

High Voltage LED Series Chip on Board

COB D-Gen.3



High efficacy COB LED package
well-suited for use in spotlight applications

Features & Benefits

- Chip on Board (COB) solution makes it easy to design in
- Simple assembly reduces manufacturing cost
- Low thermal resistance
- InGaN/GaN MQW LED with long time reliability

Applications

- Spotlight / Downlight
- LED Retrofit Bulbs
- Outdoor Illumination



SAMSUNG

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1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Model	Rating	Unit	Condition
Ambient / Operating Temperature	T _a	-	-40 ~ +105	°C	-
Storage Temperature	T _{stg}	-	-40 ~ +120	°C	-
LED Junction Temperature	T _J	-	150	°C	-
Case Temperature	T _c	-	115	°C	-
Forward Current / Power Dissipation	I _F / P _D	LC003D	230 / 8.8	mA / W	-
		LC006D	460 / 17.5		-
		LC009D	690 / 26.3		-
		LC013D	920 / 35.0		-
		LC016D	1150 / 43.8		-
		LC019D	1380 / 52.6		-
		LC026D	1840 / 70.1		-
		LC033D	2300 / 87.6		-
		LC040D	2760 / 105.1		-
		LC060D	2760 / 157.7		-
		LC080D	4140 / 231.3		-
ESD (HBM)	-	-	±2	kV	-

b) Electro-optical Characteristics (I_f = Sorting Current, $T_J = 85\text{ }^\circ\text{C}$)

Item	Unit	Model	Rank	Min.	Typ.	Max.
Forward Voltage (V_F)	V	All model	YZ	31.0	34.0	37.0
			1Z	60W	46.8	51.0
				80W	46.8	50.0
Color Rendering Index (R_a)	-	All model	3	70	-	-
			5	80	-	-
			7	90	-	-
Beam Angle	$^\circ$	-	-	-	115	-
Nominal Power / Sorting Current	W / mA	LC003D	-	-	3.1 / 90	-
		LC006D	-	-	6.1 / 180	-
		LC009D	-	-	9.2 / 270	-
		LC013D	-	-	12.2 / 360	-
		LC016D	-	-	15.3 / 450	-
		LC019D	-	-	18.4 / 540	-
		LC026D	-	-	24.5 / 720	-
		LC033D	-	-	30.6 / 900	-
		LC040D	-	-	36.7 / 1080	-
		LC060D	-	-	55.1 / 1080	-
		LC080D	-	-	81.0 / 1620	-
Thermal Resistance (Junction to chip case)	$^\circ\text{C/W}$	LC003D	-	-	2.43	-
		LC006D	-	-	1.41	-
		LC009D	-	-	0.94	-
		LC013D	-	-	0.81	-
		LC016D	-	-	0.64	-
		LC019D	-	-	0.57	-
		LC026D	-	-	0.45	-
		LC033D	-	-	0.38	-
		LC040D	-	-	0.30	-
		LC060D	-	-	0.23	-
		LC080D	-	-	0.15	-

Notes:

- 1) The COB is tested in pulsed condition at rated test current (10 ms pulse width) and rated temperature ($T_J = T_C = T_a = 85\text{ }^\circ\text{C}$)
- 2) Samsung maintains measurement tolerance of: forward voltage = $\pm 5\%$, CRI = ± 1
- 3) Refer to the derating curve, '3. Typical Characteristics Graph' designed within the range.

c) Luminous Flux Characteristics (I_F = Sorting Current)

Model	CRI (R _a) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC003D	80	2700	D3	451	475	-
		3000	D3	474	499	-
		3500	D3	488	514	-
		4000	D3	498	524	-
		5000	D3	502	529	-
		5700	D3	502	529	-
		6500	D3	498	524	-
	90	2700	D3	386	407	-
		3000	D3	406	428	-
		3500	D3	419	441	-
		4000	D3	427	450	-
		5000	D3	431	453	-
LC006D	80	2700	D3	898	946	-
		3000	D3	944	994	-
		3500	D3	972	1023	-
		4000	D3	991	1043	-
		5000	D3	1000	1052	-
		5700	D3	1000	1052	-
		6500	D3	991	1043	-
	90	2700	D3	769	809	-
		3000	D3	809	851	-
		3500	D3	833	877	-
		4000	D3	850	895	-
		5000	D3	857	902	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

Model	CRI (R _a) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC009D	70	3000	D3	1515	1594	-
		4000	D3	1543	1624	-
		5000	D3	1571	1653	-
	80	2700	D3	1334	1405	-
		3000	D3	1402	1476	-
		3500	D3	1443	1519	-
		4000	D3	1472	1550	-
		5000	D3	1485	1563	-
		5700	D3	1485	1563	-
		6500	D3	1472	1550	-
	90	2700	D3	1142	1202	-
		3000	D3	1201	1264	-
		3500	D3	1237	1302	-
		4000	D3	1263	1329	-
		5000	D3	1273	1340	-
LC013D	70	2200	D3	1667	1755	-
		2700	D3	1876	1975	-
		3000	D3	1989	2094	-
		4000	D3	2026	2133	-
		5000	D3	2063	2171	-
		5700	D3	2019	2125	-
	80	2700	D3	1753	1845	-
		3000	D3	1842	1939	-
		3500	D3	1896	1996	-
		4000	D3	1934	2036	-
		5000	D3	1950	2053	-
		5700	D3	1950	2053	-
		6500	D3	1934	2036	-
	90	2700	D3	1500	1579	-
		3000	D3	1578	1661	-
		3500	D3	1625	1710	-
		4000	D3	1658	1745	-
		5000	D3	1672	1760	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

Model	CRI (R _a) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC016D	70	2200	D3	2126	2238	-
		2700	D3	2347	2470	-
		3000	D3	2562	2697	-
		4000	D3	2609	2747	-
		5000	D3	2657	2797	-
		5700	D3	2600	2737	-
	80	2700	D3	2257	2376	-
		3000	D3	2372	2497	-
		3500	D3	2442	2570	-
		4000	D3	2490	2622	-
		5000	D3	2511	2644	-
		5700	D3	2511	2644	-
	90	6500	D3	2490	2622	-
		2700	D3	1932	2033	-
		3000	D3	2032	2139	-
		3500	D3	2093	2203	-
		4000	D3	2136	2248	-
		5000	D3	2154	2267	-
LC019D	70	2200	D3	2539	2673	-
		2700	D3	2812	2960	-
		3000	D3	3059	3220	-
		4000	D3	3116	3280	-
		5000	D3	3172	3339	-
		5700	D3	3105	3269	-
	80	2700	D3	2695	2837	-
		3000	D3	2833	2982	-
		3500	D3	2916	3069	-
		4000	D3	2974	3130	-
		5000	D3	2999	3157	-
		5700	D3	2999	3157	-
	90	6500	D3	2974	3130	-
		2700	D3	2307	2428	-
		3000	D3	2426	2554	-
		3500	D3	2499	2630	-
		4000	D3	2550	2684	-
		5000	D3	2572	2707	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

Model	CRI (R _a) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC026D	70	2200	D3	3335	3511	-
		2700	D3	3753	3950	-
		3000	D3	4019	4230	-
		4000	D3	4093	4308	-
		5000	D3	4167	4387	-
		5700	D3	4079	4294	-
	80	2700	D3	3541	3727	-
		3000	D3	3721	3917	-
		3500	D3	3830	4032	-
		4000	D3	3907	4112	-
		5000	D3	3939	4147	-
		5700	D3	3939	4147	-
	90	6500	D3	3907	4112	-
		2700	D3	3030	3190	-
		3000	D3	3187	3355	-
		3500	D3	3282	3455	-
		4000	D3	3350	3526	-
		5000	D3	3379	3556	-
LC033D	70	2200	D3	4093	4308	-
		2700	D3	4693	4940	-
		3000	D3	4973	5235	-
		4000	D3	5065	5332	-
		5000	D3	5157	5429	-
		5700	D3	5048	5313	-
	80	2700	D3	4382	4612	-
		3000	D3	4605	4847	-
		3500	D3	4740	4989	-
		4000	D3	4834	5089	-
		5000	D3	4875	5132	-
		5700	D3	4875	5132	-
	90	6500	D3	4834	5089	-
		2700	D3	3750	3947	-
		3000	D3	3944	4152	-
		3500	D3	4062	4276	-
		4000	D3	4146	4364	-
		5000	D3	4181	4401	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

Model	CRI (R _a) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC040D	70	2200	D3	5078	5346	-
		2700	D3	5634	5930	-
		3000	D3	6118	6440	-
		4000	D3	6232	6560	-
		5000	D3	6345	6679	-
		5700	D3	6210	6537	-
	80	2700	D3	5391	5675	-
		3000	D3	5665	5963	-
		3500	D3	5831	6138	-
		4000	D3	5948	6261	-
		5000	D3	5998	6313	-
		5700	D3	5998	6313	-
	90	6500	D3	5948	6261	-
		2700	D3	4614	4856	-
		3000	D3	4853	5108	-
		3500	D3	4997	5260	-
		4000	D3	5100	5369	-
		5000	D3	5144	5415	-
LC060D	70	5700	D3	5035	5300	-
		2200	D3	7505	7900	-
		2700	D3	8550	9000	-
		3000	D3	9042	9518	-
		4000	D3	9209	9694	-
		5000	D3	9377	9870	-
	80	5700	D3	9178	9661	-
		2700	D3	7967	8386	-
		3000	D3	8372	8813	-
		3500	D3	8617	9071	-
		4000	D3	8790	9253	-
		5000	D3	8864	9330	-
	90	5700	D3	8864	9330	-
		6500	D3	8790	9253	-
		2700	D3	6818	7177	-
		3000	D3	7172	7549	-
		3500	D3	7385	7774	-
		4000	D3	7537	7934	-
		5000	D3	7602	8002	-
		5700	D3	7440	7832	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

