Middle Power LED Series
2835

LM281B

Signage



LM281B leads lighting design trend with high performance and efficacy

Features& Benefits

- 0.5 W Class middle-power LED
- Extremely wide viewing angle.
- Standard form factor for design flexibility
- Mid-performance and Mid-efficacy

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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	1	2	2	8	F	N	4	W	A	A	0	S	0

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package Middle Power	SPM	
4 5	Color	WH	White
6	Product Version	1	1
7 8 9	Form Factor	228	2.8 x 3.5 x 0.65 mm; 2 pads
10	Sorting Current (mA)	F	150 mA
11	Chromaticity Coordinates	N	Signage
12	CRI& Sorting Temperature	4	Min.75 25 °C
13 14	Forward Voltage (V)	WA	2.9~3.3 Bin Code A2 2.9 ~ 3.0 A3 3.0 ~ 3.1 A4 3.1 ~ 3.2 A5 3.2 ~ 3.3
15 16	CCT (K)	A0 A3 A4	10000 Bin Code A2, A3, A4 A3 A2, A4
17 18	Luminous Flux	S0	Bin Code S1, S2

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

Nominal CCT (K)	CRI (R_a) Min.	Product Code	Flux Bin	Flux Range (Φ_v, lm)
10000	75	SPMWH1228FN4WAA0S0	S1	60.0 ~ 65.0
			S2	65.0 ~ 70.0

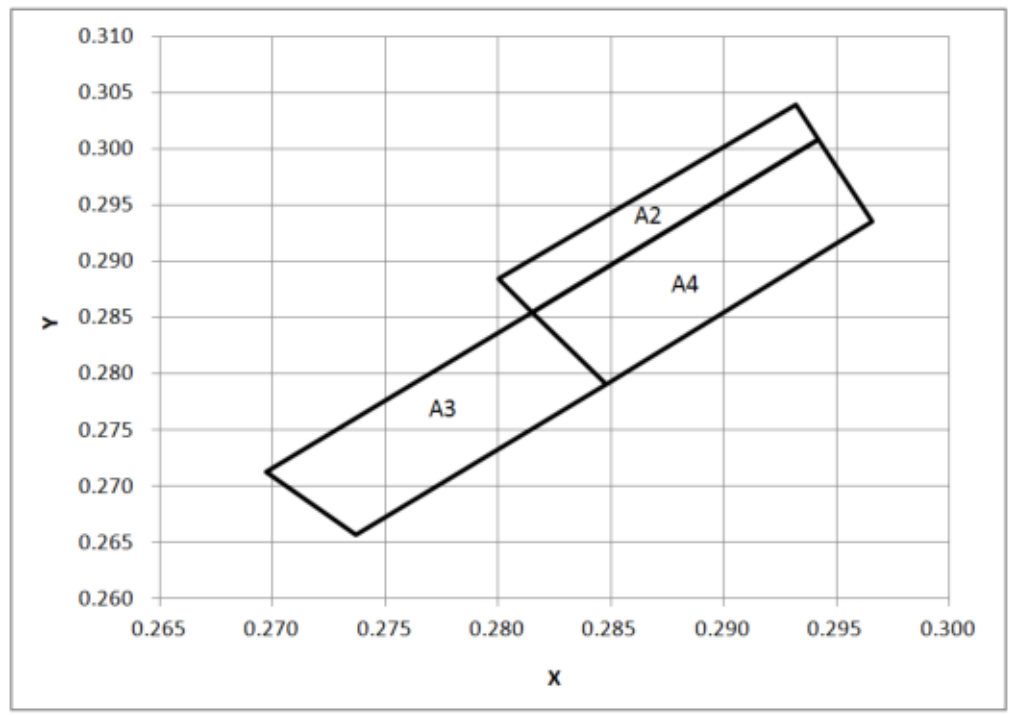
b) Color Bins (I_F = 150 mA, T_s= 25 °C)

Nominal CCT(K)	CRI (R_a) Min.	Product Code	Color Rank	Chromaticity Bins
10000	75	SPMWH1228FN4WAA0S0	A0 (Whole bin)	A2, A3, A4
		SPMWH1228FN4WAA3S0	A3	A3
		SPMWH1228FN4WAA4S0	A4	A2, A4

c) 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)
-	-	-	WA	A2	2.9 ~ 3.0
				A3	3.0 ~ 3.1
				A4	3.1 ~ 3.2
				A5	3.2 ~ 3.3

