Middle Power LED Series
3030

LM302Z Plus

CRI80

Features & Benefits

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

Table of Contents

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Operating Solder Temperature	T_a	-40 ~ +105	ºC	-
Storage Temperature	T_{stg}	-40 ~ +100	ºC	-
LED Junction Temperature	T_j	125	ºC	-
Forward Current	I_F	200	mA	-
Pulse Forward Current	I_{Fp}	300	mA	Duty 1/10, pulse width 10 ms
Assembly Process Temperature	-	260 <10	ºC s	-
ESD (HBM)	-	5	kV	-

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

Item	Nominal CCT (K)	Rank	Bin	Min.	Typ.	Max.	Unit
Forward Voltage (V_F)		GB	BZ	5.8	-	6.0	V
			B1	6.0	-	6.2	
			B2	6.2		6.4	
			B3	6.4	-	6.6	
Reverse Voltage (@ 5 mA)				0.7	-	1.2	V
Color Rendering Index (R_a)		5		80	-	-	-
Thermal Resistance (junction to solder point)				-	12	-	ºC/W
Beam Angle				-	120	-	º

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	P	5	G	B	V	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	Chromaticity Coordinates	P	MacAdam
12	CRI	5	Min. 80
13 14	Forward Voltage (V)	GB	5.8~6.6 Bin Code: BZ 5.8~6.0; B1 6.0~6.2; B2 6.2~6.4; B3 6.4~6.6
15 16	CCT (K)	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
		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
			Bin Code
			☆ : "0" (Whole Bin) "3" (MacAdam 3- step) "Y" (Kitting)
17 18	Luminous Flux (lm)	S0	Bin Code: SF 124~133 lm; SG 133~142 lm; SH 142~151 lm

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

Nominal CCT (K)	CRI Min.	Product Code	Flux Bin	Flux Range (Φ_v, lm)
2700	80	SPMWH3326FP5GBW☆S0	SF	124 – 133
			SG	133 – 142
3000	80	SPMWH3326FP5GBV☆S0	SF	124 – 133
			SG	133 – 142
3500	80	SPMWH3326FP5GBU☆S0	SG	133 – 142
			SH	142 – 151
4000	80	SPMWH3326FP5GBT☆S0	SG	133 – 142
			SH	142 – 151
5000	80	SPMWH3326FP5GBR☆S0	SG	133 – 142
			SH	142 – 151
5700	80	SPMWH3326FP5GBQ☆S0	SG	133 – 142
			SH	142 – 151
6500	80	SPMWH3326FP5GBP☆S0	SG	133 – 142
			SH	142 – 151

Note:

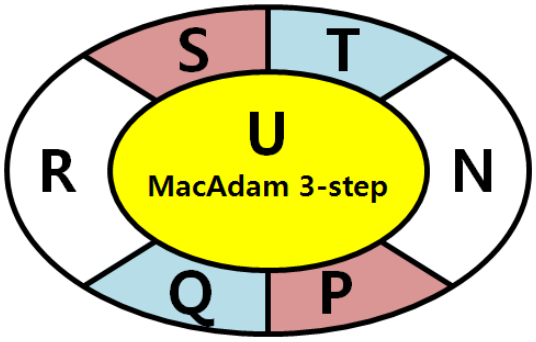
"☆" can be "0" (Whole Bin), “3” (MacAdam 3-step), "Y" (Kitting)

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	SF	SF
	SF	SG
	SG	SG
	SG	SH
	SH	SH

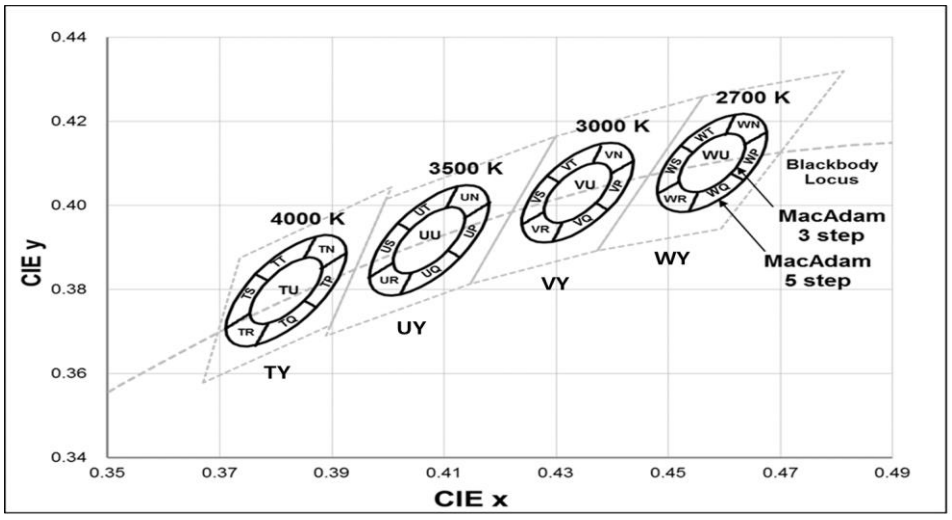
c) Color Bins (I_F = 150 mA, T_s = 25 ºC)

