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

SAMSUNG

Table of Contents

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +85	℃	-
Storage Temperature	T_{stg}	-40 ~ +100	℃	-
LED Junction Temperature	T_j	125	℃	-
Forward Current	I_F	200	mA	-
Pulse Forward Current	I_{FP}	300	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260 <10	℃ s	-
ESD (HBM)	-	5	kV	-

b) Electro-optical Characteristics (I_F = 150 mA, T_s = 25 ℃)

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 (R_a)	-	5		80	-	-
Thermal Resistance (junction to solder point)	℃/W			-	12	-
Beam Angle	°			-	120	-

Note:

Samsung maintains measurement tolerance of: forward voltage = ±0.1 V, luminous flux = ±5 %, CRI = ±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	B	T	0	S	0

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package Middle Power	**SPM**	
4 5	Color	**WH**	White
6	Product Version	**3**	Zener version
7 8 9	Form Factor	**326**	3.0 x 3.0 x 0.65 mm; 2 pads
10	Sorting Current	**F**	150 mA
11	Special specification	**N**	Human-centric Nite
12	CRI	**5**	Min. 80
13 14	Forward Voltage (V)	**FA**	5.8~6.2 Bin Code: **AX** 5.8~5.9, **AY** 5.9~6.0, **AZ** 6.0~6.1, **A1** 6.1~6.2
15 16	CCT (K)	**A☆**	1800 Bin Code: AN, AP, AQ, AR, AS, AT, AU
		Y☆	2200 YN, YP, YQ, YR, YS, YT, YU
		W☆	2700 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
			☆ : "0" ((MacAdam 5-step)) "3" (MacAdam 3- step) "Y" (Kitting)
17 18	Luminous Flux (lm)	**S0**	Bin Code: S0

a) Luminous Flux Bins (I_F = 150 mA, T_s = 25 °C)

Nominal CCT (K)	CRI Min.	Product Code	Flux Bin	Flux Range (Φ_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:

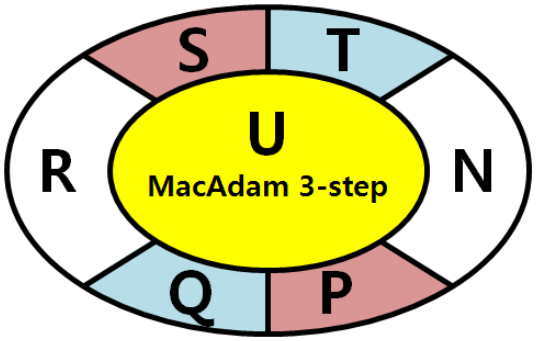
"☆" can be "0" (MacAdam 5-step), “3” (MacAdam 3-step), "Y" (Kitting)

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
CIE	U	U
	N	R
	P	S
	Q	T
IV	S0	S0

c) Color Bins (I_F = 150 mA, T_s = 25 °C)

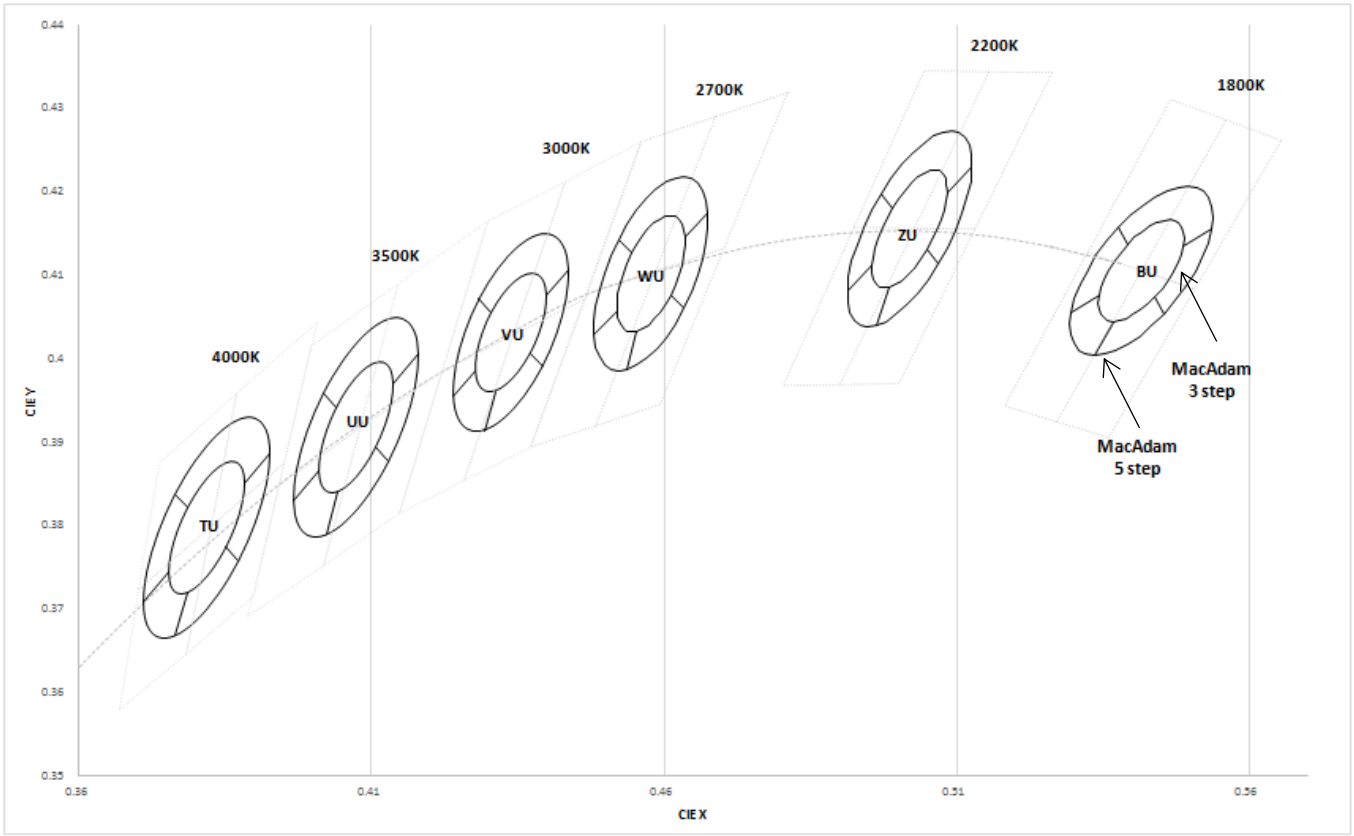
Nominal CCT (K)	CRI Min.	Product Code	Color Rank	Chromaticity Bins
1800	80	SPMWH3326FN5FAA0S0	A0 (MacAdam 5-step)	AN, AP, AQ, AR, AS, AT, AU
		SPMWH3326FN5FAA3S0	A3 (MacAdam 3-step)	AU
		SPMWH3326FN5FAAYS0	AY (Kitting)	AN, AP, AQ, AR, AS, AT, AU
2200	80	SPMWH3326FN5FAY0S0	Y0 (MacAdam 5-step)	YN, YP, 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 mA, T_s = 25 °C)