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



Region	CIE x	CIE y
A rank (10000 K)		
A2	0.2800	0.2884
	0.2932	0.3039
	0.2942	0.3008
	0.2815	0.2855
A3	0.2737	0.2657
	0.2848	0.2791
	0.2815	0.2855
	0.2697	0.2713
A4	0.2848	0.2791
	0.2966	0.2935
	0.2942	0.3008
	0.2815	0.2855

2. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Operating Temperature	T_a	-40 ~ +85	ºC	-
Storage Temperature	T_{stg}	-40 ~ +100	ºC	-
LED Junction Temperature	T_j	110	ºC	-
Forward Current	I_F	160	mA	-
Peak Pulsed Forward Current	I_{Fp}	300	mA	Duty 1/10, pulse width 10 ms
Assembly Process Temperature	-	260 <10	ºC s	-

Note:

Proper current derating must be observed to maintain junction temperature below the maximum at all time.

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

Item	Unit	Nominal CCT (K)	CRI (R_a) Min.	Rank	Bin	Min.	Typ.	Max.	cd.*
Forward Voltage (VF)	V	10000	75	WA	A2	2.9		3.0	
					A3	3.0		3.1	
					A4	3.1		3.2	
					A5	3.2		3.3	
Luminous Flux (Φ_v)	lm	10000	75	S0	S1	60.0		65.0	13.0~14.5
					S2	65.0		70.0	14.5~16.0
Reverse Voltage (@ 10 uA)	V					10.0	-		
Thermal Resistance (junction to solder point)	ºC/W					-	24	-	
Beam Angle	º					-	120	-	

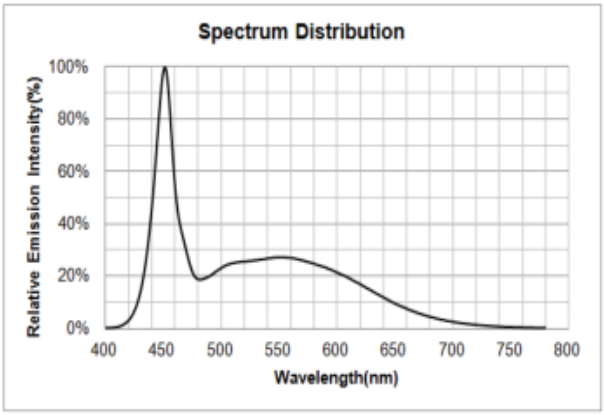
Note:

Samsung maintains measurement tolerance of: forward voltage = ±0.1 V, luminous flux = ±5 %, CRI = ±3.

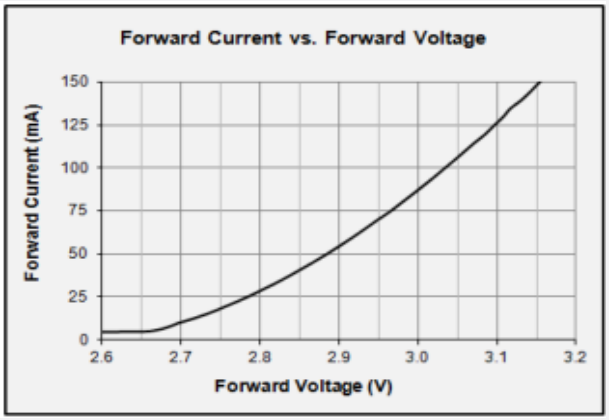
3. Typical Characteristics Graphs

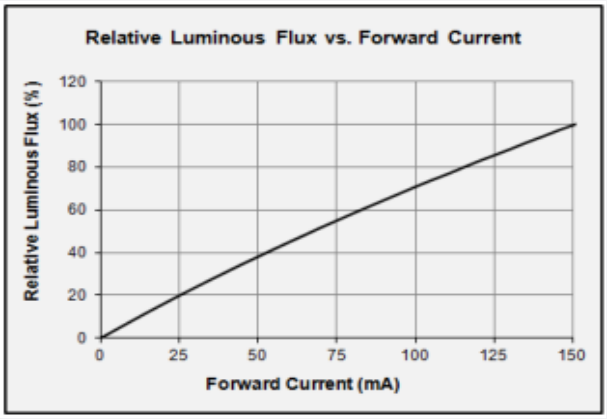
a) Spectrum Distribution (I_F = 150 mA, T_s = 25 °C)

CCT: 10000 K(75 CRI)

