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Enabling the best lm/W in Mid Power Range

Mid-Power LED - 5630 Series

STW8Q14BE (Cool, Neutral, Warm)

Product Brief

Description

- This White Colored surface-mount LED comes in standard package dimension. Package Size: 5.6x3.0x0.9mm
- It has a substrate made up of a molded plastic reflector sitting on top of a lead frame.
- The die is attached within the reflector cavity and the cavity is encapsulated by silicone.
- The package design coupled with careful selection of component materials allow these products to perform with high reliability.

Features and Benefits

- Market Standard 5630 Package Size
- High Color Quality, CRI Min. 80
- Wide CCT range 2600~7000K
- RoHS compliant

Key Applications

- Interior lighting
- General lighting
- Indoor and outdoor displays
- Architectural / Decorative lighting

Table 1. Product Selection Table

Part Number	CCT			
	Color	Min.	Typ.	Max.
STW8Q14BE	Cool White	4,700K	5,600K	7,000K
STW8Q14BE	Neutral White	3,700K	4,200K	4,700K
STW8Q14BE	Warm White	2,600K	3,000K	3,700K

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Performance Characteristics

Table 2. Electro Optical Characteristics, I_F=100mA, T_j=25ºC, RH30%

Part Number	CCT (K) [1]	RANK	Luminous Intensity [2] I_V (cd)		Luminous Flux [3] Φ_V (lm)		CRI R_a
	Typ.		Min	Max	Min	Max	Min.
STW8Q14BE	6500	U0	11.0	11.7	34.1	36.3	80
		U7	11.7	12.5	36.3	38.8	80
		V5	12.5	13.5	38.8	41.9	80
		W5	13.5	14.5	41.9	45.0	80
	5600	U0	11.0	11.7	34.1	36.3	80
		U7	11.7	12.5	36.3	38.8	80
		V5	12.5	13.5	38.8	41.9	80
		W5	13.5	14.5	41.9	45.0	80
	5000	U0	11.0	11.7	34.1	36.3	80
		U7	11.7	12.5	36.3	38.8	80
		V5	12.5	13.5	38.8	41.9	80
		W5	13.5	14.5	41.9	45.0	80
	4500	U0	11.0	11.7	33.6	35.7	80
		U7	11.7	12.5	35.7	38.1	80
		V5	12.5	13.5	38.1	41.2	80
		W5	13.5	14.5	41.2	44.2	80
	4000	U0	11.0	11.7	33.6	35.7	80
		U7	11.7	12.5	35.7	38.1	80
		V5	12.5	13.5	38.1	41.2	80
		W5	13.5	14.5	41.2	44.2	80
	3500	U0	11.0	11.7	33.0	35.1	80
		U7	11.7	12.5	35.1	37.5	80
		V5	12.5	13.5	37.5	40.5	80
		W5	13.5	14.5	40.5	43.5	80
	3000	T5	10.5	11.0	31.5	33.0	80
		U0	11.0	11.7	33.0	35.1	80
		U7	11.7	12.5	35.1	37.5	80
		V5	12.5	13.5	37.5	40.5	80
	3500	T5	10.5	11.0	31.5	33.0	80
		U0	11.0	11.7	33.0	35.1	80
		U7	11.7	12.5	35.1	37.5	80
		V5	12.5	13.5	37.5	40.5	80

Notes :

(1) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.

(2) Seoul Semiconductor maintains a tolerance of ±7% on Intensity and power measurements. The luminous intensity IV was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package.

(3) The lumen table is only for reference.

Performance Characteristics

Table 3. Absolute Maximum Ratings, I_F=100mA, T_j= 25ºC, RH30%

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current	I_F	-	100	160	mA
Forward Voltage[1]	V_F (100mA)	2.9	-	3.4	V
Reverse Voltage	V_r	-	0.9	1.2	V
Luminous Intensity (5,000 K) [1]	I_v (100mA)	-	12.5 (38.8)	-	cd (lm)
Luminous Intensity (3,000 K) [1]	I_v (100mA)	-	11.7 (35.1)	-	
Color Rendering Index [1]	Ra	80	83	90	-
Viewing Angle [2]	$2\Theta_{1/2}$		120		
Power Dissipation	P_d	-	-	560	mW
Junction Temperature	T_j	-	-	125	ºC
Operating Temperature	T_{opr}	- 40	-	+ 85	ºC
Storage Temperature	T_{stg}	- 40	-	+ 100	ºC
Thermal resistance (J to S) [3]	$R\theta_{J-S}$	-	18	-	℃/W
ESD Sensitivity(HBM) [4]	-	-	-	5000	V

Notes :

(1) Tolerance : VF :±0.1V, IV :±7%, Ra :±2, x,y :±0.005

(2) $\Theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity

(3) Thermal resistance : Rth_{JS} (Junction / solder)

(4) A zener diode is included for ESD Protection.

- LED's properties might be different from suggested values like above and below tables if operation condition will be exceeded our parameter range. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
- All measurements were made under the standardized environment of Seoul Semiconductor.

Characteristics Graph

Fig 1. Color Spectrum, I_F=100mA, T_j = 25ºC, RH30%

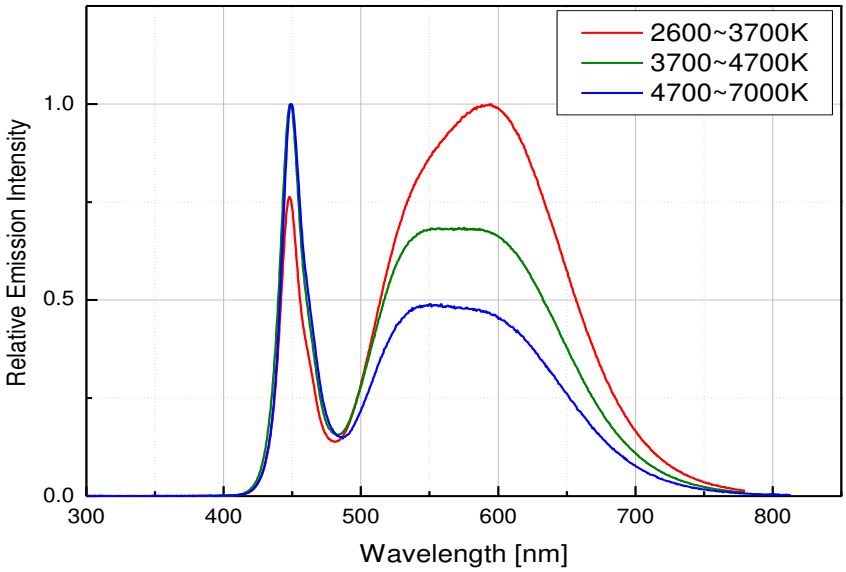
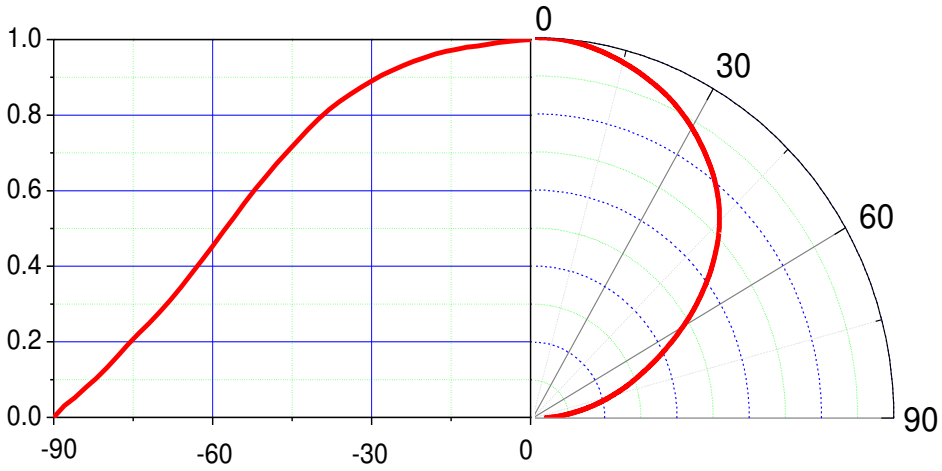