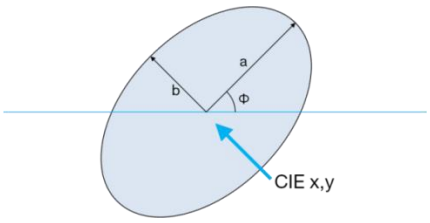
CRI (R_a) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-	FA	AX	5.8~5.9
				AY	5.9~6.0
				AZ	6.0~6.1

	A1	6.1~6.2

e) Chromaticity Region & Coordinates (I_F = 150 mA, T_S = 25 °C)



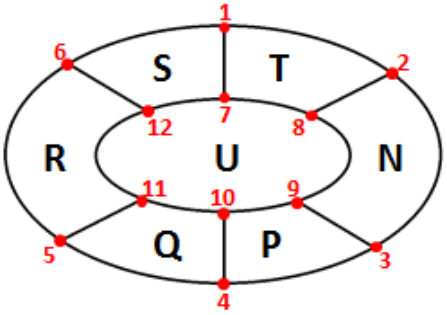
f) Chromaticity Region & Coordinates (I_F = 150 mA, T_s = 25 °C)



MacAdam	CCT (K)	Center point		Major-axis	Minor-axis	Rotation
		CIE x	CIE y	a	b	Φ
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: Cx, Cy = ±0.005

g) Chromaticity Region & Coordinates



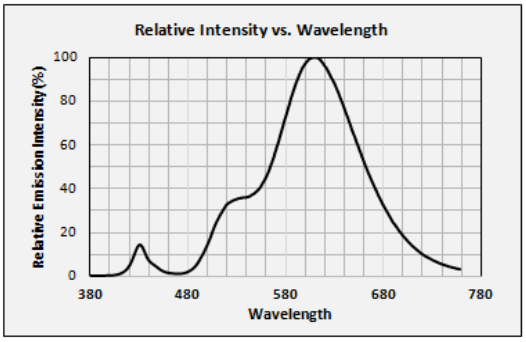
Region	1800K		2200K	
	CIE x	CIE y	CIE x	CIE y
1	0.5377	0.4157	0.4971	0.4197
2	0.5497	0.4207	0.5077	0.4271
3	0.5536	0.4155	0.5127	0.4229
4	0.5455	0.4053	0.5069	0.4113
5	0.5335	0.4003	0.4963	0.4039
6	0.5296	0.4055	0.4913	0.4081
7	0.5393	0.4136	0.4990	0.4180
8	0.5464	0.4166	0.5054	0.4225
9	0.5488	0.4135	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

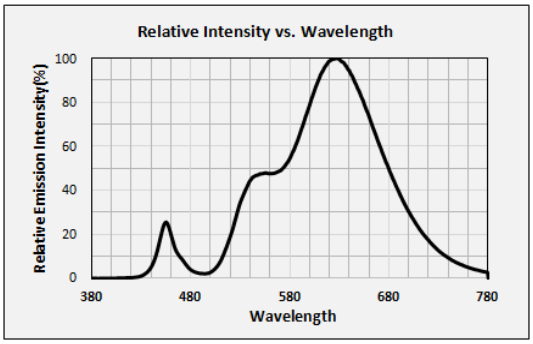
3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F = 150 mA, T_s = 25 °C)

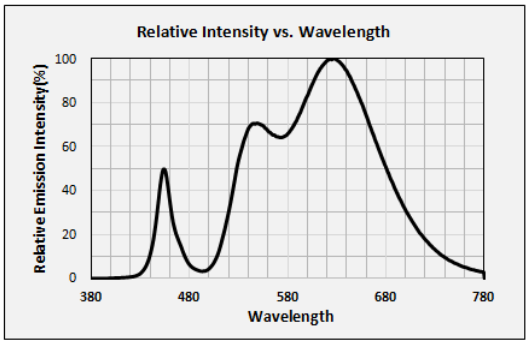
CCT : 1800K (80 CRI)



