Mid-Power LED - 3528 Series

STW8A2PD-E3H10000

(Cool, Neutral, Warm)

Product Brief

Description

- This White Colored surface-mount LED comes in standard package dimension.
- 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 3528 Package Size
- High Color Quality, CRI Min. 80
- Package Size: 3.5x2.8x0.7mm
- RoHS compliant

Key Applications

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

Table 1. Product Selection Table

Reference Code	Color	Nominal CCT	Part Number	CRI Min
STW8A2PD-E3H10000	Cool White	6500K	**S1W0-2835658003-00000000-0PEH4**	80
		5700K	**S1W0-2835578003-00000000-0PEH4**	
		5000K	**S1W0-2835508003-00000000-0PEH4**	
	Neutral White	4500K	**S1W0-2835458003-00000000-0PEH4**	
		4000K	**S1W0-2835408003-00000000-0PEH4**	
	Warm White	3500K	**S1W0-2835358003-00000000-0PEH4**	
		3000K	**S1W0-2835308003-00000000-0PEH4**	
		2700K	**S1W0-2835278003-00000000-0PEH4**	
		2200K	**S1W0-2835228003-00000000-0PEH4**	

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Performance Characteristics

Table 2. Product Selection Guide, I_F = 65mA, T_j = 25ºC, RH30%

Min. CRI, R_a	Nominal CCT [K] [1]	Min. Flux [lm]	Typ. Luminous Flux Φ_V [2] [lm] @65mA	Typ. Luminous Efficacy [lm/W] @65mA	Part Number
80	6500	35.1	37.0	211.6	S1W0-2835658003-00000000-0PEH4
	5700	36.0	37.5	214.5	S1W0-2835578003-00000000-0PEH4
	5000	36.5	38.2	218.5	S1W0-2835508003-00000000-0PEH4
	4500	36.5	38.1	217.9	S1W0-2835458003-00000000-0PEH4
	4000	36.5	38.1	217.9	S1W0-2835408003-00000000-0PEH4
	3500	36.0	37.0	211.6	S1W0-2835358003-00000000-0PEH4
	3000	35.1	36.0	205.9	S1W0-2835308003-00000000-0PEH4
	2700	35.1	35.5	203.0	S1W0-2835278003-00000000-0PEH4
	2200	31.5	33.0	188.0	S1W0-2835228003-00000000-0PEH4

Notes :

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

(2) Seoul Semiconductor maintains a tolerance of ±5% on Flux and power measurements. The luminous Flux was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package.

Performance Characteristics

Table 3. Characteristics, I_F=65mA, T_j= 25ºC, RH30%

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current	I_F	-	65	-	mA
Forward Voltage	V_F	-	2.69	2.74	V
CRI [3]	R_a	80	81.5	90	
Luminous Flux[1] (4000K)[2]	Flux	-	37.8	-	lm
Viewing Angle	$2\Theta_{1/2}$	-	120	-	Deg.
Storage Temperature	T_{stg}	-40	-	85	ºC
Thermal resistance (J to S) [4]	$R\theta_{J-S}$	-	13	-	℃/W
ESD Sensitivity(HBM)	-	Class 2 JESD22-A114-E			

Table 4. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Forward Current	I_F	300	mA
Power Dissipation	P_D	1.0	W
Junction Temperature	T_j	125	ºC
Operating Temperature	T_{opr}	-40 ~ + 85	ºC
Storage Temperature	T_{stg}	-40 ~ + 100	ºC

Notes :

(1) Seoul Semiconductor maintains a tolerance of ±5% on Flux and power measurements.

(2) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
Color coordinate : ±0.005, CCT ±5% tolerance.

(3) Tolerance is ±2.0 on CRI , ±0.1 on VF measurements.

(4) Thermal resistance is junction to Solder.

(5) The products are sensitive to static electricity and must be carefully taken when handling products

(6) It is recommended minimum currrent 5mA in order to avoid unstable brightness, and may vary depending on circuit configuration

(7) It is recommended to use it in the condition that the reliability is secured within the Max value.

- **Calculated performance values are for reference only.**
- **All measurements were made under the standardized environment of Seoul Semiconductor.**

Characteristics Graph

Fig 1. Color Spectrum

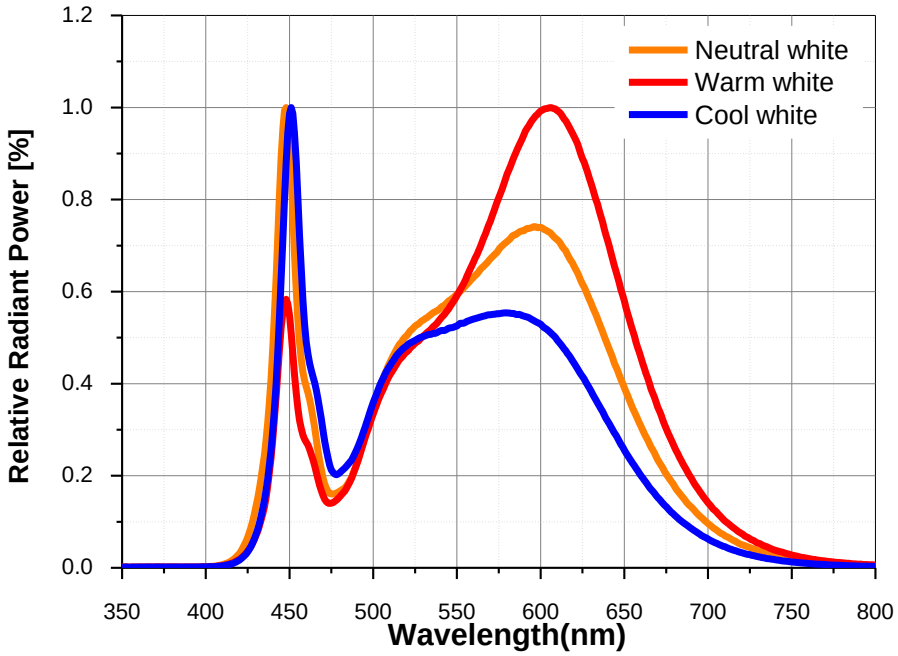
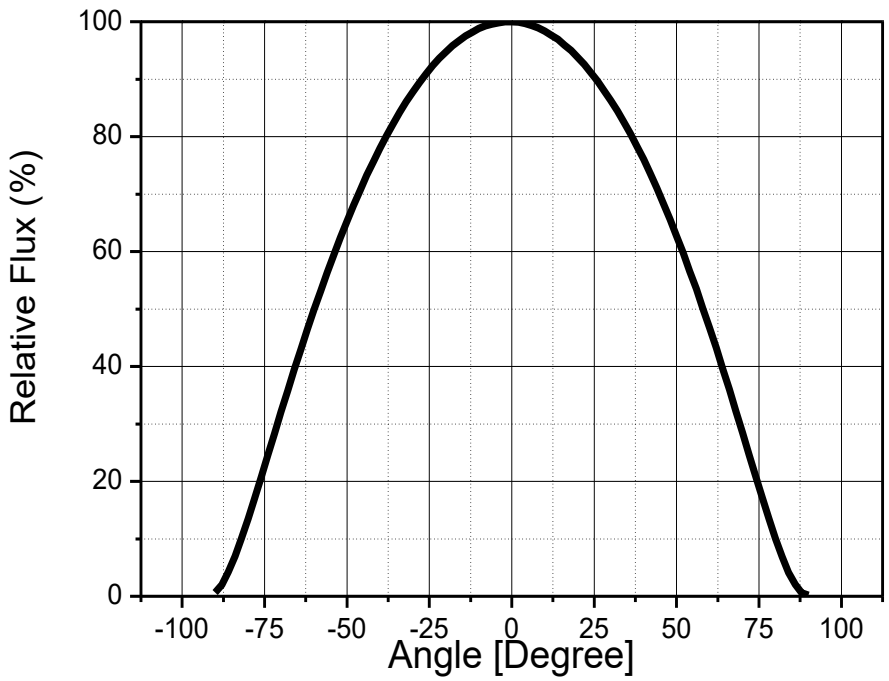


