

High Power LED I-Series

9W White

SPHWHTB5N9A0



Features

- Package : Lead frame package
- Dimension : 5.12 mm x 3.60 mm
- Chip Technology : Thin GaN
- ESD : 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Qualifications : AEC-Q102 Qualified with RV-level 1



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1. Characteristics

a) Typical Characteristics

[T_S = 25°C]^[1]

Item	Symbol	Value	Unit.
Chromaticity Coordinate	C _x C _y	0.33 0.35	
Luminous Flux (I _F = 1,000 mA)	Φ _V	Typ. 1,155	lm
Forward Voltage (I _F = 1,000 mA)	V _F	Typ. 9.0	V
Viewing Angle	Φ	Typ. 120	°
Reverse Current	I _R	Not designed for reverse operation	
Real Thermal Resistance (Junction to Solder point)	R _{th_J-S (Real)}	Typ. 1.1 Max. 1.4	K/W
Electrical Thermal Resistance (Junction to Solder point)	R _{th_J-S (Elec.)}	Typ. 0.9 Max. 1.1	K/W
Radian Surface	A	3.35	mm ²

Note:

[1] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms

b) Absolute Maximum Rating

Item	Symbol	Rating	Unit
Ambient / Operating Temperature	T _a	-40 ~ +125	°C
Storage Temperature	T _{stg}	-40 ~ +125	°C
LED Junction Temperature	T _j	150	°C
Maximum Forward current ^[2] (T _S :25°C) ^[3]	I _F	1,500	mA
Minimum Forward current ^[2] (T _S :25°C) ^[3]	I _F	50	mA
Maximum Reverse current		Do not apply for reverse current	
ESD Sensitivity ^[4]	-	±8 for HBM	kV

Note:

[2] Driving the product at forward current (I_F) below Min. I_F or above Max. I_F may result in unpredictable behavior of the product.

[3] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25 ms.

[4] It is included the device to protect the product from ESD.

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	P	H	W	H	T	B	5	N	9	A	0	A	B	C	D	E	F

Digit	PKG Information
1 2	Company name and Samsung LED PKG (SP for Samsung PKG)
3	Power variant (H for automotive high power)
4 5	Color variant (WH for automotive white color)
6	LED PKG version (T for initial version)
7 8	Product configuration and type (B5 for Automotive Individual 5136 PKG type)
9	Lens configuration (N for no lens)
10	Typical power (Internal code)
11	Special internal code (A for Automotive version)
12	Specific property (0 for default)
13 14	Forward voltage property
15 16	CIE coordination property
17 18	Luminous flux property

a) Luminous Flux Bins ^[5] ($I_F = 1,000 \text{ mA}$, $T_S = 25^\circ\text{C}$)

Symbol	Flux Bin Code	Flux Range (lm)	
		Min	Max
Φ_V	4J	940	1033
	5J	985	1082
	6J	1033	1135
	7J	1082	1188
	8J	1135	1247

b) Voltage Bins ($I_F = 1,000 \text{ mA}$, $T_S = 25^\circ\text{C}$)

Symbol	Voltage Bin Code	Voltage Range (V)	
		Min	Max
V_F	3C	8.15	8.9
	3D	8.90	9.65

Note:

[5] Luminous flux measuring equipment: CAS140CT

Φ_V and V_F tolerances are $\pm 7\%$ and $\pm 0.1\text{V}$, respectively.

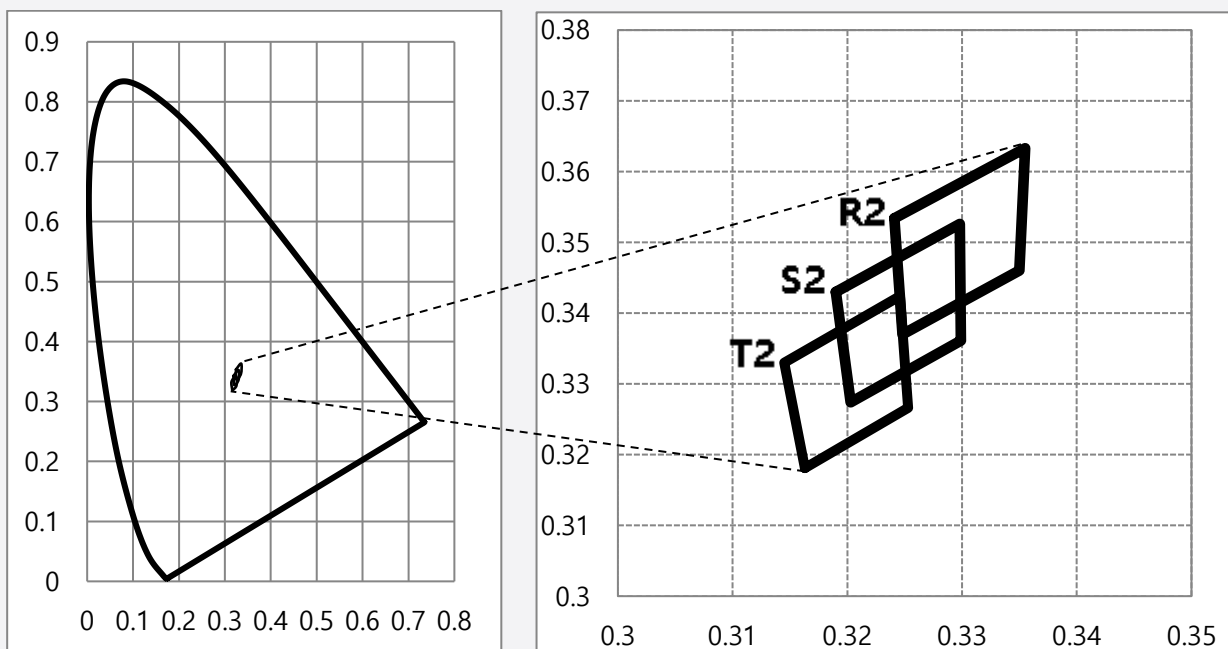
c) Color Bin ^[6]($I_F = 1,000 \text{ mA}$)