Model	CRI (Ra) Min.	Nominal CCT (K)	Flux Rank	Flux@ T _J = 85 °C (lm)		
				Min.	Typ.	Max.
LC080D	70	2200	D3	10610	11169	-
		2700	D3	12920	13600	-
		3000	D3	13409	14115	-
		4000	D3	13657	14376	-
		5000	D3	13906	14637	-
		5700	D3	13610	14326	-
		6500	D3	13035	13721	-
	80	2700	D3	11815	12437	-
		3000	D3	12416	13069	-
		3500	D3	12779	13452	-
		4000	D3	13035	13721	-
		5000	D3	13144	13836	-
		5700	D3	13144	13836	-
		6500	D3	13035	13721	-
	90	2700	D3	10111	10643	-
		3000	D3	10635	11195	-
		3500	D3	10952	11529	-
		4000	D3	11178	11766	-
		5000	D3	11273	11867	-
		5700	D3	11034	11615	-
		6500	D3	10610	11169	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C).
- 2) Samsung maintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

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	A	H	D	N	G	2	5	Y	Z	W	3	D	3

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package High Power	SPH	
4 5	Color	WH	White
6	Product Version	A	
7 8	Form Factor	HD	COB
9	Lens Type	N	No lens
10	Wattage or Model	A LC003D B LC006D C LC009D D LC013D E LC016D F LC019D G LC026D H LC033D K LC040D L LC060D M LC080D	
11	Internal Code	2	
12	CRI & Sorting Temperature	3 Min. 70 (85°C) 5 Min. 80 (85°C) 7 Min. 90 (85°C)	
13 14	Forward Voltage (V)	YZ 31.0~37.0 1Z 46.8~55.2 (60W) 46.8~52.5 (80W)	
15	CCT (K)	Y 2200K W 2700K V 3000K U 3500K T 4000K R 5000K Q 5700K P 6500K	
16	MacAdam Step	1 MacAdam 1-step 2 MacAdam 2-step 3 MacAdam 3-step	
17 18	Luminous Flux (Lm)	D3	COB D-series Gen.3 level

a) Binning Structure

※ LC003D(I_F = 90 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
80	2700	SPHWAHDNA25YZW1D3	YZ	W1	D3	451 ~
		SPHWAHDNA25YZW2D3		W2		
	3000	SPHWAHDNA25YZV1D3	YZ	V1	D3	474 ~
		SPHWAHDNA25YZV2D3		V2		
	3500	SPHWAHDNA25YZU1D3	YZ	U1	D3	488 ~
		SPHWAHDNA25YZU2D3		U2		
	4000	SPHWAHDNA25YZT1D3	YZ	T1	D3	498 ~
		SPHWAHDNA25YZT2D3		T2		
	5000	SPHWAHDNA25YZR2D3	YZ	R2	D3	502 ~
		SPHWAHDNA25YZR3D3		R3		
	5700	SPHWAHDNA25YZQ2D3	YZ	Q2	D3	502 ~
		SPHWAHDNA25YZQ3D3		Q3		
	6500	SPHWAHDNA25YZP2D3	YZ	P2	D3	498 ~
		SPHWAHDNA25YZP3D3		P3		
90	2700	SPHWAHDNA27YZW1D3	YZ	W1	D3	386 ~
		SPHWAHDNA27YZW2D3		W2		
	3000	SPHWAHDNA27YZV1D3	YZ	V1	D3	406 ~
		SPHWAHDNA27YZV2D3		V2		
	3500	SPHWAHDNA27YZU1D3	YZ	U1	D3	419 ~
		SPHWAHDNA27YZU2D3		U2		
	4000	SPHWAHDNA27YZT1D3	YZ	T1	D3	427 ~
		SPHWAHDNA27YZT2D3		T2		
	5000	SPHWAHDNA27YZR2D3	YZ	R2	D3	431 ~
		SPHWAHDNA27YZR3D3		R3		

※ LCoo6D(I_F = 180 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
80	2700	SPHWAHDNB25YZW1D3	YZ	W1	D3	898 ~
		SPHWAHDNB25YZW2D3		W2		
	3000	SPHWAHDNB25YZV1D3	YZ	V1	D3	944 ~
		SPHWAHDNB25YZV2D3		V2		
	3500	SPHWAHDNB25YZU1D3	YZ	U1	D3	972 ~
		SPHWAHDNB25YZU2D3		U2		
	4000	SPHWAHDNB25YZT1D3	YZ	T1	D3	991 ~
		SPHWAHDNB25YZT2D3		T2		
	5000	SPHWAHDNB25YZR2D3	YZ	R2	D3	1000 ~
		SPHWAHDNB25YZR3D3		R3		
	5700	SPHWAHDNB25YZQ2D3	YZ	Q2	D3	1000 ~
		SPHWAHDNB25YZQ3D3		Q3		
	6500	SPHWAHDNB25YZP2D3	YZ	P2	D3	991 ~
		SPHWAHDNB25YZP3D3		P3		
90	2700	SPHWAHDNB27YZW1D3	YZ	W1	D3	769 ~
		SPHWAHDNB27YZW2D3		W2		
	3000	SPHWAHDNB27YZV1D3	YZ	V1	D3	809 ~
		SPHWAHDNB27YZV2D3		V2		
	3500	SPHWAHDNB27YZU1D3	YZ	U1	D3	833 ~
		SPHWAHDNB27YZU2D3		U2		
	4000	SPHWAHDNB27YZT1D3	YZ	T1	D3	850 ~

SPHWAHDNB27YZT2D3		T2	
SPHWAHDNB27YZR2D3		R2	
5000	YZ	D3	857 ~
SPHWAHDNB27YZR3D3		R3	

※ LCoogD(I_F = 270 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	3000	SPHWAHDNC23YZV2D3	YZ	V2	D3	1515 ~
		SPHWAHDNC23YZV3D3		V3		
	4000	SPHWAHDNC23YZT2D3	YZ	T2	D3	1543 ~
		SPHWAHDNC23YZT3D3		T3		
	5000	SPHWAHDNC23YZR2D3	YZ	R2	D3	1571 ~
		SPHWAHDNC23YZR3D3		R3		
80	2700	SPHWAHDNC25YZW1D3	YZ	W1	D3	1334 ~
		SPHWAHDNC25YZW2D3		W2		
	3000	SPHWAHDNC25YZV1D3	YZ	V1	D3	1402 ~
		SPHWAHDNC25YZV2D3		V2		
	3500	SPHWAHDNC25YZU1D3	YZ	U1	D3	1443 ~
		SPHWAHDNC25YZU2D3		U2		
	4000	SPHWAHDNC25YZT1D3	YZ	T1	D3	1472 ~
		SPHWAHDNC25YZT2D3		T2		
	5000	SPHWAHDNC25YZR2D3	YZ	R2	D3	1485 ~
		SPHWAHDNC25YZR3D3		R3		
	5700	SPHWAHDNC25YZQ2D3	YZ	Q2	D3	1485 ~
		SPHWAHDNC25YZQ3D3		Q3		

90	6500	SPHWHAHDC25YZP2D3	YZ	P2	D3	1472 ~
		SPHWHAHDC25YZP3D3		P3		
	2700	SPHWHAHDC27YZW1D3	YZ	W1	D3	1142 ~
		SPHWHAHDC27YZW2D3		W2		
	3000	SPHWHAHDC27YZV1D3	YZ	V1	D3	1201 ~
		SPHWHAHDC27YZV2D3		V2		
	3500	SPHWHAHDC27YZU1D3	YZ	U1	D3	1237 ~
		SPHWHAHDC27YZU2D3		U2		
	4000	SPHWHAHDC27YZT1D3	YZ	T1	D3	1263 ~
		SPHWHAHDC27YZT2D3		T2		
	5000	SPHWHAHDC27YZR2D3	YZ	R2	D3	1273 ~
		SPHWHAHDC27YZR3D3		R3		

※ LCo13D(I_F = 360 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWAHDND23YZY2D3	YZ	Y2	D3	1667 ~
		SPHWAHDND23YZY3D3		Y3		
	2700	SPHWAHDND23YZW2D3	YZ	V2	D3	1876 ~
		SPHWAHDND23YZW3D3		V3		
	3000	SPHWAHDND23YZV2D3	YZ	V2	D3	1989 ~
		SPHWAHDND23YZV3D3		V3		
	4000	SPHWAHDND23YZT2D3	YZ	T2	D3	2026 ~
		SPHWAHDND23YZT3D3		T3		
	5000	SPHWAHDND23YZR2D3	YZ	R2	D3	2063 ~
		SPHWAHDND23YZR3D3		R3		
	5700	SPHWAHDND23YZQ2D3	YZ	Q2	D3	2019 ~
		SPHWAHDND23YZQ3D3		Q3		
80	2700	SPHWAHDND25YZW1D3	YZ	W1	D3	1753 ~
		SPHWAHDND25YZW2D3		W2		
	3000	SPHWAHDND25YZV1D3	YZ	V1	D3	1842 ~
		SPHWAHDND25YZV2D3		V2		
	3500	SPHWAHDND25YZU1D3	YZ	U1	D3	1896 ~
		SPHWAHDND25YZU2D3		U2		
	4000	SPHWAHDND25YZT1D3	YZ	T1	D3	1934 ~
		SPHWAHDND25YZT2D3		T2		
	5000	SPHWAHDND25YZR2D3	YZ	R2	D3	1950 ~
		SPHWAHDND25YZR3D3		R3		
	5700	SPHWAHDND25YZQ2D3	YZ	Q2	D3	1950 ~
		SPHWAHDND25YZQ3D3		Q3		