Fig 2. Viewing Angle Distribution, I_F=100mA



Characteristics Graph

Fig 3. Forward Voltage vs. Forward Current , T_j=25ºC

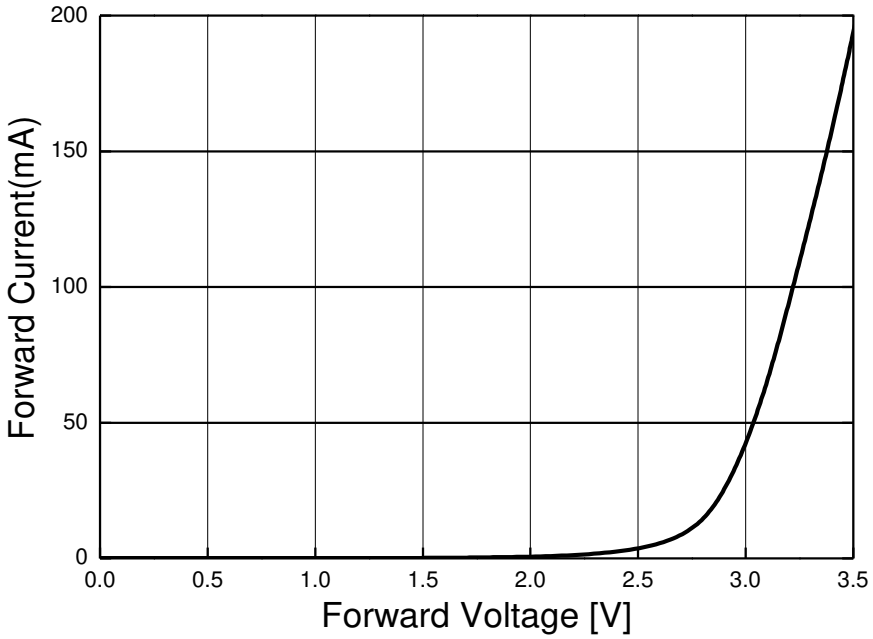
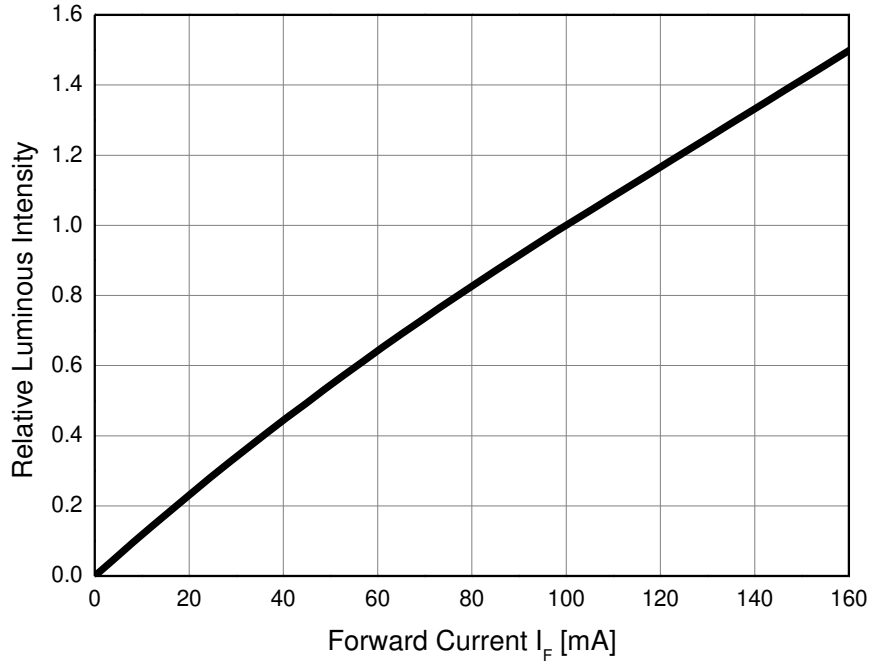
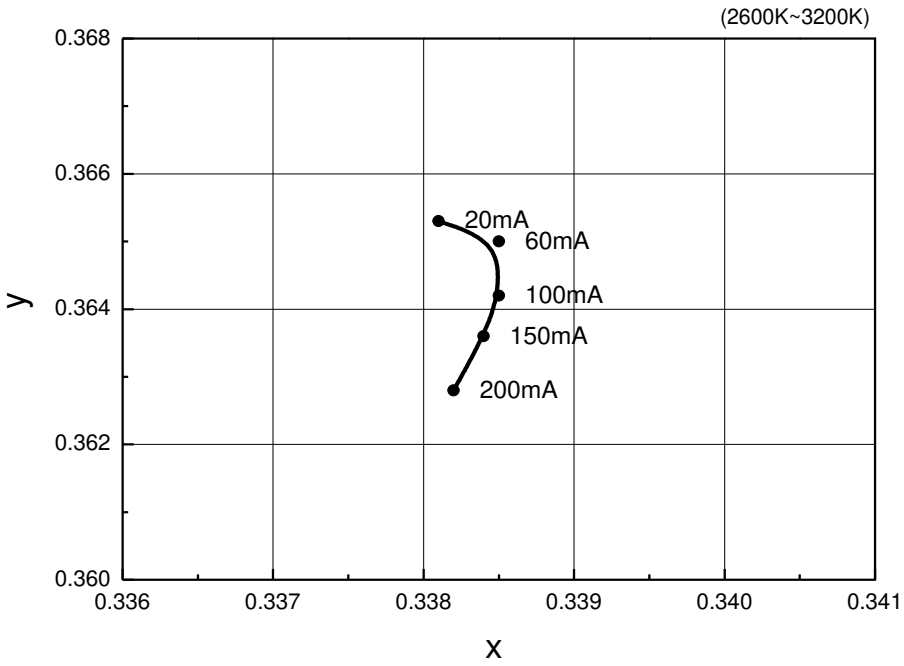