Symbol	Color Bin Code	Cx				Cy			
Cx, Cy	R2	0.3241	0.3248	0.3350	0.3355	0.3534	0.3370	0.3460	0.3633
	S2	0.3190	0.3203	0.3299	0.3298	0.3430	0.3274	0.3361	0.3526
	T2	0.3163	0.3145	0.3246	0.3253	0.3181	0.3330	0.3424	0.3266

Note

[6] Luminous flux measuring equipment : CAS140CT

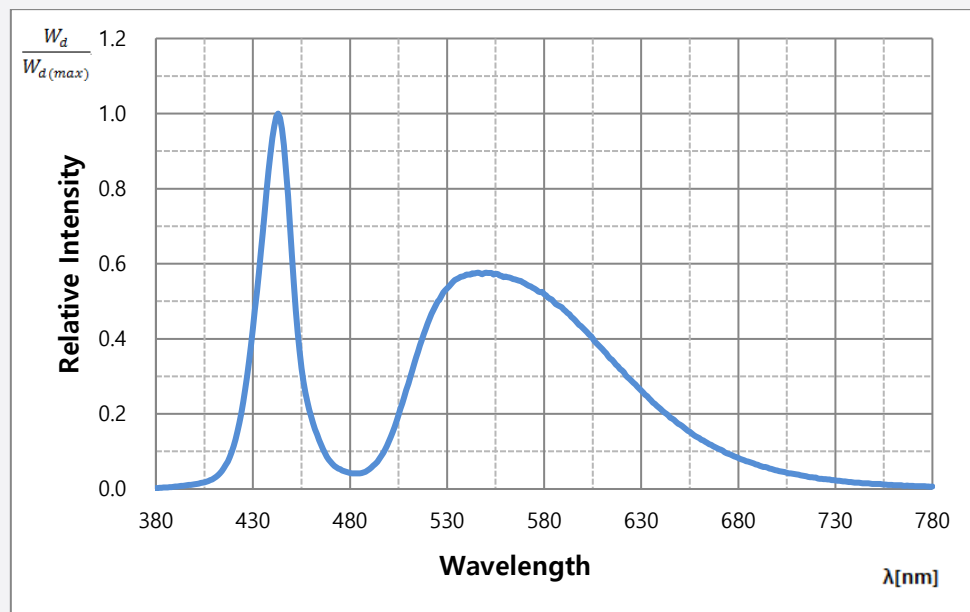
Chromaticity coordinates : Cx, Cy according to CIE 1931. Cx and Cy tolerances are ± 0.005 , respectively.


d) Luminous Flux Bins according to Color Bin ($I_F = 1,000 \text{ mA}$, $T_S = 25 \text{ }^\circ\text{C}$)

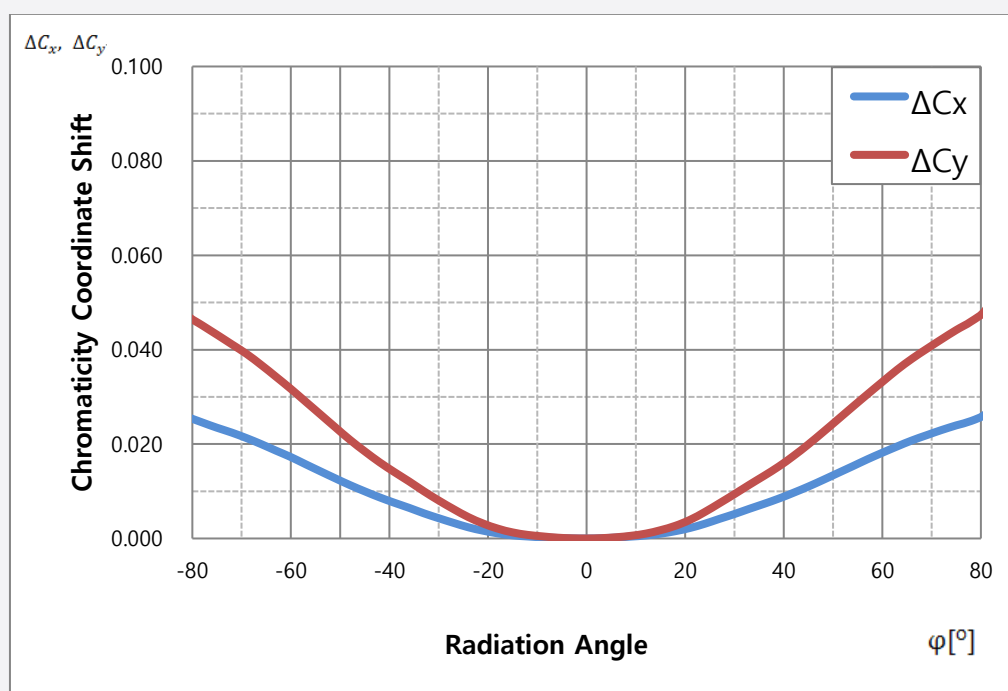
Symbol	Flux Bin Code	4J		5J		6J		7J		8J	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
		940	1033	985	1082	1033	1135	1082	1188	1135	1247
Φ_V	R2			O		O		O		O	
	S2	O		O		O		O			
	T2	O		O		O					

3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_F = 1,000 \text{ mA}$, $T_S = 25 \text{ }^\circ\text{C}$)