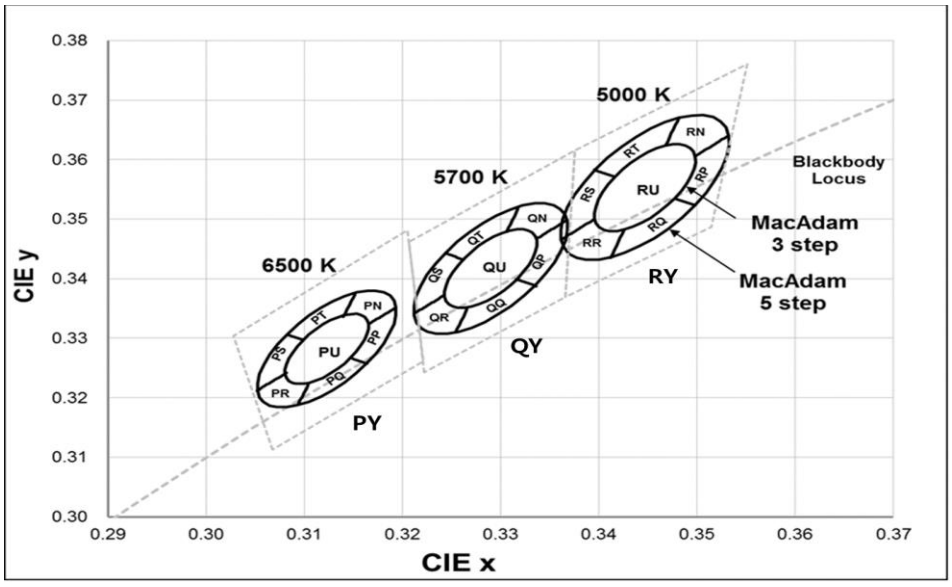
Nominal CCT (K)	CRI Min.	Product Code	Color Rank	Chromaticity Bins
2700	80	SPMWH3326FP5GBW0S0	W0 (Whole Bin)	WN, WP, WQ, WR, WS, WT, WU
		SPMWH3326FP5GBW3S0	W3 (MacAdam 3-step)	WU
		SPMWH3326FP5GBWYS0	WY (Kitting)	WN, WP, WQ, WR, WS, WT, WU
3000	80	SPMWH3326FP5GBV0S0	V0 (Whole Bin)	VN, VP, VQ, VR, VS, VT, VU
		SPMWH3326FP5GBV3S0	V3 (MacAdam 3-step)	VU
		SPMWH3326FP5GBVYS0	VY (Kitting)	VN, VP, VQ, VR, VS, VT, VU
3500	80	SPMWH3326FP5GBU0S0	U0 (Whole Bin)	UN, UP, UQ, UR, US, UT, UU
		SPMWH3326FP5GBU3S0	U3 (MacAdam 3-step)	UU
		SPMWH3326FP5GBUYS0	UY (Kitting)	UN, UP, UQ, UR, US, UT, UU
4000	80	SPMWH3326FP5GBT0S0	T0 (Whole Bin)	TN, TP, TQ, TR, TS, TT, TU
		SPMWH3326FP5GBT3S0	T3 (MacAdam 3-step)	TU
		SPMWH3326FP5GBTYS0	TY (Kitting)	TN, TP, TQ, TR, TS, TT, TU
5000	80	SPMWH3326FP5GBR0S0	R0 (Whole Bin)	RN, RP, RQ, RR, RS, RT, RU
		SPMWH3326FP5GBR3S0	R3 (MacAdam 3-step)	RU
		SPMWH3326FP5GBRYS0	RY (Kitting)	RN, RP, RQ, RR, RS, RT, RU
5700	80	SPMWH3326FP5GBQ0S0	Q0 (Whole Bin)	QN, QP, QQ, QR, QS, QT, QU
		SPMWH3326FP5GBQ3S0	Q3 (MacAdam 3-step)	QU
		SPMWH3326FP5GBQYS0	QY (Kitting)	QN, QP, QQ, QR, QS, QT, QU
6500	80	SPMWH3326FP5GBP0S0	P0 (Whole Bin)	PN, PP, PQ, PR, PS, PT, PU
		SPMWH3326FP5GBP3S0	P3 (MacAdam 3-step)	PU
		SPMWH3326FP5GBPYS0	PY (Kitting)	PN, PP, PQ, PR, PS, PT, PU

d) Voltage Bins (I_F = 150 mA, T_s = 25 °C)

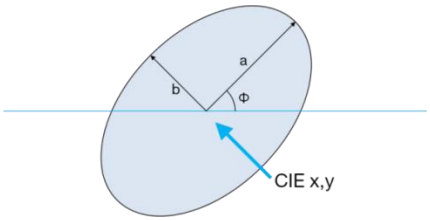
Nominal CCT	CRI	Product Code	Voltage Rank	Voltage Bin	Voltage Range
-	-	-	GB	BZ	5.8 ~ 6.0
				B1	6.0 ~ 6.2
				B2	6.2 ~ 6.4
				B3	6.4 ~ 6.6

e) Chromaticity Region & Coordinates (I_F = 150 mA, T_s = 25 ºC)





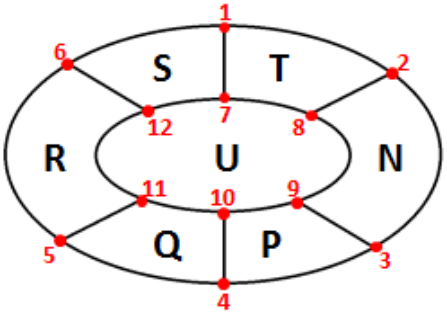
f) Chromaticity Region & Coordinates (I_F = 150 mA, T_s = 25 ºC)