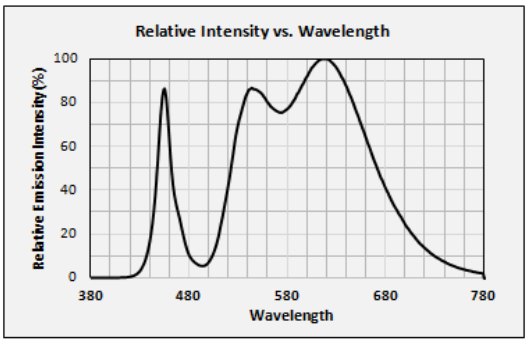
CCT : 2200K (80 CRI)



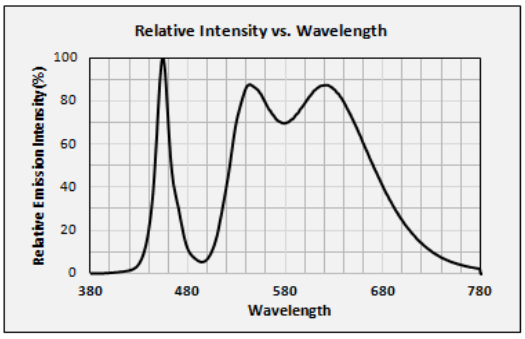
CCT : 2700K (80 CRI)



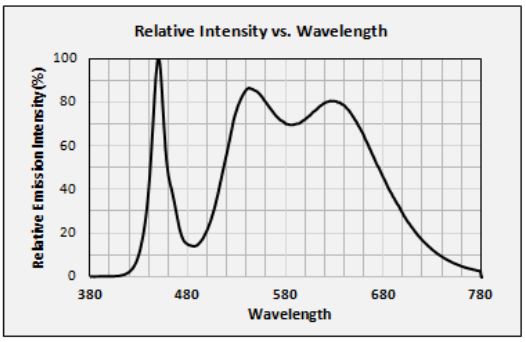
CCT : 3000K (80 CRI)



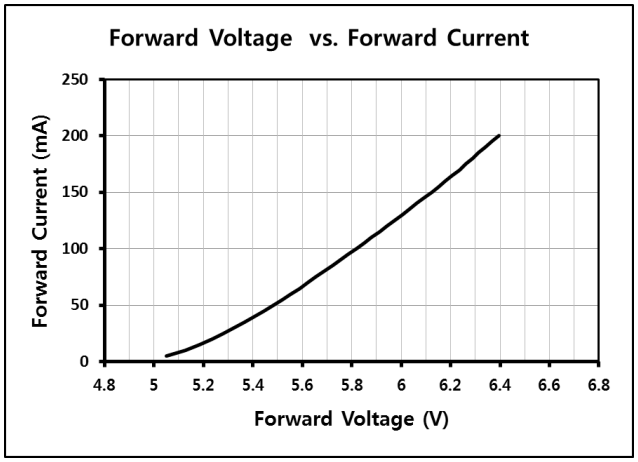
CCT : 3500K (80 CRI)

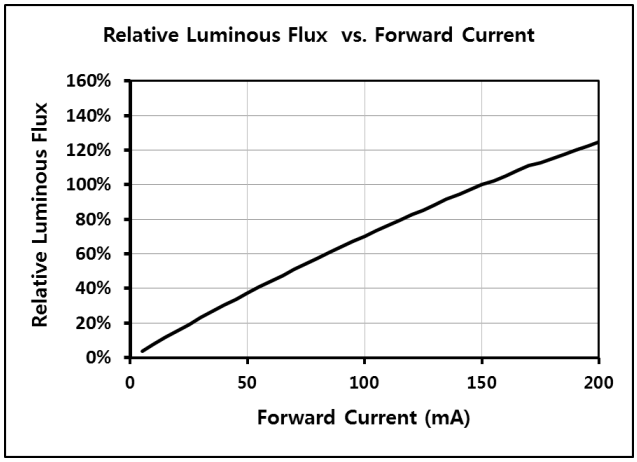


CCT : 4000K (80 CRI)

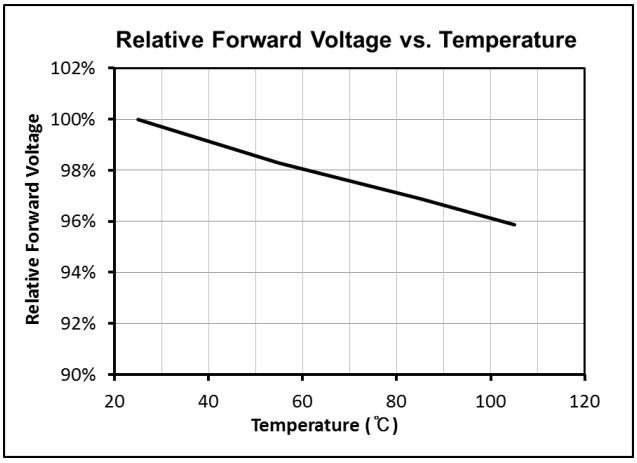


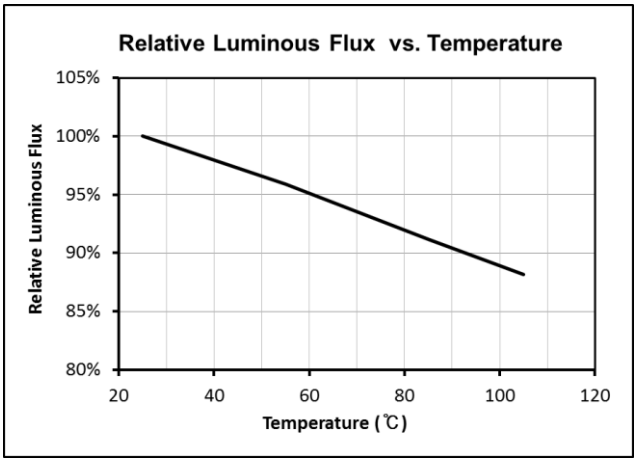
b) Forward Current Characteristics (T_s = 25 °C)



