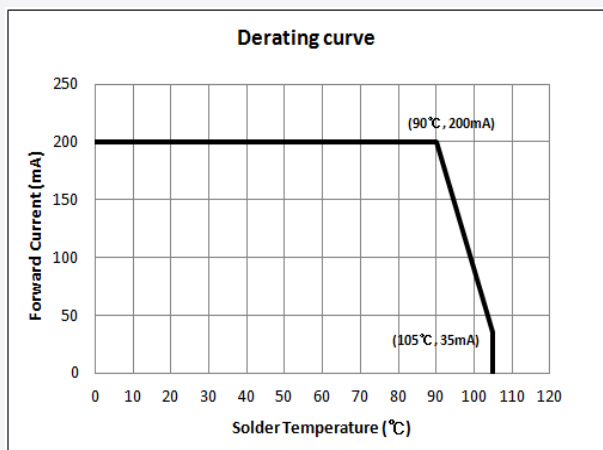
### c) Temperature Characteristics ( $I_f = 150\text{ mA}$ )



### d) Color Shift Characteristics ( $T_a=25^\circ\text{C}$ , $I_f=150\text{mA}$ )



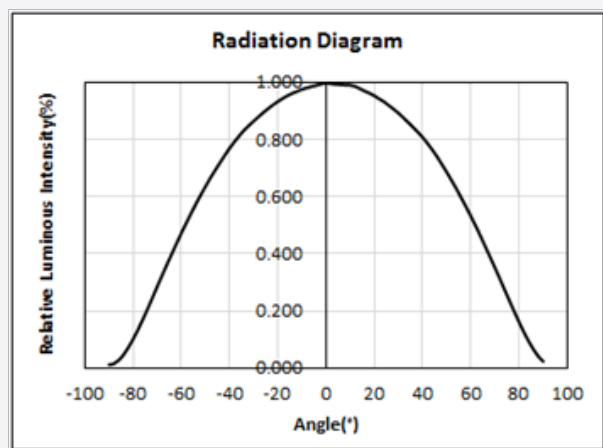
### e) Derating curve



**Note:** All characteristics shown are for reference only.

Derating characteristics will meet the criteria as detailed in the Reliability section within this specification.

