

Middle Power LED PLCC Series

P-Series

0.5W Red

SPMRDT366EA0



Features

- Package : Au Plated 6 pad design package with silicone resin
- Dimension : 3.2 mm x 3.2 mm
- Technology : AlGaInP
- Chip Configuration : 1 chip
- ESD Voltage : Up to 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)
- Viewing Angle : 120°
- Qualifications : The product qualification test based on the guidelines of AEC-Q102

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1. Characteristics

a) Typical Characteristics

[T_s= 25°C] ^[1]

Item	Symbol	Value	Unit
Luminous Flux (I _F = 140 mA)	I _V	Typ. 8.80	cd
Forward Voltage (I _F = 140 mA)	V _F	Typ. 2.15	V
Viewing Angle	Φ	Typ. 120	°
Reverse Current	I _R	10	μA
Real Thermal Resistance (Junction to Solder point)	R _{th_J-S (Real)}	Typ. 53	K/W
		Max. 61	
Electrical Thermal Resistance (Junction to Solder point)	R _{th_J-S (Elec.)}	Typ. 35	K/W
		Max. 40	
Radian Surface	A	4.52	mm ²

Notes:

[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 ~ +110	°C
Storage Temperature	T _{stg}	-40 ~ +110	°C
LED Junction Temperature	T _j	125	°C
Maximum Forward current ^[2] (T _s = 25°C) ^[3]	I _F	200	mA
Minimum Forward current ^[2] (T _s = 25°C) ^[3]	I _F	10	mA
Maximum Reverse current		Do not apply for reverse current	
ESD Sensitivity ^[4]	-	±2 HBM	kV

Notes:

[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 25ms.

[4] It is recommended to use the LED with additional protection device (for example Zener diode) to protect it against 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	M	R	D	T	3	6	6	E	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 (M for automotive middle power)
4 5	color variant (RD for automotive red color)
6	LED PKG version (T for initial version)
7 8 9	product configuration and type (366 for automotive 3232 6Pin PKG Au plate type)
10	operating condition (E for 140mA)
11	specific property (A for Automotive exterior)
12	CRI variant (0 for default)
13 14	forward voltage property
15 16	dominant wavelength property
17 18	luminous flux property

a) Luminous Intensity Bins ^[5] ($I_F = 140 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

Symbol	Bin Code	Intensity Range (cd)		Flux Range (lm)	
		Min	Max	Min	Max
$I_V \mid \Phi_V$	EA	7.1	9.0	21.3	27.0
	EB	9.0	11.2	27.0	33.6
	FA	11.2	14.0	33.6	42.0

b) Voltage Bins ^[5] ($I_F = 140 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

Symbol	Bin Code	Voltage Range (V)	
		Min	Max
V_F	E1	1.90	2.05
	E2	2.05	2.20
	E3	2.20	2.35
	E4	2.35	2.50

Notes:

[5] Luminous intensity measuring equipment: CAS140CT Φ_V and V_F tolerances are $\pm 7\%$ and $\pm 0.1\text{V}$, respectively

Given tolerances are valid for typical conditions.

c) Dominant Wavelength Bins ^[6] ($I_F = 140 \text{ mA}$)

Symbol	Bin Code	Wavelength Range (nm)	
		Min	Max
λ_D	D1	612	618
	D2	618	624

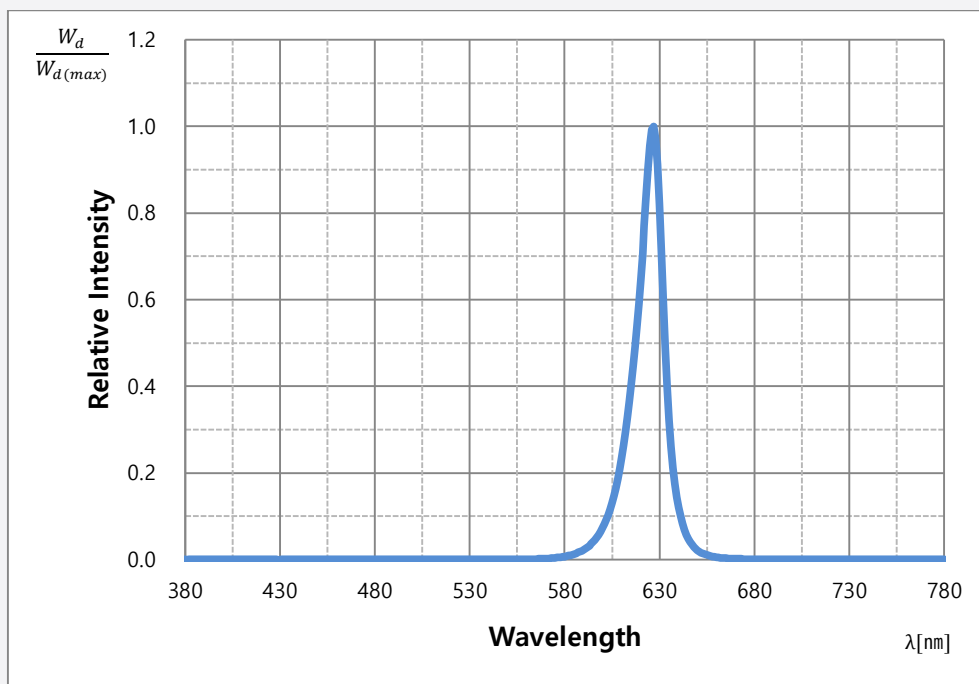
Notes:

[6] Wavelength measuring equipment: CAS140CT

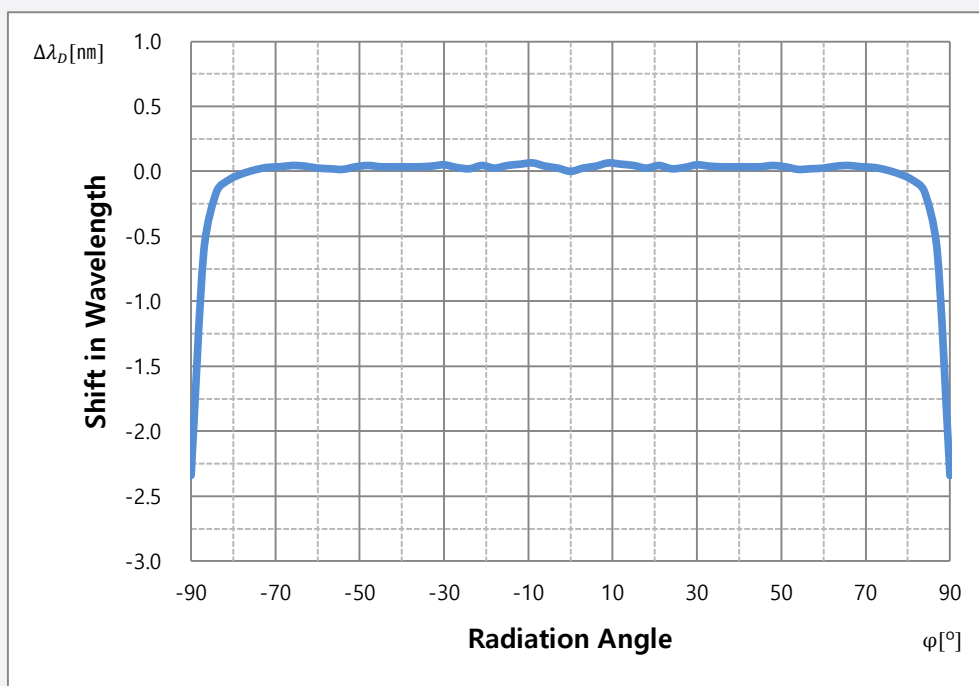
Tolerance $\pm 2\text{nm}$

3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_F = 140 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



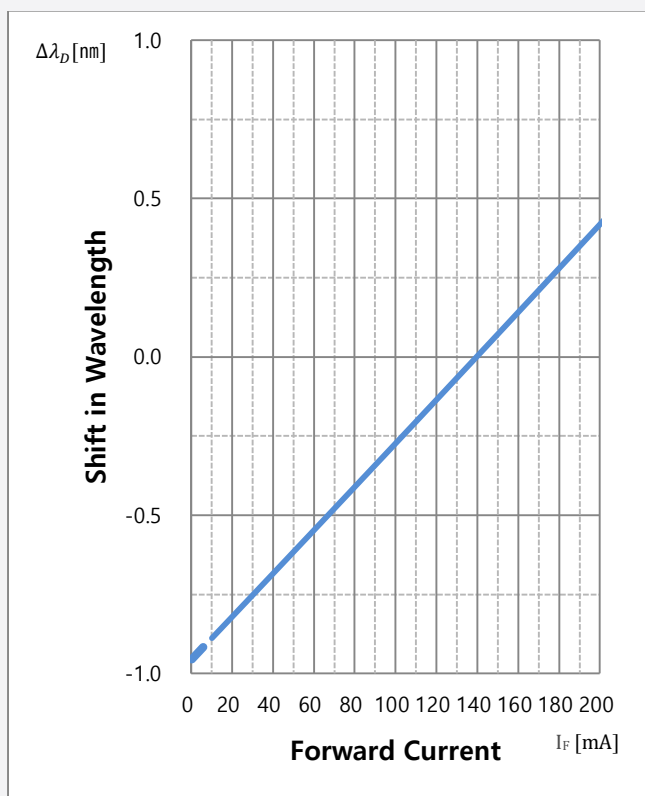
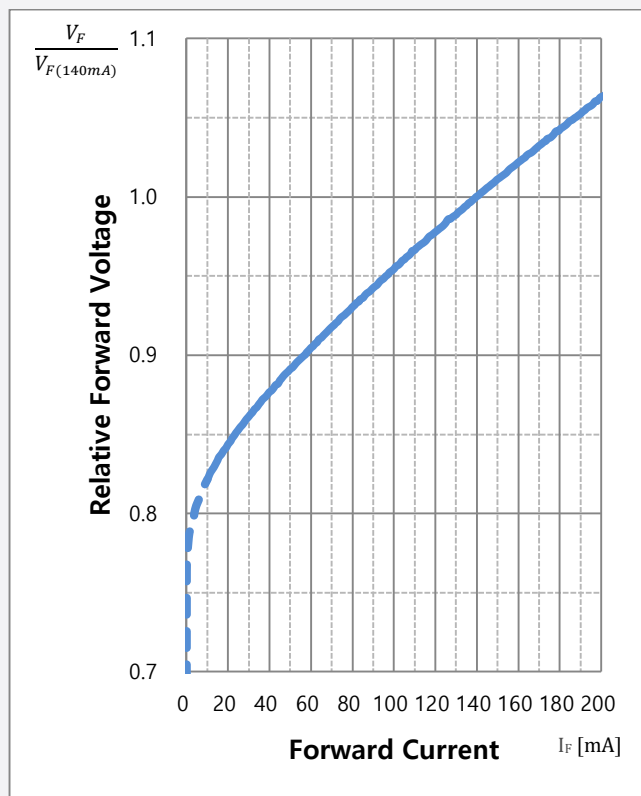
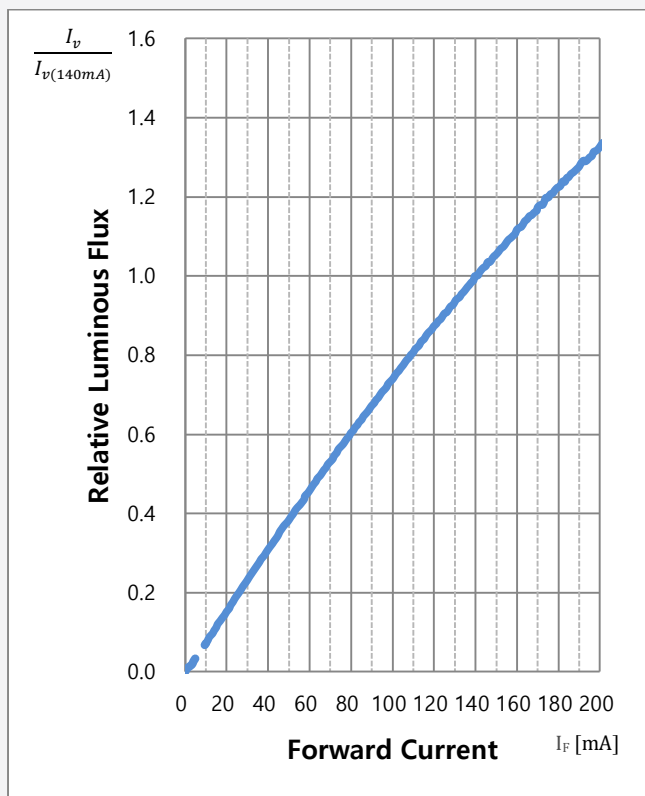
b) Wavelength Shift vs Radiation Angle ($I_F = 140 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$) ^[7]