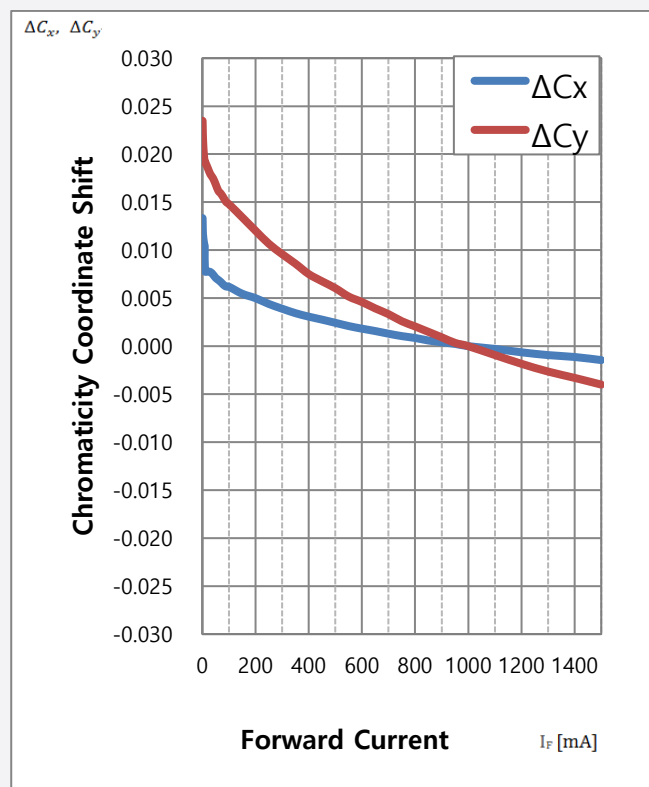
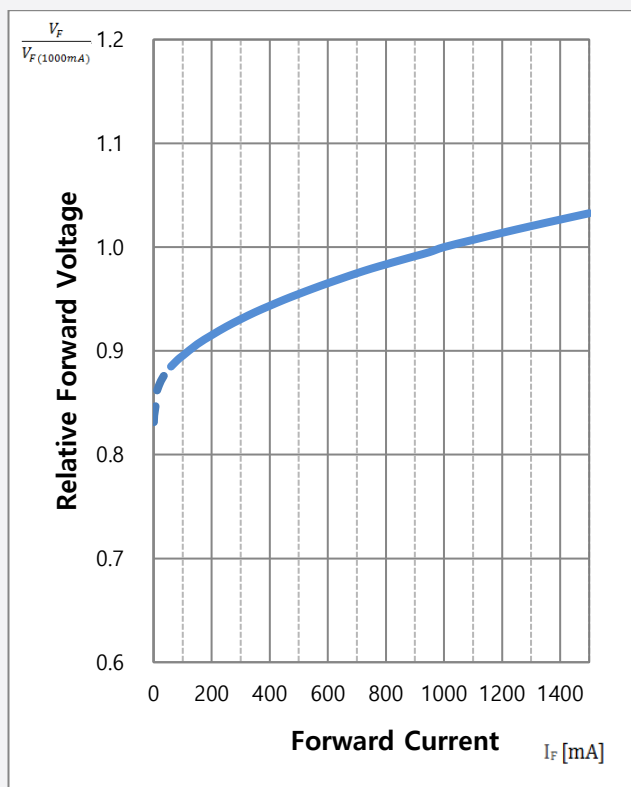
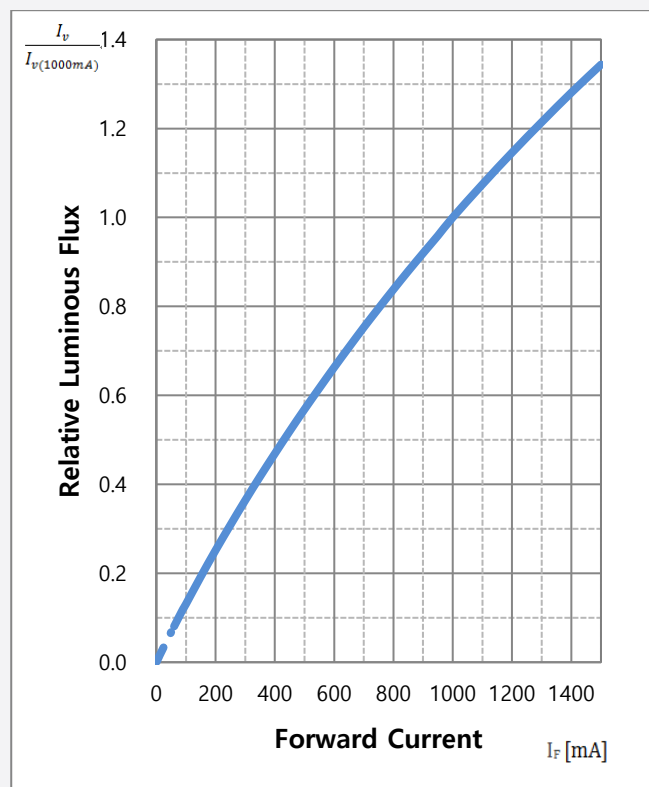
b) Typical Chromaticity Coordinate Shift vs Radiation Angle ($I_F = 1,000 \text{ mA}$, $T_S = 25 \text{ }^\circ\text{C}$) ^[7]



Note:

[7] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25 ms.