### f) Beam angle Characteristics



### g) Melanopic ratio ( $T_s = 25\text{ }^{\circ}\text{C}$ )

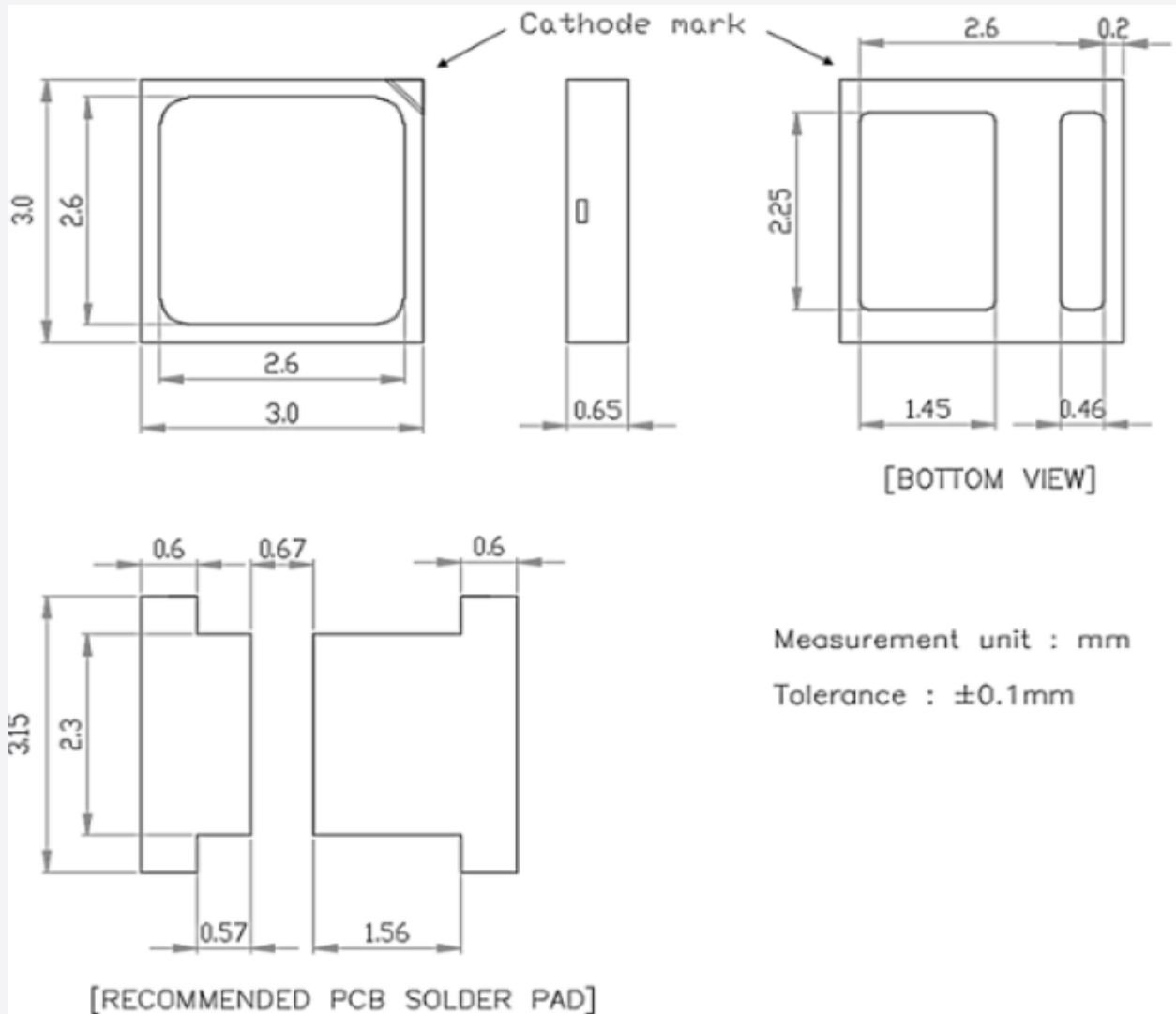
CRI Min	Nominal CCT(K)	MDER* (Typical, 150mA)	M/P Ratio** (Typical, 150mA)
80	1800	0.18	0.20
	2200	0.25	0.28
	2700	0.34	0.37
	3000	0.43	0.48
	3500	0.51	0.56
	4000	0.58	0.64

**Note:** The provision melanopic ratio is for design reference only. There can be production variations associated with each individual LED.

\* MDER stands for Melanopic Daylight Efficacy Ratio following the definition in CIE S 0.25:2018.

\*\* M/P Ratio stands for Melanopic Photopic Ratio, also Known as MEER, Melanopic Equal-Energy Efficacy Ratio.

#### 4. Outline Drawing & Dimension



#### Notes:

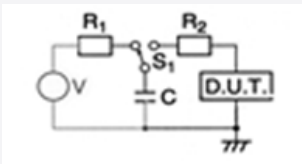
- 1) This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).
- 2)  $T_s$  point and measurement method:
  - ① Measure one point at the cathode pad, if necessary remove PSR of PCB to reach  $T_s$  point.
  - ② All pads must be soldered to the PCB to dissipate heat properly,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

##### a) Test Items

Test Item	Test Condition	Test Hour / Cycle	Sample No.
High Temperature Life Test	85 °C, DC 150 mA	1000 h	22
High Temperature Humidity Life Test	60 °C, 90 % RH, DC 150 mA	1000 h	22
Low Temperature Life Test	-40 °C, DC 150 mA	1000 h	22
Thermal Cycle	-40 °C / 15 min ↔ 100 °C / 15 min → Hot plate 180 °C	500 cycles	100
High Temperature Storage	100 °C	1000 h	11
Low Temperature Storage	-40 °C	1000 h	11
ESD (HBM)	 <div> R<sub>1</sub>: 10 MΩ  R<sub>2</sub>: 1.5 kΩ  C: 100 pF  V: ±5 kV </div>	5 times	30