Fig 4. Forward Current vs. Relative Luminous Flux, T_j=25ºC



Characteristics Graph

Fig 5. Forward Current vs. CIE X, Y Shift , T_j = 25ºC



Characteristics Graph

Fig 6. Relative Light Output vs. Junction Temperature, I_F=100mA

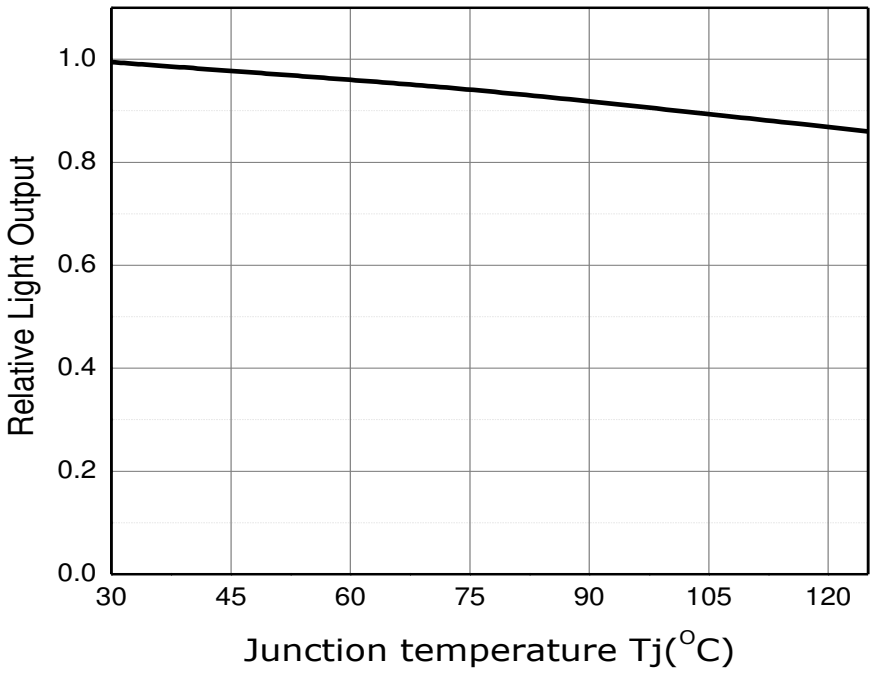
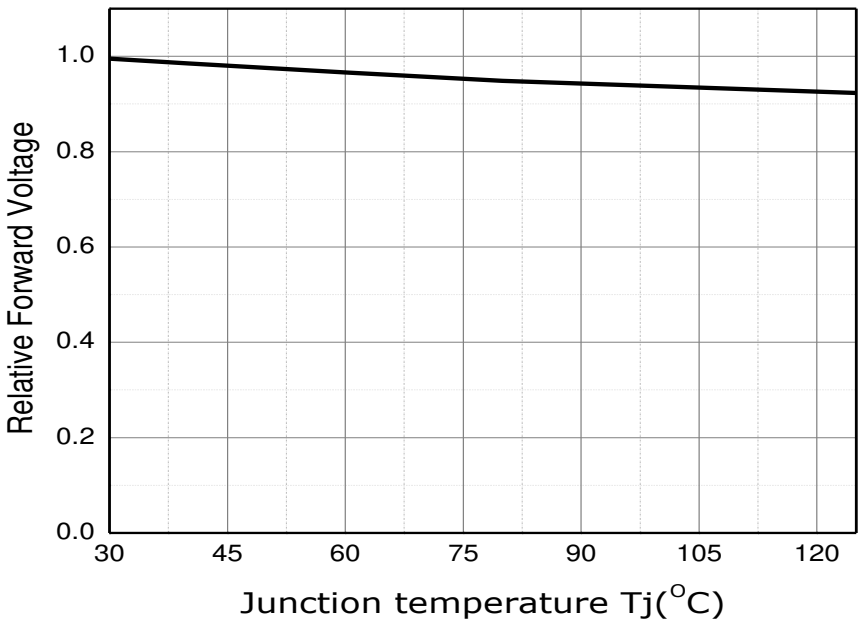
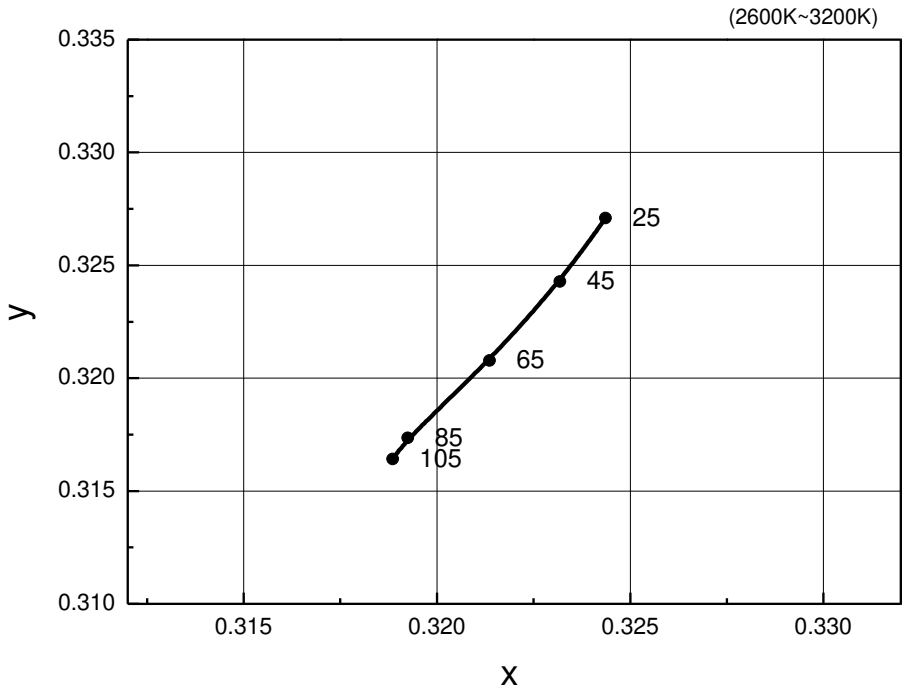


Fig 7. Junction Temperature vs. Relative Forward Voltage, I_F=100mA



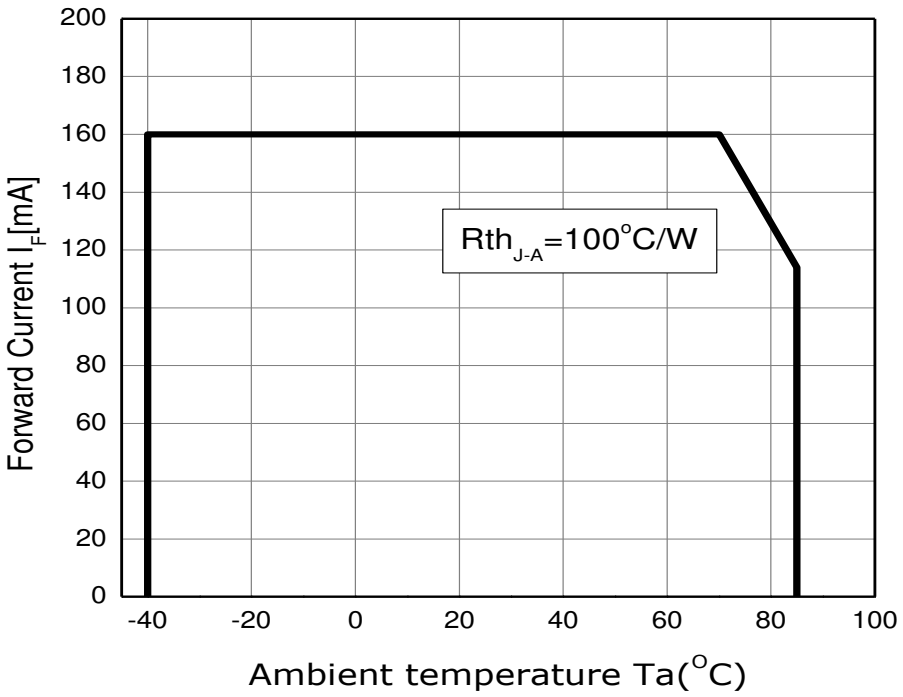
Characteristics Graph

Fig 8. Chromaticity Coordinate vs. Junction Temperature, I_F=100mA



Characteristics Graph

Fig 9. Maximum Forward Current vs. Ambient Temperature



Color Bin Structure

Table 4. Bin Code description, I_F = 100mA

Part Number	Luminous Intensity (cd)			Color Chromaticity Coordinate	Typical Forward Voltage (V_f)		
	Bin Code	Min.	Max.		Bin Code	Min.	Max.
STW8Q14BE	T5	10.5	11.0	Refer to page.12	Y3	2.9	3.0
	U0	11.0	11.7		Z1	3.0	3.1
	U7	11.7	12.5		Z2	3.1	3.2
	V5	12.5	13.5		Z3	3.2	3.3
	W5	13.5	14.5		A1	3.3	3.4
	X5	14.5	15.2				