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

Note: Samsung maintains measurement tolerance of: Cx, Cy = ±0.005

e) Chromaticity Region & Coordinates



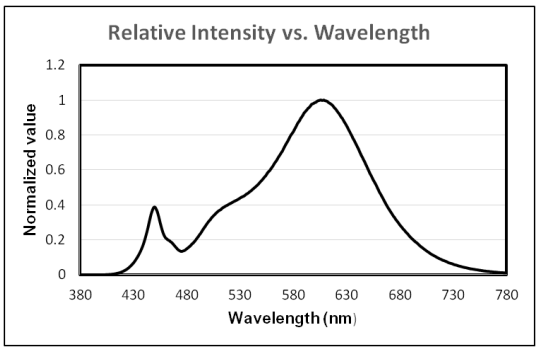
Region	2700K		3000K		3500K		4000K	
	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y	CIE x	CIE y
1	0.4521	0.4142	0.4283	0.4071	0.4018	0.3957	0.3764	0.3837
2	0.4619	0.4216	0.4382	0.4146	0.4125	0.4046	0.3871	0.3926
3	0.4675	0.4175	0.4437	0.4105	0.418	0.4005	0.3925	0.3887
4	0.4634	0.4059	0.4393	0.3989	0.4128	0.3877	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

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	0.367	0.332	0.3524	0.3153	0.3377
3	0.3532	0.364	0.3365	0.3496	0.3194	0.3352
4	0.3497	0.3524	0.3333	0.339	0.3164	0.3257
5	0.3412	0.3436	0.3254	0.331	0.3093	0.3187
6	0.3362	0.3465	0.3209	0.3338	0.3052	0.3212
7	0.3417	0.3571	0.326	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	0.35	0.324	0.3369	0.308	0.324

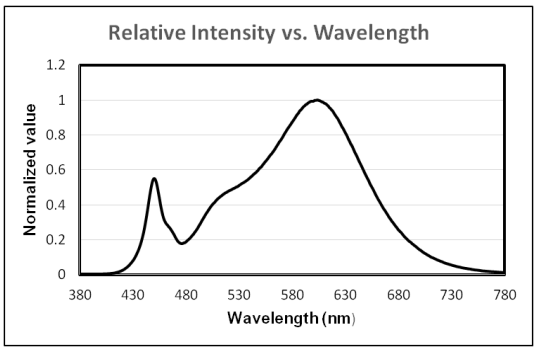
3. Typical Characteristics Graphs

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

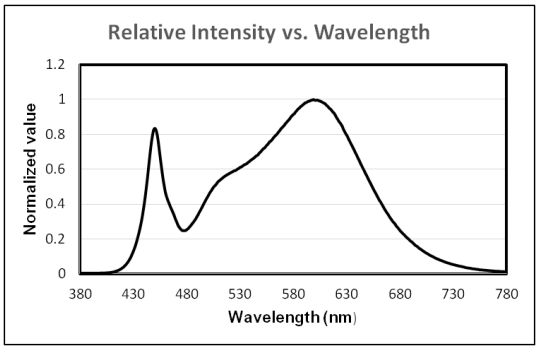
CCT : 2700K (80 CRI)



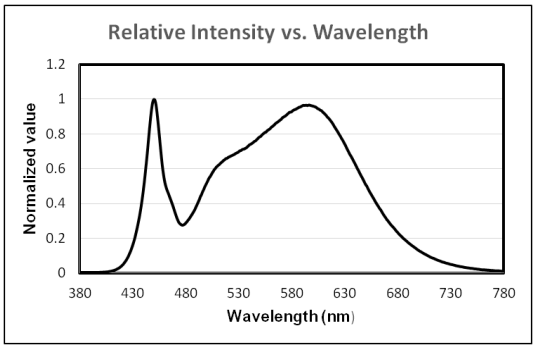
CCT : 3000K (80 CRI)



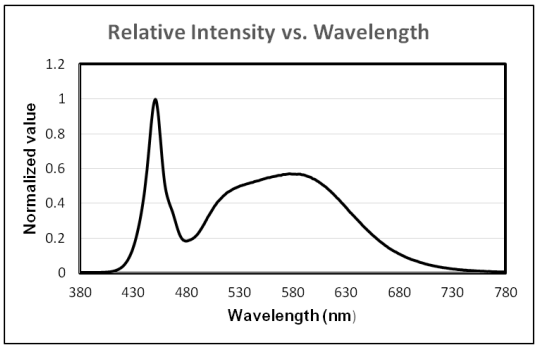
CCT : 3500K (80 CRI)



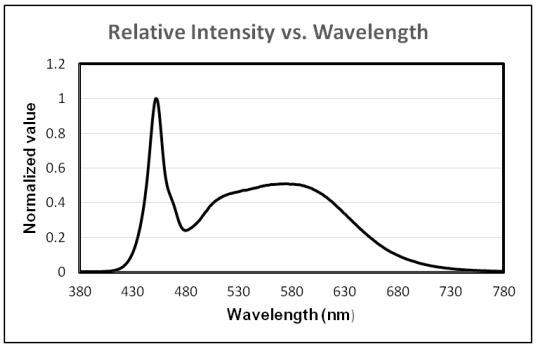
CCT : 4000K (80 CRI)



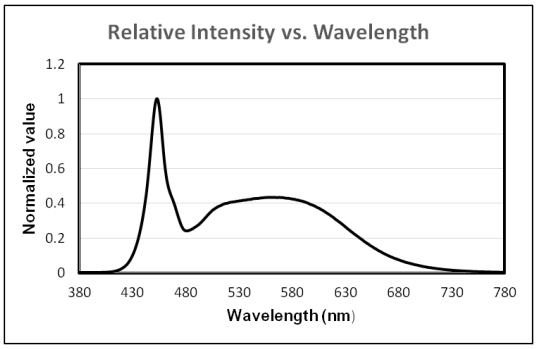
CCT : 5000K (80 CRI)