90	6500	SPHWWAHDND25YZP2D3	YZ	P2	D3	1934 ~
		SPHWWAHDND25YZP3D3		P3		
	2700	SPHWWAHDND27YZW1D3	YZ	W1	D3	1500 ~
		SPHWWAHDND27YZW2D3		W2		
	3000	SPHWWAHDND27YZV1D3	YZ	V1	D3	1578 ~
		SPHWWAHDND27YZV2D3		V2		
	3500	SPHWWAHDND27YZU1D3	YZ	U1	D3	1625 ~
		SPHWWAHDND27YZU2D3		U2		
	4000	SPHWWAHDND27YZT1D3	YZ	T1	D3	1658 ~
		SPHWWAHDND27YZT2D3		T2		
	5000	SPHWWAHDND27YZR2D3	YZ	R2	D3	1672 ~
		SPHWWAHDND27YZR3D3		R3		

※ LCo16D(I_F = 450 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWWAHDNE23YZY2D3	YZ	Y2	D3	2126 ~
		SPHWWAHDNE23YZY3D3		Y3		
	2700	SPHWWAHDNE23YZW2D3	YZ	Y2	D3	2347 ~
		SPHWWAHDNE23YZW3D3		Y3		
	3000	SPHWWAHDNE23YZV2D3	YZ	V2	D3	2562 ~
		SPHWWAHDNE23YZV3D3		V3		
	4000	SPHWWAHDNE23Yzt2D3	YZ	T2	D3	2609 ~
		SPHWWAHDNE23Yzt3D3		T3		
	5000	SPHWWAHDNE23YzR2D3	YZ	R2	D3	2657 ~
		SPHWWAHDNE23YzR3D3		R3		
	5700	SPHWWAHDNE23YzQ2D3	YZ	Q2	D3	2600 ~
		SPHWWAHDNE23YzQ3D3		Q3		
80	2700	SPHWWAHDNE25YZW1D3	YZ	W1	D3	2257 ~
		SPHWWAHDNE25YZW2D3		W2		
	3000	SPHWWAHDNE25YZV1D3	YZ	V1	D3	2372 ~
		SPHWWAHDNE25YZV2D3		V2		
	3500	SPHWWAHDNE25YZU1D3	YZ	U1	D3	2442 ~
		SPHWWAHDNE25YZU2D3		U2		
	4000	SPHWWAHDNE25Yzt1D3	YZ	T1	D3	2490 ~
		SPHWWAHDNE25Yzt2D3		T2		
	5000	SPHWWAHDNE25YzR2D3	YZ	R2	D3	2511 ~
		SPHWWAHDNE25YzR3D3		R3		
	5700	SPHWWAHDNE25YzQ2D3	YZ	Q2	D3	2511 ~
		SPHWWAHDNE25YzQ3D3		Q3		

90	6500	SPHWWAHDNE25YZP2D3	YZ	P2	D3	2490 ~
		SPHWWAHDNE25YZP3D3		P3		
	2700	SPHWWAHDNE27YZW1D3	YZ	W1	D3	1932 ~
		SPHWWAHDNE27YZW2D3		W2		
	3000	SPHWWAHDNE27YZV1D3	YZ	V1	D3	2032 ~
		SPHWWAHDNE27YZV2D3		V2		
	3500	SPHWWAHDNE27YZU1D3	YZ	U1	D3	2093 ~
		SPHWWAHDNE27YZU2D3		U2		
	4000	SPHWWAHDNE27YZT1D3	YZ	T1	D3	2136 ~
		SPHWWAHDNE27YZT2D3		T2		
	5000	SPHWWAHDNE27YZR2D3	YZ	R2	D3	2154 ~
		SPHWWAHDNE27YZR3D3		R3		

※ LCo19D(I_F = 540 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWAHDF23YZY2D3	YZ	Y2	D3	2539 ~
		SPHWAHDF23YZY3D3		Y3		
	2700	SPHWAHDF23YZW2D3	YZ	W2	D3	2812 ~
		SPHWAHDF23YZW3D3		W3		
	3000	SPHWAHDF23YZV2D3	YZ	V2	D3	3059 ~
		SPHWAHDF23YZV3D3		V3		
	4000	SPHWAHDF23YZT2D3	YZ	T2	D3	3116 ~
		SPHWAHDF23YZT3D3		T3		
	5000	SPHWAHDF23YZR2D3	YZ	R2	D3	3172 ~
		SPHWAHDF23YZR3D3		R3		
	5700	SPHWAHDF23YZQ2D3	YZ	Q2	D3	3105 ~
		SPHWAHDF23YZQ3D3		Q3		
80	2700	SPHWAHDF25YZW1D3	YZ	W1	D3	2695 ~
		SPHWAHDF25YZW2D3		W2		
	3000	SPHWAHDF25YZV1D3	YZ	V1	D3	2833 ~
		SPHWAHDF25YZV2D3		V2		
	3500	SPHWAHDF25YZU1D3	YZ	U1	D3	2916 ~
		SPHWAHDF25YZU2D3		U2		
	4000	SPHWAHDF25YZT1D3	YZ	T1	D3	2974 ~
		SPHWAHDF25YZT2D3		T2		
	5000	SPHWAHDF25YZR2D3	YZ	R2	D3	2999 ~
		SPHWAHDF25YZR3D3		R3		
	5700	SPHWAHDF25YZQ2D3	YZ	Q2	D3	2999 ~
		SPHWAHDF25YZQ3D3		Q3		
	6500	SPHWAHDF25YZP2D3	YZ	P2	D3	2974 ~
		SPHWAHDF25YZP3D3		P3		

90	2700	SPHWWAHDNF27YZW1D3	YZ	W1	D3	2307 ~
		SPHWWAHDNF27YZW2D3		W2		
	3000	SPHWWAHDNF27YZV1D3	YZ	V1	D3	2426 ~
		SPHWWAHDNF27YZV2D3		V2		
	3500	SPHWWAHDNF27YZU1D3	YZ	U1	D3	2499 ~
		SPHWWAHDNF27YZU2D3		U2		
	4000	SPHWWAHDNF27YZT1D3	YZ	T1	D3	2550 ~
		SPHWWAHDNF27YZT2D3		T2		
	5000	SPHWWAHDNF27YZR2D3	YZ	R2	D3	2572 ~
		SPHWWAHDNF27YZR3D3		R3		

※ LCo26D(I_F = 720 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWWAHDNG23YZY2D3	YZ	Y2	D3	3335 ~
		SPHWWAHDNG23YZY3D3		Y3		
	2700	SPHWWAHDNG23YZW2D3	YZ	W2	D3	3465 ~
		SPHWWAHDNG23YZW3D3		W3		
	3000	SPHWWAHDNG23YZV2D3	YZ	V2	D3	4019 ~
		SPHWWAHDNG23YZV3D3		V3		
	4000	SPHWWAHDNG23YZT2D3	YZ	T2	D3	4093 ~
		SPHWWAHDNG23YZT3D3		T3		
	5000	SPHWWAHDNG23YZR2D3	YZ	R2	D3	4167 ~
		SPHWWAHDNG23YZR3D3		R3		
	5700	SPHWWAHDNG23YZQ2D3	YZ	Q2	D3	4079 ~
		SPHWWAHDNG23YZQ3D3		Q3		
80	2700	SPHWWAHDNG25YZW1D3	YZ	W1	D3	3541 ~
		SPHWWAHDNG25YZW2D3		W2		
	3000	SPHWWAHDNG25YZV1D3	YZ	V1	D3	3721 ~
		SPHWWAHDNG25YZV2D3		V2		
	3500	SPHWWAHDNG25YZU1D3	YZ	U1	D3	3830 ~
		SPHWWAHDNG25YZU2D3		U2		
	4000	SPHWWAHDNG25YZT1D3	YZ	T1	D3	3907 ~
		SPHWWAHDNG25YZT2D3		T2		
	5000	SPHWWAHDNG25YZR2D3	YZ	R2	D3	3939 ~
		SPHWWAHDNG25YZR3D3		R3		
	5700	SPHWWAHDNG25YZQ2D3	YZ	Q2	D3	3939 ~
		SPHWWAHDNG25YZQ3D3		Q3		
	6500	SPHWWAHDNG25YZP2D3	YZ	P2	D3	3907 ~
		SPHWWAHDNG25YZP3D3		P3		

90	2700	SPHWHABDNG27YZW1D3	YZ	W1	D3	3030 ~
		SPHWHABDNG27YZW2D3		W2		
	3000	SPHWHABDNG27YZV1D3	YZ	V1	D3	3187 ~
		SPHWHABDNG27YZV2D3		V2		
	3500	SPHWHABDNG27YZU1D3	YZ	U1	D3	3282 ~
		SPHWHABDNG27YZU2D3		U2		
	4000	SPHWHABDNG27YZT1D3	YZ	T1	D3	3350 ~
		SPHWHABDNG27YZT2D3		T2		
	5000	SPHWHABDNG27YZR2D3	YZ	R2	D3	3379 ~
		SPHWHABDNG27YZR3D3		R3		