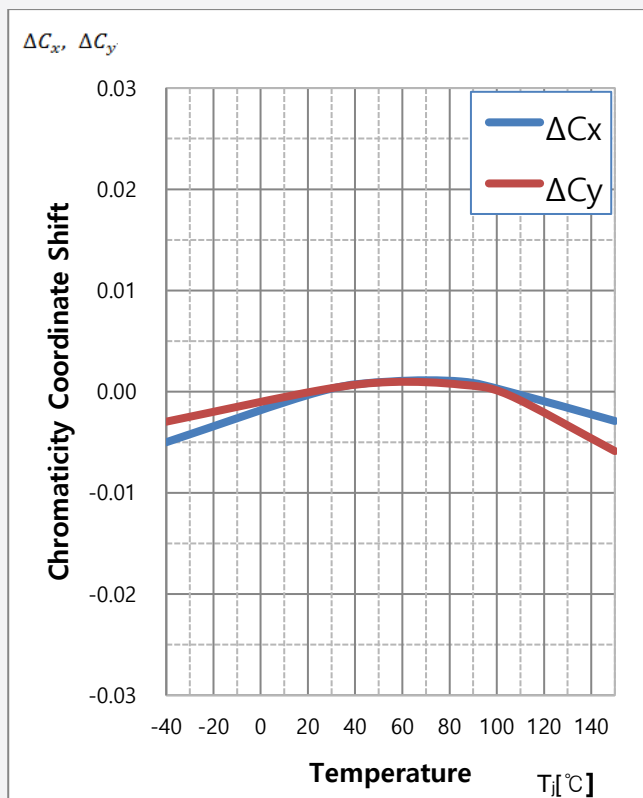
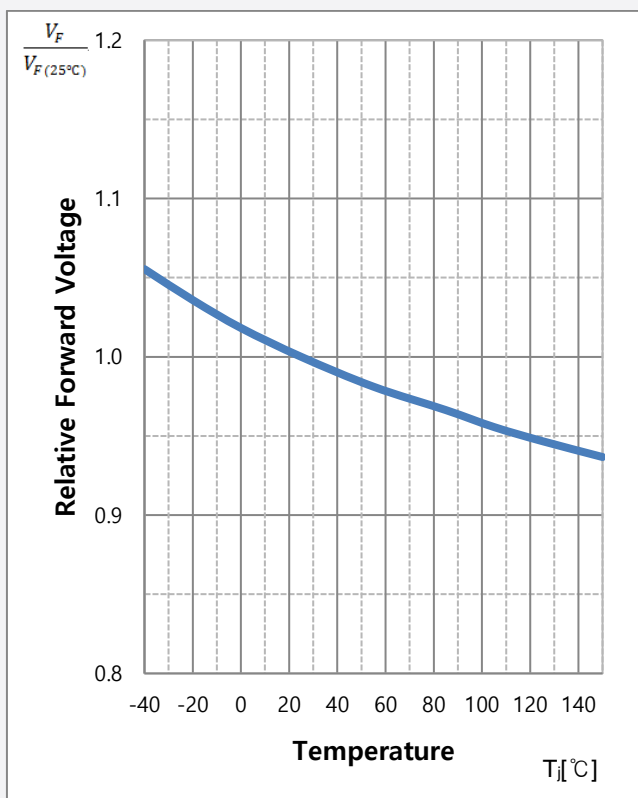
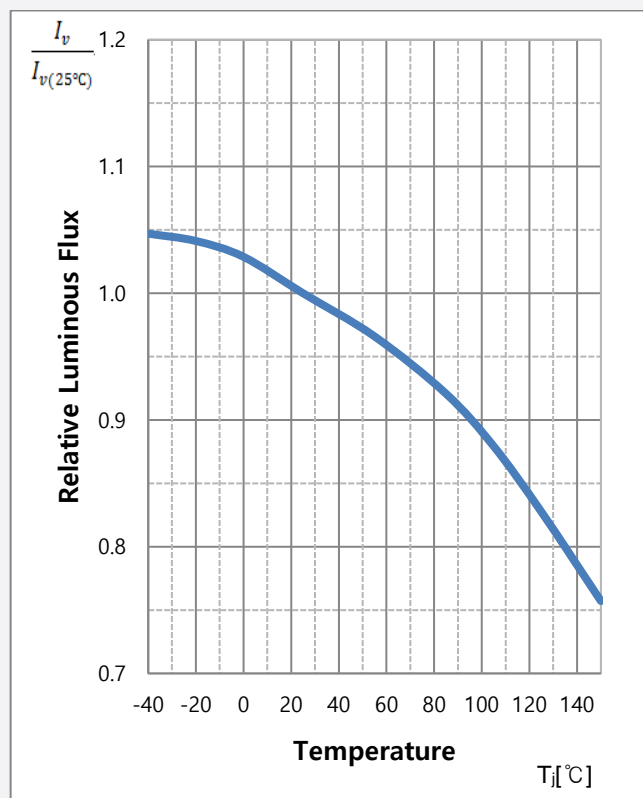
c) Forward Current Characteristics ($T_s = 25^\circ\text{C}$)^[8]



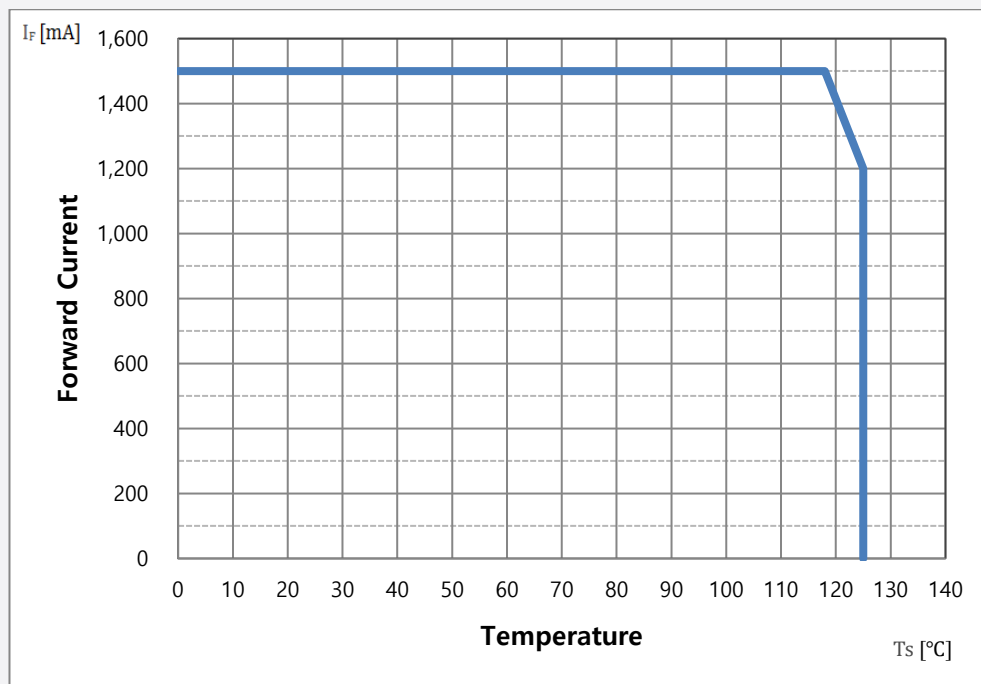
Note:

[8] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25 ms

d) Temperature Characteristics ($I_F = 1,000 \text{ mA}$)



e) Derating Curve^[9]