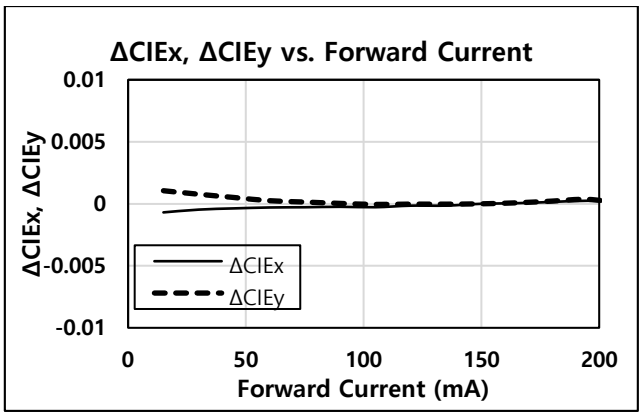


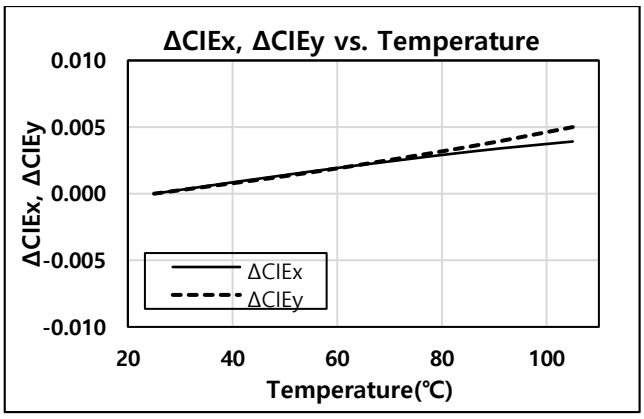
c) Temperature Characteristics (I_F = 150 mA)





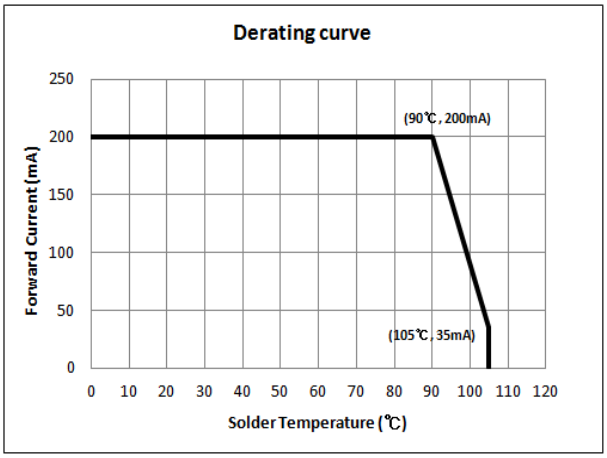
d) Color Shift Characteristics (Ta=25℃, IF=150mA)





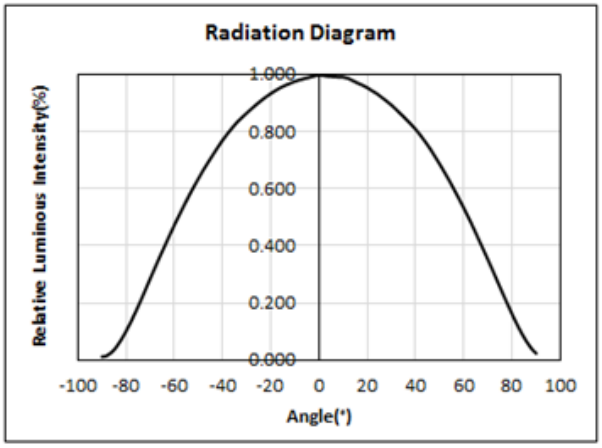
Note: This information is provided just for reference only as a design guide with 2700K.