※ LCo33D(I_F = 900 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWAHDNH23YZY2D3	YZ	Y2	D3	4093 ~
		SPHWAHDNH23YZY3D3		Y3		
	2700	SPHWAHDNH23YZW2D3	YZ	W2	D3	4274 ~
		SPHWAHDNH23YZW3D3		W3		
	3000	SPHWAHDNH23YZV2D3	YZ	V2	D3	4973 ~
		SPHWAHDNH23YZV3D3		V3		
	4000	SPHWAHDNH23YZT2D3	YZ	T2	D3	5065 ~
		SPHWAHDNH23YZT3D3		T3		
	5000	SPHWAHDNH23YZR2D3	YZ	R2	D3	5157 ~
		SPHWAHDNH23YZR3D3		R3		
	5700	SPHWAHDNH23YZQ2D3	YZ	Q2	D3	5048 ~
		SPHWAHDNH23YZQ3D3		Q3		
80	2700	SPHWAHDNH25YZW1D3	YZ	W1	D3	4382 ~
		SPHWAHDNH25YZW2D3		W2		
	3000	SPHWAHDNH25YZV1D3	YZ	V1	D3	4605 ~
		SPHWAHDNH25YZV2D3		V2		
	3500	SPHWAHDNH25YZU1D3	YZ	U1	D3	4740 ~
		SPHWAHDNH25YZU2D3		U2		
	4000	SPHWAHDNH25YZT1D3	YZ	T1	D3	4834~
		SPHWAHDNH25YZT2D3		T2		
	5000	SPHWAHDNH25YZR2D3	YZ	R2	D3	4875 ~
		SPHWAHDNH25YZR3D3		R3		
	5700	SPHWAHDNH25YZQ2D3	YZ	Q2	D3	4875 ~
		SPHWAHDNH25YZQ3D3		Q3		
	6500	SPHWAHDNH25YZP2D3	YZ	P2	D3	4834 ~
		SPHWAHDNH25YZP3D3		P3		

90	2700	SPHWHAHDNH27YZW1D3	YZ	W1	D3	3750 ~
		SPHWHAHDNH27YZW2D3		W2		
	3000	SPHWHAHDNH27YZV1D3	YZ	V1	D3	3944 ~
		SPHWHAHDNH27YZV2D3		V2		
	3500	SPHWHAHDNH27YZU1D3	YZ	U1	D3	4062 ~
		SPHWHAHDNH27YZU2D3		U2		
	4000	SPHWHAHDNH27YZT1D3	YZ	T1	D3	4146 ~
		SPHWHAHDNH27YZT2D3		T2		
	5000	SPHWHAHDNH27YZR2D3	YZ	R2	D3	4181 ~
		SPHWHAHDNH27YZR3D3		R3		

※ LCo4oD(I_F = 1080 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Color Rank	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWAHDNK23YZY2D3	YZ	Y2	D3	5078 ~
		SPHWAHDNK23YZY3D3		Y3		
	2700	SPHWAHDNK23YZW2D3	YZ	W2	D3	5432 ~
		SPHWAHDNK23YZW3D3		W3		
	3000	SPHWAHDNK23YZV2D3	YZ	V2	D3	6118 ~
		SPHWAHDNK23YZV3D3		V3		
	4000	SPHWAHDNK23YZT2D3	YZ	T2	D3	6232 ~
		SPHWAHDNK23YZT3D3		T3		
	5000	SPHWAHDNK23YZR2D3	YZ	R2	D3	6345 ~
		SPHWAHDNK23YZR3D3		R3		
	5700	SPHWAHDNK23YZQ2D3	YZ	Q2	D3	6210 ~
		SPHWAHDNK23YZQ3D3		Q3		
80	2700	SPHWAHDNK25YZW1D3	YZ	W1	D3	5391 ~
		SPHWAHDNK25YZW2D3		W2		
	3000	SPHWAHDNK25YZV1D3	YZ	V1	D3	5665 ~
		SPHWAHDNK25YZV2D3		V2		
	3500	SPHWAHDNK25YZU1D3	YZ	U1	D3	5831 ~
		SPHWAHDNK25YZU2D3		U2		
	4000	SPHWAHDNK25YZT1D3	YZ	T1	D3	5948 ~
		SPHWAHDNK25YZT2D3		T2		
	5000	SPHWAHDNK25YZR2D3	YZ	R2	D3	5998 ~
		SPHWAHDNK25YZR3D3		R3		
	5700	SPHWAHDNK25YZQ2D3	YZ	Q2	D3	5998 ~
		SPHWAHDNK25YZQ3D3		Q3		
	6500	SPHWAHDNK25YZP2D3	YZ	P2	D3	5948 ~
		SPHWAHDNK25YZP3D3		P3		

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2700	SPHWAHDNK27YZW1D3	YZ	W1	D3	4614 ~
	SPHWAHDNK27YZW2D3		W2		
3000	SPHWAHDNK27YZV1D3	YZ	V1	D3	4853 ~
	SPHWAHDNK27YZV2D3		V2		
3500	SPHWAHDNK27YZU1D3	YZ	U1	D3	4997 ~
	SPHWAHDNK27YZU2D3		U2		
4000	SPHWAHDNK27YZT1D3	YZ	T1	D3	5100 ~
	SPHWAHDNK27YZT2D3		T2		
5000	SPHWAHDNK27YZR2D3	YZ	R2	D3	5144 ~
	SPHWAHDNK27YZR3D3		R3		
5700	SPHWAHDNK27YZQ2D3	YZ	Q2	D3	5035 ~
	SPHWAHDNK27YZQ3D3		Q3		

※ LCo6oD(I_F = 1080 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWWAHDNL231ZY2D3	1Z	Y2	D3	7505 ~
		SPHWWAHDNL231ZY3D3		Y3		
	2700	SPHWWAHDNL231ZW2D3	1Z	W2	D3	7883 ~
		SPHWWAHDNL231ZW3D3		W3		
	3000	SPHWWAHDNL231ZV2D3	1Z	V2	D3	9042 ~
		SPHWWAHDNL231ZV3D3		V3		
	4000	SPHWWAHDNL231ZT2D3	1Z	T2	D3	9209 ~
		SPHWWAHDNL231ZT3D3		T3		
	5000	SPHWWAHDNL231ZR2D3	1Z	R2	D3	9377 ~
		SPHWWAHDNL231ZR3D3		R3		
	5700	SPHWWAHDNL231ZQ2D3	1Z	Q2	D3	9178 ~
		SPHWWAHDNL231ZQ3D3		Q3		
80	2700	SPHWWAHDNL251ZW1D3	1Z	W1	D3	7967 ~
		SPHWWAHDNL251ZW2D3		W2		
	3000	SPHWWAHDNL251ZV1D3	1Z	V1	D3	8372 ~
		SPHWWAHDNL251ZV2D3		V2		
	3500	SPHWWAHDNL251ZU1D3	1Z	U1	D3	8617 ~
		SPHWWAHDNL251ZU2D3		U2		
	4000	SPHWWAHDNL251ZT1D3	1Z	T1	D3	8790 ~
		SPHWWAHDNL251ZT2D3		T2		
	5000	SPHWWAHDNL251ZR2D3	1Z	R2	D3	8864 ~
		SPHWWAHDNL251ZR3D3		R3		
	5700	SPHWWAHDNL251ZQ2D3	1Z	Q2	D3	8864 ~
		SPHWWAHDNL251ZQ3D3		Q3		
	6500	SPHWWAHDNL251ZP2D3	1Z	P2	D3	8790 ~
		SPHWWAHDNL251ZP3D3		P3		

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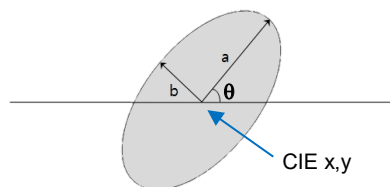
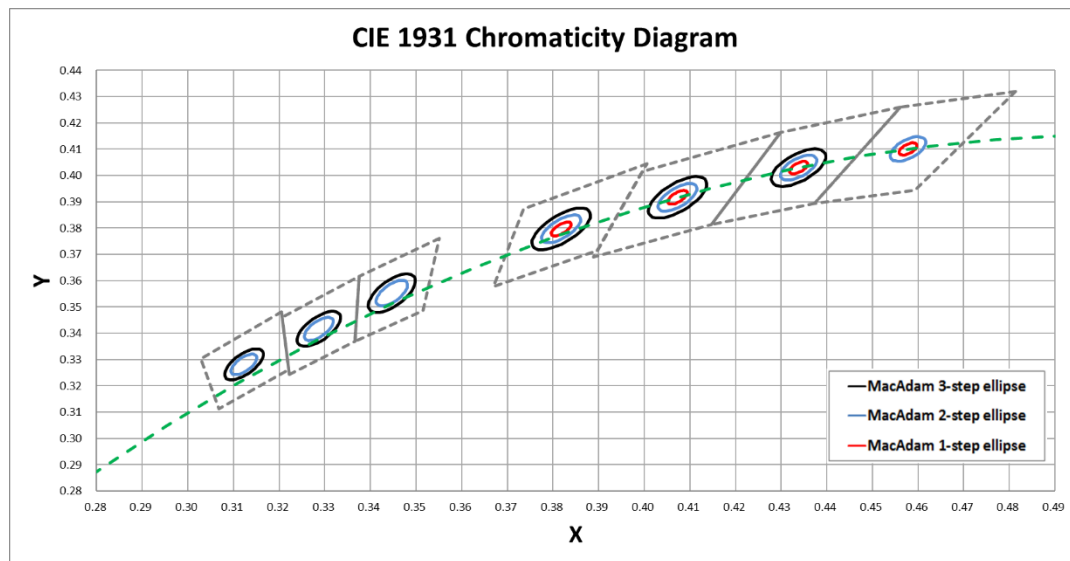
2700	SPHWWAHDNL271ZW1D3	1Z	W1	D3	6818 ~
	SPHWWAHDNL271ZW2D3		W2		
3000	SPHWWAHDNL271ZV1D3	1Z	V1	D3	7172 ~
	SPHWWAHDNL271ZV2D3		V2		
3500	SPHWWAHDNL271ZU1D3	1Z	U1	D3	7385 ~
	SPHWWAHDNL271ZU2D3		U2		
4000	SPHWWAHDNL271ZT1D3	1Z	T1	D3	7537 ~
	SPHWWAHDNL271ZT2D3		U2		
5000	SPHWWAHDNL271ZR2D3	1Z	R2	D3	7602 ~
	SPHWWAHDNL271ZR3D3		R3		
5700	SPHWWAHDNL271ZQ2D3	1Z	Q2	D3	7440 ~
	SPHWWAHDNL271ZQ3D3		Q3		