Table 5. Intensity rank distribution

CCT	CIE	IV Rank					
6,000 ~ 7,000K	A	T5	U0	U7	V5	W5	X5
5,300 – 6,000K	B	T5	U0	U7	V5	W5	X5
4,700 ~ 5,300K	C	T5	U0	U7	V5	W5	X5
4,200 ~ 4,700K	D	T5	U0	U7	V5	W5	X5
3,700 ~ 4,200K	E	T5	U0	U7	V5	W5	X5
3,200 ~ 3,700K	F	T5	U0	U7	V5	W5	X5
2,900 ~ 3,200K	G	T5	U0	U7	V5	W5	X5
2,600 ~ 2,900K	H	T5	U0	U7	V5	W5	X5

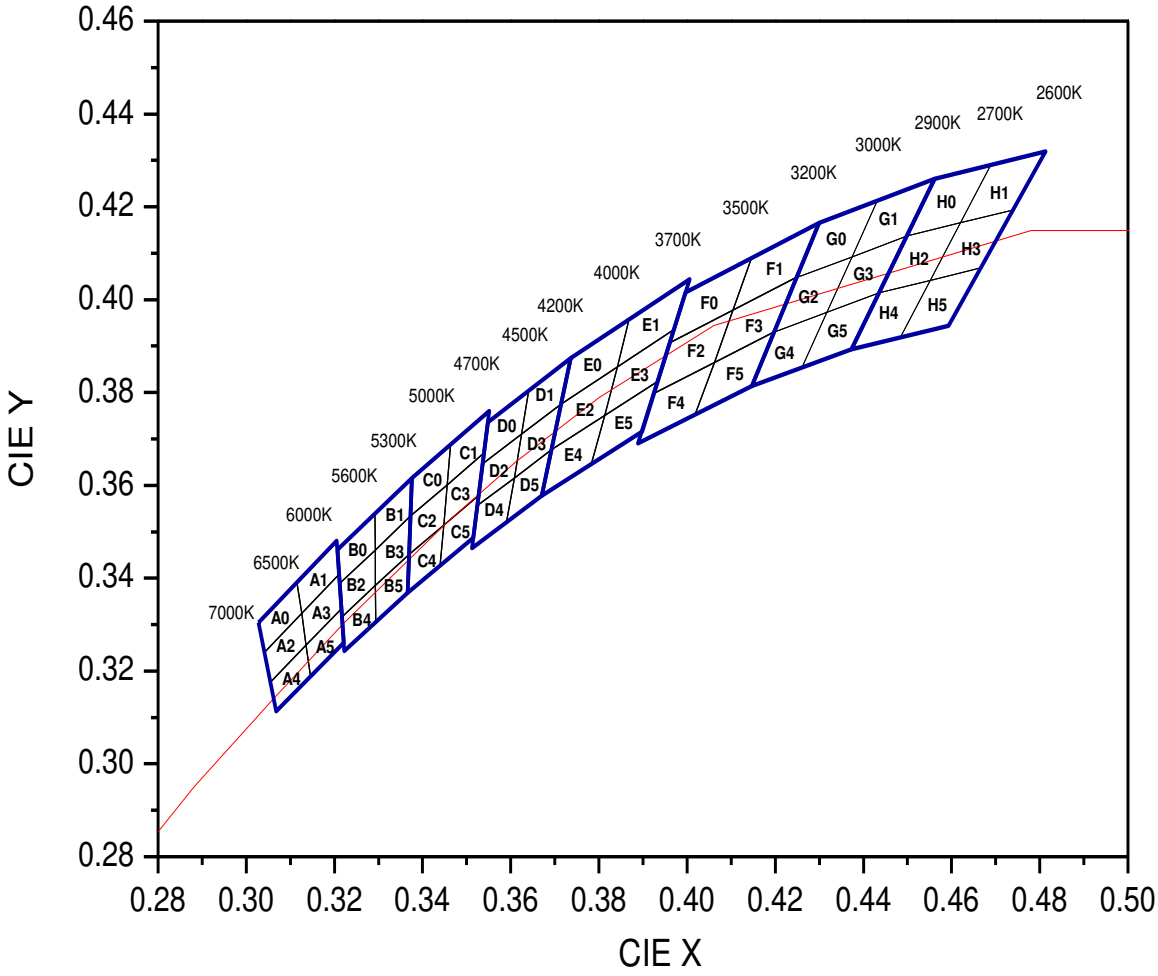
Available ranks
Not yet available ranks

***Notes :**

(1) All measurements were made under the standardized environment of Seoul Semiconductor
In order to ensure availability, single color rank will not be orderable.

Color Bin Structure

CIE Chromaticity Diagram, I_F=100mA, T_j=25ºC

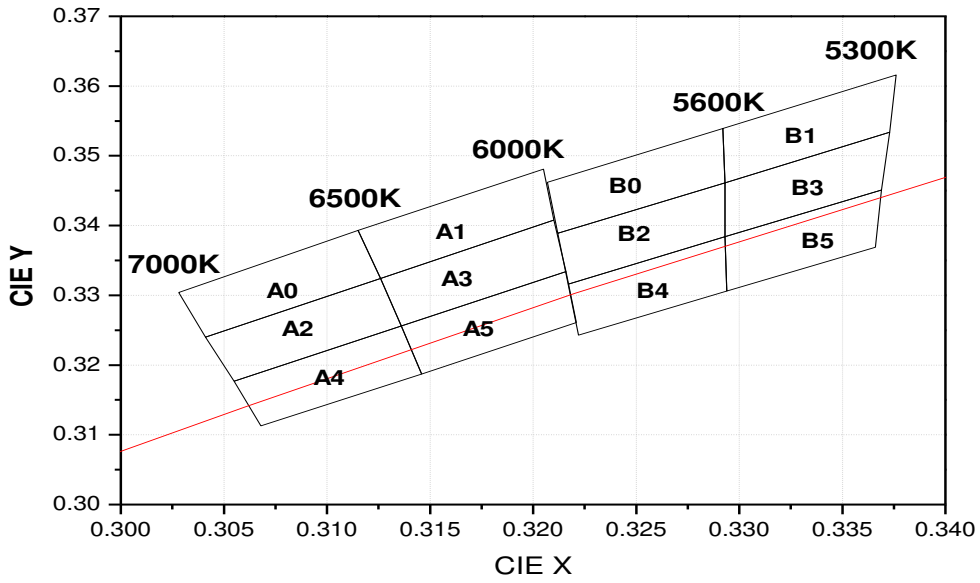


***Notes :**

- Energy Star binning applied to all 2600~7000K.
- Measurement Uncertainty of the Color Coordinates : ± 0.005