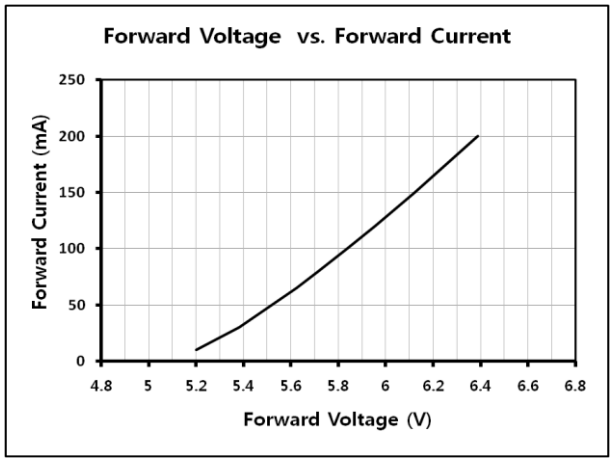
CCT : 5700K (80 CRI)

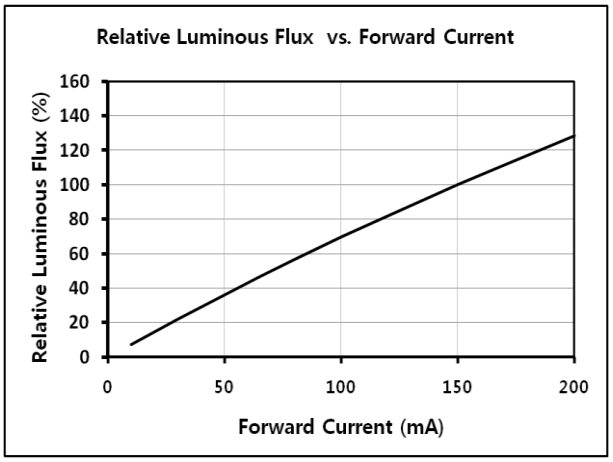


CCT : 6500K (80 CRI)

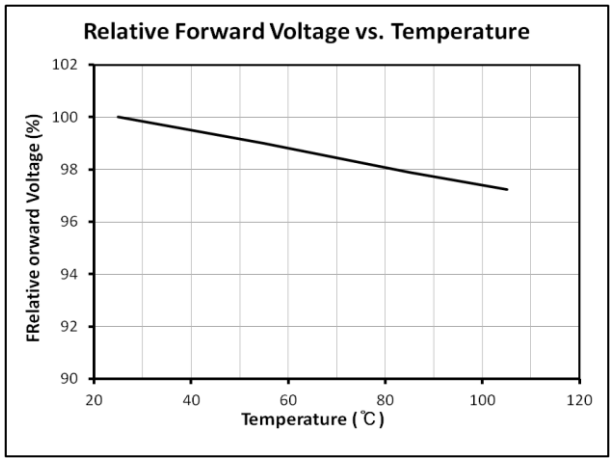


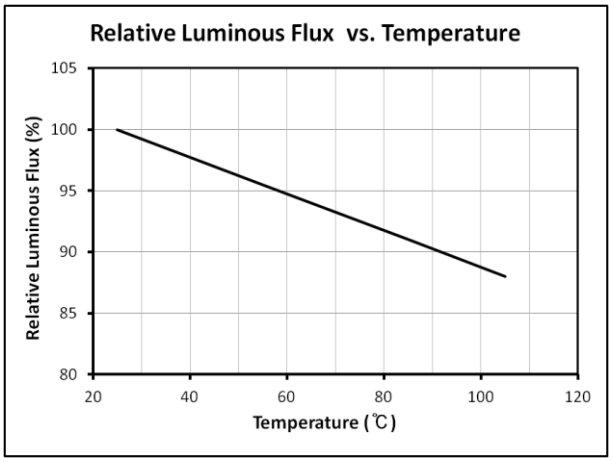
b) Forward Current Characteristics (T_s = 25 ºC)



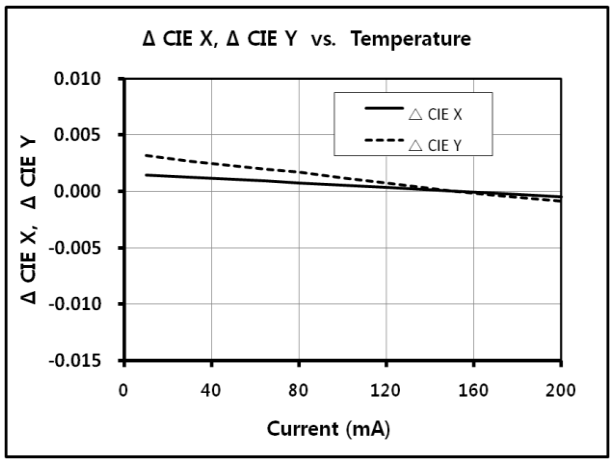


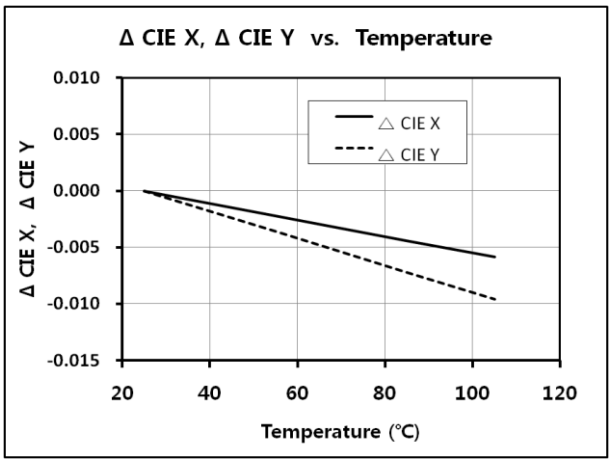
c) Temperature Characteristics (I_F = 150 mA)