※ LCo8oD(I_F = 1620 mA, T_J = 85 °C)

CRI(R _a) Min.	Nominal CCT(K)	Product Code	V _F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ _v , lm)
70	2200	SPHWWAHDNM231ZY2D3	1Z	Y2	D3	10610 ~
		SPHWWAHDNM231ZY3D3		Y3		
	2700	SPHWWAHDNM231ZW2D3	1Z	W2	D3	12920 ~
		SPHWWAHDNM231ZW3D3		W3		
	3000	SPHWWAHDNM231ZV2D3	1Z	V2	D3	13409 ~
		SPHWWAHDNM231ZV3D3		V3		
	4000	SPHWWAHDNM231ZT2D3	1Z	T2	D3	13657 ~
		SPHWWAHDNM231ZT3D3		T3		
	5000	SPHWWAHDNM231ZR2D3	1Z	R2	D3	13906 ~
		SPHWWAHDNM231ZR3D3		R3		
	5700	SPHWWAHDNM231ZQ2D3	1Z	Q2	D3	13610 ~
		SPHWWAHDNM231ZQ3D3		Q3		
80	2700	SPHWWAHDNM251ZW1D3	1Z	W1	D3	11815 ~
		SPHWWAHDNM251ZW2D3		W2		
	3000	SPHWWAHDNM251ZV1D3	1Z	V1	D3	12416 ~
		SPHWWAHDNM251ZV2D3		V2		
	3500	SPHWWAHDNM251ZU1D3	1Z	U1	D3	12779 ~
		SPHWWAHDNM251ZU2D3		U2		
	4000	SPHWWAHDNM251ZT1D3	1Z	T1	D3	13035 ~
		SPHWWAHDNM251ZT2D3		T2		
	5000	SPHWWAHDNM251ZR2D3	1Z	R2	D3	13144 ~
		SPHWWAHDNM251ZR3D3		R3		
	5700	SPHWWAHDNM251ZQ2D3	1Z	Q2	D3	13144 ~
		SPHWWAHDNM251ZQ3D3		Q3		

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6500	SPHWWAHDNM251ZP2D3	1Z	P2	D3	13035 ~
	SPHWWAHDNM251ZP3D3		P3		
2700	SPHWWAHDNM271ZW1D3	1Z	W1	D3	10111 ~
	SPHWWAHDNM271ZW2D3		W2		
3000	SPHWWAHDNM271ZV1D3	1Z	V1	D3	10635 ~
	SPHWWAHDNM271ZV2D3		V2		
3500	SPHWWAHDNM271ZU1D3	1Z	U1	D3	10952 ~
	SPHWWAHDNM271ZU2D3		U2		
4000	SPHWWAHDNM271ZT1D3	1Z	T1	D3	11178 ~
	SPHWWAHDNM271ZT2D3		T2		
5000	SPHWWAHDNM271ZR2D3	1Z	R2	D3	11273 ~
	SPHWWAHDNM271ZR3D3		R3		
5700	SPHWWAHDNM271ZR2D3	1Z	Q2	D3	11034 ~
	SPHWWAHDNM271ZR3D3		Q3		

b) Chromaticity Region & Coordinates (I_F = Sorting Current, T_J = 85 °C)


MacAdam Ellipse (Y2, Y3)					
Step	CIE x	CIE y	θ	a	b
2-step	0.5018	0.4153	53.45	0.0048	0.0026
3-step	0.5018	0.4153	53.45	0.0072	0.004

MacAdam Ellipse (W1, W2)					
Step	CIE x	CIE y	θ	a	b
2-step	0.4578	0.4101	53.7	0.0027	0.0014
3-step	0.4578	0.4101	53.7	0.0054	0.0028

MacAdam Ellipse (V1, V2, V3)					
Step	CIE x	CIE y	θ	a	b
1-step	0.4338	0.403	53.22	0.0028	0.0014
2-step	0.4338	0.403	53.22	0.0056	0.0027
3-step	0.4338	0.403	53.22	0.0083	0.0041

MacAdam Ellipse (U1, U2, U3)					
Step	CIE x	CIE y	θ	a	b
1-step	0.4073	0.3917	54	0.0031	0.0014
2-step	0.4073	0.3917	54	0.0062	0.0028
3-step	0.4073	0.3917	54	0.0093	0.0041

MacAdam Ellipse (T1, T2, T3)					
Step	CIE x	CIE y	θ	a	b
1-step	0.3818	0.3797	53.72	0.0031	0.0013
2-step	0.3818	0.3797	53.72	0.0063	0.0027
3-step	0.3818	0.3797	53.72	0.0094	0.004

MacAdam Ellipse (R2, R3)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3447	0.3553	59.62	0.0055	0.0024
3-step	0.3447	0.3553	59.62	0.0082	0.0035

MacAdam Ellipse (Q2, Q3)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3287	0.3417	59.1	0.005	0.0021
3-step	0.3287	0.3417	59.1	0.0075	0.0032

MacAdam Ellipse (P2, P3)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3123	0.3282	58.57	0.0045	0.0019
3-step	0.3123	0.3282	58.57	0.0067	0.0029

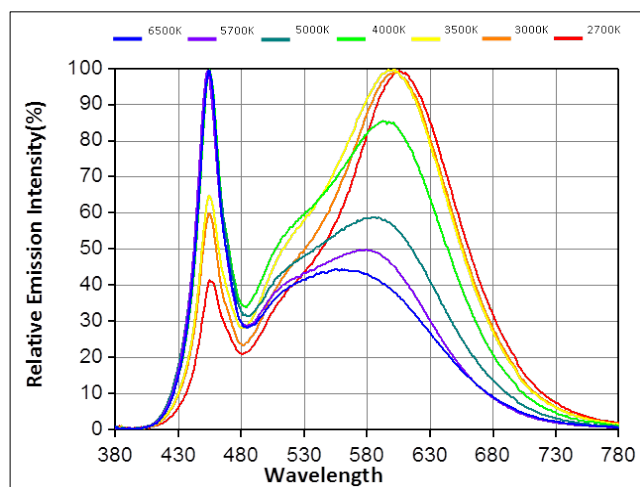
Note:

Samsung maintains measurement tolerance of: $C_x, C_y = \pm 0.005$

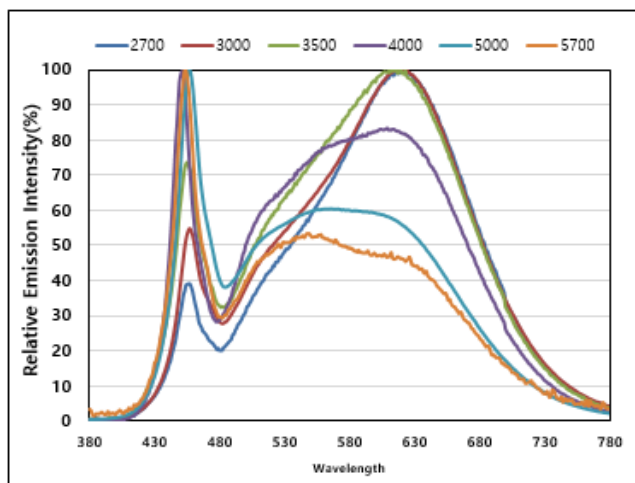
3. Typical Characteristics Graphs

a) Spectrum Distribution (I_f = Sorting Current, T_J = 85 °C)