Color Bin Structure

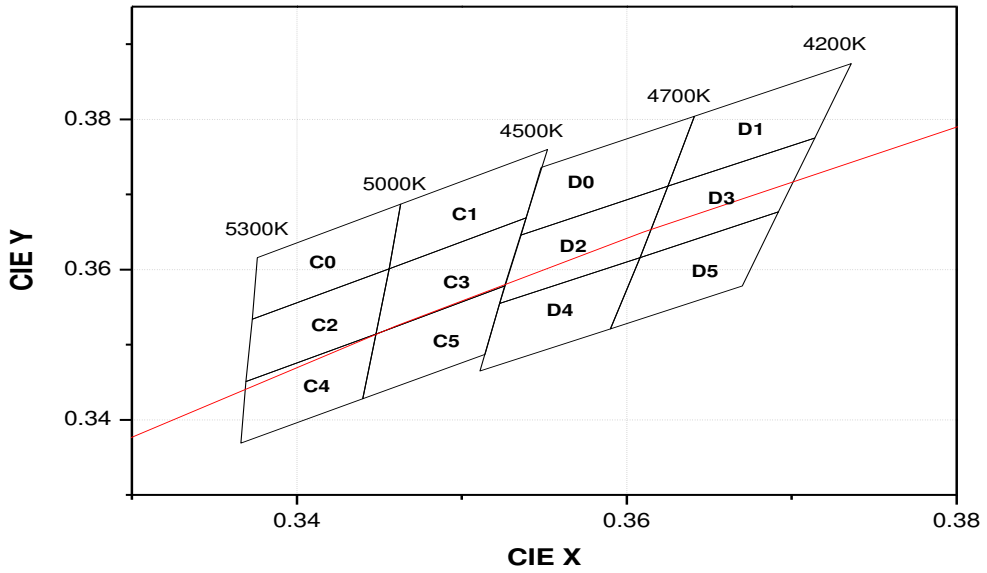
CIE Chromaticity Diagram, I_F = 100mA, T_j = 25ºC



A0		A1		A2	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3028	0.3304	0.3115	0.3393	0.3041	0.324
0.3041	0.324	0.3126	0.3324	0.3055	0.3177
0.3126	0.3324	0.3210	0.3408	0.3136	0.3256
0.3115	0.3393	0.3205	0.3481	0.3126	0.3324
A3		**A4**		**A5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3126	0.3324	0.3055	0.3177	0.3136	0.3256
0.3136	0.3256	0.3068	0.3113	0.3146	0.3187
0.3216	0.3334	0.3146	0.3187	0.3221	0.3261
0.321	0.3408	0.3136	0.3256	0.3216	0.3334
B0		**B1**		**B2**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3207	0.3462	0.3292	0.3539	0.3212	0.3389
0.3212	0.3389	0.3293	0.3461	0.3217	0.3316
0.3293	0.3461	0.3373	0.3534	0.3293	0.3384
0.3292	0.3539	0.3376	0.3616	0.3293	0.3461
B3		**B4**		**B5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3293	0.3461	0.3217	0.3316	0.3293	0.3384
0.3293	0.3384	0.3222	0.3243	0.3294	0.3306
0.3369	0.3451	0.3294	0.3306	0.3366	0.3369
0.3373	0.3534	0.3293	0.3384	0.3369	0.3451

Color Bin Structure

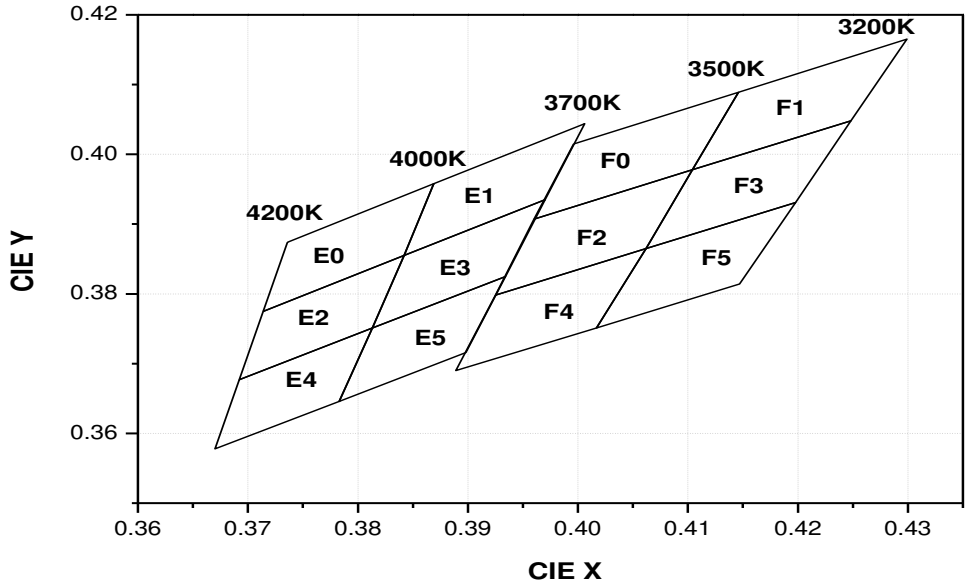
CIE Chromaticity Diagram, I_F = 100mA, T_j = 25ºC



C0		C1		C2	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3376	0.3616	0.3463	0.3687	0.3373	0.3534
0.3373	0.3534	0.3456	0.3601	0.3369	0.3451
0.3456	0.3601	0.3539	0.3669	0.3448	0.3514
0.3463	0.3687	0.3552	0.376	0.3456	0.3601
C3		**C4**		**C5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3456	0.3601	0.3369	0.3451	0.3448	0.3514
0.3448	0.3514	0.3366	0.3369	0.3440	0.3428
0.3526	0.3578	0.3440	0.3428	0.3514	0.3487
0.3539	0.3669	0.3448	0.3514	0.3526	0.3578
D0		**D1**		**D2**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3548	0.3736	0.3641	0.3804	0.3536	0.3646
0.3536	0.3646	0.3625	0.3711	0.3523	0.3555
0.3625	0.3711	0.3714	0.3775	0.3608	0.3616
0.3641	0.3804	0.3736	0.3874	0.3625	0.3711
D3		**D4**		**D5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3625	0.3711	0.3523	0.3555	0.3608	0.3616
0.3608	0.3616	0.3511	0.3465	0.359	0.3521
0.3692	0.3677	0.359	0.3521	0.367	0.3578
0.3714	0.3775	0.3608	0.3616	0.3692	0.3677

Color Bin Structure

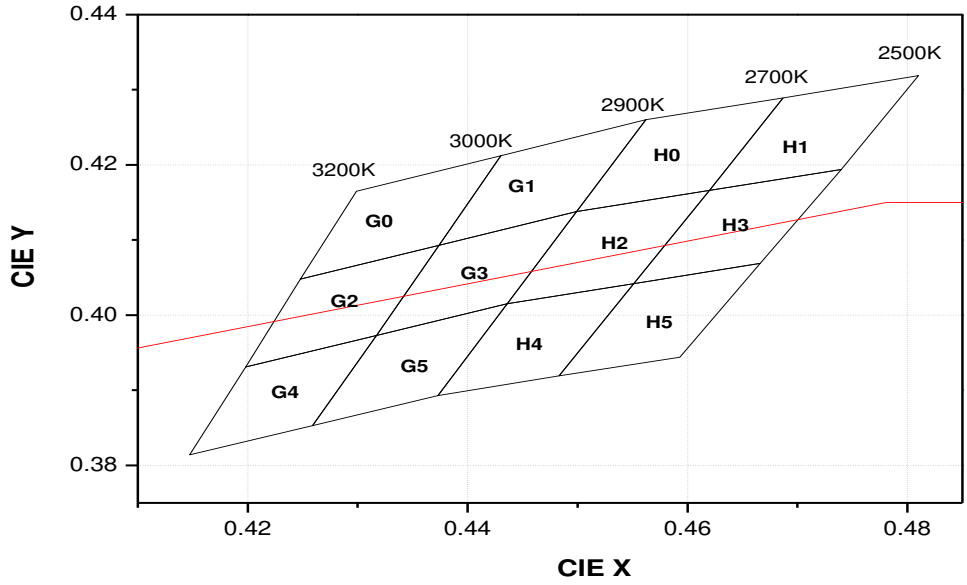
CIE Chromaticity Diagram, I_F = 100mA, T_j = 25ºC