Notes:

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

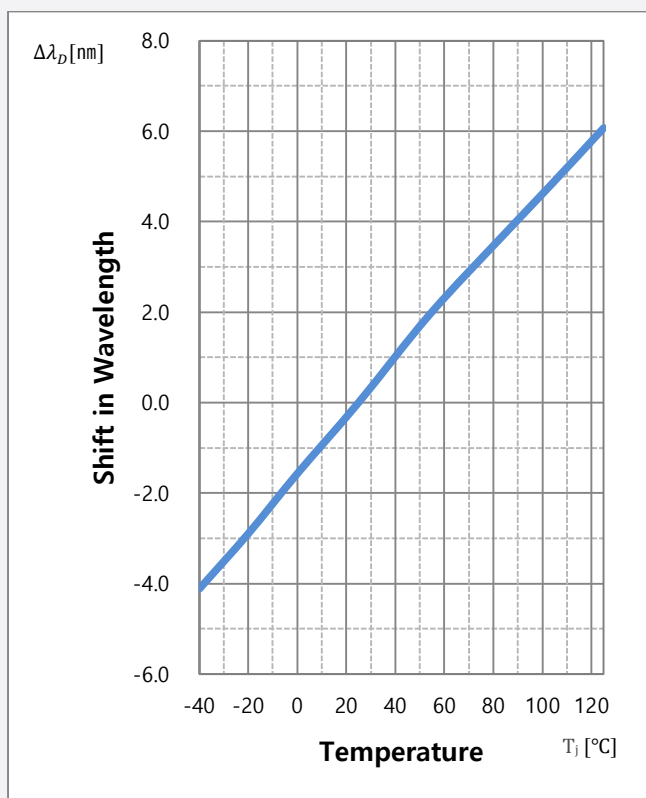
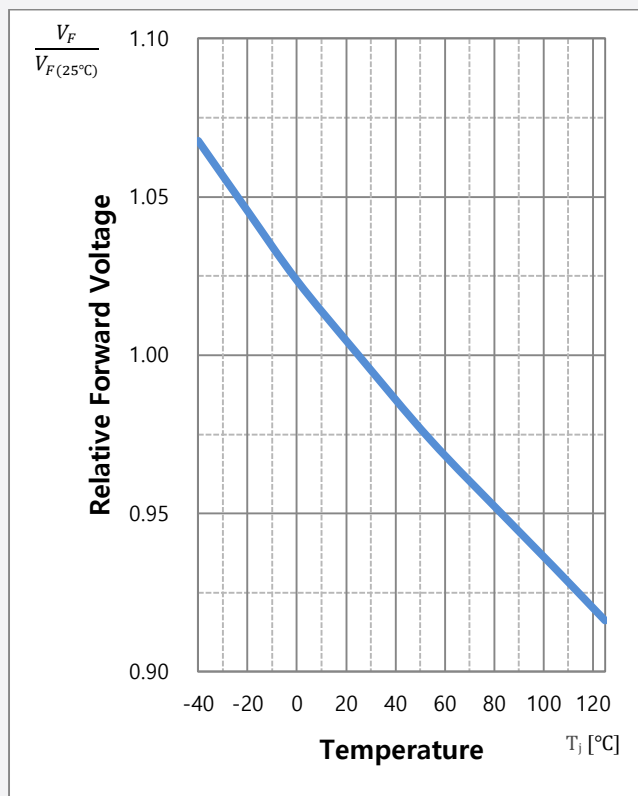
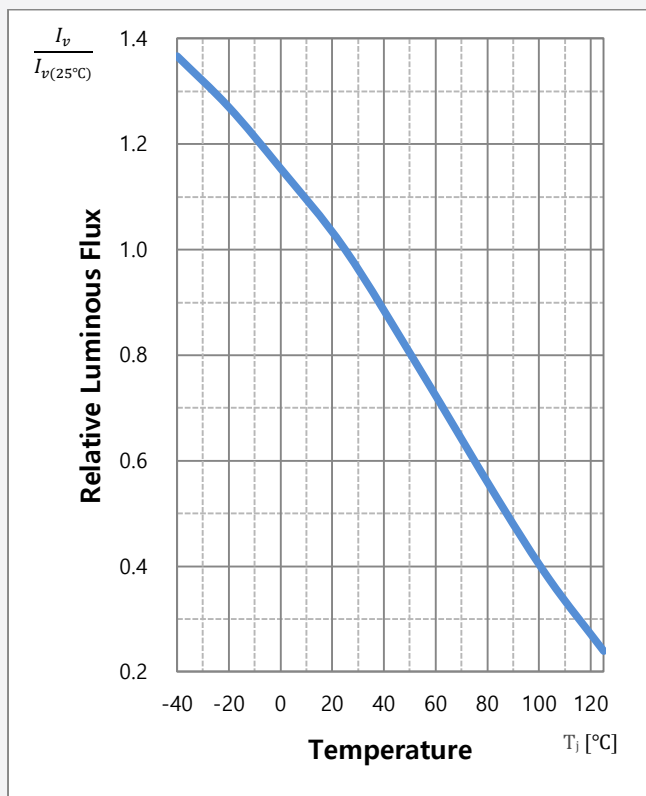
c) Forward Current Characteristics ($T_s = 25\text{ }^{\circ}\text{C}$) [8]