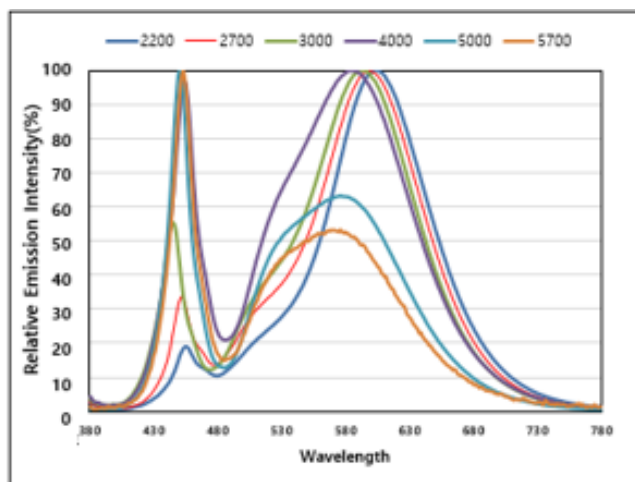
CRI Ra 80+



CRI Ra 90+

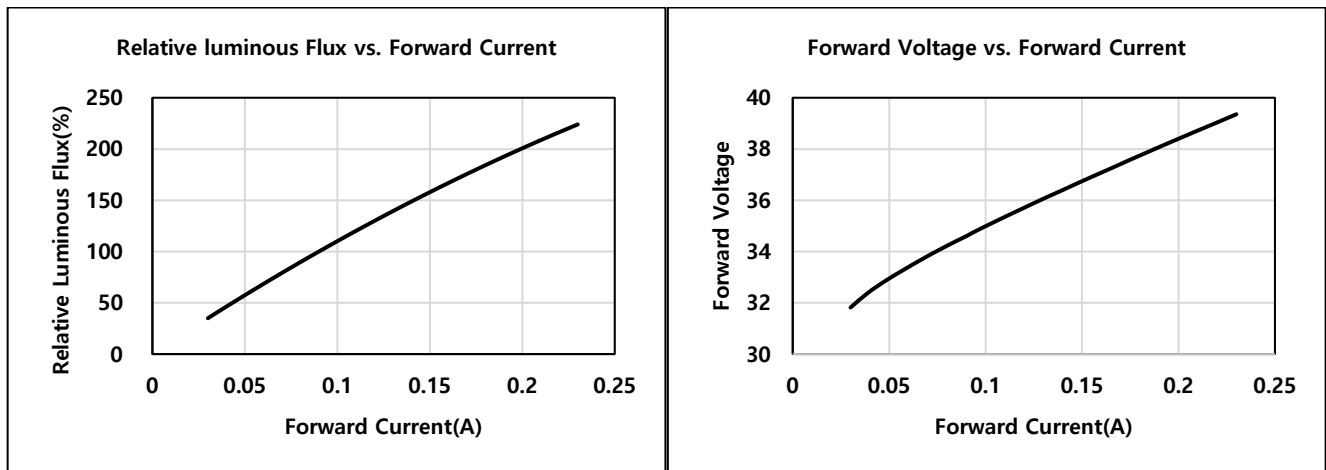


CRI Ra 70+

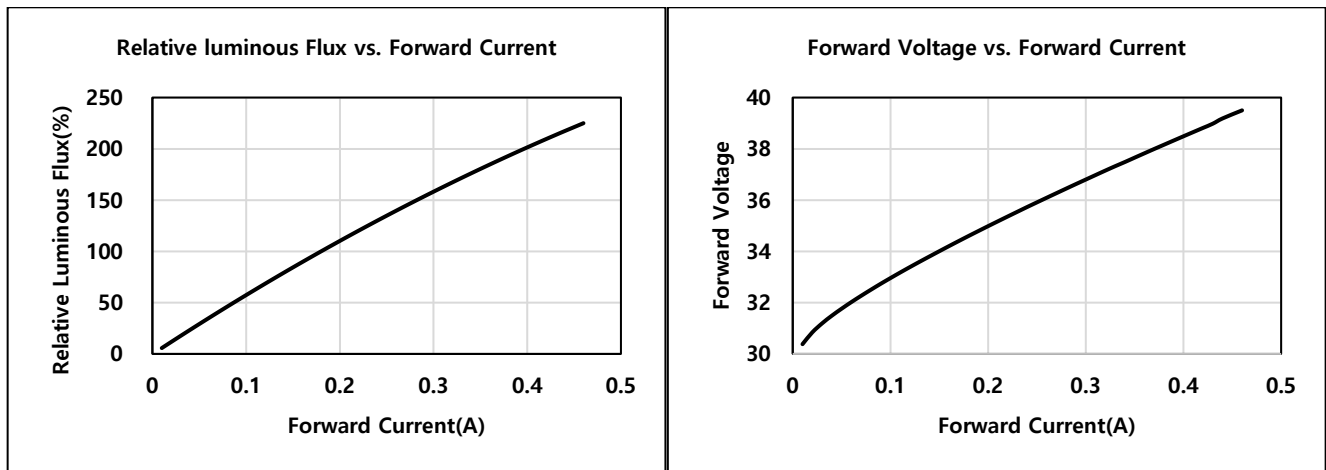


b) Forward Current Characteristics ($T_J = 85^\circ\text{C}$)