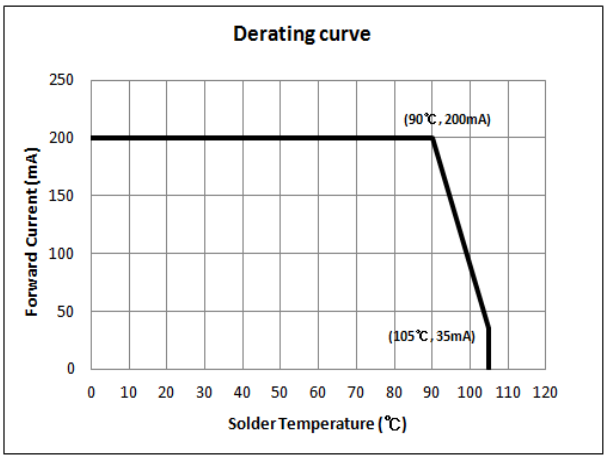


c) Color Shift Characteristics (Ta=25℃, IF=150mA)

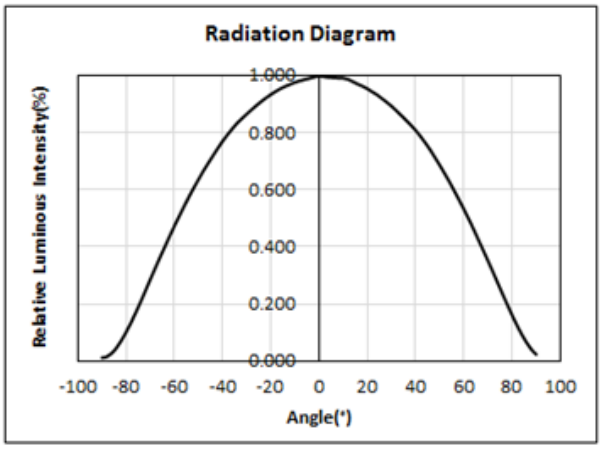




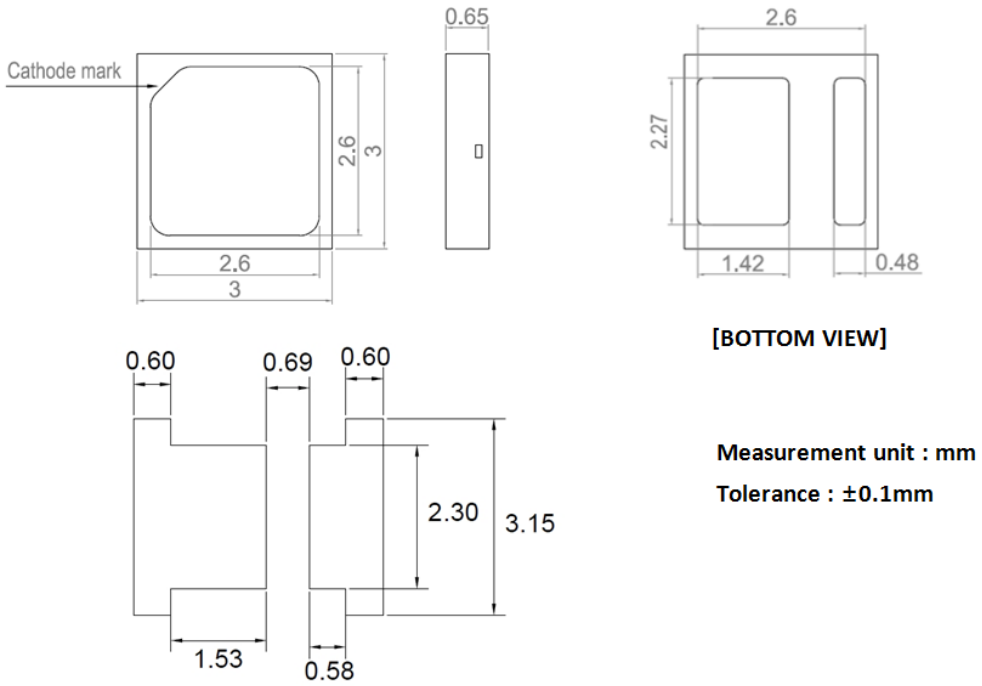
e) Derating curve



f) Beam angle Characteristics



4. Outline Drawing & Dimension



[BOTTOM VIEW]

[RECOMMENDED PCB SOLDER PAD]

Measurement unit : mm

Tolerance : ±0.1mm

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:

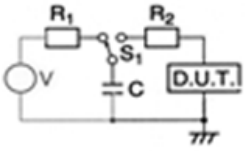
1) Pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid strong pressure on the LEDs. Do not put stress on the LEDs during heating.

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.
Room Temperature Life Test	25 °C, DC 150 mA	1000 h	22
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
Powered Temperature Cycle Test	-45 °C / 20 min ↔ 85 °C / 20 min, sweep 100 min cycle on/off: each 5 min, DC 150 mA	100 cycles	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	5 times	30
ESD (MM)	R_1: 10 MΩ R_2: 0 C: 200 pF	5 times	30
Vibration Test	20~2000~20 Hz, 200 m/s^2, sweep 4 min X, Y, Z 3 direction, each 1 cycle	4 cycles	11
Mechanical Shock Test	1500 g, 0.5 ms 3 shocks each X-Y-Z axis	5 cycles	11