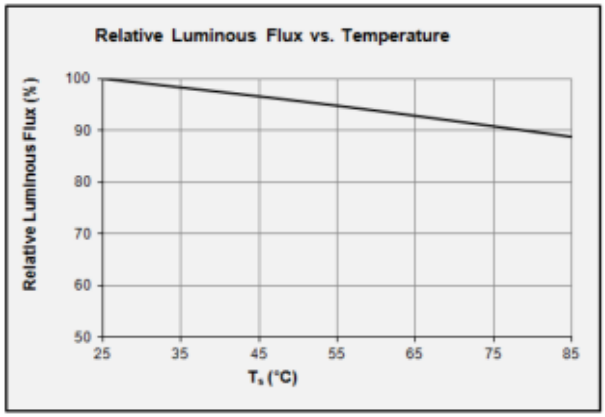


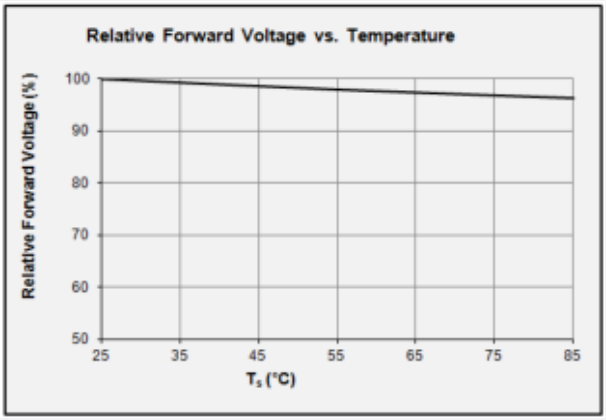
b) Forward Current Characteristics (T_s = 25 °C)



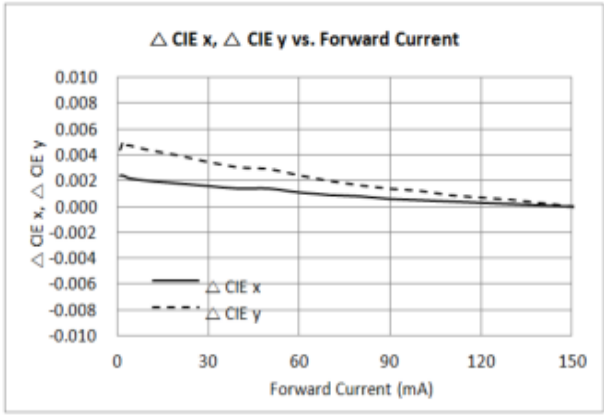


c) Temperature Characteristics (I_F = 150 mA)

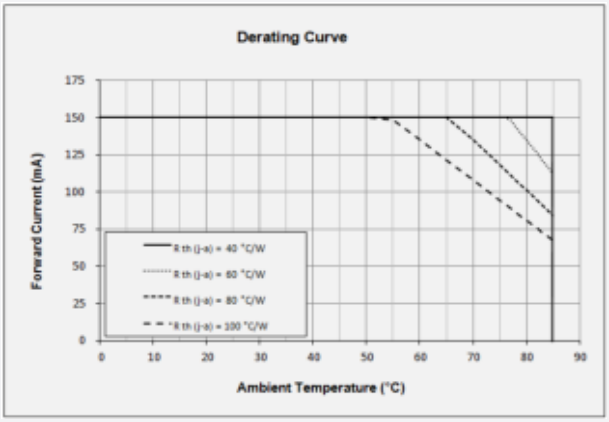




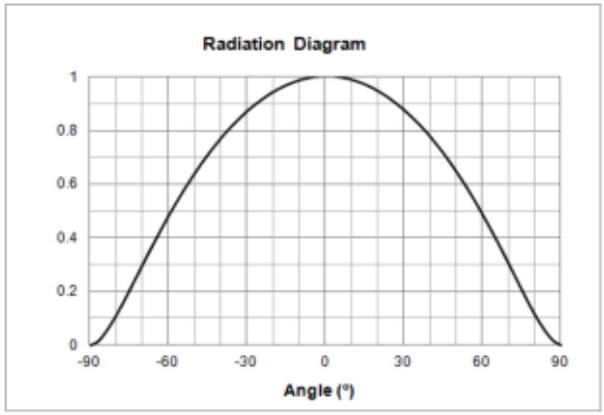
d) Color Shift Characteristics (T_s = 25 °C, I_F = 150 mA)