Fig 2. Typical Spatial Distribution



Characteristics Graph

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

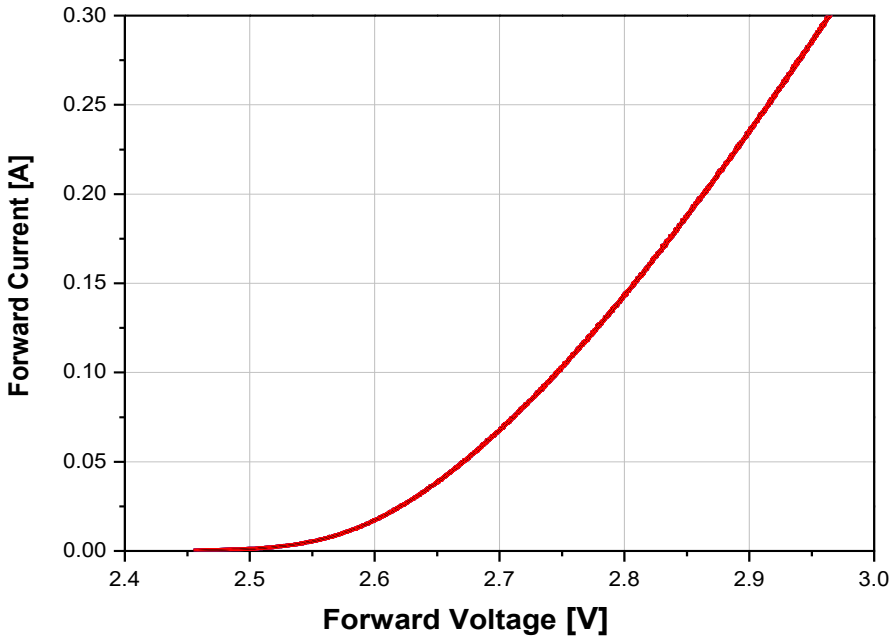
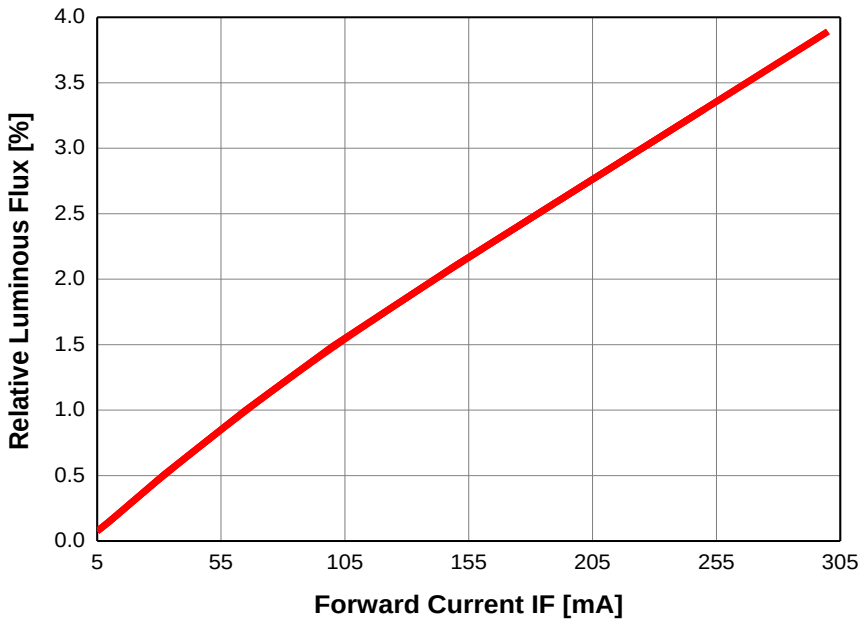


Fig 4. Forward Current vs. Relative Luminous Flux, T_j = 25ºC

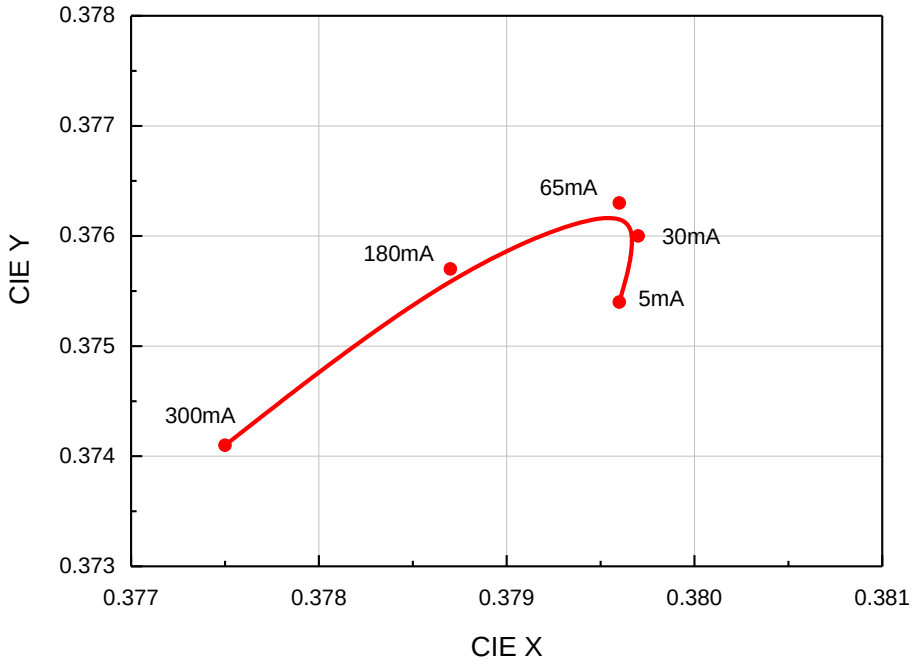


- Use of less than 5mA is not recommended

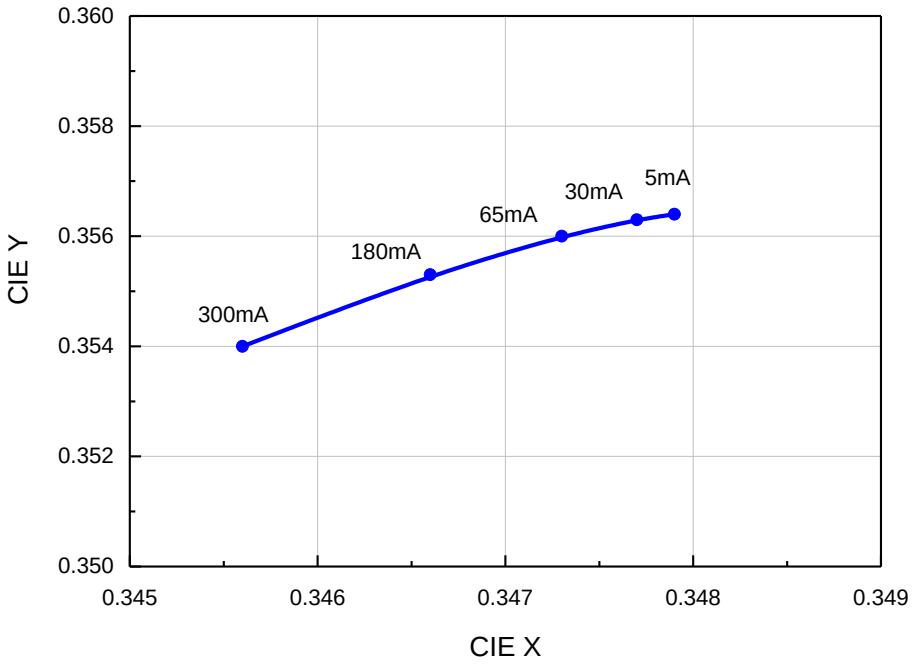
Characteristics Graph

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

(2600~4200K)



(4200~7000K)



Characteristics Graph

Fig 6. Junction Temperature vs. Relative Luminous Flux, I_F=65mA

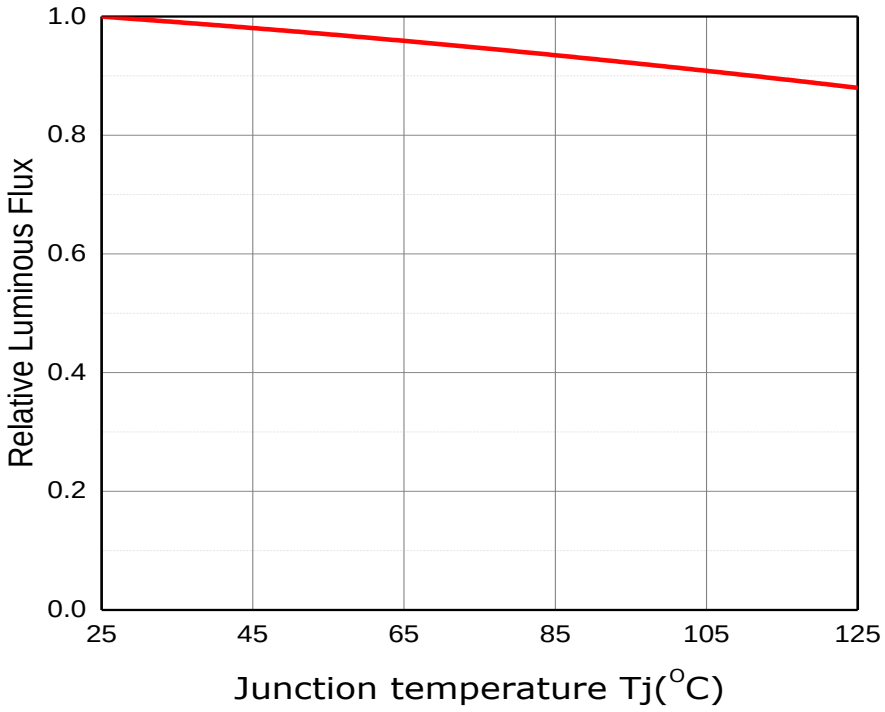
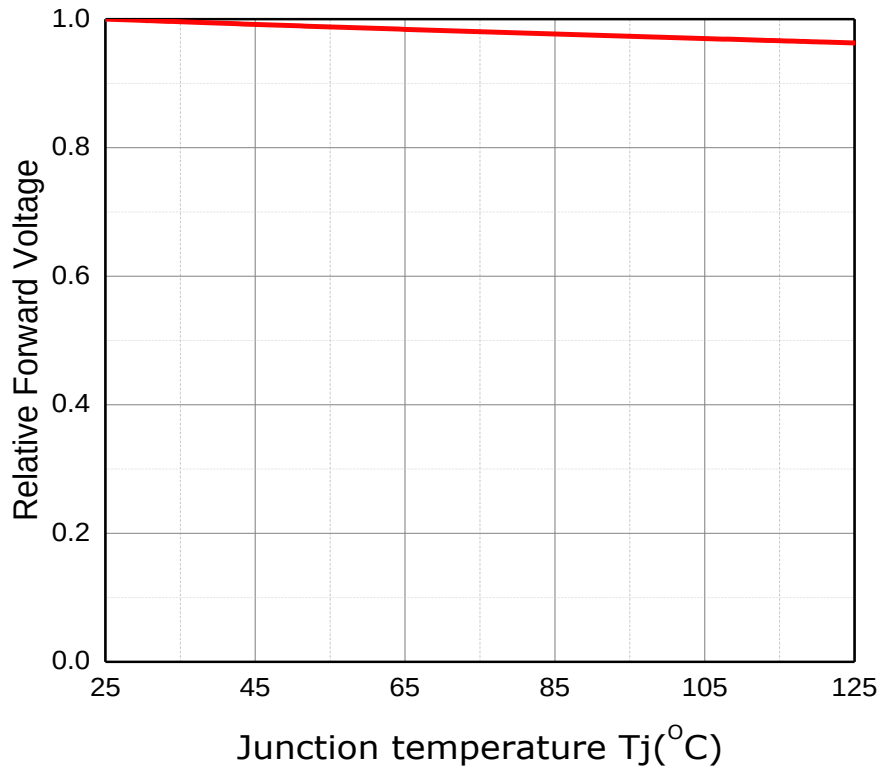