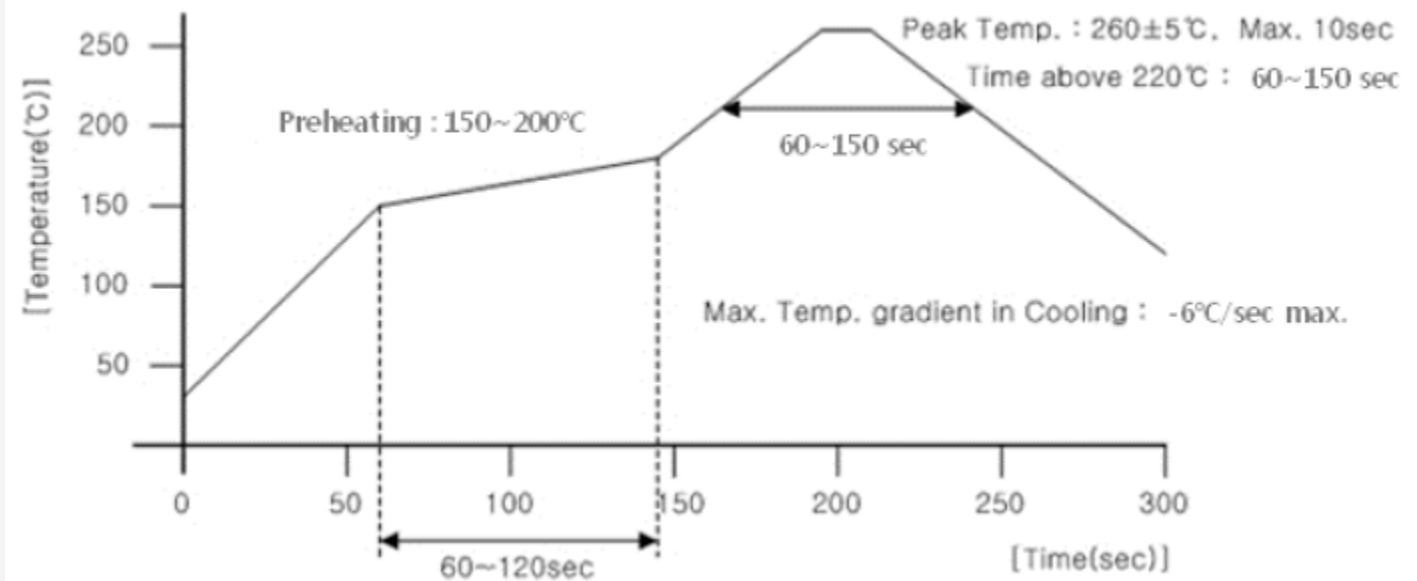
#### b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T <sub>s</sub> = 25 °C)	Limit	
			Min	Max
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 150 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ <sub>v</sub>	I <sub>F</sub> = 150 mA	Init. Value * 0.7	Init. Value * 1.1