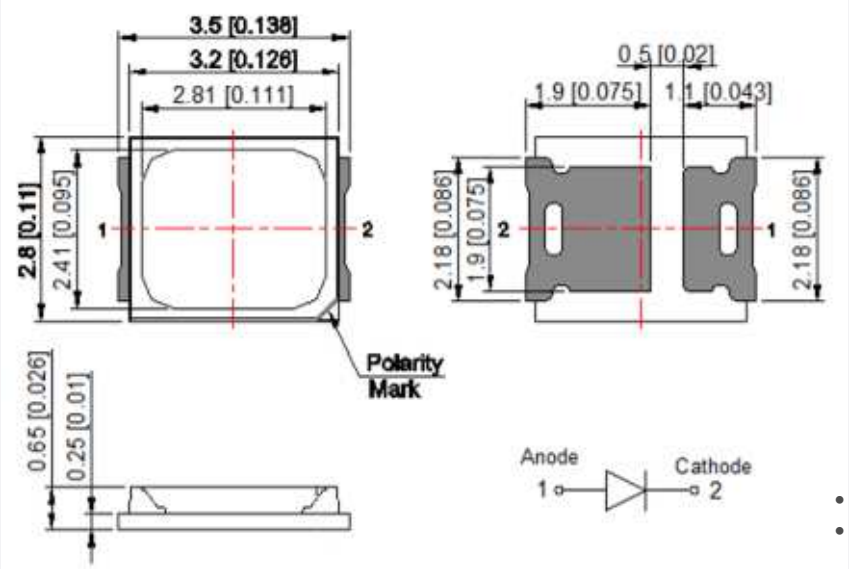
e) Derating Curve



f) Beam Angle Characteristics (I_F = 150 mA, T_s = 25 °C)

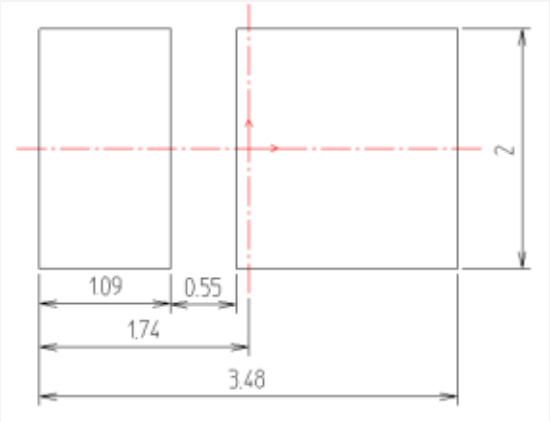


4. Outline Drawing & Dimension



- Measurement unit: mm
- Tolerance: ±0.1mm

[Recommended PCB Solder PAD]



Notes:

1) 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.

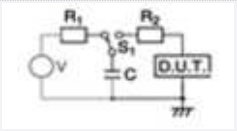
   ②All pads must be soldered to the PCB to dissipate heat properly, otherwise the LED can be damaged.

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 Size
Room Temperature Life Test	25 °C, DC 160 mA	1000 h	22
High Temperature Life Test	85 °C, DC 160 mA	1000 h	22
High Temperature Humidity Life Test	85 °C, 85 % RH, DC 160 mA	1000 h	22
Low Temperature Life Test	-40 °C, DC 160 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 160 mA	1000 h	22
Thermal Shock	-45 °C / 15 min ↔ 125 °C / 15 min → Hot plate 180 °C	500 cycles	100
High Temperature Storage	120 °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: ±2 kV	5 times	30
Vibration Test	20~2000~20 Hz, 200 m/s², 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