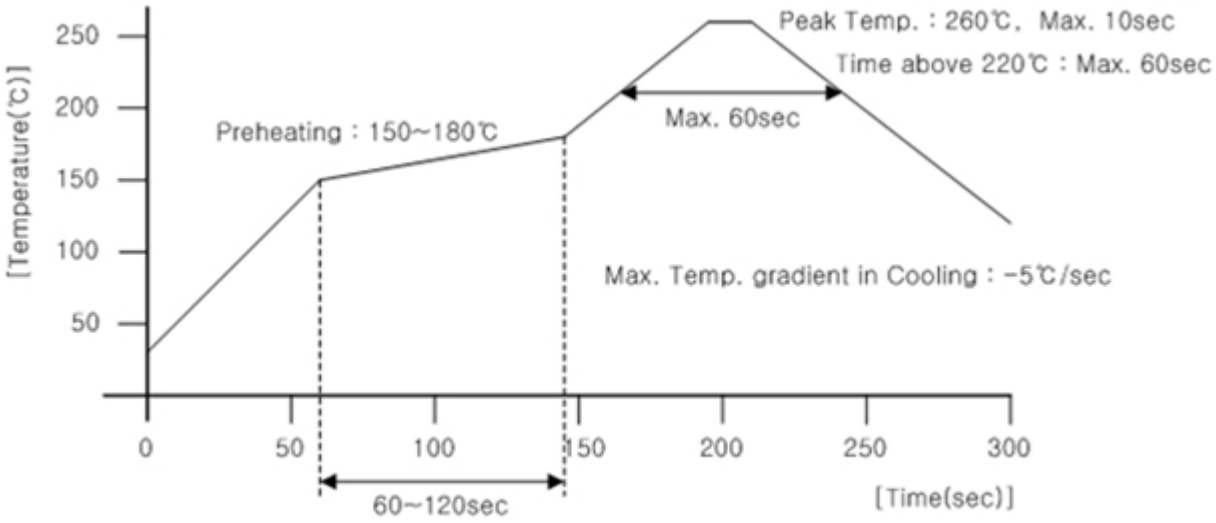
b) Criteria for Judging the Damage

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.



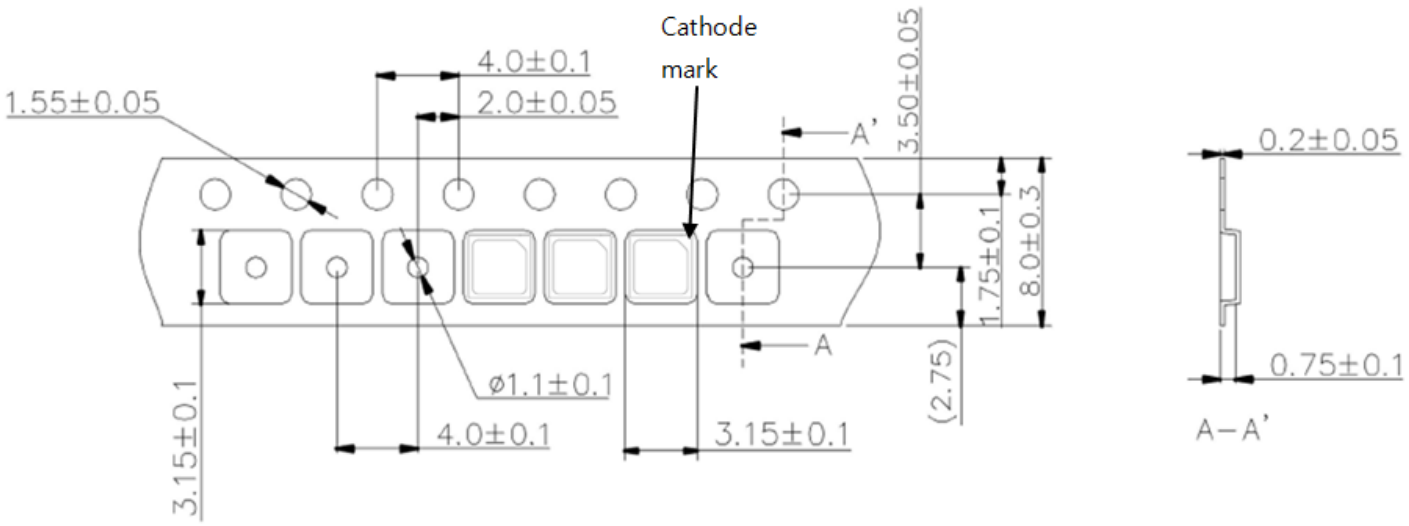
b) Manual Soldering Conditions

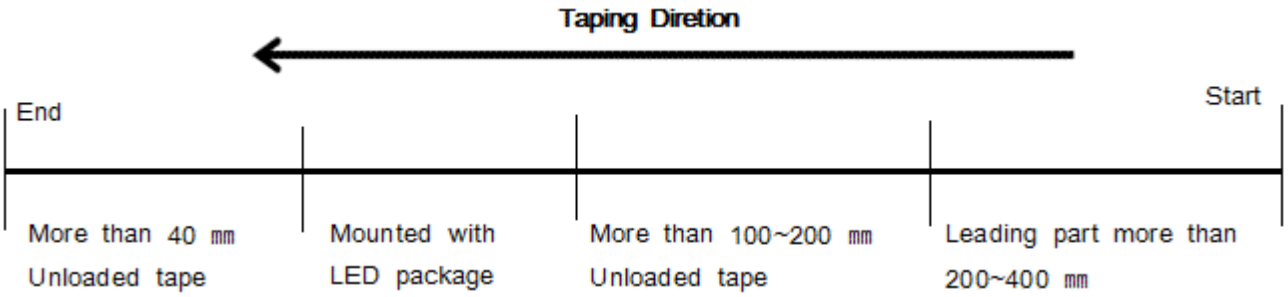
Not more than 5 seconds @ max. 300 ºC, under soldering iron.