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

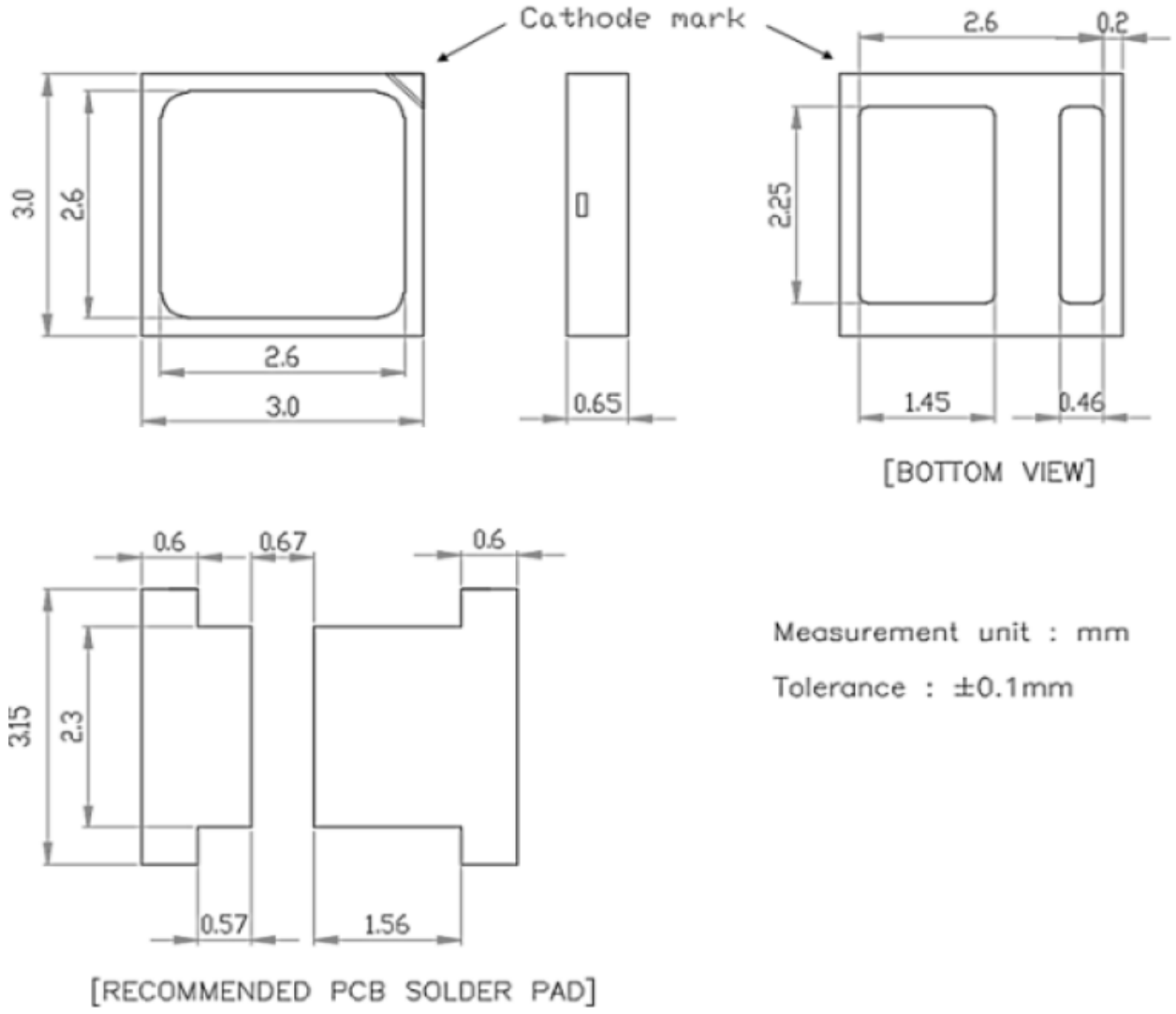


g) Melanopic ratio (T_s = 25 °C)

Item	CRI	Nominal CCT (K)	150mA (Typical)
Melanopic ratio	80	1800K	0.2
		2200K	0.28
		2700K	0.37
		3000K	0.48
		3500K	0.56
		4000K	0.64

Note: This information is provided just for reference only as a design guide.

4. Outline Drawing & Dimension



Notes:

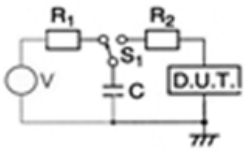
1) This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).
2) T_s point and measurement method:
   ① Measure one point at the cathode pad, if necessary remove PSR of PCB to reach T_s point.
   ② All pads must be soldered to the PCB to dissipate heat properly, otherwise the 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)	 R_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ±5 kV	5 times	30

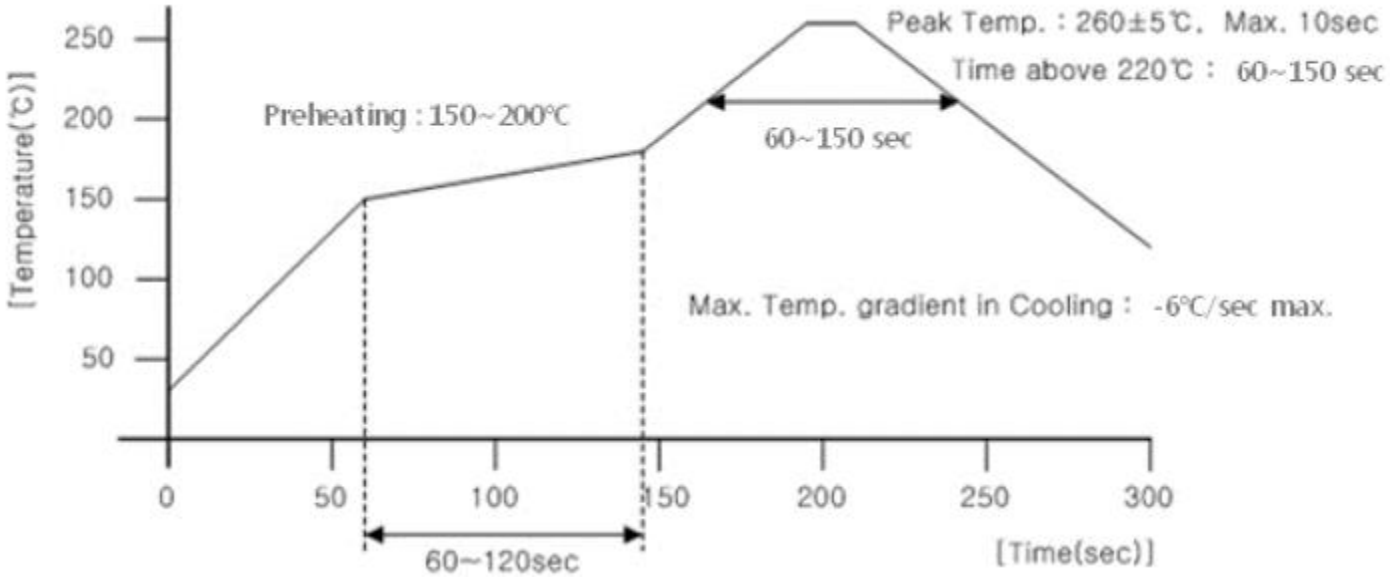
b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_s = 25 °C)	Limit	
			Min	Max
Forward Voltage	V_F	I_F = 150 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ_v	I_F = 150 mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