## 6. Soldering Conditions

### a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



### b) Manual Soldering Conditions

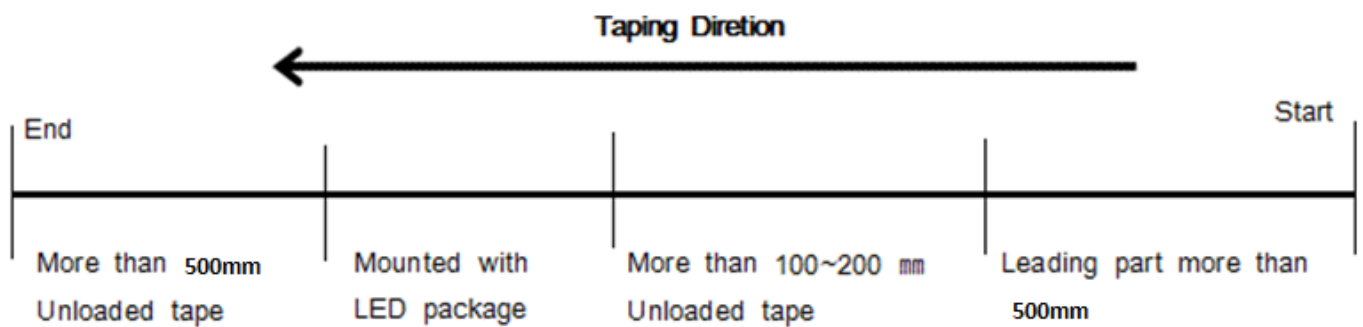
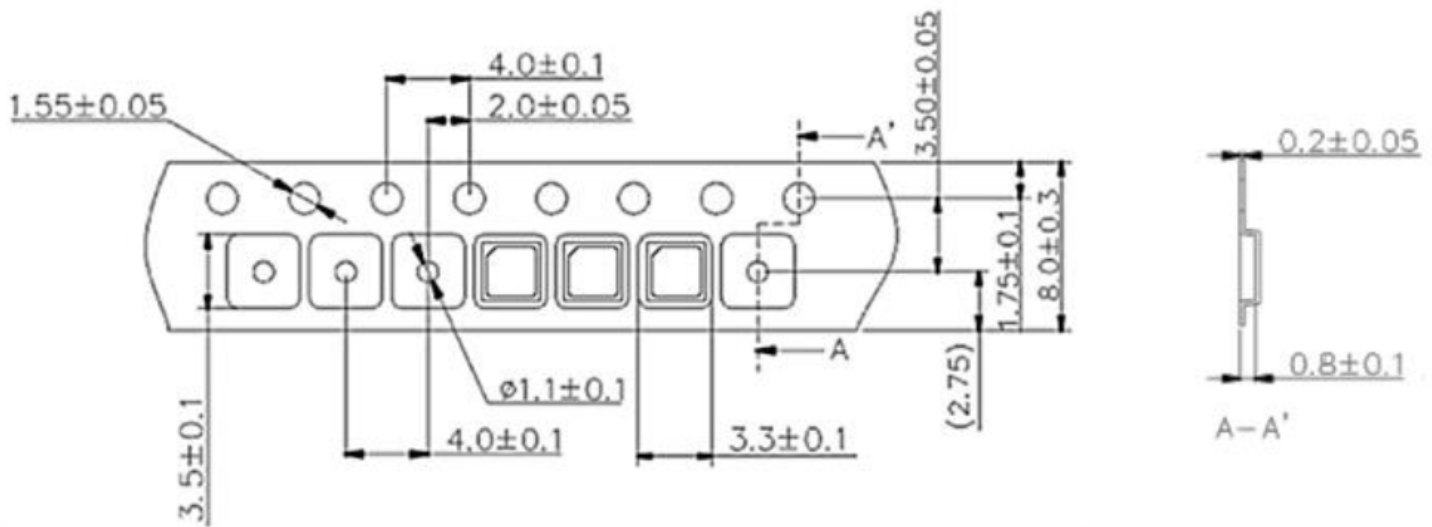
Not more than 5 seconds @ max. 300 °C, under soldering iron.