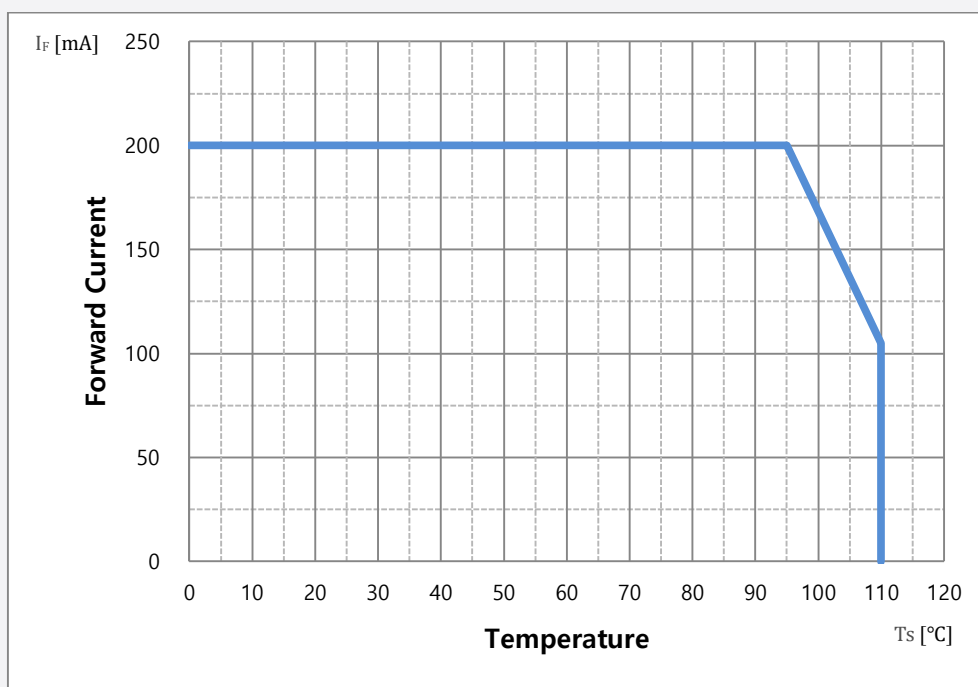
Notes:

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

d) Temperature Characteristics ($I_F = 140 \text{ mA}$)



e) Derating Curve ^[9]

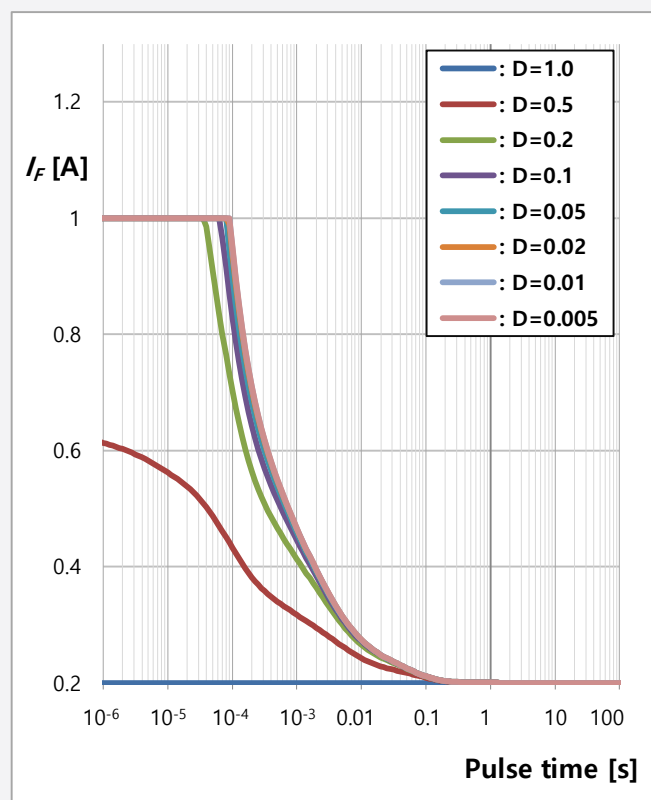


Notes:

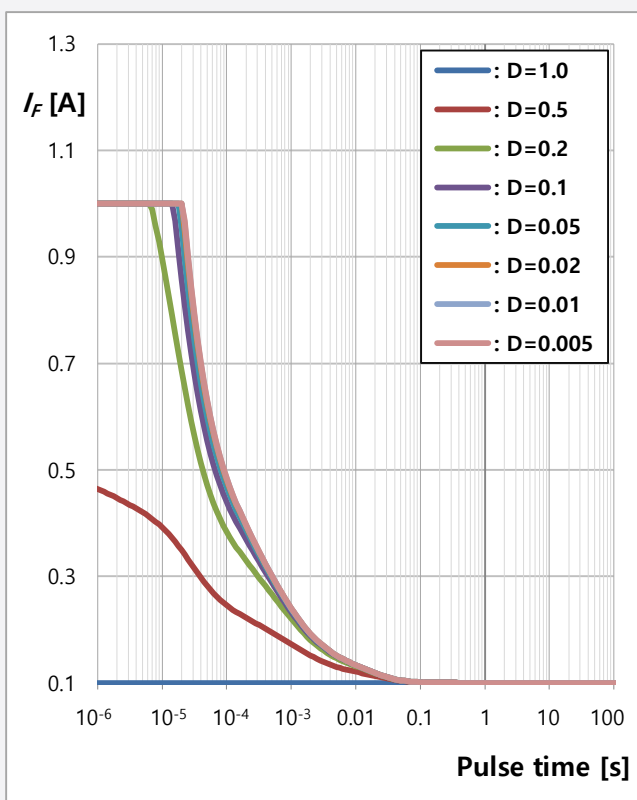
[9] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms.

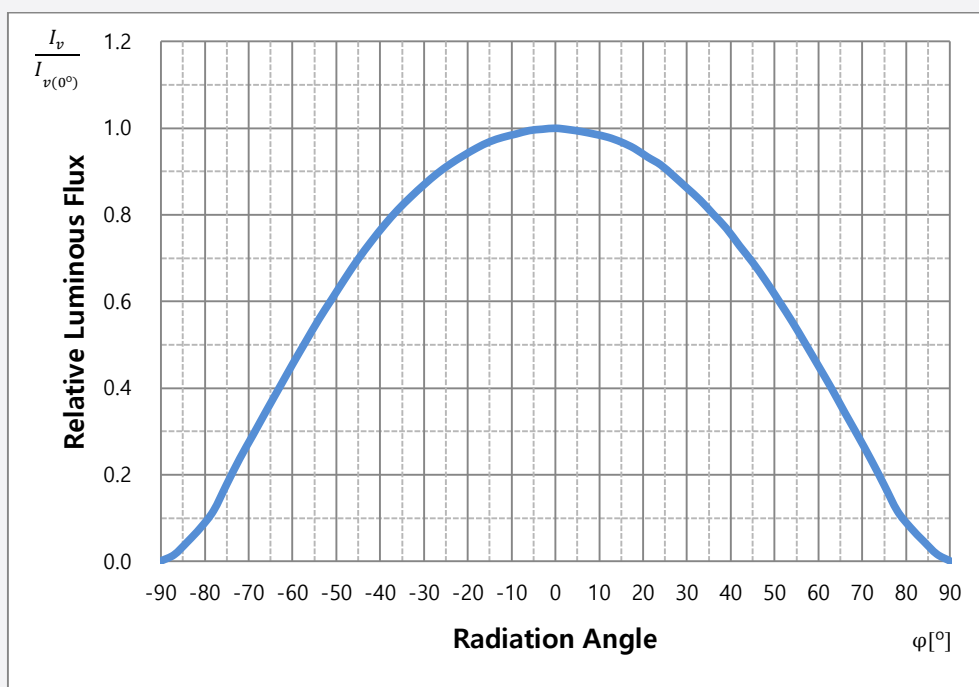
f) Permissible Pulse Handling Capability ($I_F = f(t_p)$; D: Duty cycle)

$T_s = 0 \sim 95^\circ\text{C}$

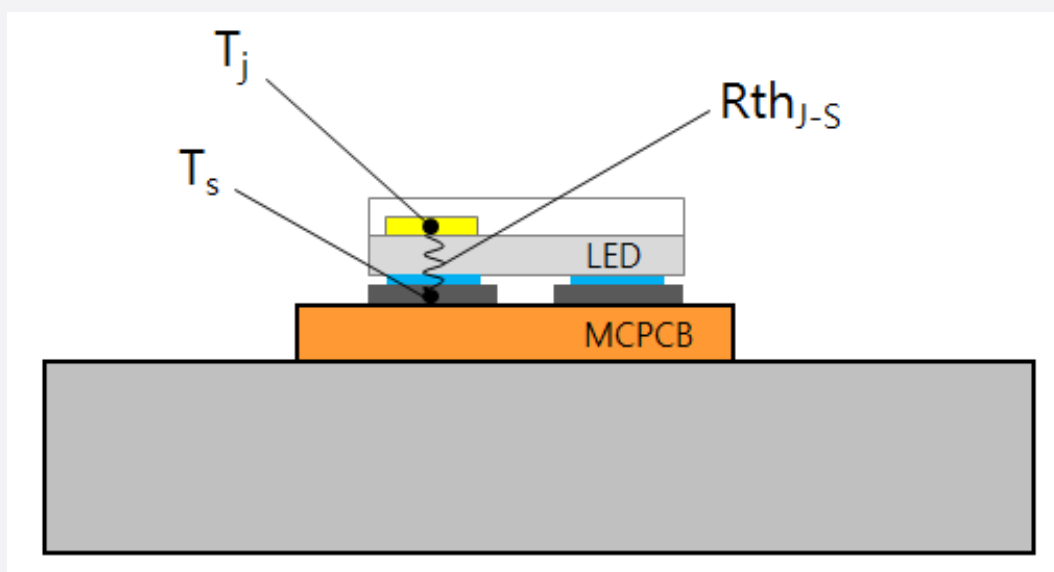


$T_s = 110^\circ\text{C}$



g) Beam Angle Characteristics ($I_F = 140 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