7. Tape & Reel

a) Taping Dimension

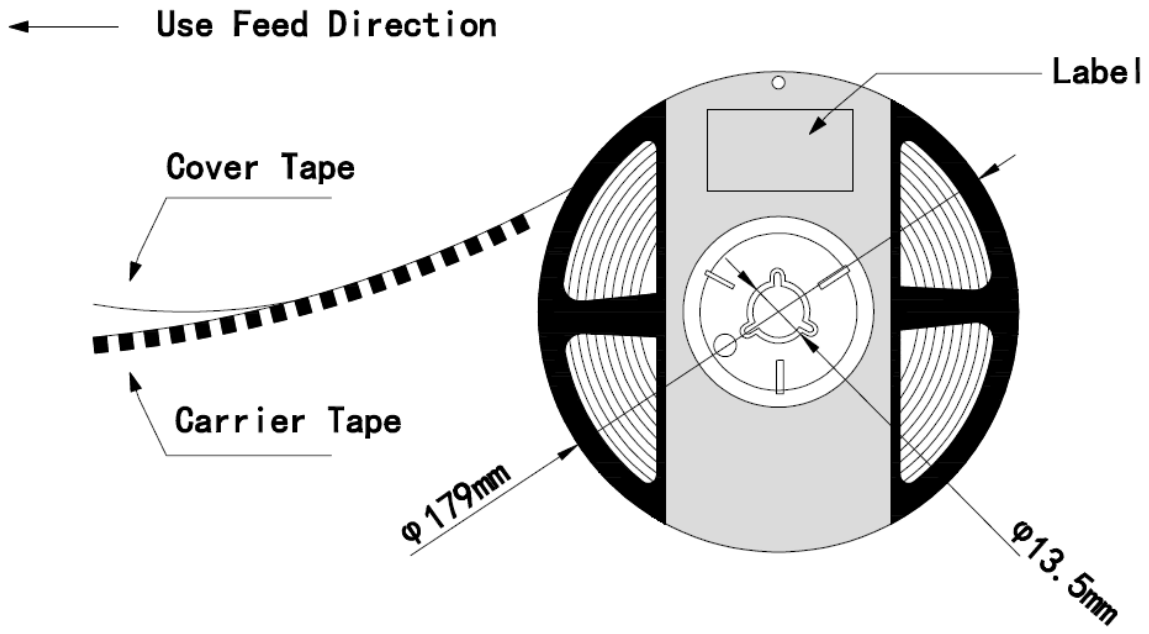
(unit: mm)





b) Reel Dimension

(unit: mm)

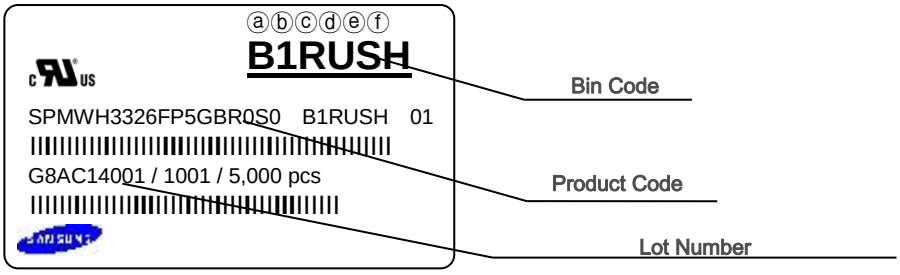


Notes:

1) Quantity: The quantity/reel is 5,000 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:

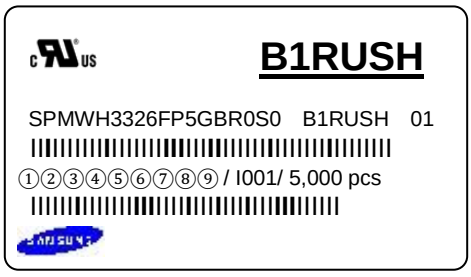
ⓐⓑ: Forward Voltage bin (refer to page 7)

ⓒⓓ: 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 (G8 : China Xiamen)

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)

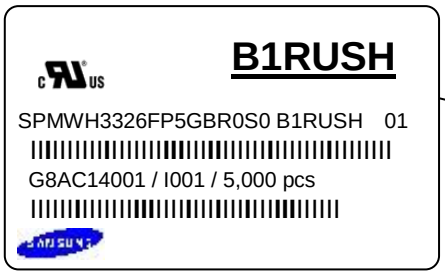
⑥ : Day (1~9, A, B~V)

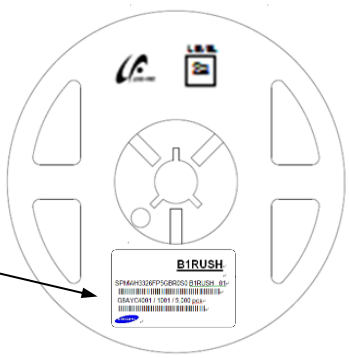
⑦⑧⑨ : Product serial number (001 ~ 999)

9. Packing Structure

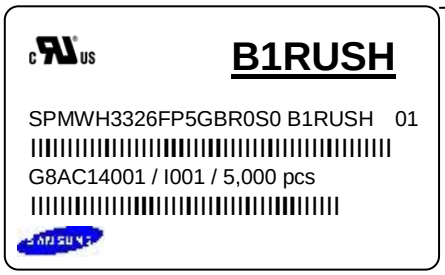
a) Packing Process (The quantity of PKG on the Reel to be Max 5,000pcs)