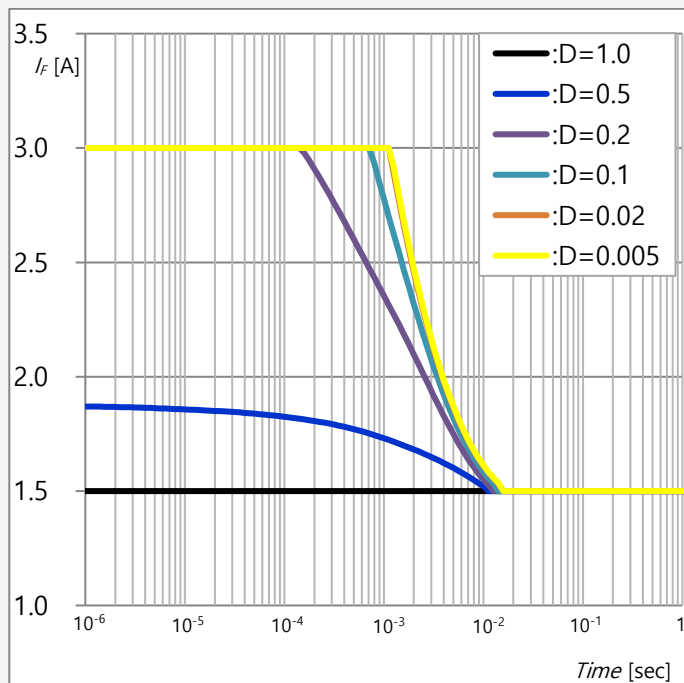


Note:

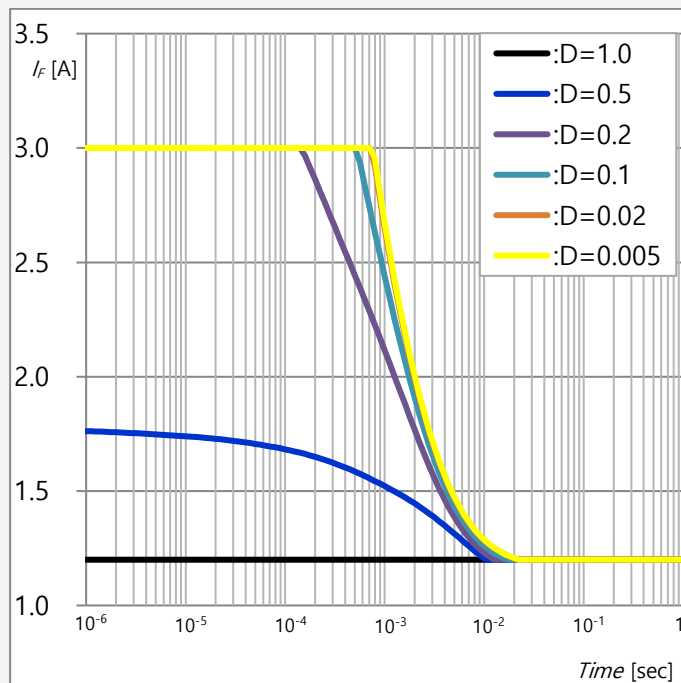
[9] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25 ms

f) Permissible Pulse Handling Capability ($I_F = f(t_p)$; D: Duty cycle)

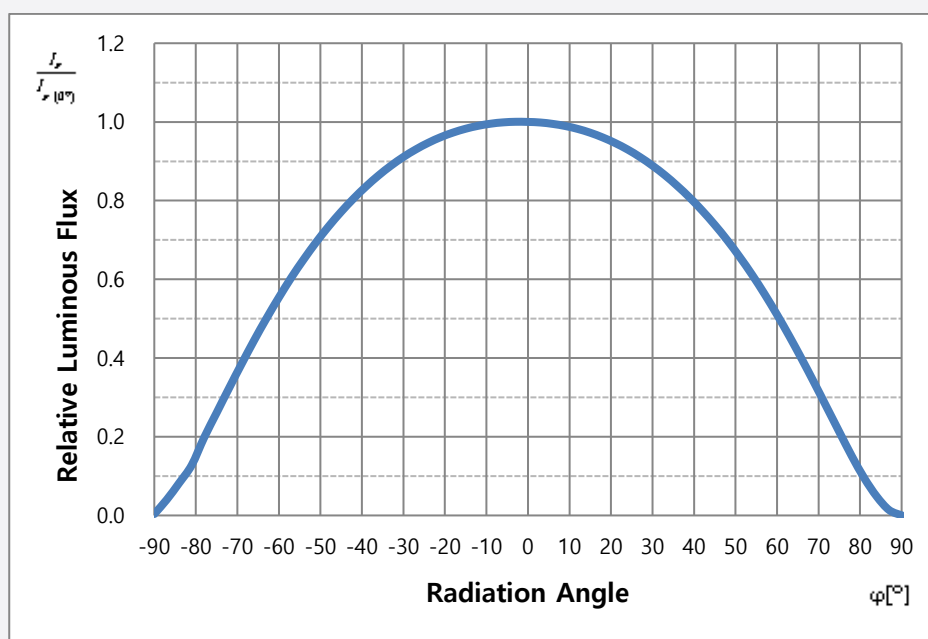
$T_s = 0 \sim 118^\circ\text{C}$



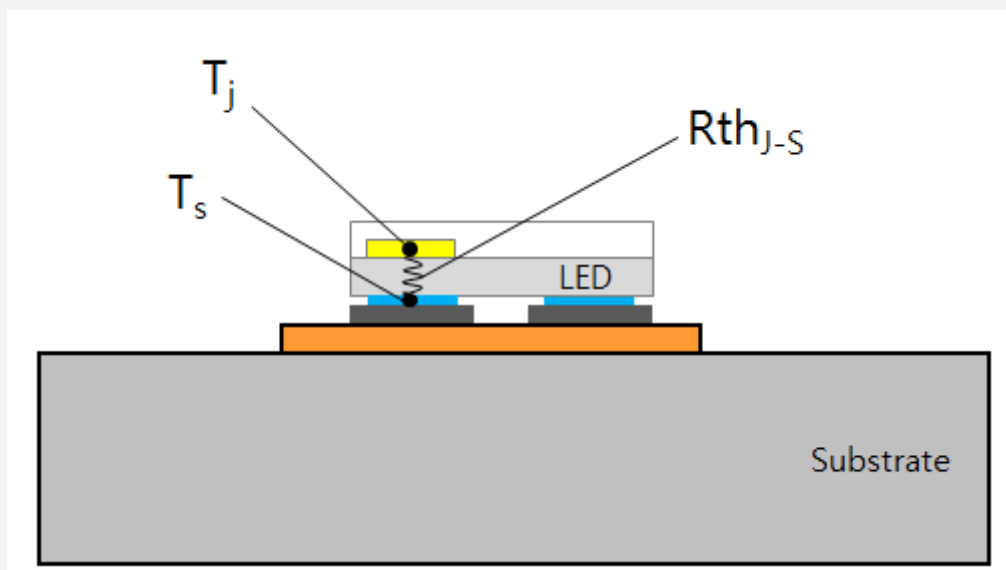
$T_s = 118 \sim 125^\circ\text{C}$



g) Beam Angle Characteristics ($I_F = 1,000 \text{ mA}$, $T_S = 25 \text{ }^\circ\text{C}$)