4. Soldering Temperature Location

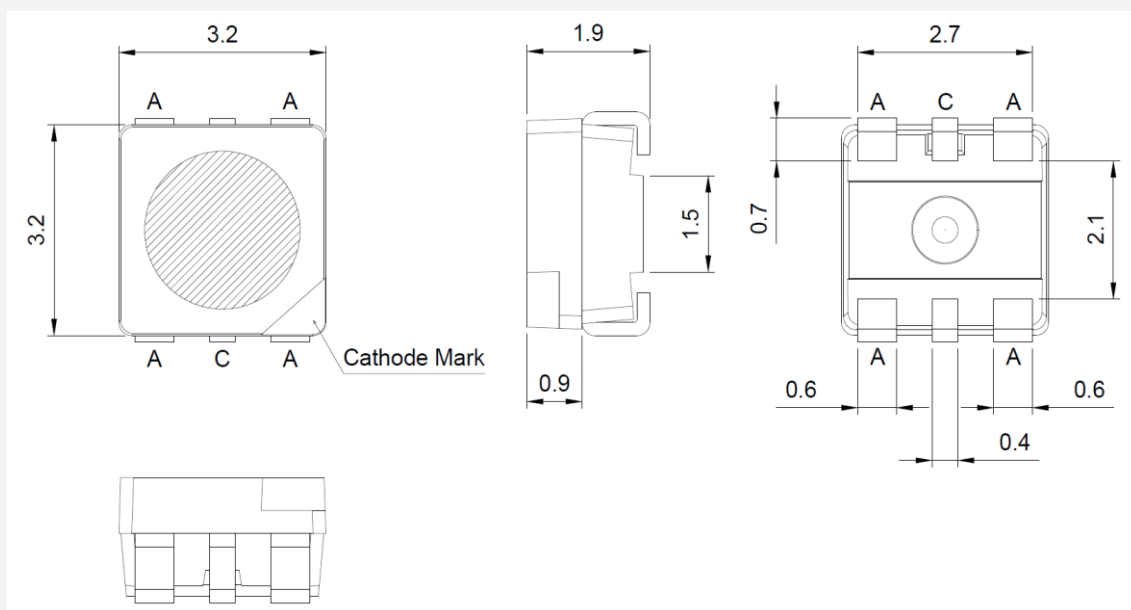


T_j : Temperature of Junction

T_s : Temperature of Solder Pad

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

5. Mechanical Dimension



Notes:

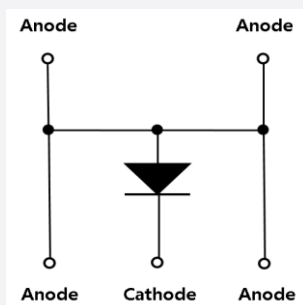
Unit: mm, Tolerance: ± 0.1 mm Approximate Weight : 39mg, A: Anode, C: Cathode

a) Pick and Place

Do not place pressure on the resin lens (hatch area)

The maximum compressing force is 15N in the polymer

b) Electric Schematic Diagram



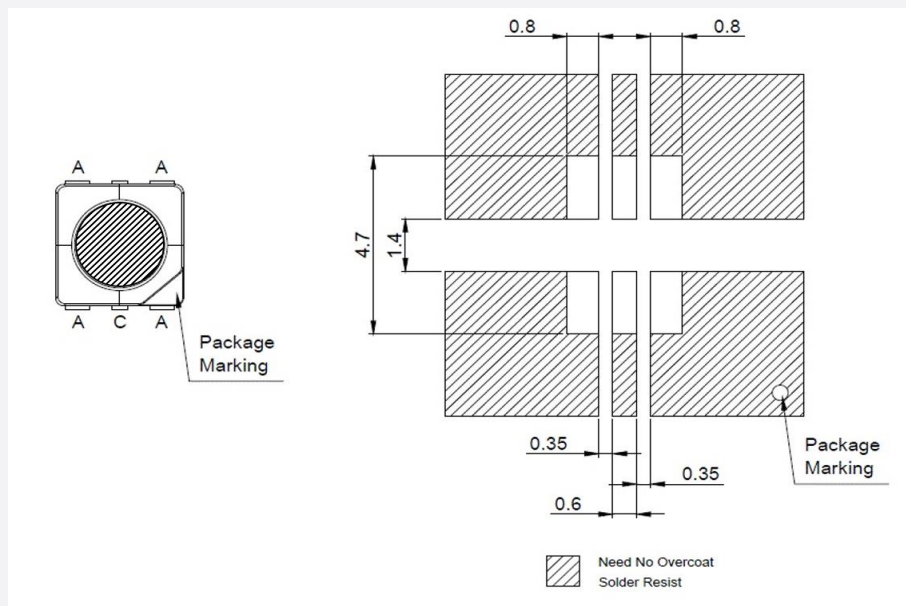
[Circuit]

c) Material Information

Description	Material
Lead Frame	PLCC
LED Die	AlGaInP
Wire	Au
Resin Mold	Silicone

6. Soldering Conditions

a) Pad Configuration & Solder Pad Layout

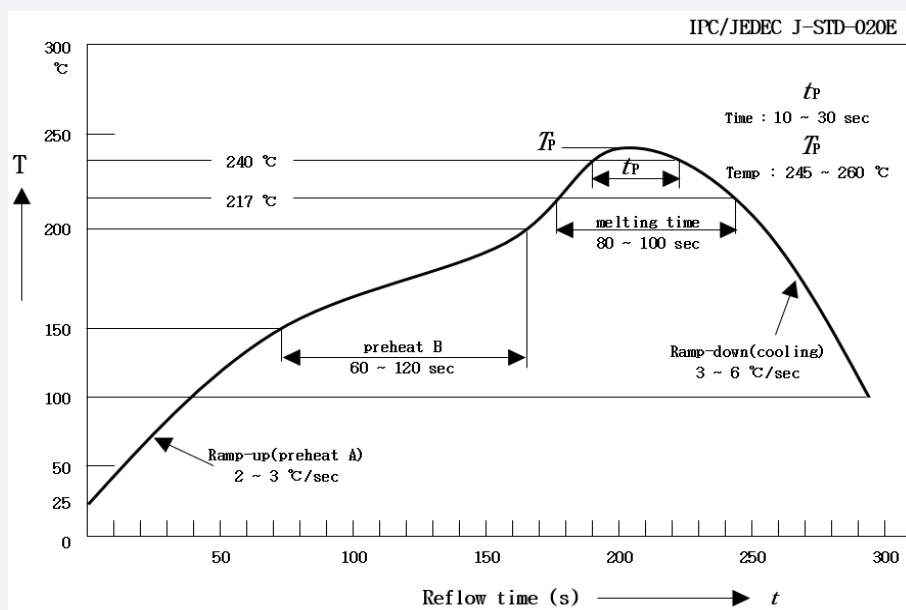


Notes:

Unit: mm, Tolerance: ± 0.1 mm

b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



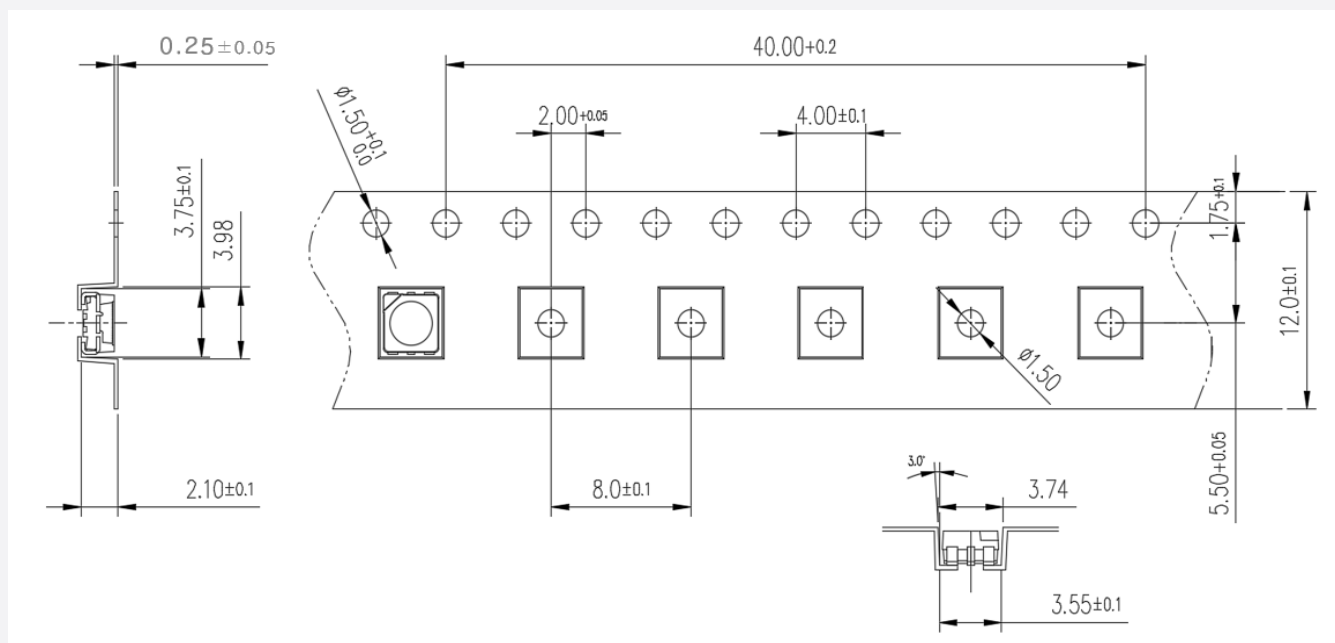
※ All temperature refer to the pad of package.

c) Manual Soldering Conditions

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

7. Tape & Reel

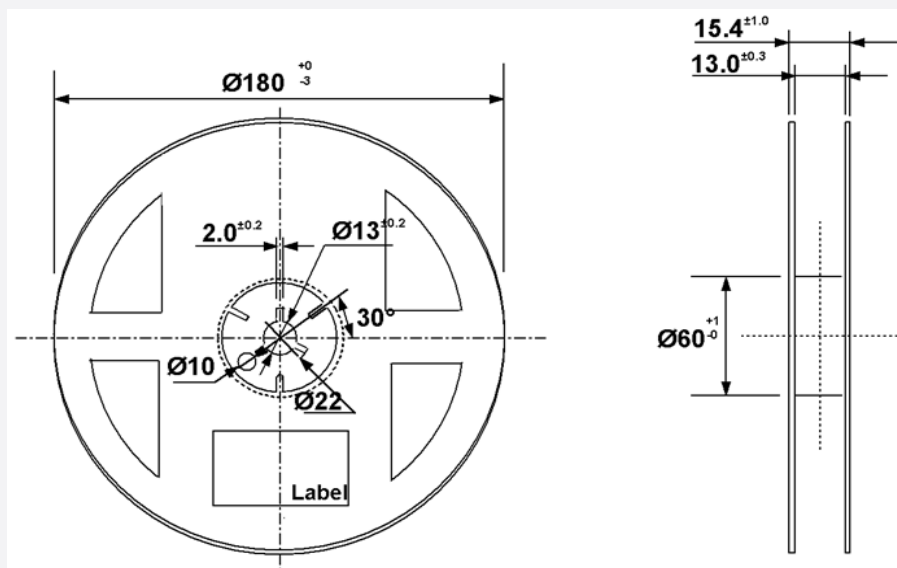
a) Taping Dimension



Notes:

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

b) Reel Dimension



Notes:

Unit: mm, Tolerance: $\pm 0.2\text{mm}$

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8. Label Structure

a) Product Labeling Information



N.B) Denoted rank is the only example.

b) Bin Code Structure

AB: Forward Voltage (V_F) Bin (refer to page. 5)