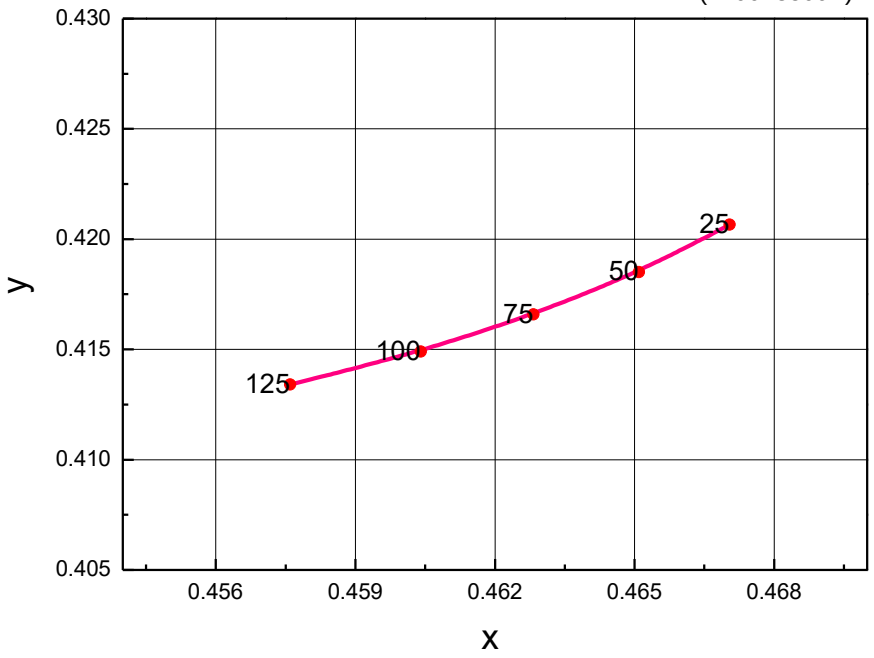
Fig 7. Junction Temperature vs. Relative Forward Voltage, I_F=65mA



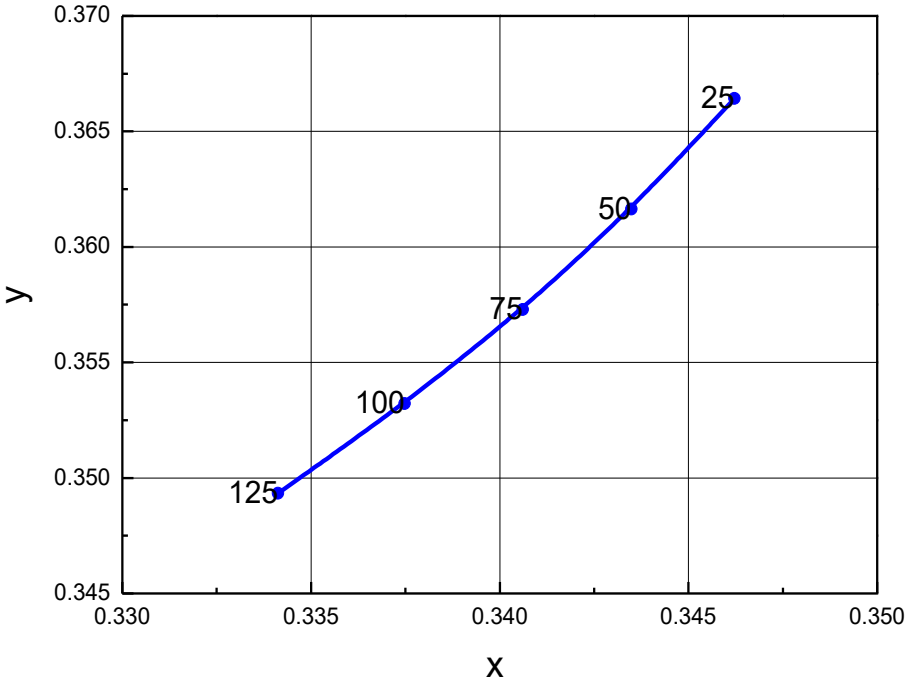
Characteristics Graph

Fig 8. Chromaticity Coordinate vs. Junction Temperature, I_F=65mA

(2700~3500K)

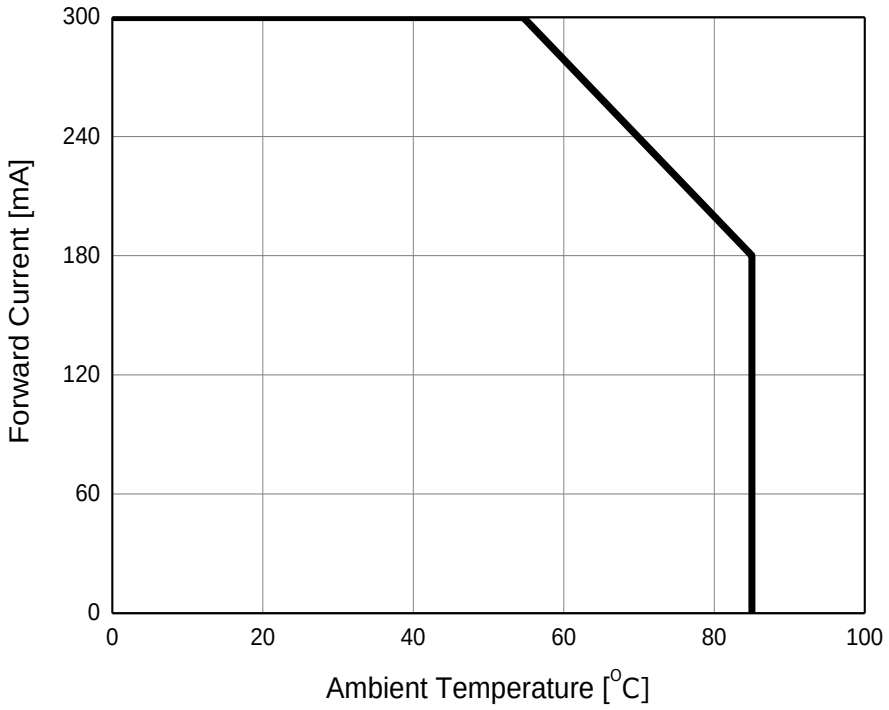


(4200~7000K)



Characteristics Graph

Fig 9. Ambient Temperature vs. Maximum Forward Current, T_{j_max} = 125℃



Color Bin Structure

Table 5. Bin Code description, T_j=25℃, I_F=65mA

Part Number	Luminous Flux (lm)			Color Chromaticity Coordinate	Typical Forward Voltage (V)		
	Bin Code	Min.	Max.		Bin Code	Min.	Max.
S1W0-2835xx8003-00000000-0PEH4	T5	31.5	33.0	Refer to Page. 12	Y0	2.6	2.7
	U0	33.0	33.9		Y1	2.7	2.8
	U3	33.9	35.1				
	U7	35.1	36.3				
	V1	36.3	37.2				
	V4	37.2	38.1				
	V7	38.1	39.0				

Table 6. Flux rank distribution

Available ranks

CCT	CIE	Flux Rank			
6,000 ~ 7,000K	A	U7	V1	V4	V7
5,300 – 6,000K	B	U7	V1	V4	V7
4,700 ~ 5,300K	C	U7	V1	V4	V7
4,200 ~ 4,700K	D	U7	V1	V4	V7
3,700 ~ 4,200K	E	U7	V1	V4	V7
3,200 ~ 3,700K	F	U7	V1	V4	V7
2,900 ~ 3,200K	G	U7	V1	V4	V7
2,600 ~ 2,900K	H	U7	V1	V4	V7
2,000 ~ 2,400K	K	T5	U0	U3	