E0		E1		E2	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3736	0.3874	0.3869	0.3958	0.3714	0.3775
0.3714	0.3775	0.3842	0.3855	0.3692	0.3677
0.3842	0.3855	0.397	0.3935	0.3813	0.3751
0.3869	0.3958	0.4006	0.4044	0.3842	0.3855
E3		**E4**		**E5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3842	0.3855	0.3692	0.3677	0.3813	0.3751
0.3813	0.3751	0.367	0.3578	0.3783	0.3646
0.3934	0.3825	0.3783	0.3646	0.3898	0.3716
0.397	0.3935	0.3813	0.3751	0.3934	0.3825
F0		**F1**		**F2**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3996	0.4015	0.4146	0.4089	0.396	0.3907
0.396	0.3907	0.4104	0.3978	0.3925	0.3798
0.4104	0.3978	0.4248	0.4048	0.4062	0.3865
0.4146	0.4089	0.4299	0.4165	0.4104	0.3978
F3		**F4**		**F5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4104	0.3978	0.3925	0.3798	0.4062	0.3865
0.4062	0.3865	0.3889	0.369	0.4017	0.3751
0.4198	0.3931	0.4017	0.3751	0.4147	0.3814
0.4248	0.4048	0.4062	0.3865	0.4198	0.3931

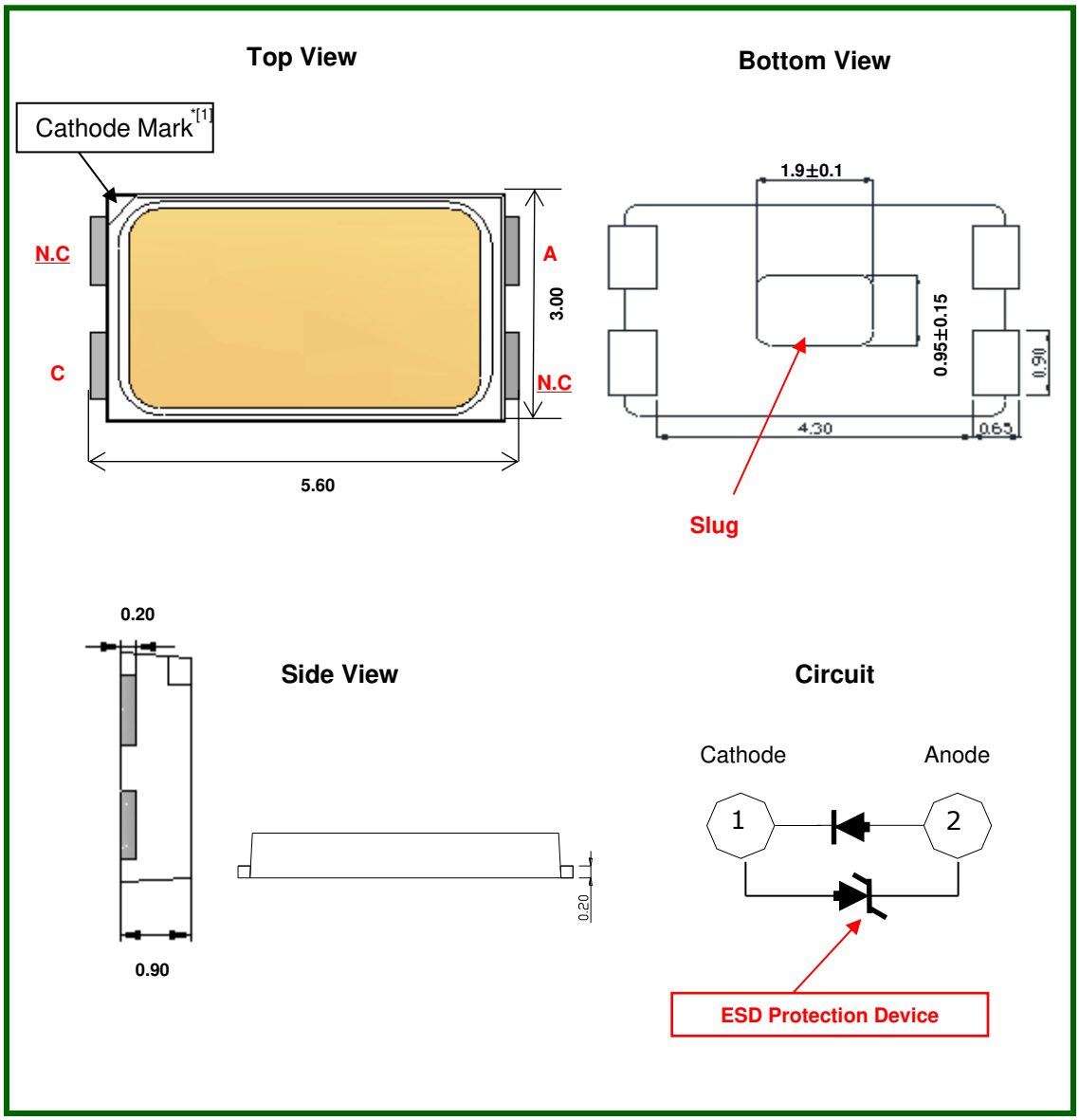
Color Bin Structure

CIE Chromaticity Diagram, I_F = 100mA, T_j = 25ºC



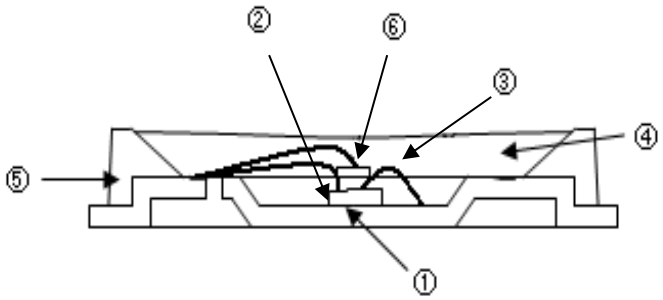
G0		G1		G2	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4299	0.4165	0.443	0.4212	0.4248	0.4048
0.4248	0.4048	0.4374	0.4093	0.4198	0.3931
0.4374	0.4093	0.4499	0.4138	0.4317	0.3973
0.443	0.4212	0.4562	0.426	0.4374	0.4093
G3		**G4**		**G5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4374	0.4093	0.4198	0.3931	0.4317	0.3973
0.4317	0.3973	0.4147	0.3814	0.4259	0.3853
0.4436	0.4015	0.4259	0.3853	0.4373	0.3893
0.4499	0.4138	0.4317	0.3973	0.4436	0.4015
H0		**H1**		**H2**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4562	0.426	0.4687	0.4289	0.4499	0.4138
0.4499	0.4138	0.462	0.4166	0.4436	0.4015
0.462	0.4166	0.474	0.4194	0.4551	0.4042
0.4687	0.4289	0.481	0.4319	0.462	0.4166
H3		**H4**		**H5**	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.462	0.4166	0.4436	0.4015	0.4551	0.4042
0.4551	0.4042	0.4373	0.3893	0.4483	0.3919
0.4666	0.4069	0.4483	0.3919	0.4593	0.3944
0.474	0.4194	0.4551	0.4042	0.4666	0.4069