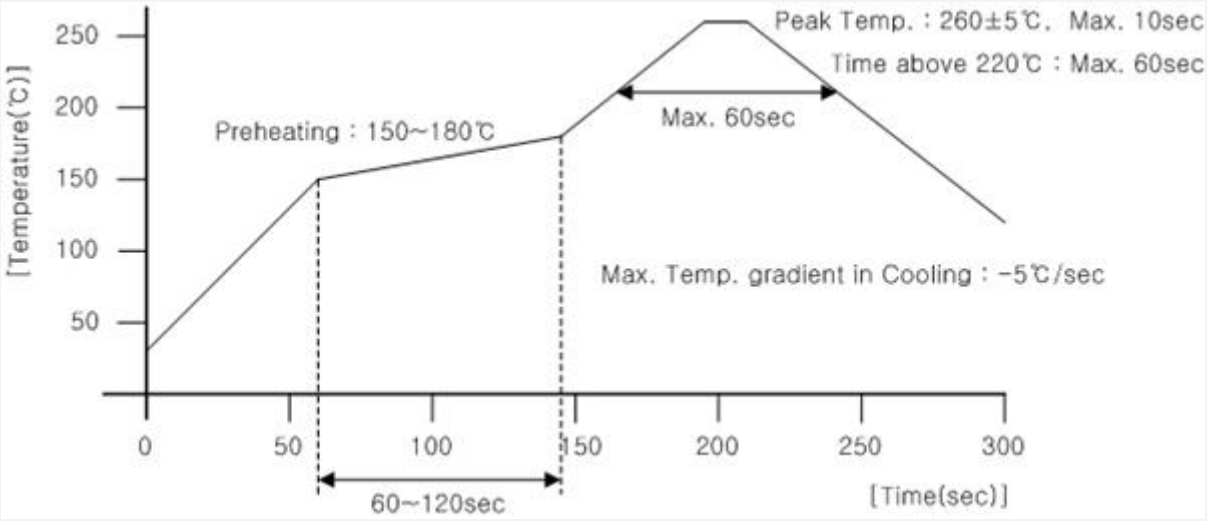
b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_s = 25 °C)	Limit	
			Min.	Max.
Forward Voltage	V_F	I_F = 160 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ_v	I_F = 160 mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



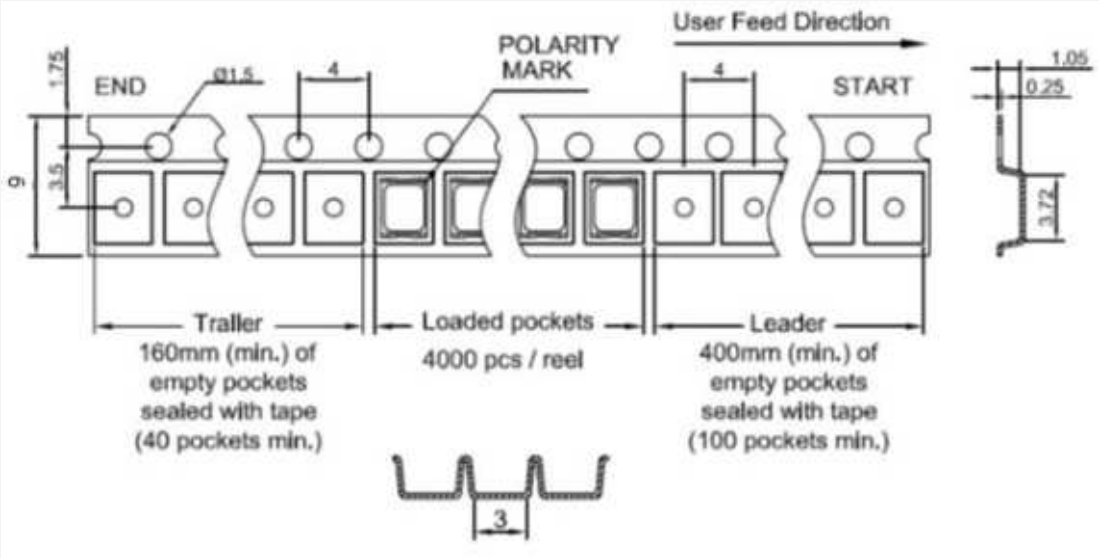
b) Manual Soldering Conditions

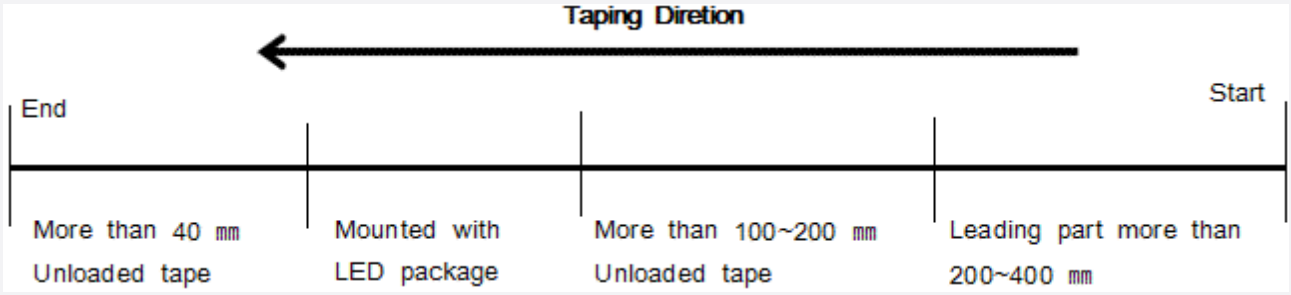
Not more than 5 seconds @max. 300 °C, under soldering iron.