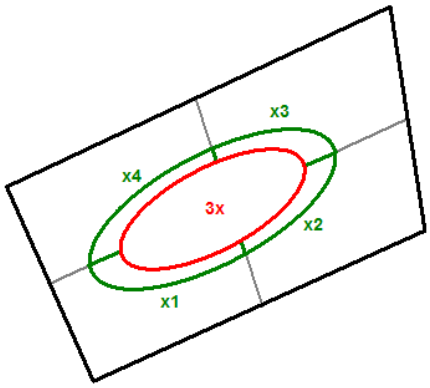
***Notes :**

- **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 Kitting Chromaticity Diagram

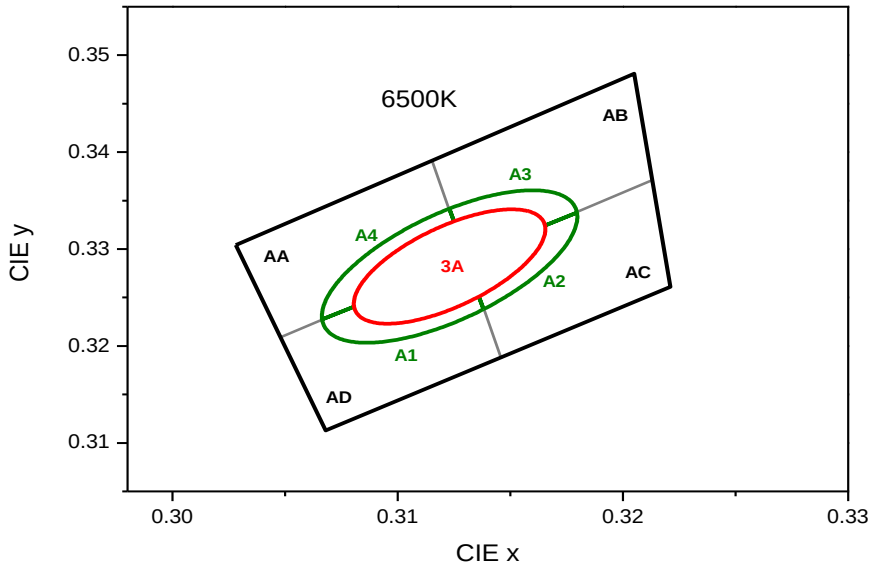


Item	Bin #1	Bin #2	Note
CIE	3x	3x	3 step
	x1	x3	4 step
	x2	x4	
VF	Do not specify rank, randomly assigned.		
LM	Do not specify rank, randomly assigned.		

***Notes :**
'x' can be A(6500K),B(5700K),C(5000K),D(4500K),E(4000K),F(3500K),G(3000K),H(2700K)

Color Bin Structure

CIE Chromaticity Diagram (Cool white), T_j=25℃, I_F=65mA



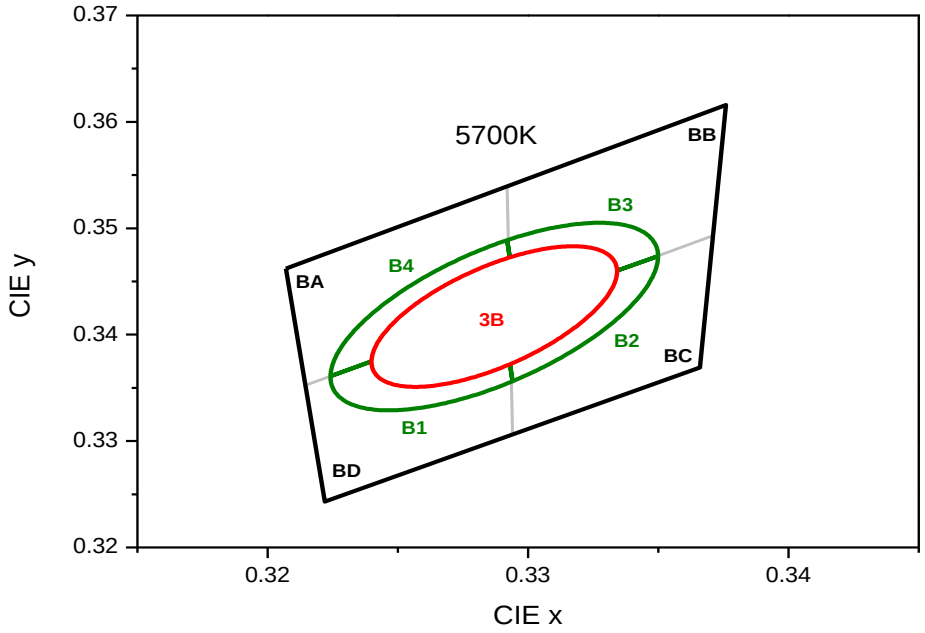
3step(3A)		4step	
Center point	0.3123 : 0.3282	Center point	0.3123 : 0.3282
Major Axis a	0.0067	Major Axis a	0.0089
Minor Axis b	0.0029	Minor Axis b	0.0038
Ellipse Rotation Angle	59	Ellipse Rotation Angle	59

A1		A2		A3		A4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3066	0.3227	0.3138	0.3238	0.318	0.3338	0.3123	0.3341
0.3081	0.3241	0.3136	0.3251	0.3165	0.3324	0.3125	0.3328
0.3138	0.3238	0.3180	0.3338	0.3123	0.3341	0.3066	0.3227
0.3136	0.3251	0.3165	0.3324	0.3125	0.3328	0.3081	0.3241

AA		AB		AC		AD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3028	0.3304	0.3115	0.3393	0.3131	0.329	0.3048	0.3209
0.3048	0.3209	0.3131	0.3290	0.3146	0.3187	0.3068	0.3113
0.3131	0.3290	0.3213	0.3371	0.3221	0.3261	0.3146	0.3187
0.3115	0.3393	0.3205	0.3481	0.3213	0.3371	0.3131	0.3290

Color Bin Structure

CIE Chromaticity Diagram (Cool white), T_j=25℃, I_F=65mA



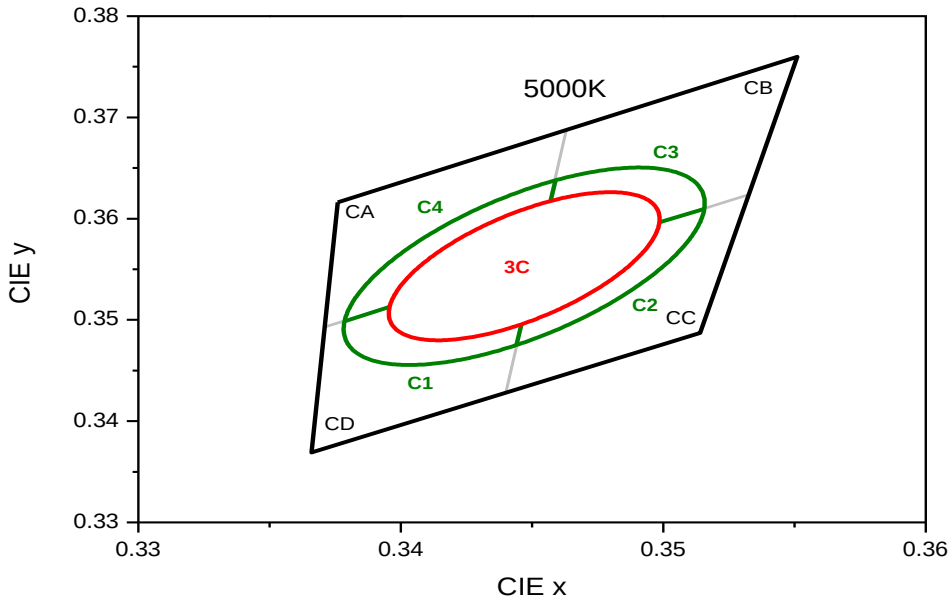
3step(3B)		4step	
Center point	0.3287 : 0.3417	Center point	0.3287 : 0.3417
Major Axis a	0.0075	Major Axis a	0.01
Minor Axis b	0.0032	Minor Axis b	0.0043
Ellipse Rotation Angle	59	Ellipse Rotation Angle	59

B1		B2		B3		B4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3224	0.3361	0.3294	0.3356	0.3350	0.3474	0.3292	0.3489
0.3240	0.3375	0.3293	0.3373	0.3334	0.3460	0.3293	0.3472
0.3294	0.3356	0.3350	0.3474	0.3292	0.3489	0.3224	0.3361
0.3293	0.3373	0.3334	0.3460	0.3293	0.3472	0.3240	0.3375

BA		BB		BC		BD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3207	0.3462	0.3292	0.3539	0.3293	0.3423	0.3215	0.3353
0.3215	0.3353	0.3293	0.3423	0.3294	0.3306	0.3222	0.3243
0.3293	0.3423	0.3371	0.3493	0.3366	0.3369	0.3294	0.3306
0.3115	0.3393	0.3205	0.3481	0.3213	0.3371	0.3131	0.3290