Mechanical Dimensions



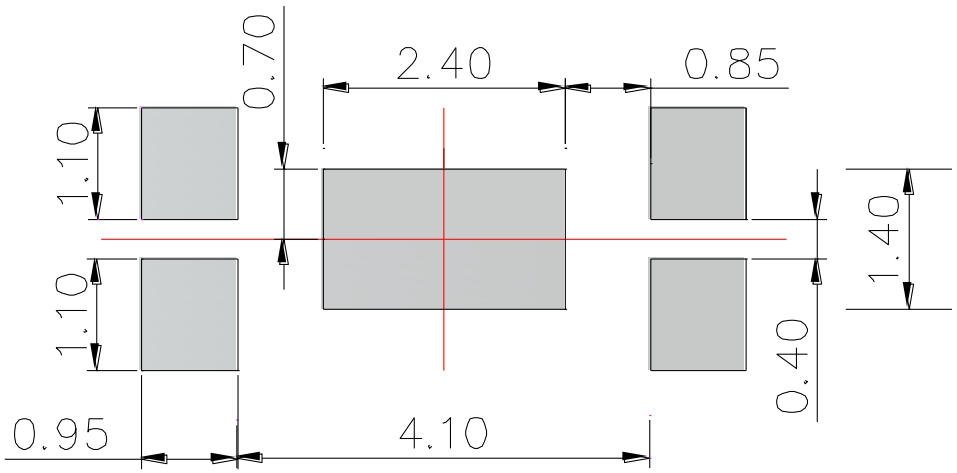
(1) All dimensions are in millimeters.
(2) Scale : none
(3) Undefined tolerance is ±0.1mm
(4) The LED package has two Cathode Marks. *[1]

Material Structure



Parts No.	Name	Description	Materials
①	LEAD FRAME	Metal	Copper Alloy (Silver Plated)
②	Chip Source	Blue LED	GaN on Sapphire
③	Wire	Metal	Gold Wire
④	Encapsulation	Silicone	+Phosphor
⑤	Body	Thermo Plastic	Heat-resistant Polymer
⑥	Zener Diode	Si	-

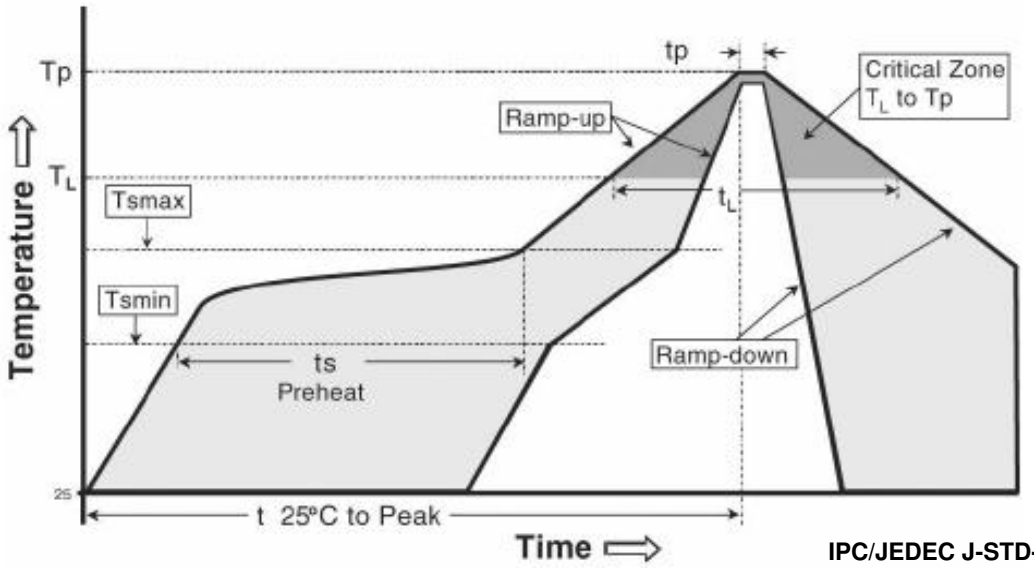
Recommended Solder Pad



Notes :

(1) All dimensions are in millimeters.
(2) Scale : none
(3) This drawing without tolerances are for reference only.
(4) Undefined tolerance is ±0.1mm.

Reflow Soldering Characteristics



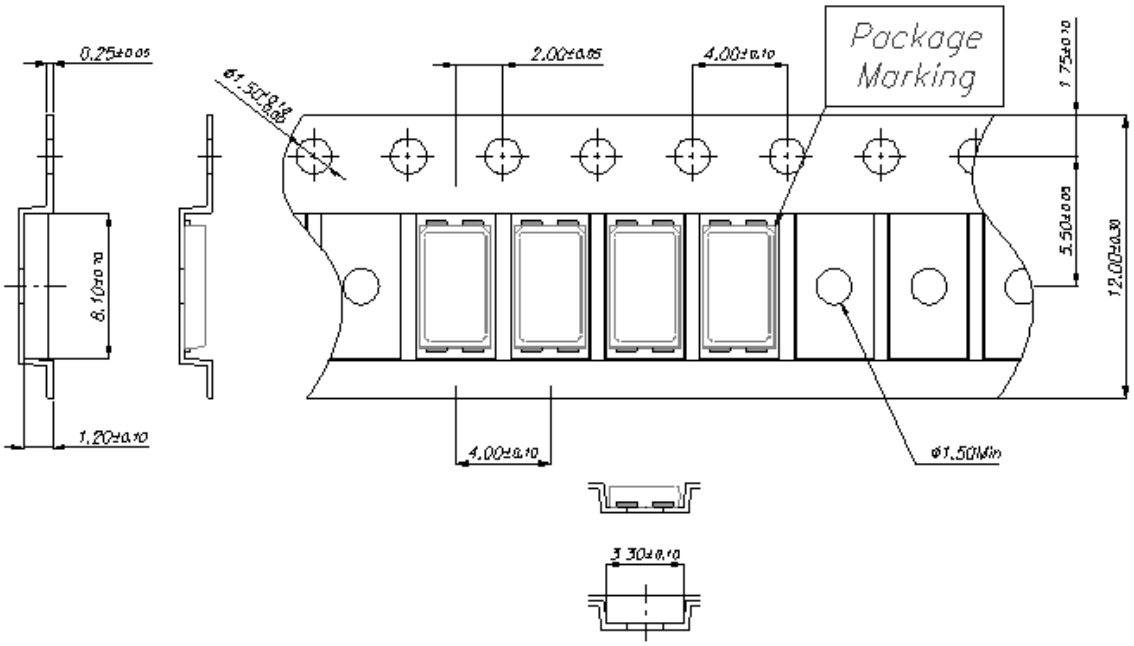
IPC/JEDEC J-STD-020

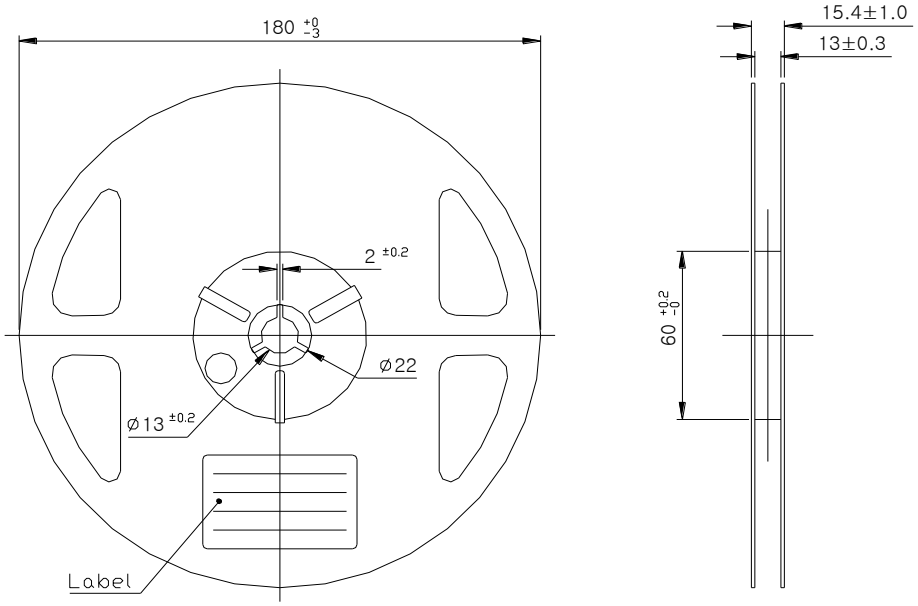
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Tsmin to Tsmax) (ts)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (TL) - Time (tL)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (Tp)	215℃	260℃
Time within 5°C of actual Peak Temperature (tp)2	10-30 seconds	20-40 seconds
Ramp-down Rate	6 °C/second max.	6 °C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Caution

(1) Reflow soldering is recommended not to be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.
(2) Repairs should not be done after the LEDs have been soldered. When repair is unavoidable, suitable tools must be used.
(3) Die slug is to be soldered.
(4) When soldering, do not put stress on the LEDs during heating.
(5) After soldering, do not warp the circuit board.