7. Tape & Reel

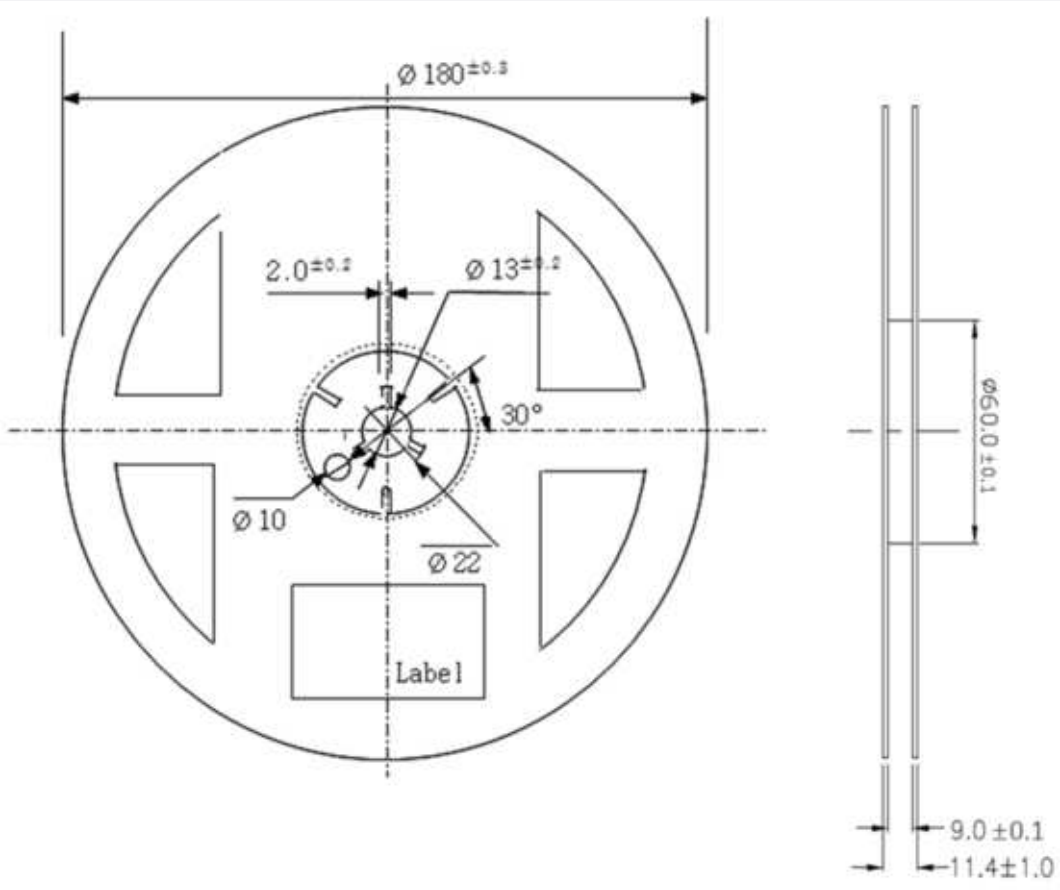
a) Taping Dimension

(unit: mm)





b) Reel Dimension

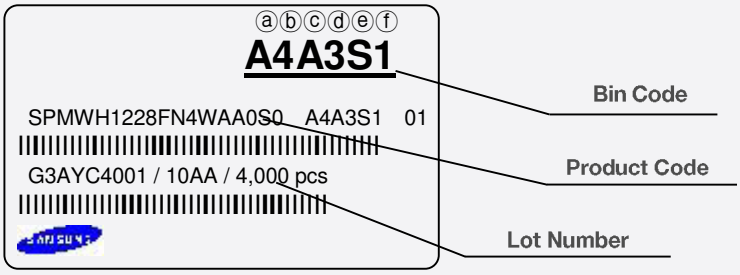


Notes:

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 Sample

'★' means all kind of Chromaticity Coordinate Ranks

Bin Code:

ⓐⓑ: Forward Voltage bin (refer to page 4)

ⓒⓓ: Chromaticity bin (refer to page 5)

ⓔⓕ: Luminous Flux bin (refer to page 4)

b) Lot Number

The lot number is composed of the following characters:



①②③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / 4,000 pcs

①	: Production site(S: Giheung, Korea, G: Tianjin, China)
②	: 3 (LED)
③	: Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	: Year (Y: 2014, Z: 2015, A: 2016,…)
⑤	: Month (1~9, A, B, C)
⑥	: Day (1~9, A, B~V)
⑦⑧⑨	: Product serial number (001 ~ 999)
ⓐⓑⓒ	: Reel number (001 ~ 999)

9. Packing Structure

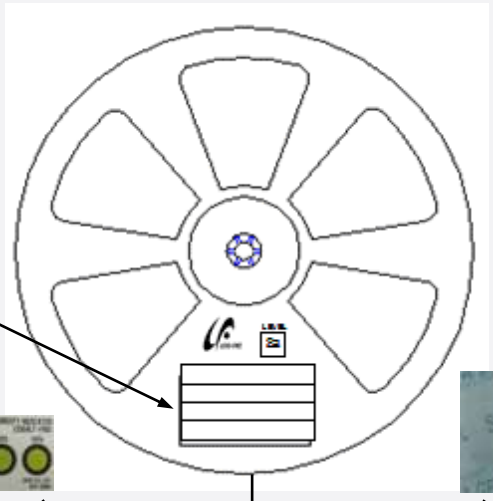
a) Packing Process

Reel

A4A3S1

SPMWH1228FN4WAA0S0 A4A3S1 01

①②③④⑤⑥⑦⑧⑨/1ⓐⓑⓒ/ 4,000 pcs



Aluminum Vinyl Packing Bag

A4A3S1

SPMWH1228FN4WAA0S0 A4A3S1 01

G3AYC4001/10AA/ 4,000 pcs



Outer Box

Material: Paper (SW3B(B))

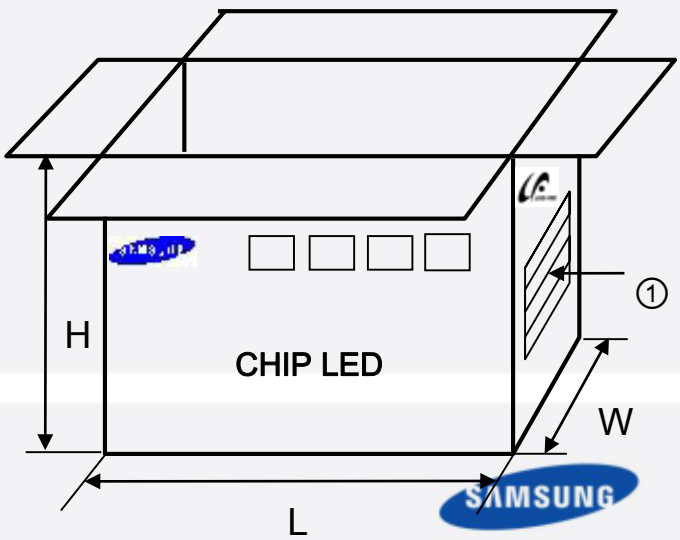
Type	Size (mm)			Note
	L	W	H	
7 inch L	245± 5	220± 5	182± 5	Up to 10reels
7 inch S	245 ± 5	220 ± 5	86 ± 5	Up to 5 reels