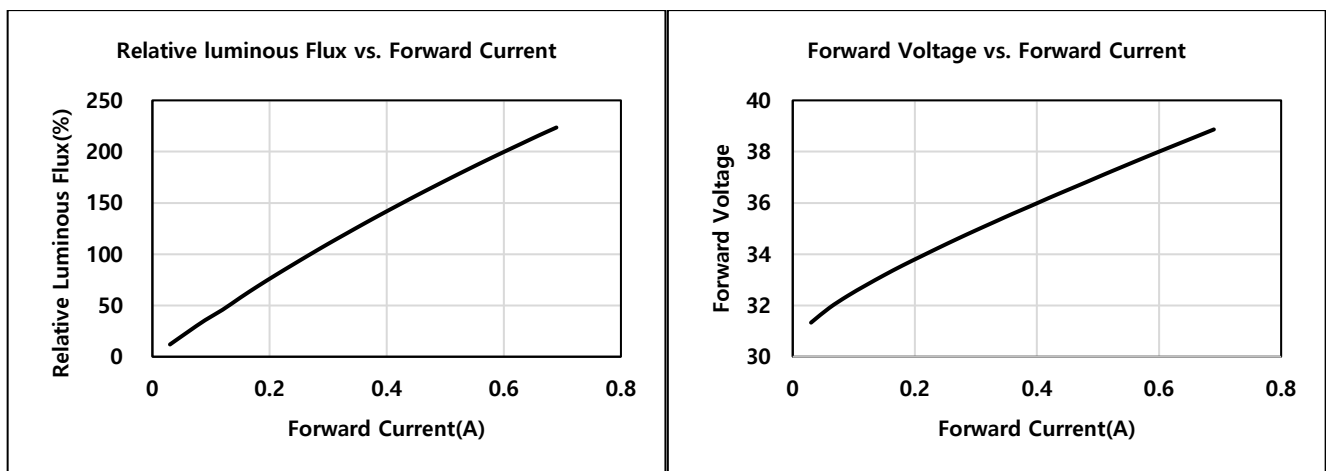
1) LC003D



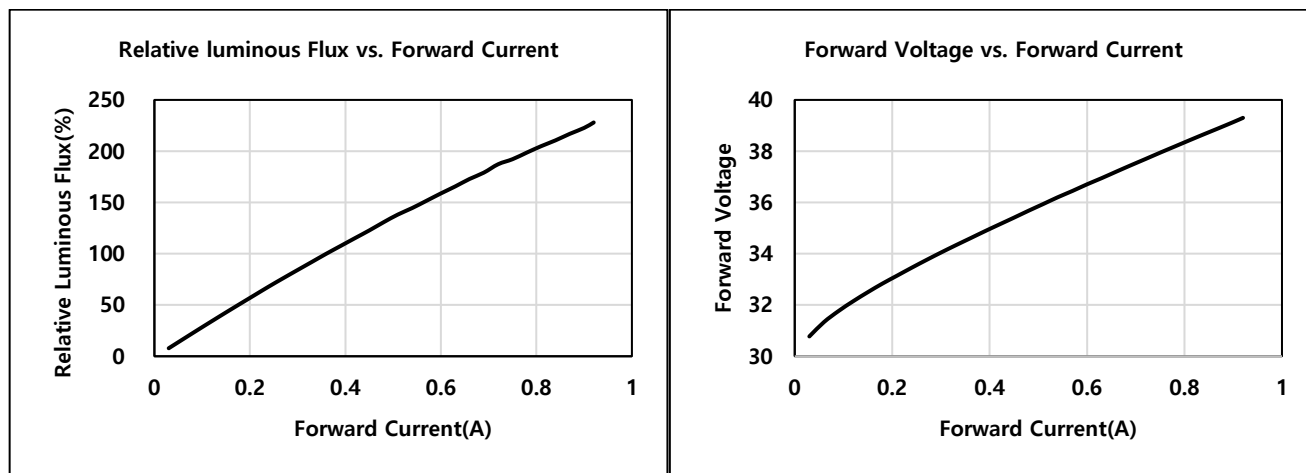
2) LC006D



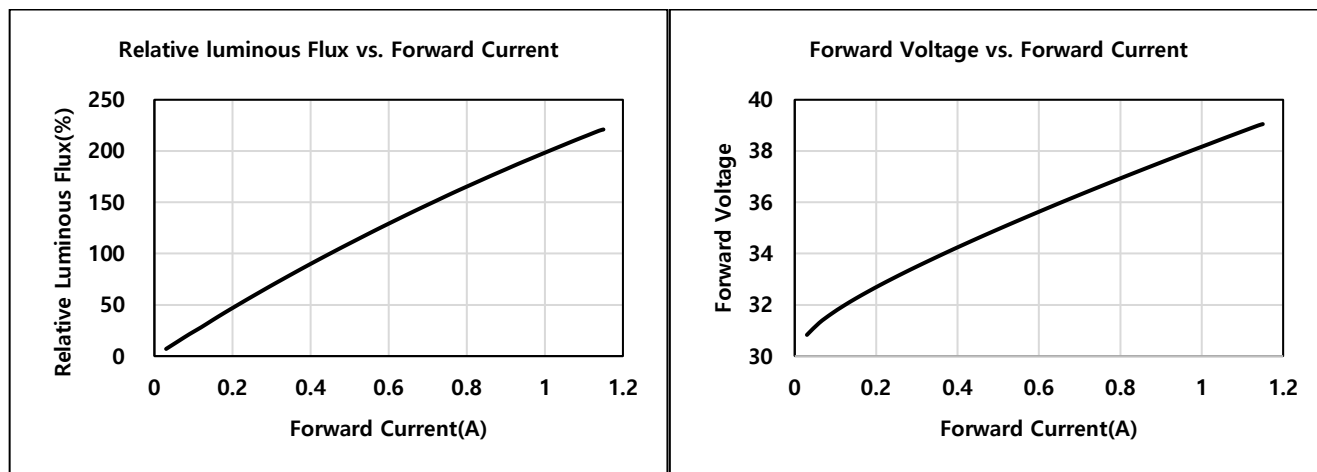
3) LC009D



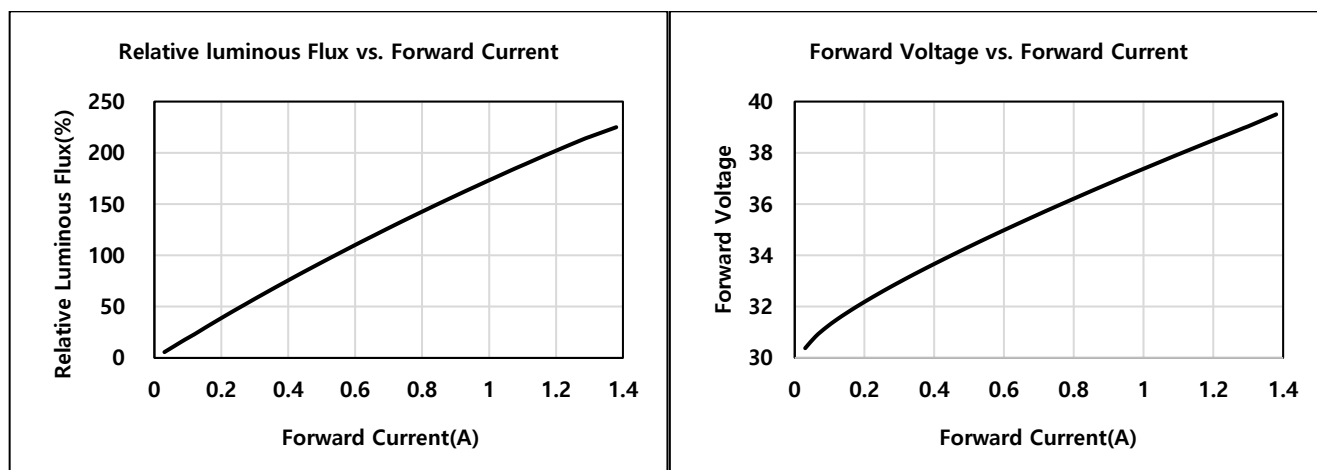
4) LC013D



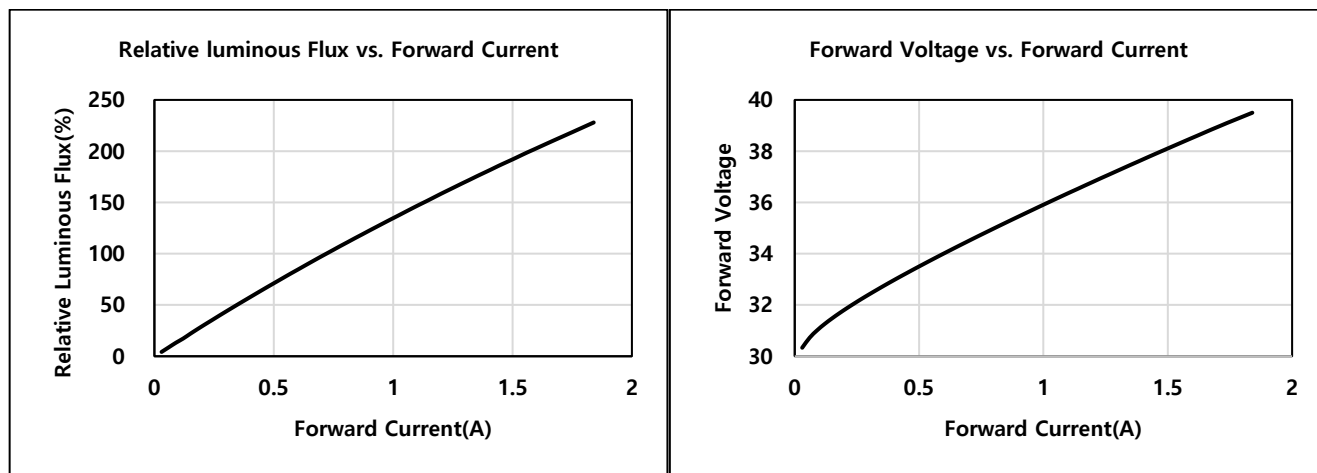
5) LC016D



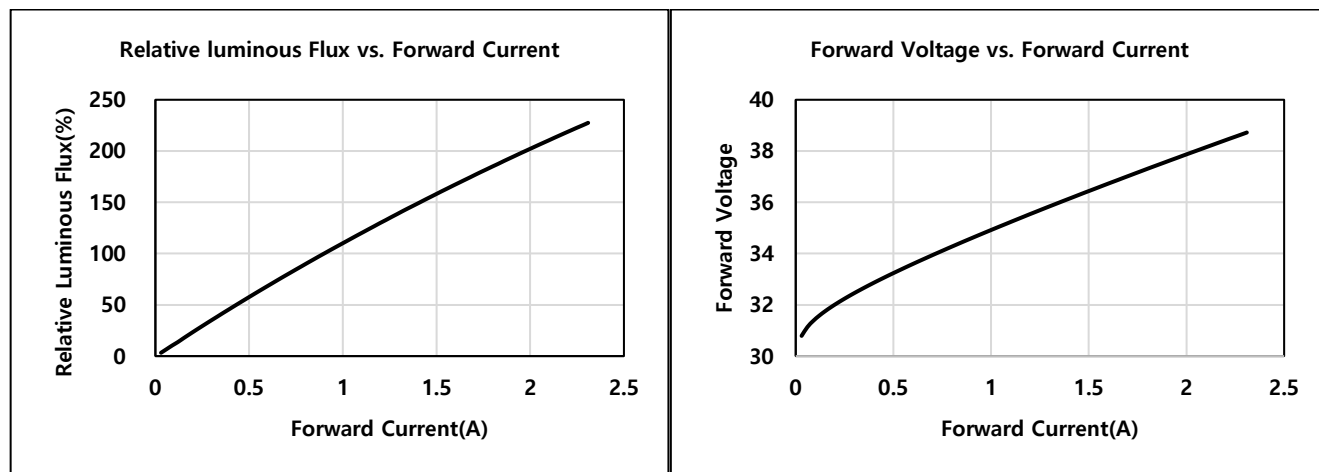
6) LC019D



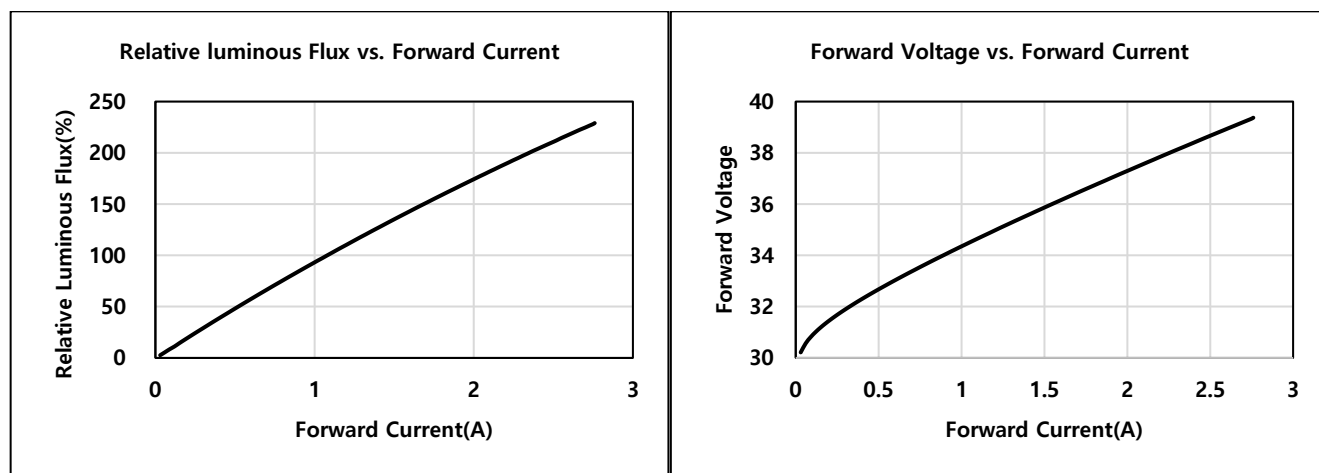
7) LC026D



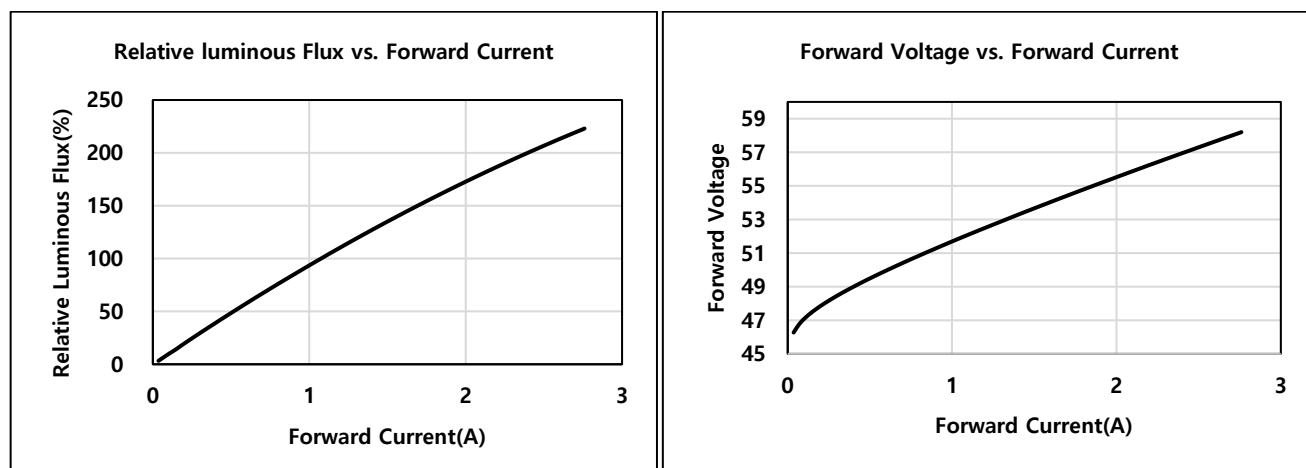
8) LC033D



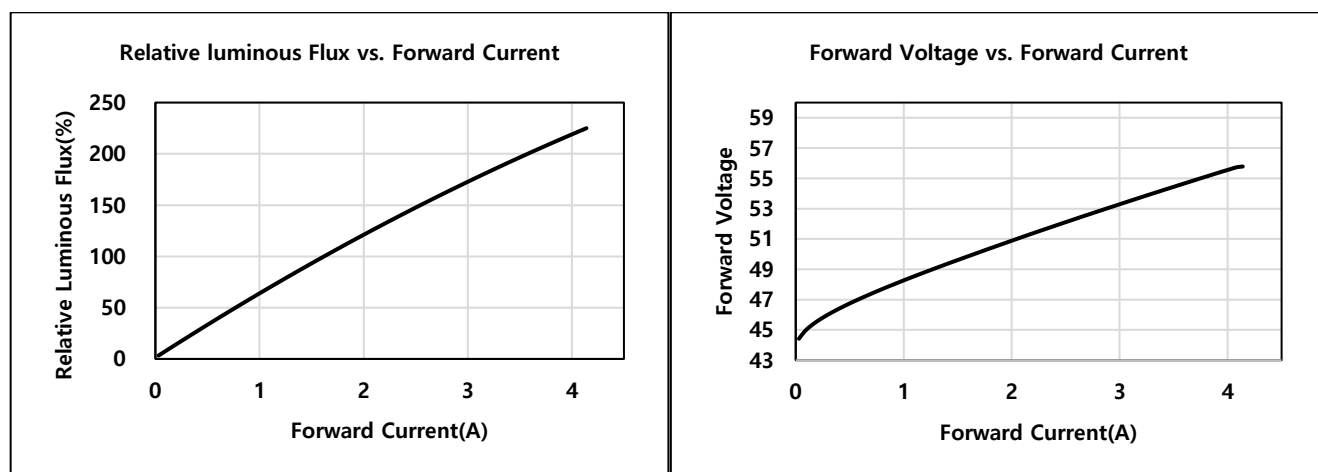
9) LC040D