Color Bin Structure

CIE Chromaticity Diagram (Cool white), T_j=25℃, I_F=65mA



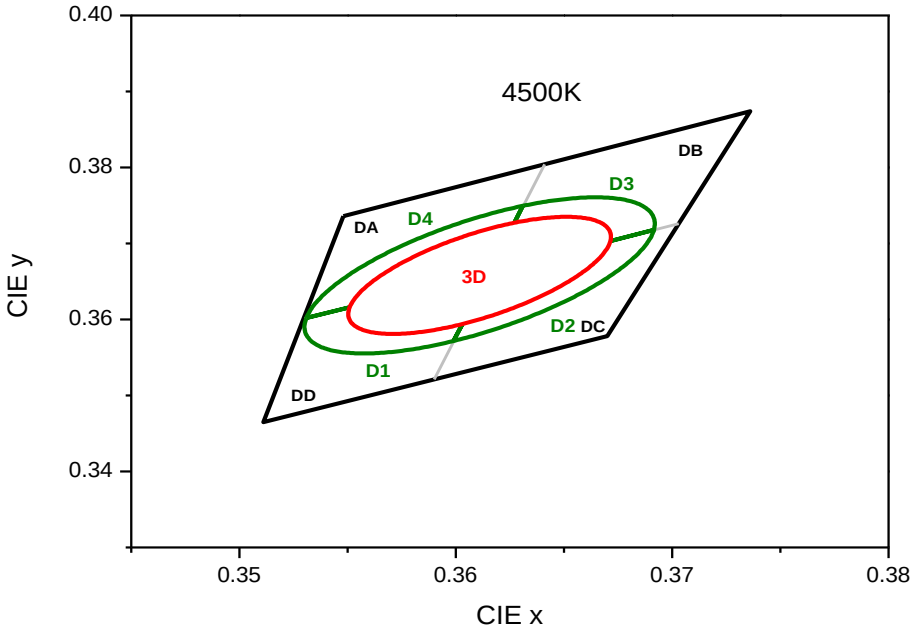
3step(3C)		4step	
Center point	0.3447 : 0.3553	Center point	0.3447 : 0.3553
Major Axis a	0.0082	Major Axis a	0.011
Minor Axis b	0.0035	Minor Axis b	0.0047
Ellipse Rotation Angle	60	Ellipse Rotation Angle	60

C1		C2		C3		C4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3379	0.3499	0.3444	0.3475	0.3516	0.3610	0.3459	0.3638
0.3396	0.3513	0.3446	0.3496	0.3498	0.3596	0.3457	0.3617
0.3444	0.3475	0.3516	0.3610	0.3459	0.3638	0.3379	0.3499
0.3446	0.3496	0.3498	0.3596	0.3457	0.3617	0.3396	0.3513

CA		CB		CC		CD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3376	0.3616	0.3463	0.3687	0.3452	0.3558	0.3371	0.3493
0.3371	0.3493	0.3452	0.3558	0.344	0.3428	0.3366	0.3369
0.3452	0.3558	0.3533	0.3624	0.3514	0.3487	0.3440	0.3428
0.3463	0.3687	0.3551	0.3760	0.3533	0.3624	0.3452	0.3558

Color Bin Structure

CIE Chromaticity Diagram (Neutral white), T_j=25℃, I_F=65mA



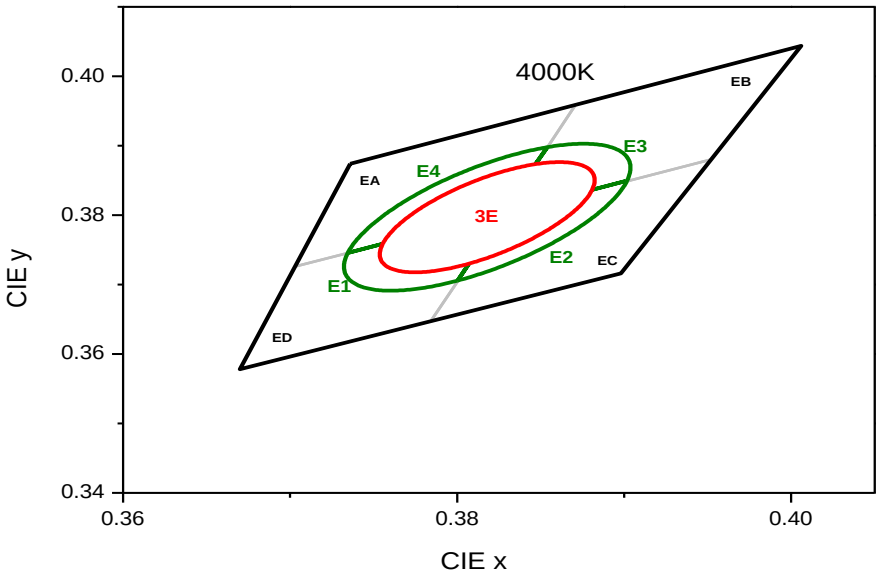
3step(3D)		4step	
Center point	0.3611 : 0.3658	Center point	0.3611 : 0.3658
Major Axis a	0.009	Major Axis a	0.012
Minor Axis b	0.0039	Minor Axis b	0.0052
Ellipse Rotation Angle	55	Ellipse Rotation Angle	55

D1		D2		D3		D4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3531	0.3602	0.3599	0.3572	0.3692	0.3718	0.3631	0.375
0.3551	0.3616	0.3603	0.3594	0.3671	0.3703	0.3627	0.3727
0.3599	0.3572	0.3692	0.3718	0.3631	0.3750	0.3531	0.3602
0.3603	0.3594	0.3671	0.3703	0.3627	0.3727	0.3551	0.3616

DA		DB		DC		DD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3548	0.3736	0.3641	0.3804	0.3616	0.3663	0.3530	0.3601
0.3530	0.3601	0.3616	0.3663	0.3590	0.3521	0.3511	0.3465
0.3616	0.3663	0.3703	0.3726	0.3670	0.3578	0.3590	0.3521
0.3641	0.3804	0.3736	0.3874	0.3703	0.3726	0.3616	0.3663

Color Bin Structure

CIE Chromaticity Diagram (Neutral white), T_j=25℃, I_F=65mA



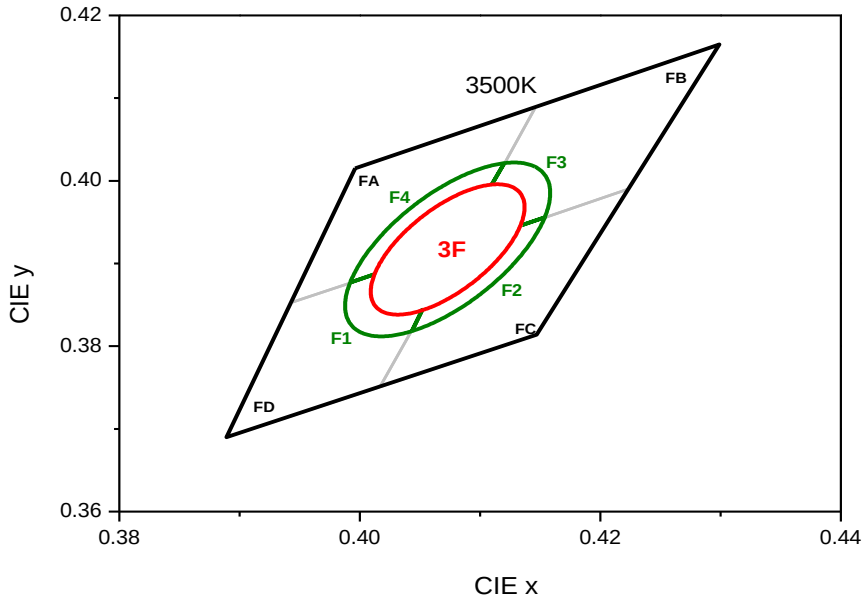
3step(3E)		4step	
Center point	0.3818 : 0.3797	Center point	0.3818 : 0.3797
Major Axis a	0.0094	Major Axis a	0.0125
Minor Axis b	0.004	Minor Axis b	0.0054
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

E1		E2		E3		E4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3735	0.3746	0.3800	0.3705	0.3901	0.3849	0.3854	0.3898
0.3756	0.3759	0.3807	0.3730	0.388	0.3836	0.3847	0.3874
0.3800	0.3705	0.3901	0.3849	0.3854	0.3898	0.3735	0.3746
0.3807	0.3730	0.3880	0.3836	0.3847	0.3874	0.3756	0.3759

EA		EB		EC		ED	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3736	0.3874	0.3871	0.3959	0.3828	0.3803	0.3703	0.3726
0.3703	0.3726	0.3828	0.3803	0.3784	0.3647	0.3670	0.3578
0.3828	0.3803	0.3952	0.3880	0.3898	0.3716	0.3784	0.3647
0.3871	0.3959	0.4006	0.4044	0.3952	0.3880	0.3828	0.3803

Color Bin Structure

CIE Chromaticity Diagram (Warm white), T_j=25℃, I_F=65mA



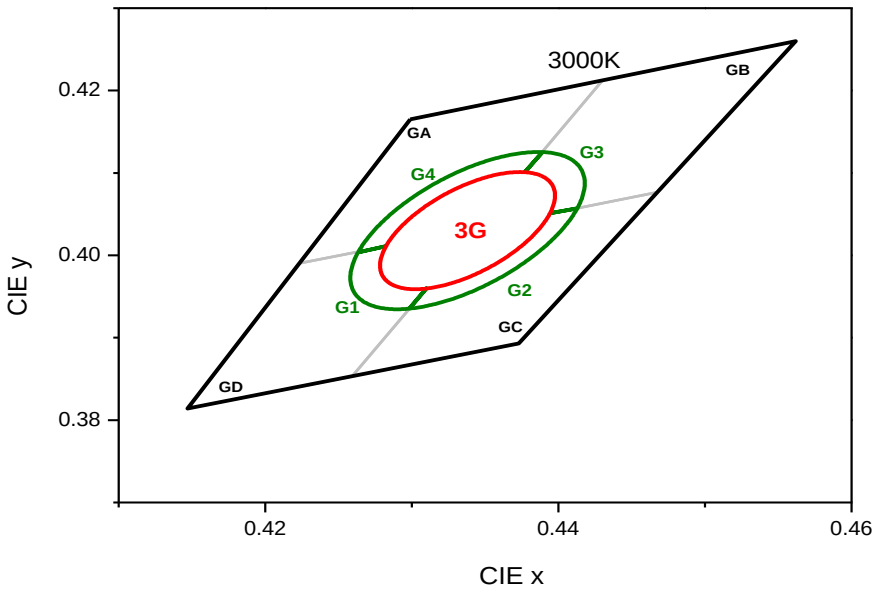
3step(3F)		4step	
Center point	0.4073 : 0.3917	Center point	0.4073 : 0.3917
Major Axis a	0.0093	Major Axis a	0.0124
Minor Axis b	0.0041	Minor Axis b	0.0055
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