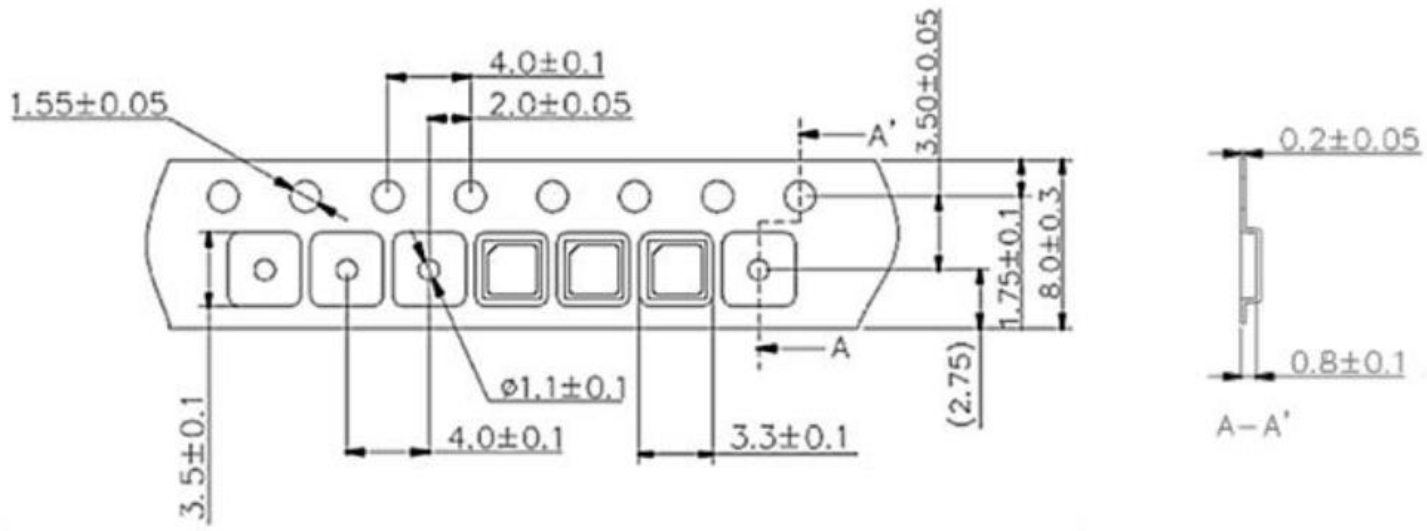
b) Manual Soldering Conditions

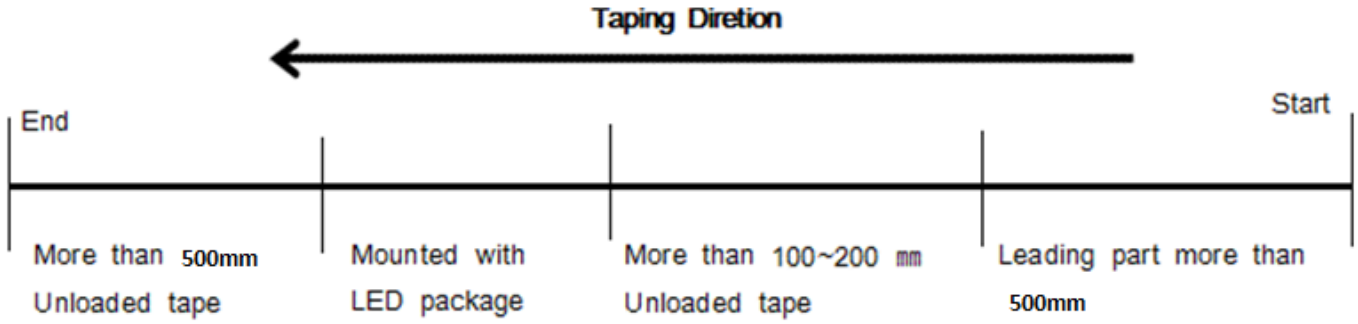
Not more than 5 seconds @ max. 300 °C, under soldering iron.