4. Soldering Temperature Location



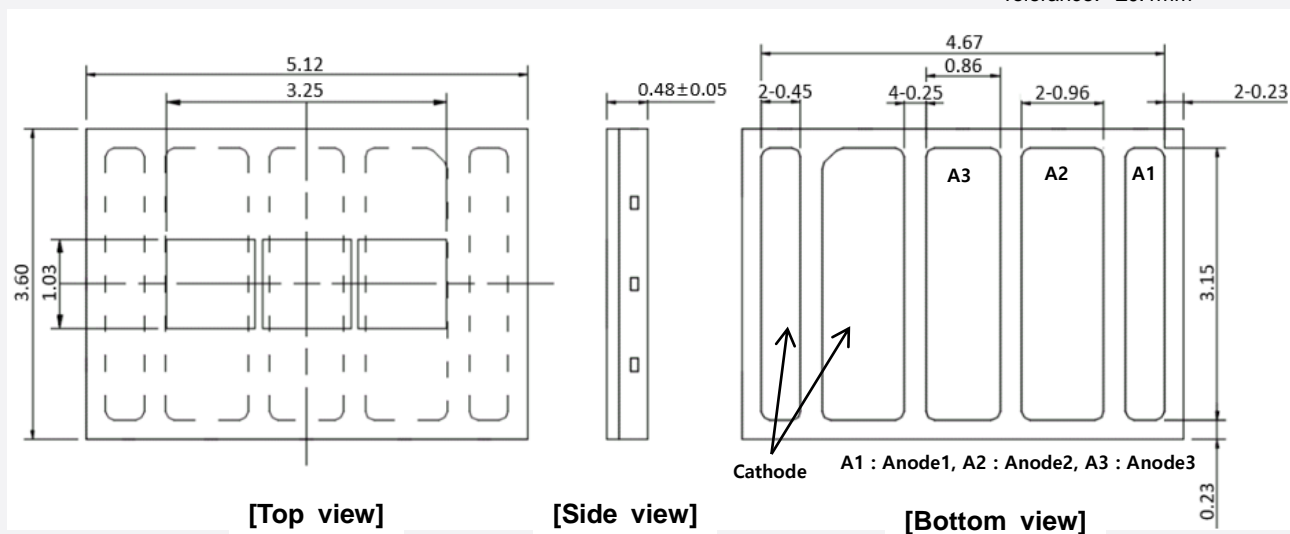
T_j : Temperature of Junction

T_s : Temperature of Solder Pad

$R_{th_{J-S}}$: Thermal Resistance from Junction to Solder Pad

5. Mechanical Dimension

Tolerance: $\pm 0.1\text{mm}$



Notes:

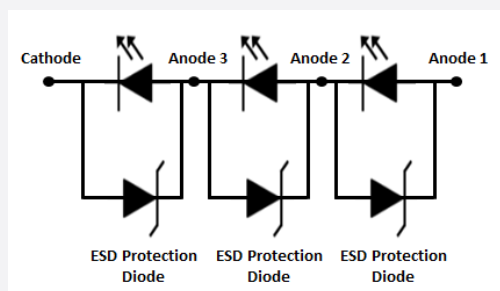
Unit: mm, Tolerance: $\pm 0.1\text{mm}$. Approximate Weight : 0.035g

a) Pick and Place

Do not place pressure on the resin molded part

It is recommended to use a pick & place nozzle CNT 3X5, etc.

b) Electric Schematic Diagram

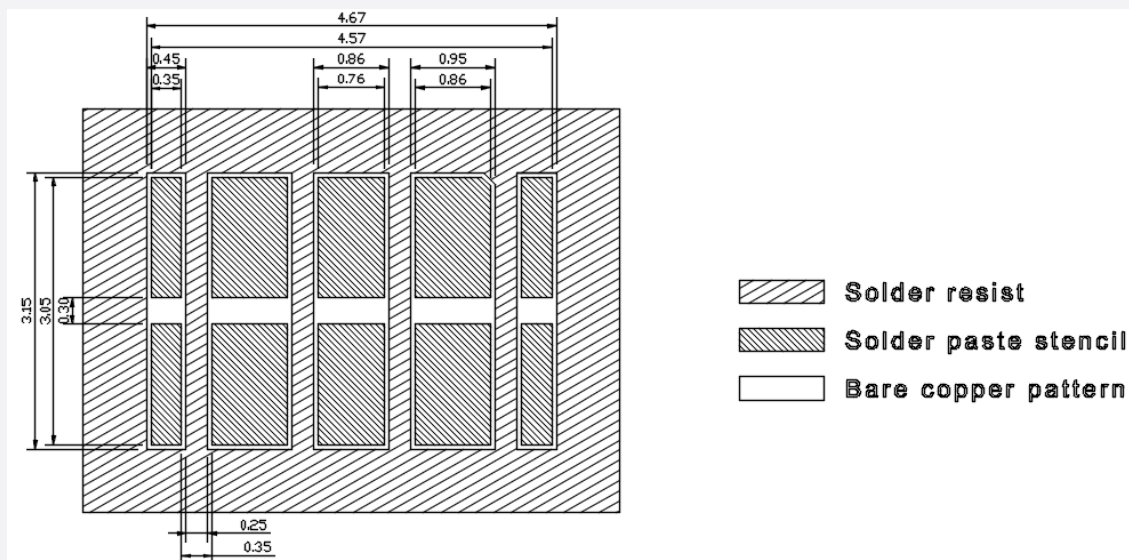


c) Material Information

Description	Material
Substrate	EMC Lead Frame
LED Die	Thin GaN
Phosphor	Glass with Phosphor
Zener Diode	Silicon
Wire	Au
Resin Mold	Silicone