F1		F2		F3		F4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3992	0.3877	0.4043	0.3818	0.4154	0.3956	0.4120	0.4021
0.4012	0.3887	0.4052	0.3844	0.4134	0.3946	0.4110	0.3996
0.4043	0.3818	0.4154	0.3956	0.4120	0.4021	0.3992	0.3877
0.4052	0.3844	0.4134	0.3946	0.4110	0.3996	0.4012	0.3887

FA		FB		FC		FD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3996	0.4015	0.4146	0.4089	0.4082	0.3920	0.3943	0.3853
0.3943	0.3853	0.4082	0.3920	0.4017	0.3751	0.3889	0.3690
0.4082	0.3920	0.4223	0.3990	0.4147	0.3814	0.4017	0.3751
0.4146	0.4089	0.4299	0.4165	0.4223	0.3990	0.4082	0.3920

Color Bin Structure

CIE Chromaticity Diagram (Warm white), T_j=25℃, I_F=65mA



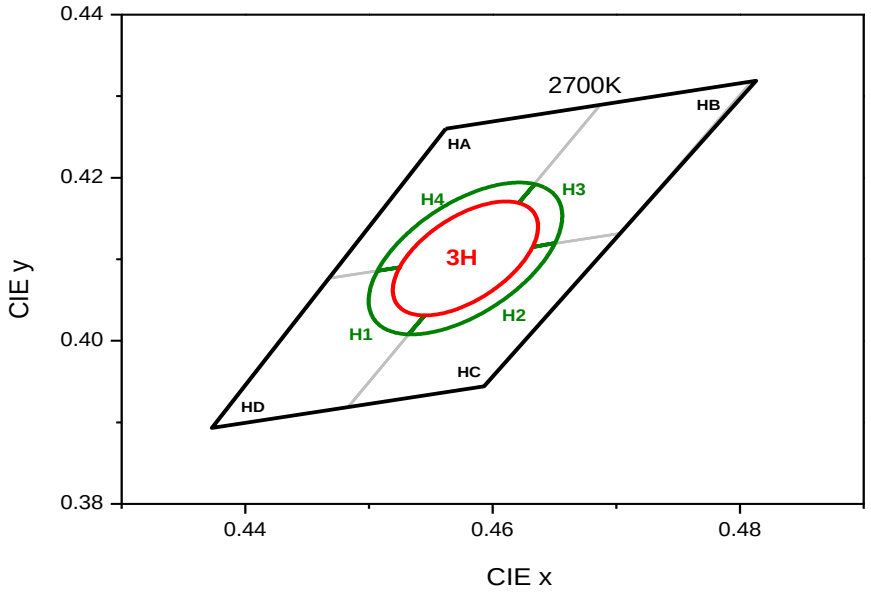
3step(3G)		4step	
Center point	0.4338 : 0.4030	Center point	0.4338 : 0.4030
Major Axis a	0.0083	Major Axis a	0.0112
Minor Axis b	0.0041	Minor Axis b	0.0054
Ellipse Rotation Angle	53	Ellipse Rotation Angle	53

G1		G2		G3		G4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4264	0.4004	0.4298	0.3935	0.4413	0.4057	0.4389	0.4125
0.4282	0.4011	0.4310	0.3960	0.4394	0.4051	0.4377	0.4101
0.4298	0.3935	0.4413	0.4057	0.4389	0.4125	0.4264	0.4004
0.4310	0.3960	0.4394	0.4051	0.4377	0.4101	0.4282	0.4011

GA		GB		GC		GD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4299	0.4165	0.4430	0.4212	0.4345	0.4033	0.4223	0.3990
0.4223	0.399	0.4345	0.4033	0.4259	0.3853	0.4147	0.3814
0.4345	0.4033	0.4468	0.4077	0.4373	0.3893	0.4259	0.3853
0.4430	0.4212	0.4562	0.4260	0.4468	0.4077	0.4345	0.4033

Color Bin Structure

CIE Chromaticity Diagram (Warm white), T_j=25℃, I_F=65mA



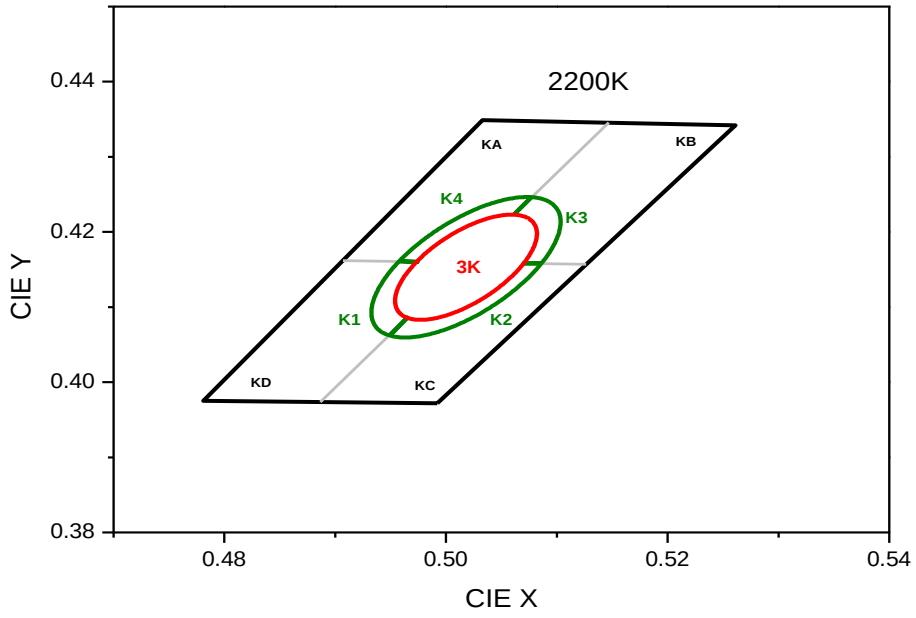
3step(3H)		4step	
Center point	0.4578 : 0.4101	Center point	0.4578 : 0.4101
Major Axis a	0.0081	Major Axis a	0.0108
Minor Axis b	0.0042	Minor Axis b	0.0056
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

H1		H2		H3		H4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4507	0.4086	0.4532	0.4008	0.4650	0.4120	0.4634	0.4192
0.4525	0.4090	0.4545	0.4031	0.4632	0.4115	0.4621	0.4169
0.4532	0.4008	0.4650	0.4120	0.4634	0.4192	0.4507	0.4086
0.4545	0.4031	0.4632	0.4115	0.4621	0.4169	0.4525	0.4090

HA		HB		HC		HD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4562	0.4260	0.4687	0.4289	0.4585	0.4104	0.4468	0.4077
0.4468	0.4077	0.4585	0.4104	0.4483	0.3919	0.4373	0.3893
0.4585	0.4104	0.4703	0.4132	0.4593	0.3944	0.4483	0.3919
0.4687	0.4289	0.4810	0.4319	0.4703	0.4132	0.4585	0.4104

Color Bin Structure

CIE Chromaticity Diagram T_j=25℃, I_F=65mA



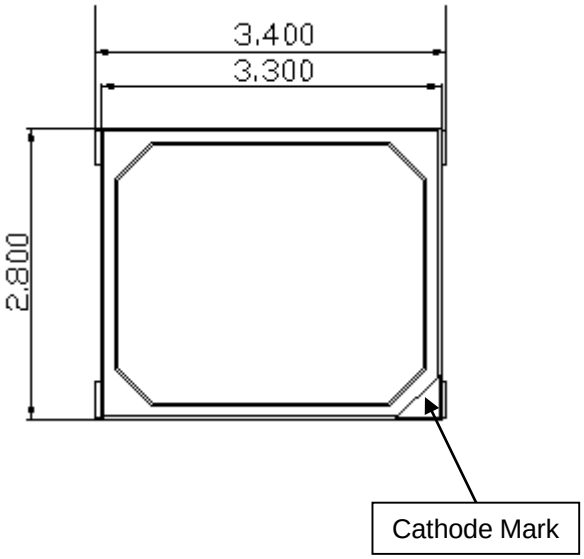
3step(3K)		4step	
Center point	0.5018 : 0.4153	Center point	0.5018 : 0.4153
Major Axis a	0.0086	Major Axis a	0.0115
Minor Axis b	0.004	Minor Axis b	0.0053
Ellipse Rotation Angle	49	Ellipse Rotation Angle	49