7. Tape & Reel

a) Taping Dimension

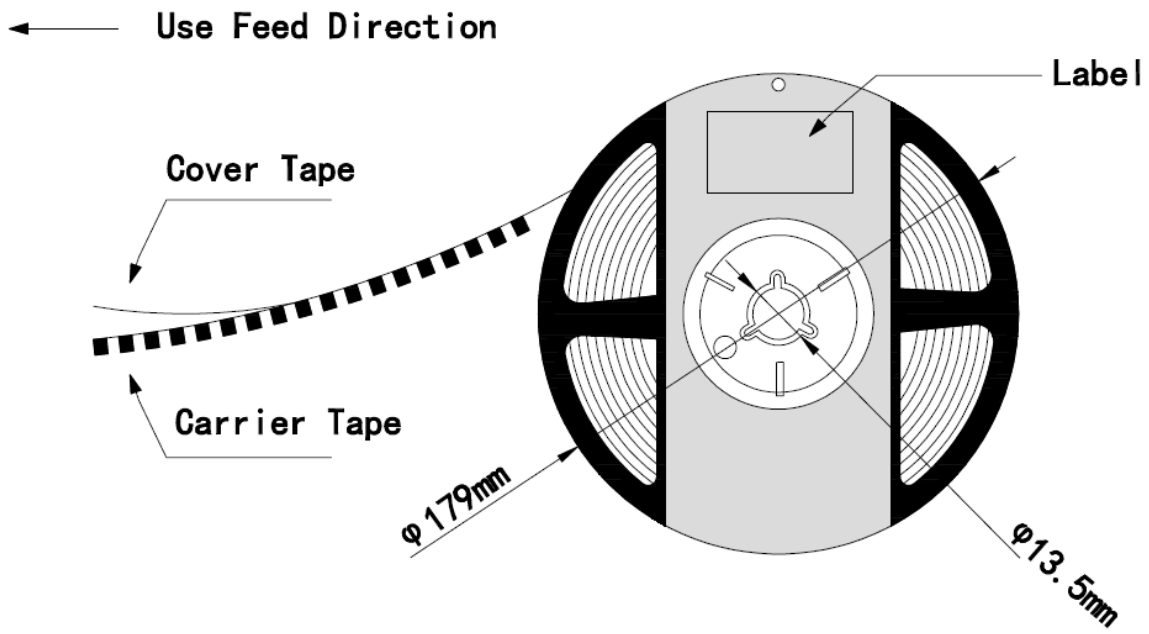
(unit: mm)





b) Reel Dimension

(unit: mm)

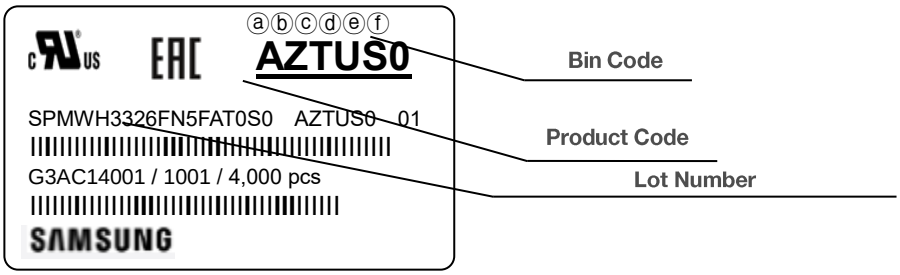


Notes:

1) Quantity: The quantity/reel is 4,000 pcs
2) Cumulative Tolerance: Cumulative tolerance / 10 pitches is ±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

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:

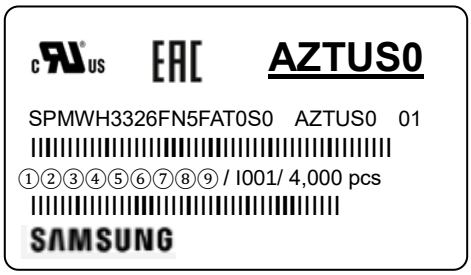
ⓐⓑ: Forward Voltage bin (refer to page 7)

ⓒⓓ: 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)

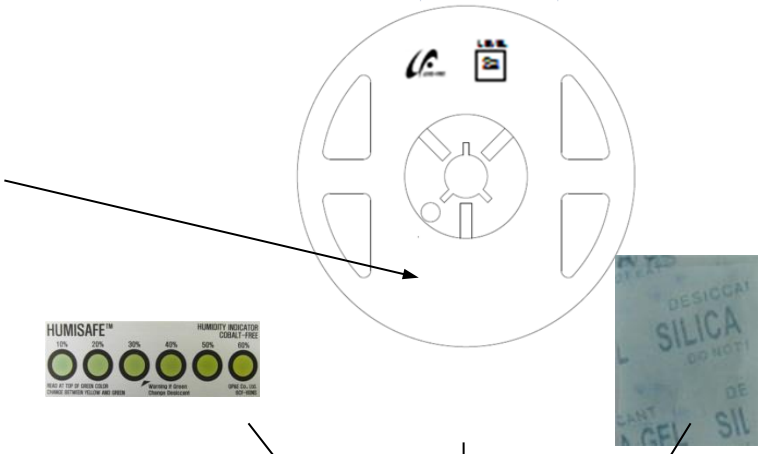
⑥ : Day (1~9, A, B~V)

⑦⑧⑨ : Product serial number (001 ~ 999)