## 7. Tape & Reel

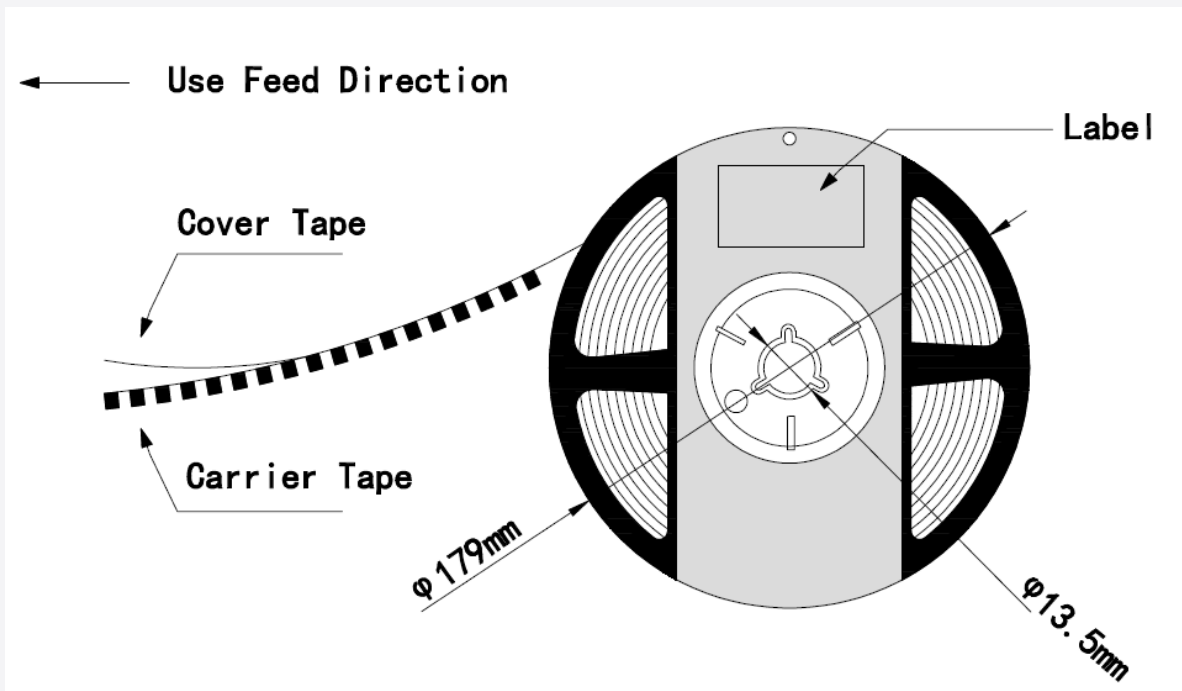
### a) Taping Dimension

(unit: mm)



## b) Reel Dimension

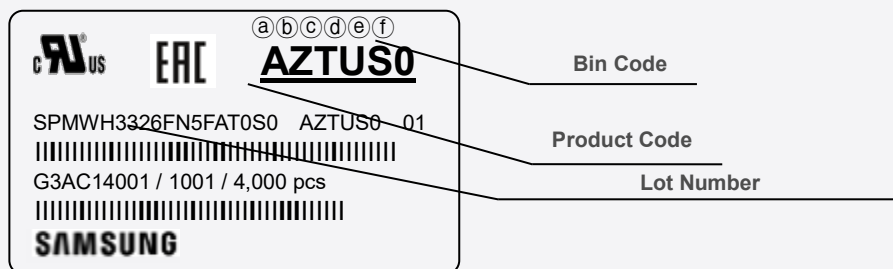
(unit: mm)

**Notes:**

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) Cumulative Tolerance: Cumulative tolerance / 10 pitches is  $\pm 0.2$  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  $10^\circ$  angle to the carrier tape
- 4) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

## 8. Label Structure

### a) Label Structure



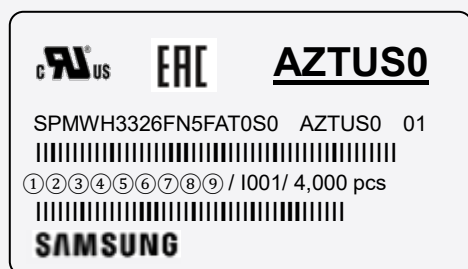
Note: Denoted bin code and product code above is only an example (see description on page 4)

Bin Code:

- ⒶⒷ: Forward Voltage bin (refer to page 7)
- ⒸⒹ: Chromaticity bin (refer to page 8-10)
- ⒺⒻ: Luminous Flux bin (refer to page 5)

### b) Lot Number

The lot number is composed of the following characters:

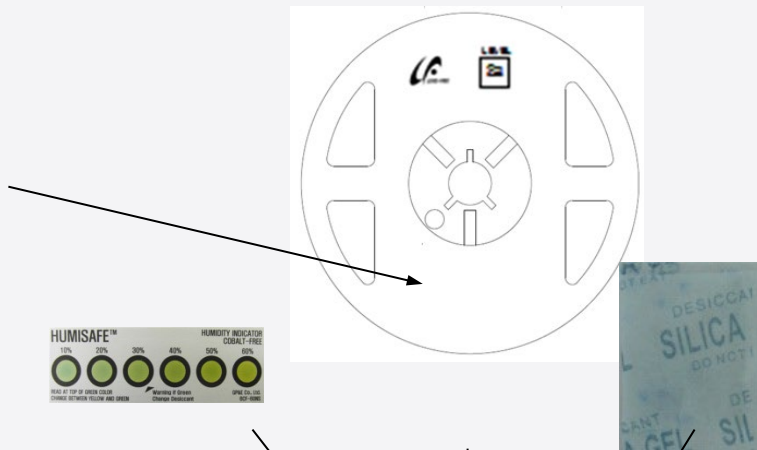
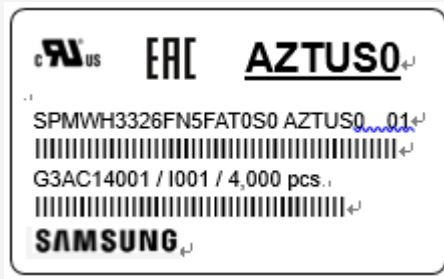


- ①② : Production site (G3 : Shenzhen,China)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (C: 2018, D: 2019, E: 2020...)
- ⑤ : Month (1~9, A, B, C)
- ⑥ : Day (1~9, A, B~V)
- ⑦⑧⑨ : Product serial number (001 ~ 999)