K1		K2		K3		K4	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4958	0.4161	0.4949	0.4062	0.5086	0.4158	0.5077	0.4246
0.4974	0.4160	0.4965	0.4086	0.5070	0.4158	0.5061	0.4223
0.4949	0.4062	0.5086	0.4158	0.5077	0.4246	0.4958	0.4161
0.4965	0.4086	0.5070	0.4158	0.5061	0.4223	0.4974	0.4160

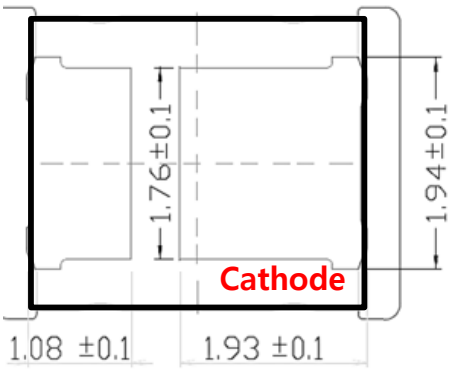
KA		KB		KC		KD	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.5033	0.4349	0.5147	0.4346	0.5017	0.4160	0.4907	0.4162
0.4907	0.4162	0.5017	0.4160	0.4887	0.3974	0.4781	0.3975
0.5017	0.4160	0.5127	0.4157	0.4992	0.3972	0.4887	0.3974
0.5147	0.4346	0.5261	0.4342	0.5127	0.4157	0.5017	0.4160

Mechanical Dimensions

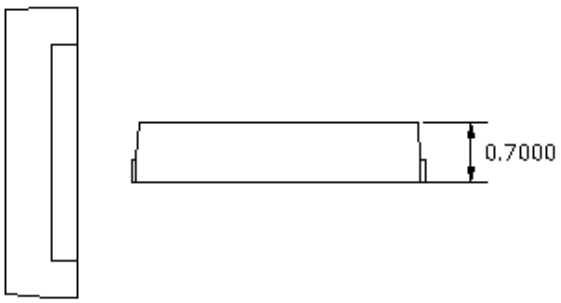
Top View



Bottom View



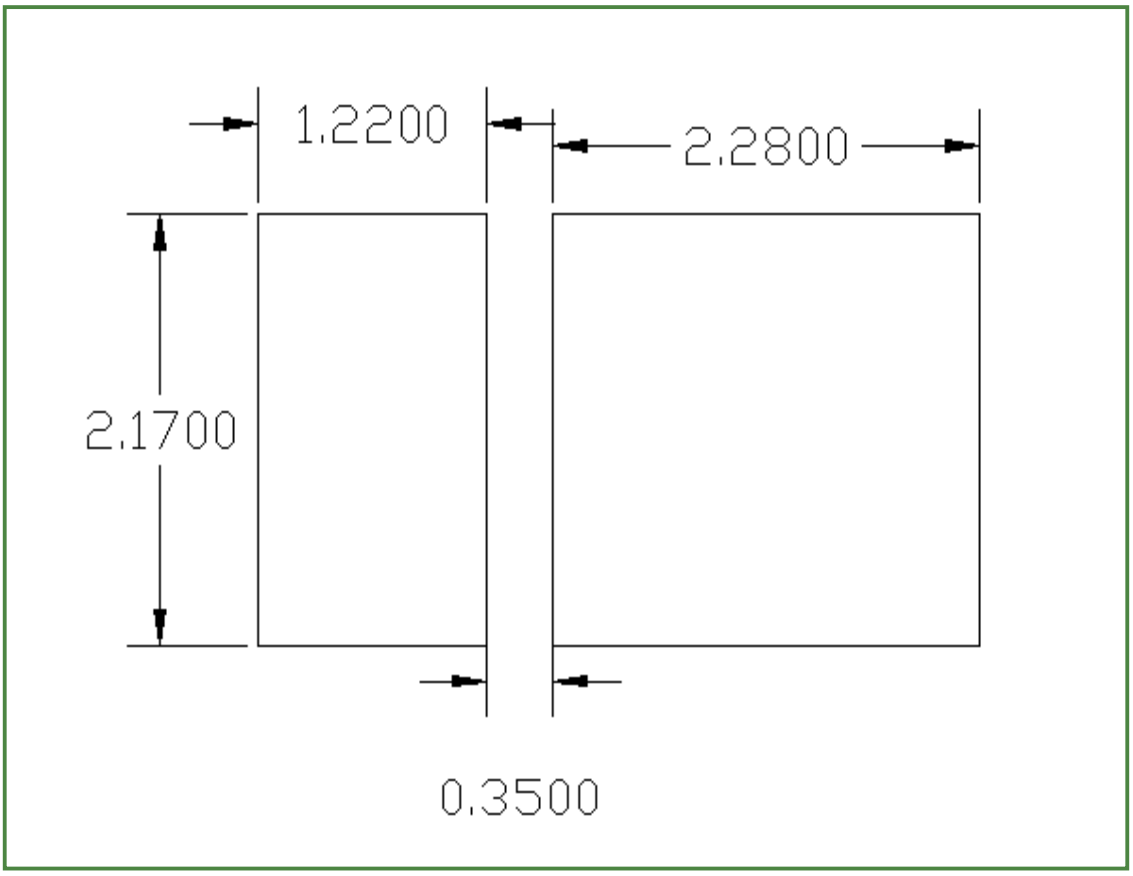
Side View



Notes :

(1) All dimensions are in millimeters.
(2) Scale : none
(3) Undefined tolerance is ±0.2mm

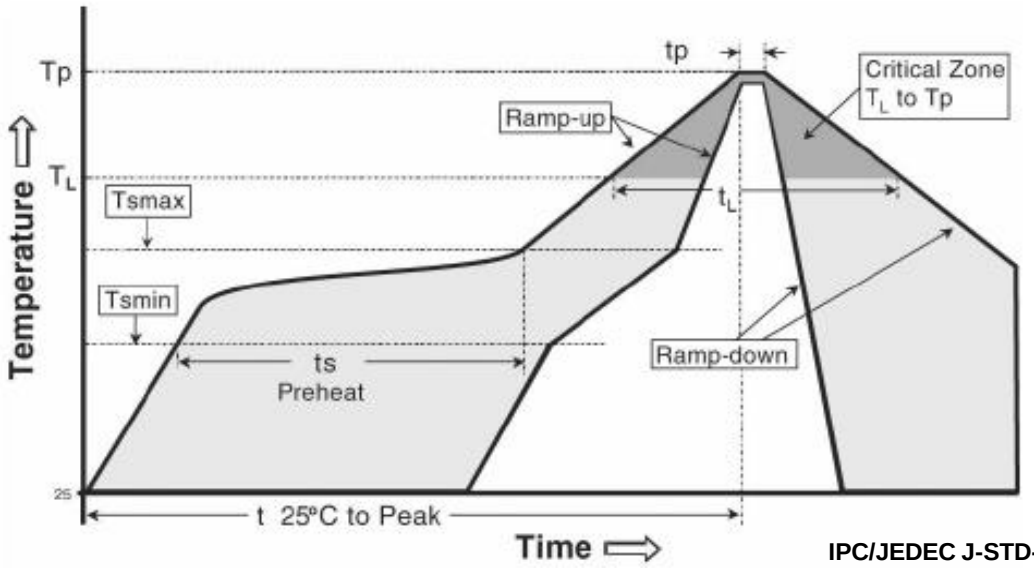
Recommended Solder Pad



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

Reflow Soldering Characteristics



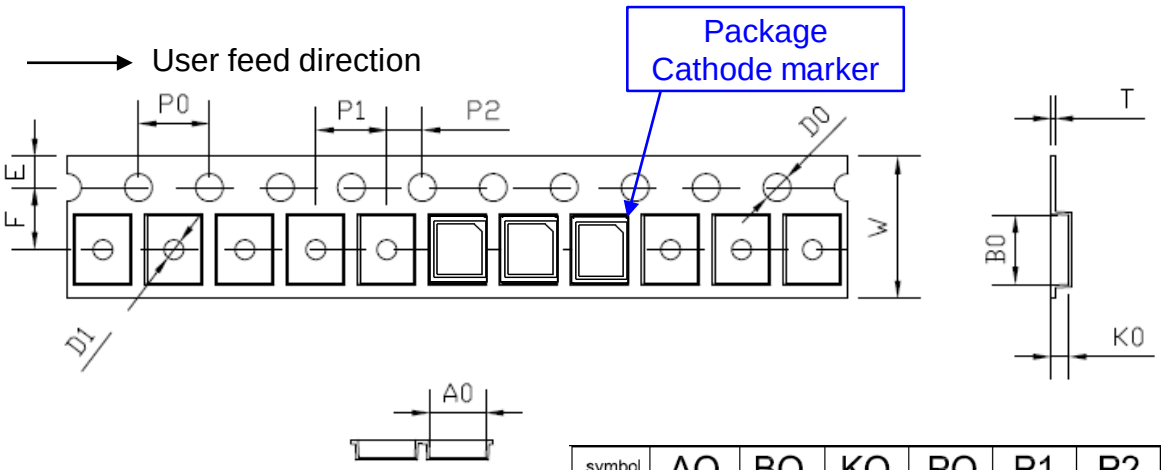
IPC/JEDEC J-STD-020

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_{s_max} to T_p)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (T_{s_min}) - Temperature Max (T_{s_max}) - Time (T_{s_min} to T_{s_max}) (t_s)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (T_p)	215℃	260℃
Time within 5°C of actual Peak Temperature (t_p)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.