Emitter Tape & Reel Packaging



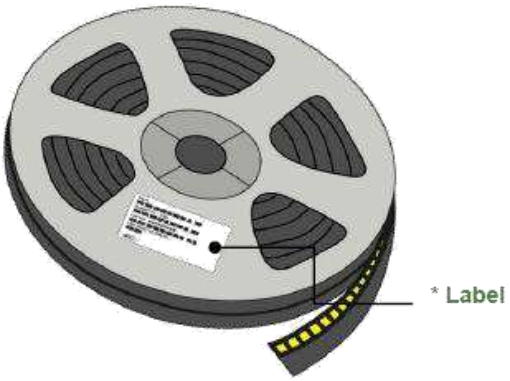


(Tolerance: ±0.2, Unit: mm)

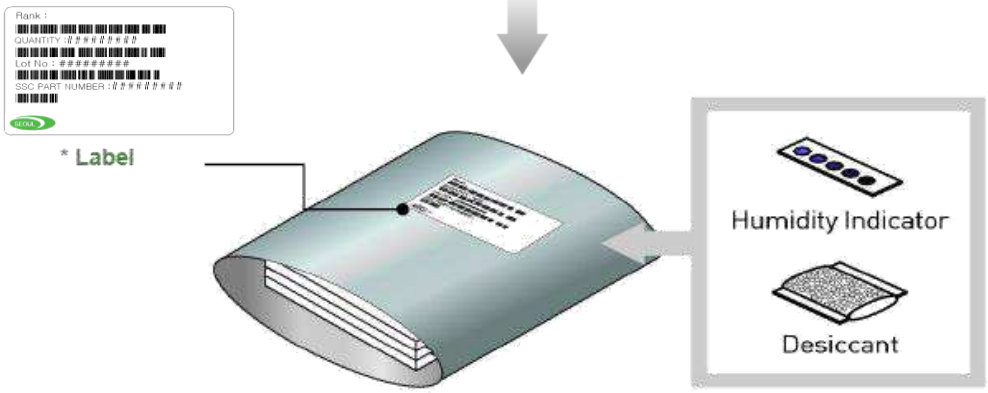
(1) Quantity : Max 3,500pcs/Reel
(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
(3) Adhesion Strength of Cover Tape
Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10˚ to the carrier tape.
(4) Package : P/N, Manufacturing data Code No. and Quantity to be indicated on a damp proof Package.

Emitter Tape & Reel Packaging

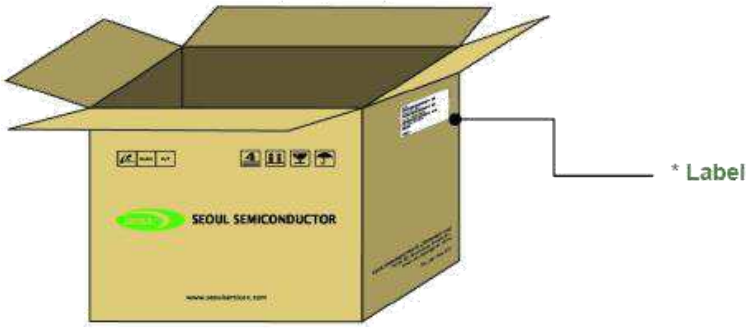
Reel



Aluminum Bag



Outer Box



* Please refer to the next page for the 'Labeling Information' and 'Product Nomenclature'.

Product Nomenclature

Table 6. Part Numbering System : $X_1X_2X_3X_4X_5X_6X_7X_8X_9$

Part Number Code	Description	Part Number	Value
X_1	Company	S	
X_2	Top View LED series	T	
X_3X_4	Color Specification	W8	CRI 80
X_5	Package series	Q	Q series
X_6X_7	Characteristic code	14	
X_8X_9	Revision	BE	

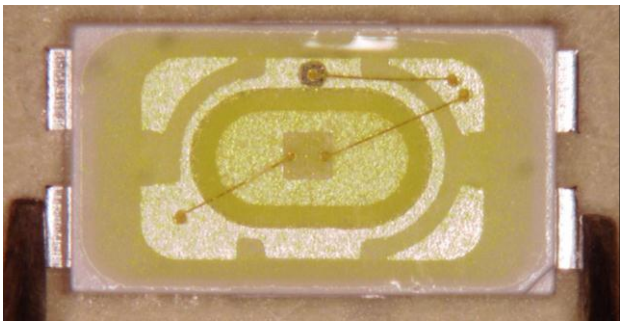
Table 7. Lot Numbering System :$Y_1Y_2Y_3Y_4Y_5Y_6Y_7Y_8Y_9Y_{10}$–$Y_{11}Y_{12}Y_{13}Y_{14}Y_{15}Y_{16}Y_{17}$

Lot Number Code	Description	Lot Number	Value
Y_1Y_2	Year		
Y_3	Month		
Y_4Y_5	Day		
Y_6	Top View LED series		
$Y_7Y_8Y_9Y_{10}$	Mass order		
$Y_{11}Y_{12}Y_{13}Y_{14}Y_{15}Y_{16}Y_{17}$	Internal Number		

Handling of Silicone Resin for LEDs

(1) During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.

(2) In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.



(3) When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.

(4) Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust.

As mentioned previously, the increased sensitivity to dust requires special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

(5) Seoul Semiconductor suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin.
Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

(6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this. product with acid or sulfur material in sealed space.

Precaution for Use

(1) Storage

To avoid the moisture penetration, we recommend store in a dry box with a desiccant .

The recommended storage temperature range is 5℃ to 30℃ and a maximum humidity of RH50%.

(2) Use Precaution after Opening the Packaging

Use proper SMT techniques when the LED is to be soldered dipped as separation of the lens may affect the light output efficiency.

Pay attention to the following:

a. Recommend conditions after opening the package

- Sealing

- Temperature : 5 ~ 30℃ Humidity : less than RH60%

b. If the package has been opened more than 4 week(MSL_2a) or the color of the desiccant changes, components should be dried for 10-12hr at 60±5℃

(3) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.

(4) Do not rapidly cool device after soldering.

(5) Components should not be mounted on warped (non coplanar) portion of PCB.

(6) Radioactive exposure is not considered for the products listed here in.

(7) Gallium arsenide is used in some of the products listed in this publication.

These products are dangerous if they are burned or shredded in the process of disposal.

It is also dangerous to drink the liquid or inhale the gas generated by such products when chemically disposed of.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent and etc. When washing is required, IPA (Isopropyl Alcohol) should be used.

(9) When the LEDs are in operation the maximum current should be decided after measuring the package temperature.

(10) The appearance and specifications of the product may be modified for improvement without notice.

(11) Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.

(12) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy.

The result can be a significant loss of light output from the fixture.

Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues.

(13) Attaching LEDs, do not use adhesives that outgas organic vapor.

(14) The driving circuit must be designed to allow forward voltage only when it is ON or OFF.

If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.