6. Soldering Conditions

a) Pad Configuration & Solder Pad Layout

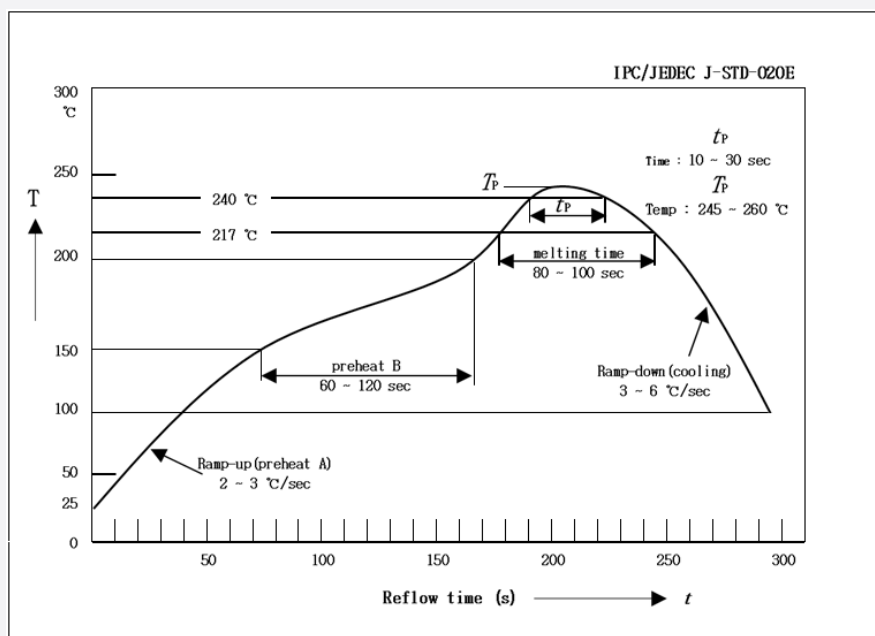


Notes:

Unit: mm, Tolerance: ± 0.10 mm, recommended stencil thickness 120 μm

b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

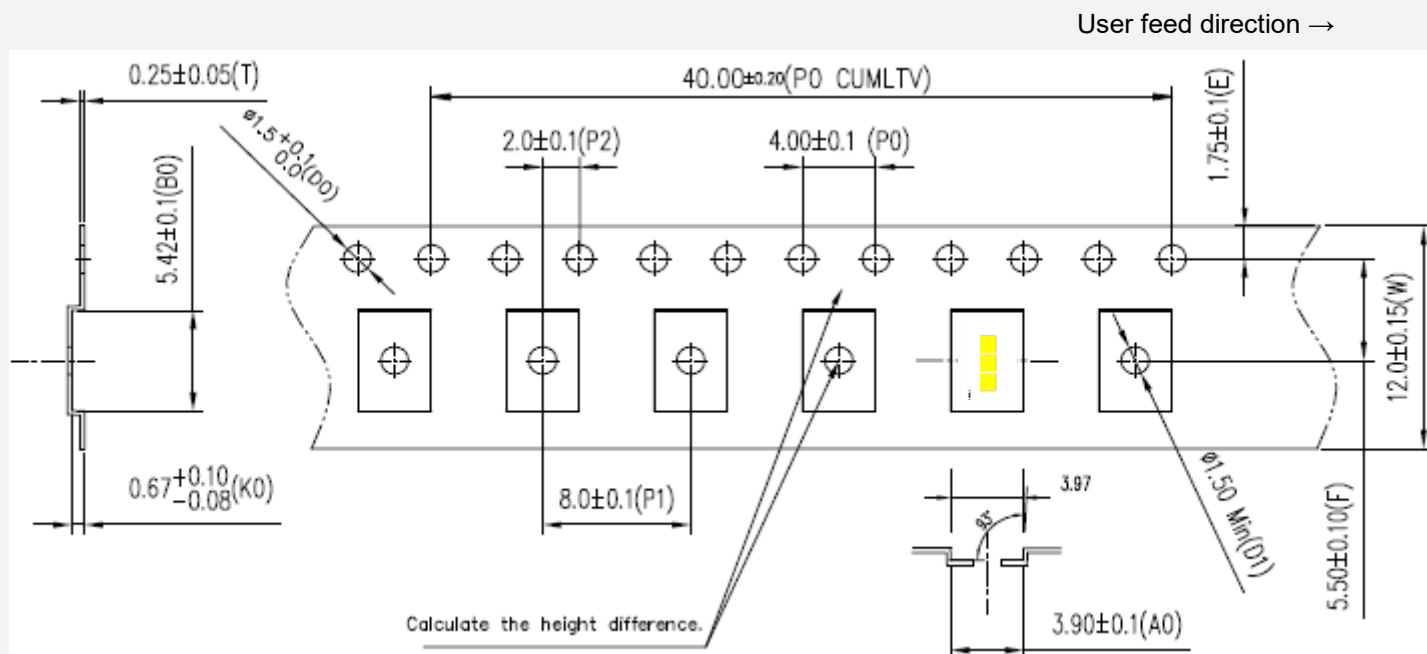


c) Manual Soldering Conditions

Not more than 5 seconds @ max. 300 °C, typically soldering iron. (one time only)