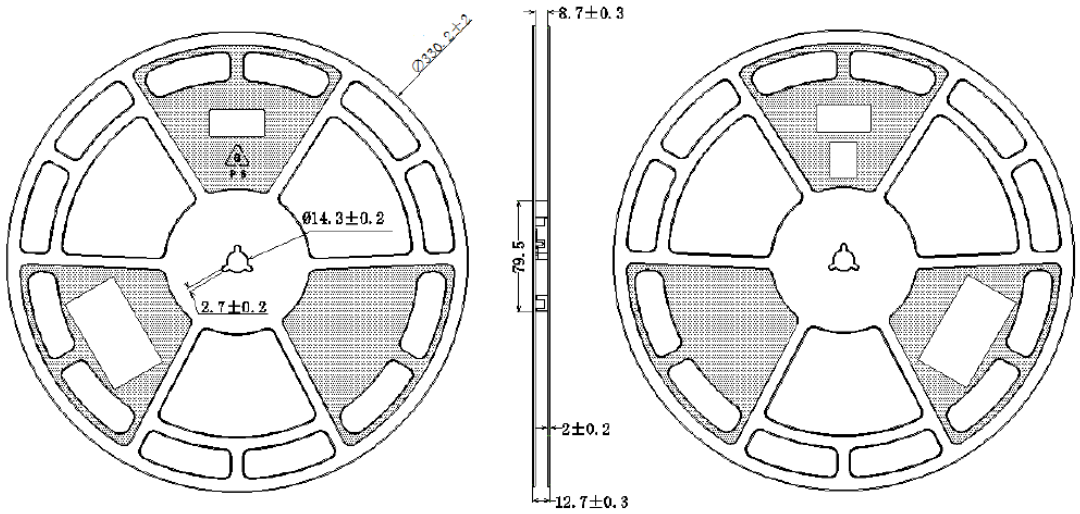
Caution :

(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



symbol	AO	BO	KO	PO	P1	P2
Spec	3.0±0.10	3.75±0.15	1.05±0.15	4.0±0.10	4.0±0.10	2.0±0.10
symbol	W	T	E	F	DO	D1
Spec	8.00±0.10	0.20±0.05	1.75±0.10	3.5±0.10	1.5±0.05	1.10±0.10

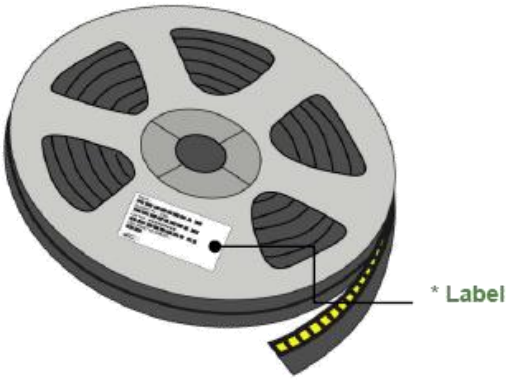


Notes :

(1) Quantity : Max 16,000pcs/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.

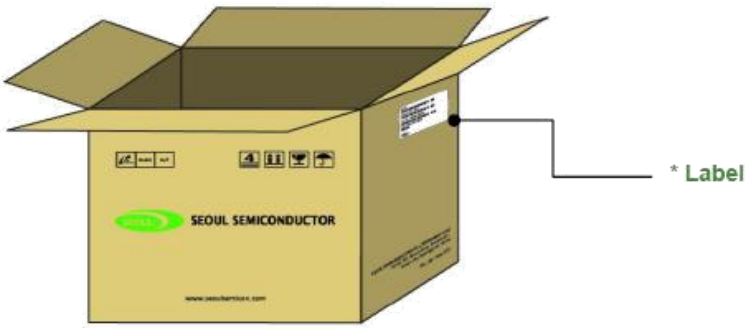
Emitter Tape & Reel Packaging

Reel



Aluminum Bag

Outer Box



Product Nomenclature

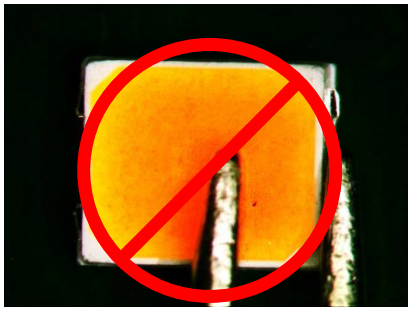
Table 7. Part Numbering System

S	1	W	0	-	2	8	3	5	x	x	8	0	0	3	-	0	0	0	0	0	0	0	0	-	0	P	E	H	4
X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}	X_{27}	X_{28}	X_{29}	X_{30}

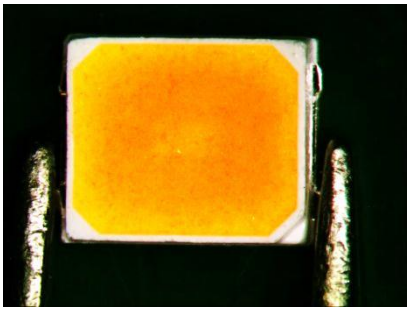
Part Number Code	Description	Part Number	Value
X_1	Company	S	Seoul Semiconductor
X_2	Level of Integration	1	Discrete LED
X_3X_4	Technology	W0	White General
X_5	-	-	-
$X_6X_7X_8X_9$	Dimension	2835	2.8x3.5mm
$X_{10}X_{11}$	CCT	xx	65: 6500K 57: 5700K 50: 5000K 45: 4500K 40: 4000K 35: 3500K 30: 3000K 27: 2700K 22 : 2200K
$X_{12}X_{13}$	CRI	80	CRI80
$X_{14}X_{15}$	Vf	03	
X_{16}	-	-	-
$X_{17}X_{16}X_{19}$	Characteristic code Flux Rank	000	
$X_{20}X_{21}X_{22}$	Characteristic code Vf Rank	000	
$X_{23}X_{24}$	Characteristic code Color Step	xx	3S: 3step ellipse 4S: 4step ellipse 00: Full
X_{25}	-	-	-
$X_{26}X_{27}$	Type	0P	
$X_{28}X_{29}X_{30}$	Internal code	EH4	

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) SSC 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 maximum storage temperature range is 40℃ and a maximum humidity of RH90%.

(2) Use Precaution after Opening the Packaging

Use SMT techniques properly 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 : 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 10-24hr at 65±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) Don't recommend to use it for cold storage lighting

Precaution for Use

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

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

(13) 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.

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

(15) 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.

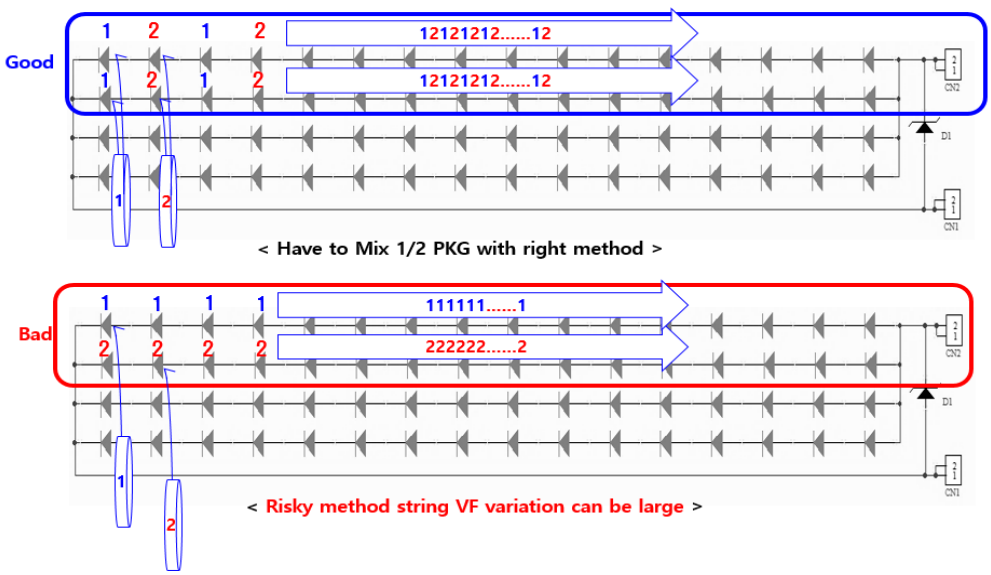
(16) Similar to most Solid state devices;
LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).
Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

(17) Voltage Variation Mixing

If Module circuit series and parallel many PKG, voltage variation problem coming out seriously.

To avoid this issue we recommend mixing Vf bin at the SMD Module Program level. Even though using Single bin only.

For example, when configuring a module with two reels (reel1 and Reel2), SMT should be as follows Good below.



Precaution for Use

a. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to an LEDs may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event.
One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:

- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:

- Humidity control (ESD gets worse in a dry environment)

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device.
The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
  (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures. It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package
  (shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

c. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing:

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Company Information

Published by

Company Information

Seoul Semiconductor (www.SeoulSemicon.com) manufacturers and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, Home appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as "nPola", "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology" a proprietary family of high-voltage LEDs.

The company's broad product portfolio includes a wide array of package and device choices such as Acrich and Acirch2, high-brightness LEDs, mid-power LEDs, side-view LEDs, and through-hole type LEDs as well as custom modules, displays, and sensors.

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