Reel





Aluminum Vinyl Packing Bag

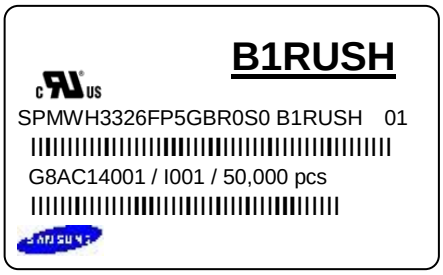


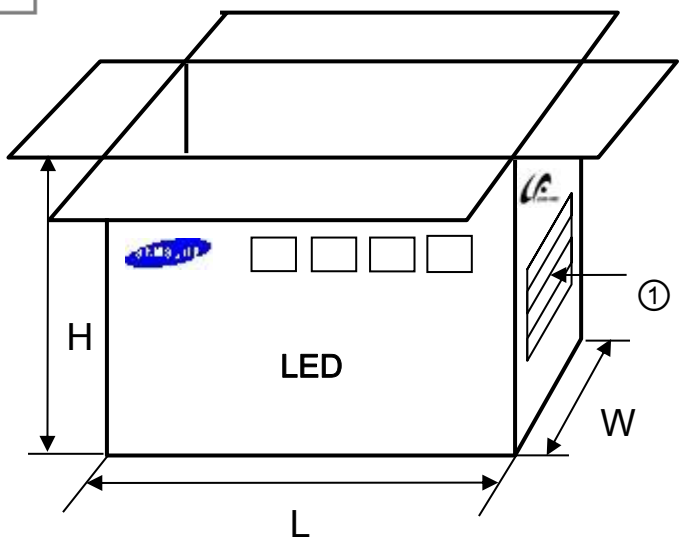
Outer Box

Material: Paper (SW3B(B))

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

① **Side Label**





b) Packing Process for kitting (The quantity of PKG on the Reel to be Max 5,000pcs)

Reel

Kitting 'A'

B1★YSH

SPMWH3326MD5WA★YS0 B1★YSH 01

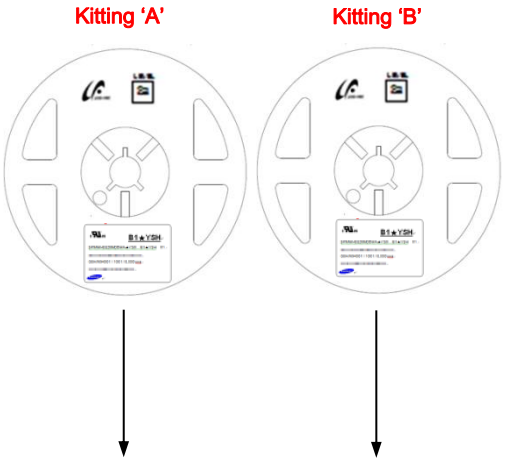
G8AC14001 / I001 / 5,000 pcs

Kitting 'B'

B1★YSH

SPMWH3326MD5WA★YS0 B1★YSH 01

G8AC14001 / I001 / 5,000 pcs



Aluminum Vinyl Packing Bag

Kitting 'A'

B1★YSH

SPMWH3326FP5GB★YS0 B1★YSH 01

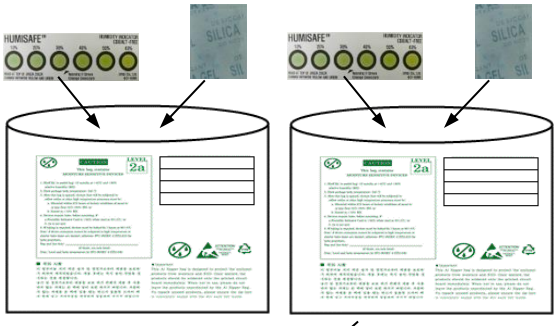
G8AC14001 / I001 / 5,000 pcs

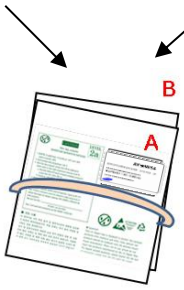
Kitting 'B'

B1★YSH

SPMWH3326FP5GB★YS0 B1★YSH 01

G8AC14001 / I001 / 5,000 pcs





Tie A and B

Outer Box

Kitting 'A'

B1★YSH

SPMWH3326FP5GB★YS0 B1★YSH 01

G8AC14001 / I001 / 50,000 pcs

[BOX Label]

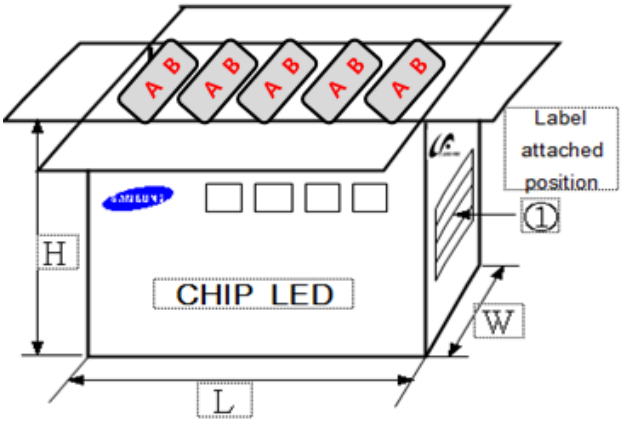
Kitting 'B'

B1★YSH

SPMWH3326FP5GB★YS0 B1★YSH 01

G8AC14001 / I001 / 50,000 pcs

[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

c) Aluminum Vinyl Packing Bag

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

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. If the LEDs are to be stored for three months or more after being shipped from Samsung, they should be packed by a sealed container with nitrogen gas injected (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
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 Electronics Co., Ltd. inspires the world and shapes the future with transformative ideas and technologies that redefine the worlds of TVs, smartphones, wearable devices, tablets, cameras, digital appliances, printers, medical equipment, network systems, and semiconductor and LED solutions. We are also leading in the Internet of Things space with the open platform SmartThings, our broad range of smart devices, and through proactive cross-industry collaboration. We employ 319,000 people across 84 countries with annual sales of US $196 billion. To discover more, and for the latest news, feature articles and press material, please visit the Samsung Newsroom at news.samsung.com.

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