① **Side Label**

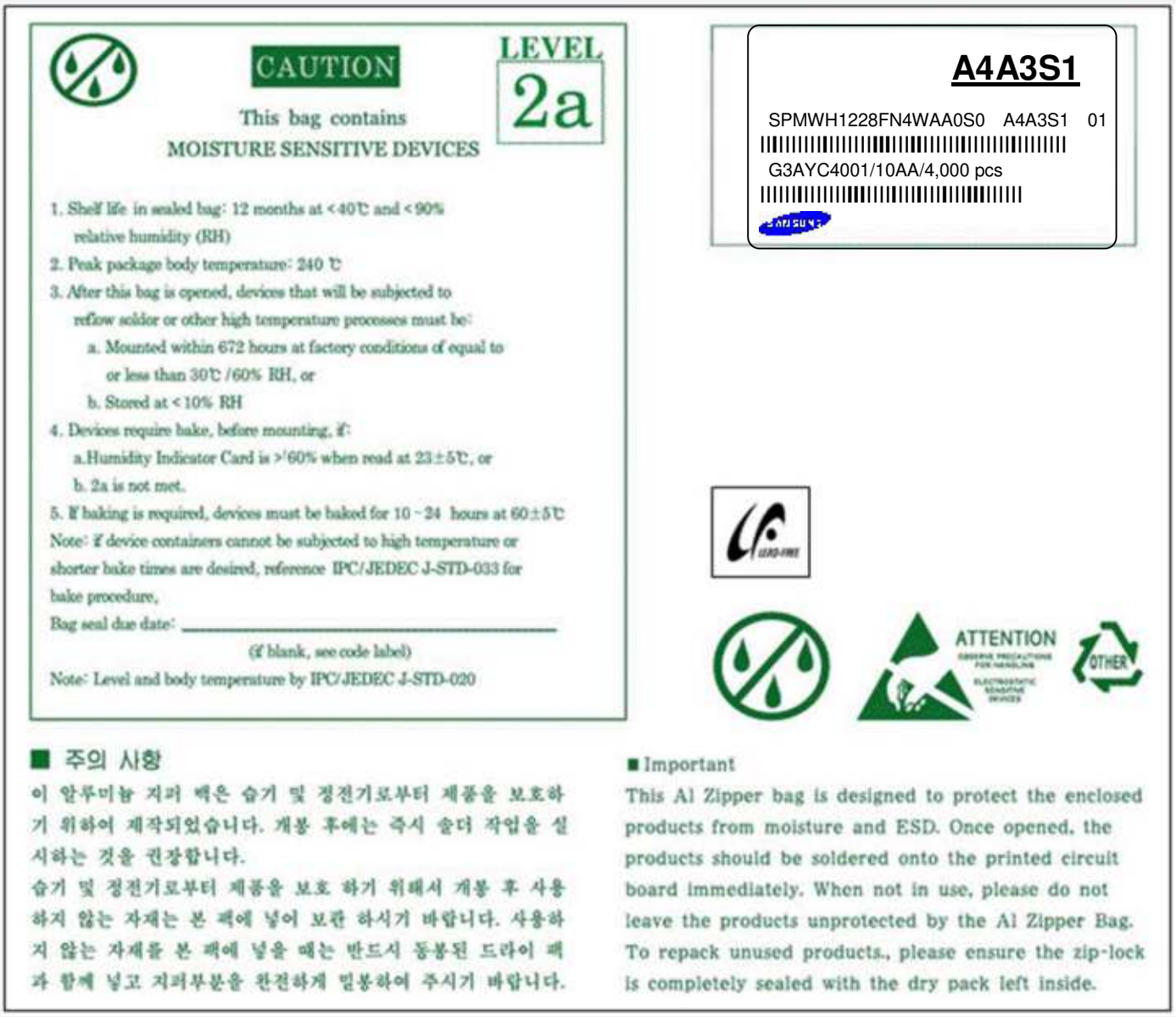
A4A3S1

SPMWH1228FN4WAA0S0 A4A3S1 01

G3AYC4001 / 10AA/ 40,000 pcs

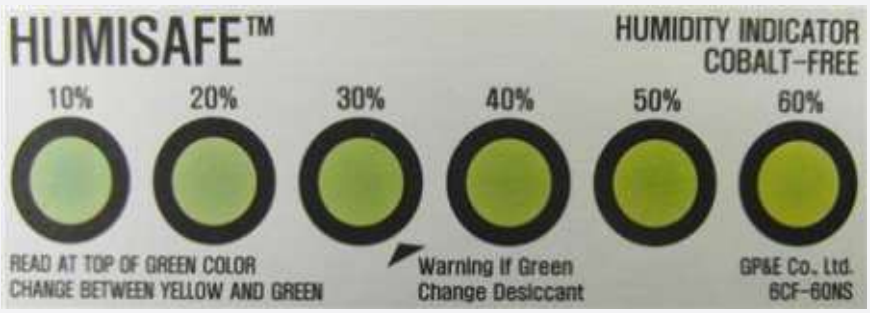


b) Aluminum Vinyl Packing Bag



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.
12) This LED (Lighting area or Non lighting area) Particle or Dust size under 50,000um2 is permitted.

Legal and additional information.

About Samsung Electronics Co., Ltd.

Samsung Electronics Co., Ltd. is a global leader in technology, opening new possibilities for people everywhere. Through relentless innovation and discovery, we are transforming the worlds of TVs, smartphones, tablets, PCs, cameras, home appliances, printers, LTE systems, medical devices, semiconductors and LED solutions. We employ 286,000 people across 80 countries with annual sales of US$216.7 billion. To discover more, please visit www.samsungled.com.

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