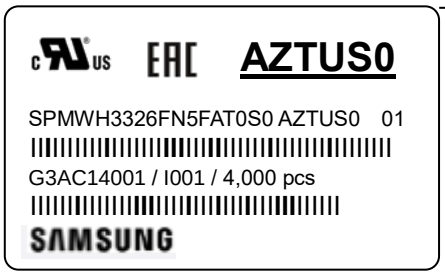
9. Packing Structure

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

Reel



Aluminum Vinyl Packing Bag

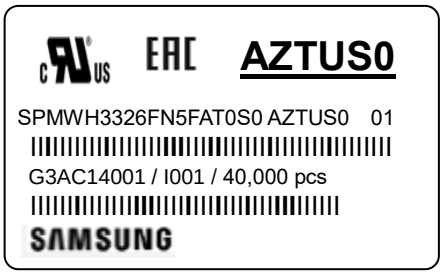


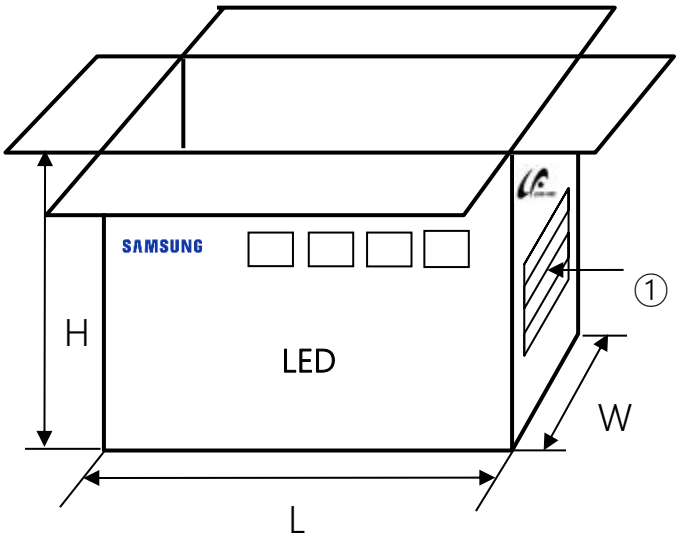
Outer Box

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'

AZ★NS0

SPMWH3326FN5FA★NS0 AZ★NS0 01

G3AC14001 / I001 / 4,000 pcs

SAMSUNG

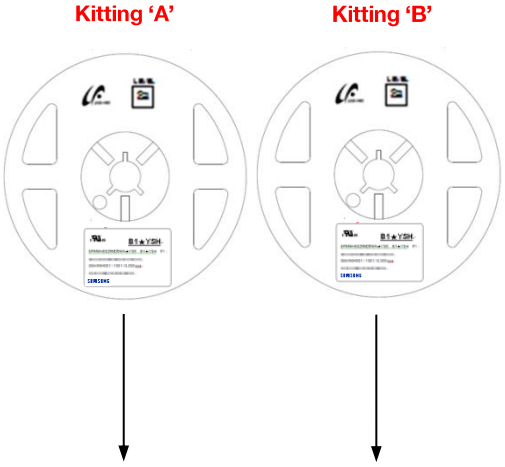
Kitting 'B'

AZ★RS0

SPMWH3326FN5FA★RS0 AZ★RS0 01

G3AC14001 / I001 /4,000 pcs

SAMSUNG



Aluminum Vinyl Packing Bag

Kitting 'A'

AZ★NS0

SPMWH3326FN5FA★NS0 AZ★NS0 01

G8AC14001 / I001 / 4,000 pcs

SAMSUNG

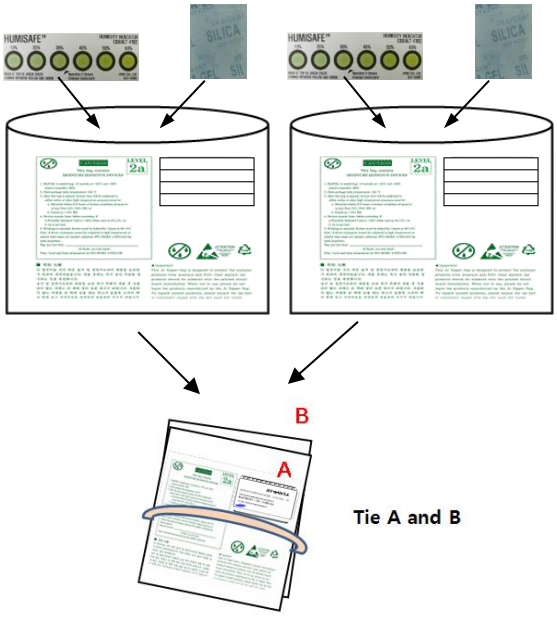
Kitting 'B'

AZ★RS0

SPMWH3326FN5FA★RS0 AZ★RS0 01

G8AC14001 / I001 / 4,000 pcs

SAMSUNG



Outer Box

Kitting 'A'

AZ★NS0

SPMWH3326FN5FA★NS0 AZ★NS0 01

G8AC14001 / I001 /20,000 pcs

SAMSUNG

[BOX Label]

Kitting 'B'

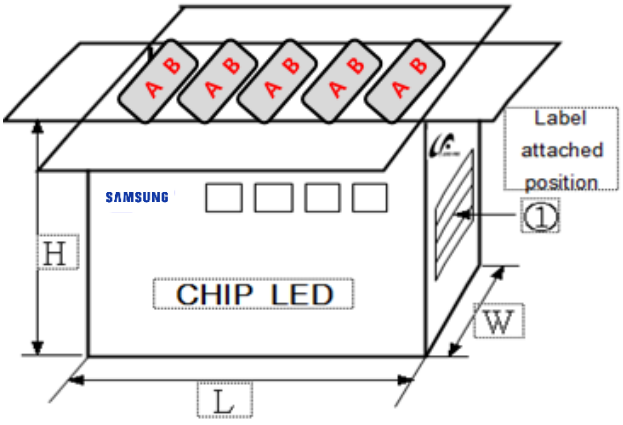
AZ★RS0

SPMWH3326FN5FA★NS0 AZ★RS0 01

G8AC14001 / I001 / 20,000 pcs

SAMSUNG

[BOX Label]



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

c) Silica Gel & 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 ºC, ~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 ºC / 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 ºC.
8) Devices must be baked for 10~24 hours at 60 ± 5 ºC, 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.

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