7. Tape & Reel

a) Taping Dimension



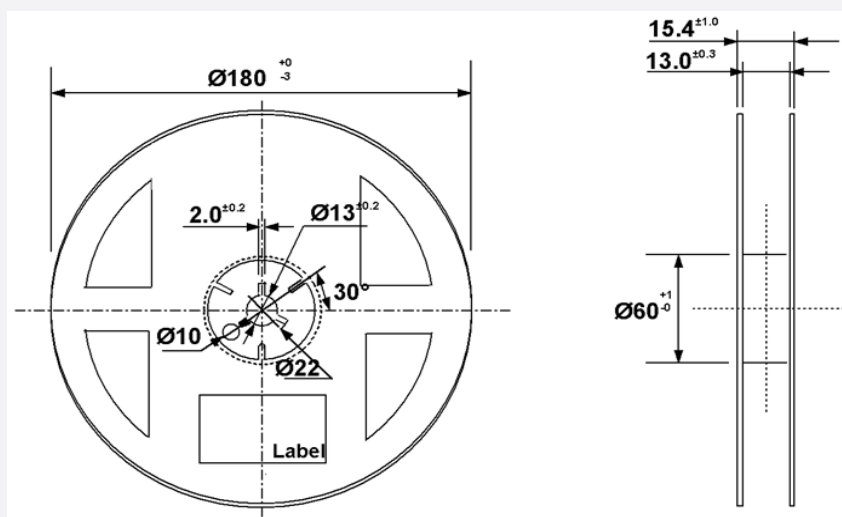
※ Package placement condition in a reel tape

Empty pocket(Min. 100ea)	LED mounting part	Empty pocket(Min. 100ea)
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Notes:

Unit: mm, LED taping quantity : 1,000EA / Reel

b) Reel Dimension

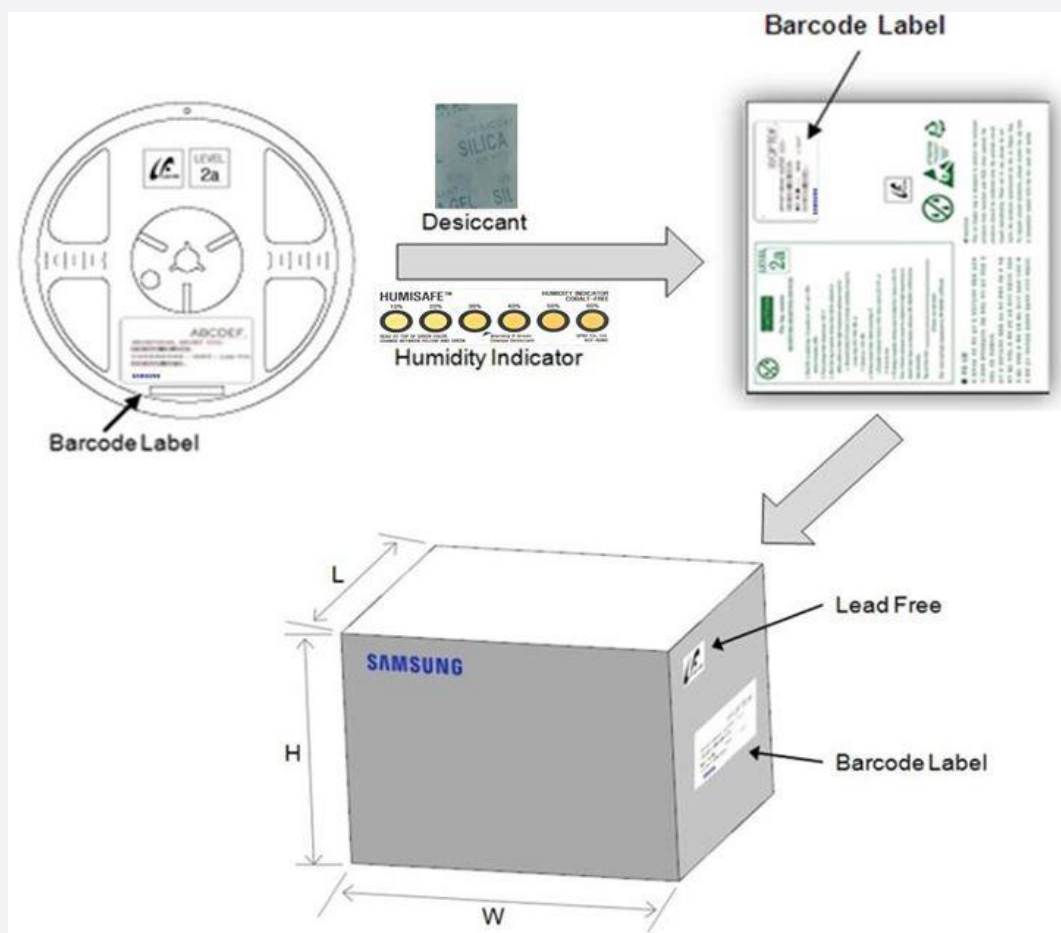


Notes:

Unit: mm, Tolerance : ±0.20 mm

9. Packing Structure

a) Packing Process



Dimension of Transportation Box in mm

Width	Length	Height
220	245	182

10. Precautions in Handling & Use

- 1) Absolute maximum ratings are set to prevent LED products from breaking due to extreme stress (temperature, current, voltage, etc.). Usage conditions must never go above the ratings, nor do any of two of the factors reach the rating level simultaneously.
- 2) Please avoid touch or pressure on resin molded part in the products. To handle the products directly, it is recommended to use nonmetallic tweezers.
- 3) 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.
- 4) LEDs must be stored in a clean environment. If the LEDs are to be stored for 3 months or more after being shipped from SAMSUNG ELECTRONICS, they should be packed by a sealed container with nitrogen gas injected.
- 5) After bag is opened, device subjected to soldering, solder reflow, or other high temperature processes must be:
 - a. Mounted within 672hours at an assembly line with a condition of no more than 30°C/60% RH,
 - b. Stored at < 10% RH.
- 6) Repack unused products using anti-moisture packing, fold to close any openings and store in a dry place with <10% RH.
- 7) Devices require baking before mounting, if humidity card reading is >60% at 23±°C.
- 8) Devices must be baked for 1 day 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) Prepare an ESD protective area by placing conductive mattress ($10^6\Omega$) and ionizer to remove any static electricity.
- 11) VOCs (volatile organic compounds) may be occurred by adhesives, flux, hardener or organic additives which are used in luminaires (fixture) and LED silicone bags are permeable to it. It may lead a discoloration when LED expose to heat or light. This phenomenon can give a significant loss of light emitted (output) from the luminaires (fixtures). In order to prevent these problems, we recommend you to know the physical properties for the materials used in luminaires, it requires selecting carefully.

11. Company Information

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