CD: Dominant Wavelength (W_d) Bin (refer to page. 5)

EF: Luminous Flux (I_v) Bin (refer to page. 5)

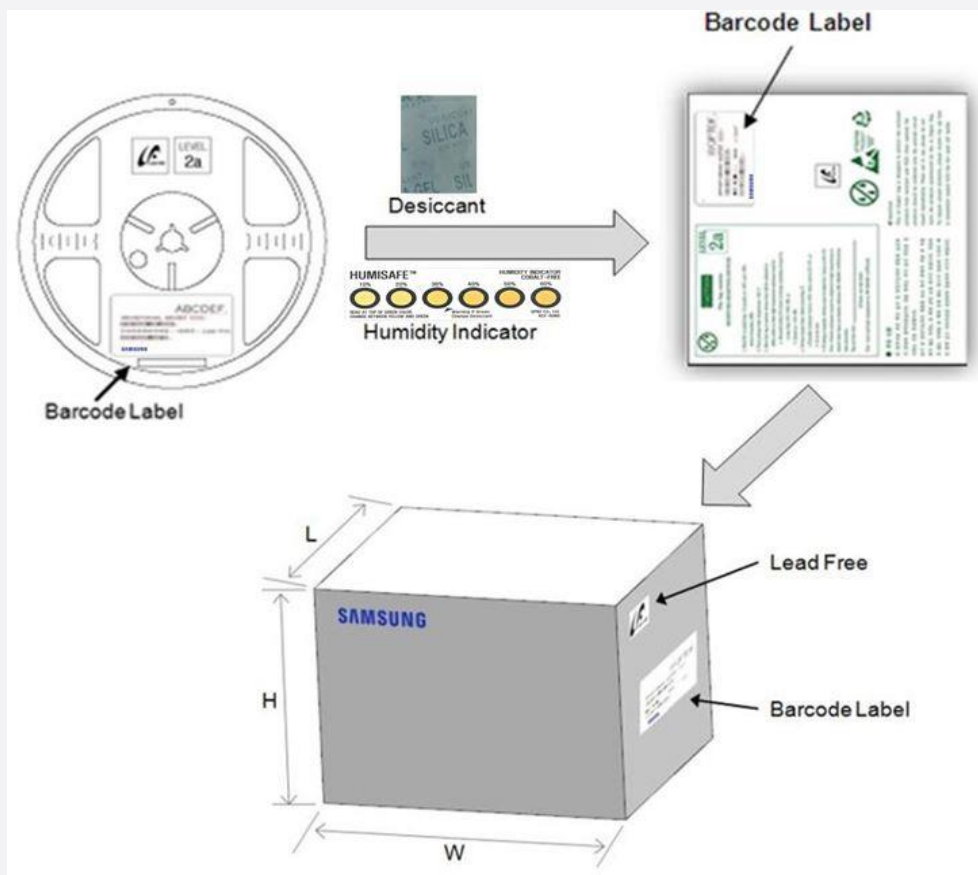
c) Lot Number Structure

The lot number is composed of the following characters:

No.	Information
1,2	Production Site SL : SAMSUNG LED, GL : GOSIN CHINA, EL/EM : KOREA
3	Product State A : Normality, B : Bulk, C : First Production, R : Reproduction, S : Sample
4	Year C : 2018, D : 2019, E : 2020 ...
5	Month : 1 ~ 9, A, B
6	Day : 1 ~ 9, A, B ~ V
789	Product number : 1 ~ 999
abc	Reel Number : 1 ~ 999

9. Packing Structure

a) Packing Process



Dimension of Transportation Box in mm

Width	Length	Height
220	245	182

10. Handling and use precautions

- 1) For over-current protection, we recommend the use of resistors to prevent sudden current surges caused by slight shifts in voltage
- 2) LEDs should not be contacted to any type of fluid (i.e. water, oil, organic solvent, etc.). If cleaning is required, only use isopropyl alcohol.
- 3) The maximum ambient temperature must be considered in order for the maximum temperature ratings not to be exceeded.
- 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. (Shelf life of sealed bags: 12 months, temp. $\sim 40^{\circ}\text{C}$, $\sim 90\%$ RH)
- 5) After storage bag is open, LED 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.
 - 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) LEDs require baking before mounting, if humidity card reading is $>60\%$ at $23\pm 5^{\circ}\text{C}$.
- 8) If baking is required, LEDs must be baked for 1 day at $60\pm 5^{\circ}\text{C}$.
- 9) LEDs are sensitive to electrostatic discharge and surges. Applying any voltage exceeding the absolute maximum rating of the LED can cause permanent damage to the device. Damaged LEDs may have some unusual characteristics such as increased leakage current, lower turn-on voltage or may light abnormally at low current. When handling LEDs, using grounding wrist-bands or anti-static gloves is recommended.
- 10) VOCs (volatile organic compounds) present in adhesives, flux, hardeners or organic additives, etc. that are used in luminaires may lead to discoloration of the LED when exposed to heat or light. Note that VOCs can permeate silicone bags. This phenomenon can significantly affect light output from the luminaire. To avoid this issue, please carefully evaluate materials used in your process and/or luminaire to be free of VOCs.
- 11) To avoid risk of sulfurization (or tarnishing), do not use or store LEDs near materials containing sulfur, fluorine, chlorine, bromine, iodine or other halogens or compounds that can potentially react with the LED's silver plated lead frame. Examples of these materials include: various rubbers, paper products, certain solder pastes, cleaning solutions, adhesives, etc. or may be present in certain environments in form of fertilizers, lubricants, etc. This reaction can result into the lead frame darkening when exposed to such compounds, resulting in degradation of intensity, change in forward voltage, chromaticity coordinate shift and it may go as far as becoming an open circuit in more extreme cases.

11. Company Information

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Legal and additional information

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