## 9. Packing Structure

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

#### Reel



#### Aluminum Vinyl Packing Bag

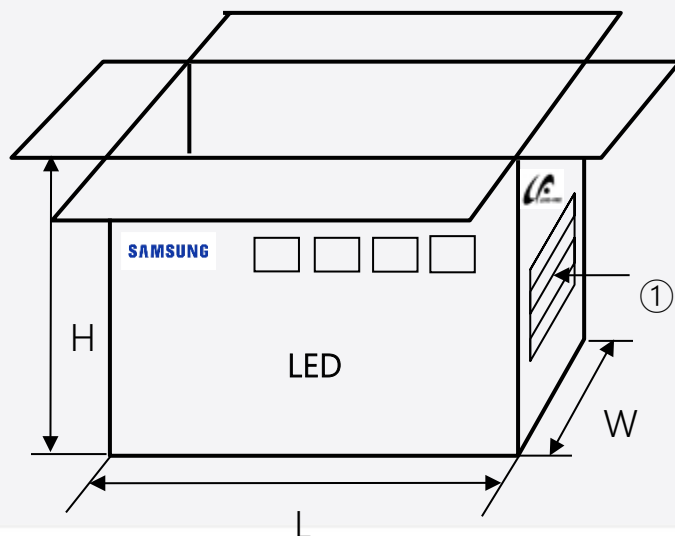


#### Outer Box

##### 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



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

### Reel

#### Kitting 'A'



#### Kitting 'B'

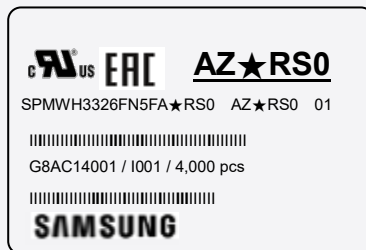


### Aluminum Vinyl Packing Bag

#### Kitting 'A'



#### Kitting 'B'



### Outer Box

#### Kitting 'A'



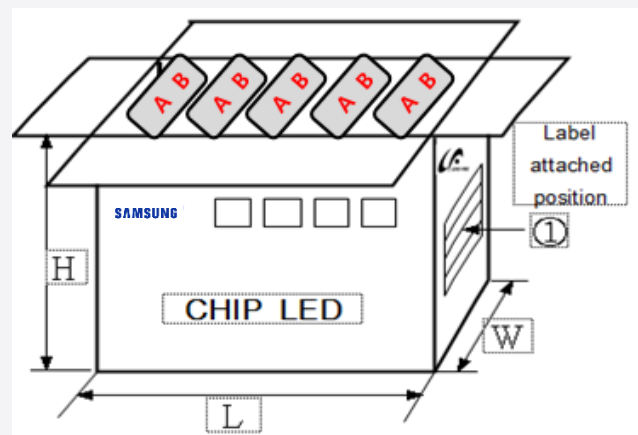
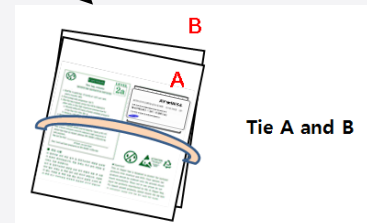
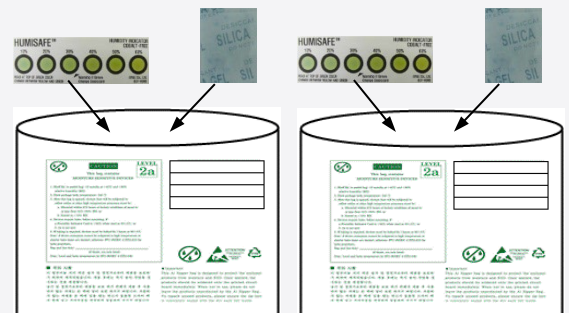
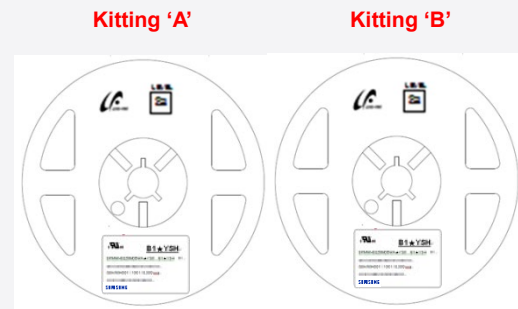
#### Kitting 'B'



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
7 inch S	245 ± 5	220 ± 5	86 ± 5	Up to 5 reels



## c) Aluminum Vinyl Packing Bag



**CAUTION**

This bag contains  
**MOISTURE SENSITIVE DEVICES**

**LEVEL 2a**

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 >60% when read at 23±5°C, or
  - b. 2a is not met.
5. 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



SPMWH3326FN5FAT0S0 AZTUS0 01  
 G3AC14001 / I001 / 4,000 pcs  
**SAMSUNG**






**ATTENTION**  
OBSERVE PRECAUTIONS  
FOR HANDLING  
ELECTROSTATIC  
SENSITIVE  
DEVICES



**■ 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.

## c) Silica Gel &amp; Humidity Indicator Card inside Aluminum Vinyl Bag

( This image is for reference only. Silicagel and humidity indicator shapes maybe different)





## 10. Precautions in Handling & Use

- 1) For over-current-proof function, customers are recommended to apply resistors to prevent sudden change of the current caused by slight shift of the voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use.
- 3) When the LEDs illuminate, operating current should be decided after considering the ambient maximum temperature.
- 4) LEDs must be stored in a clean environment. Shelf life of sealed bags: 12 months, temperature ~40 °C, ~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, or
  - b. Stored at <10 % RH

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

- 6) Repack unused products 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. 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 leak 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 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 (fixtures). In order to prevent these problems, we recommend users to know the physical properties of the materials used in luminaires, and they must be selected carefully.
- 11) Risk of sulfurization (or tarnishing)  
 The LED from Samsung Electronics Co., Ltd. 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.

# Legal and additional information.

## About Samsung Electronics Co., Ltd.

Samsung inspires the world and shapes the future with transformative ideas and technologies.

The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions. For the latest news, please visit the Samsung Newsroom at [news.samsung.com](http://news.samsung.com).

Samsung provides limited warranty for its LED products, the full text of which is available at <https://www.samsung.com/led/support/warranties>

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The Samsung logo, consisting of the word "SAMSUNG" in a bold, blue, sans-serif typeface.