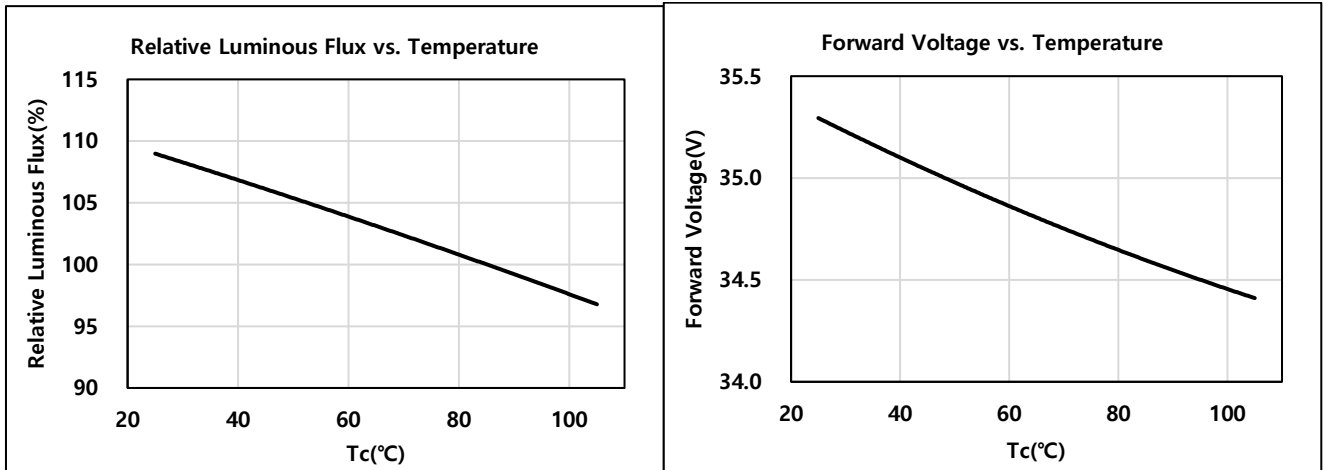
10) LC060D



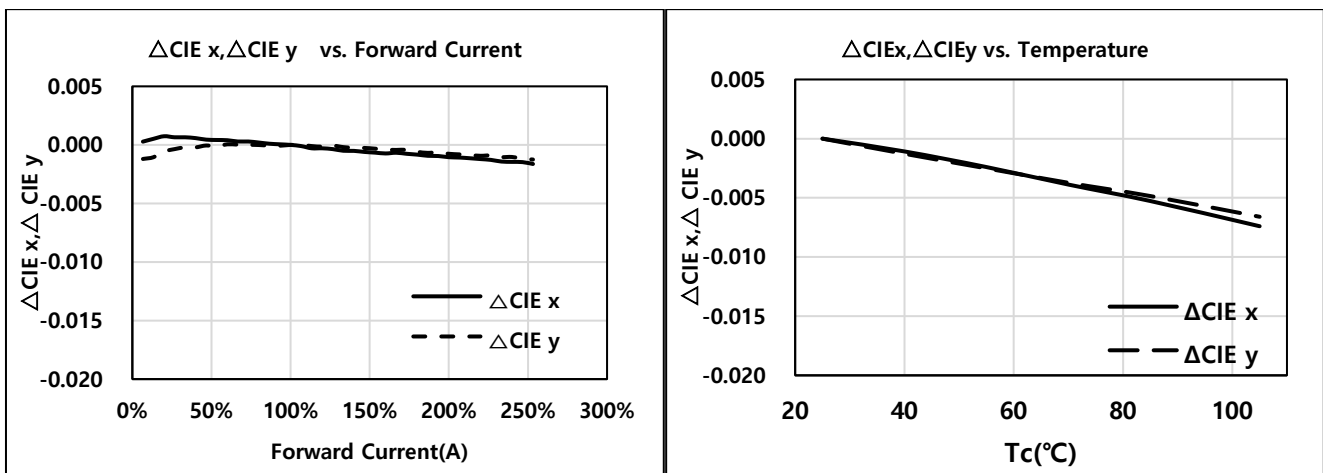
11) LC080D



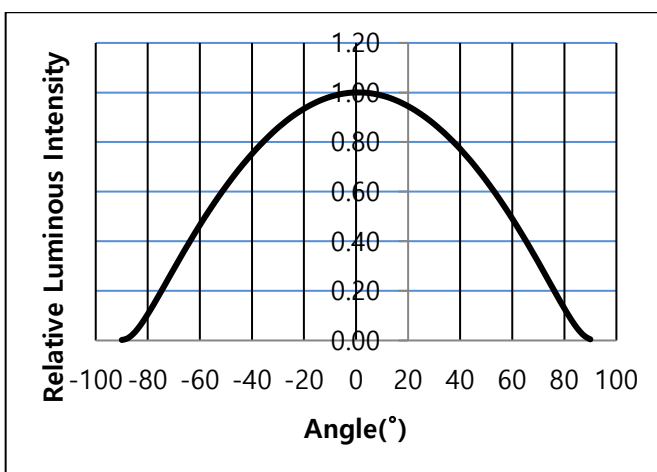
c) Temperature Characteristics (I_F = Sorting Current)



d) Color Shift Characteristics ($T_J = 85^{\circ}\text{C}$, I_F = Sorting Current, CRI = 80+)

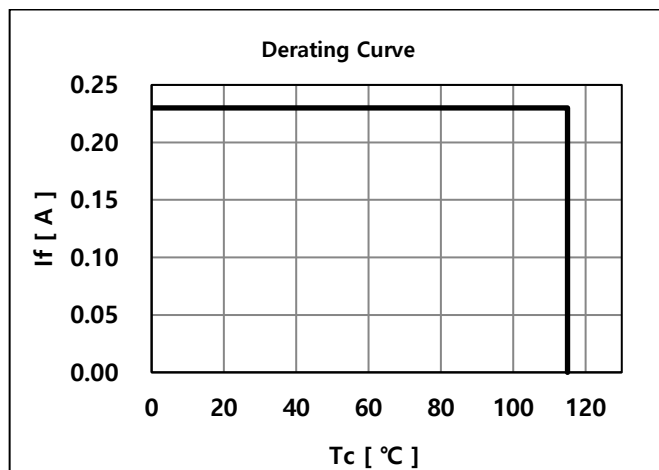


e) Beam Angle Characteristics (I_F = Sorting Current, $T_J = 85^{\circ}\text{C}$)

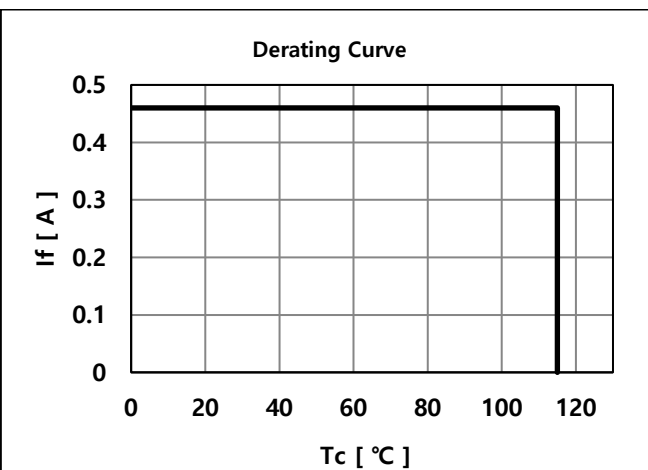


f) Derating Characteristics

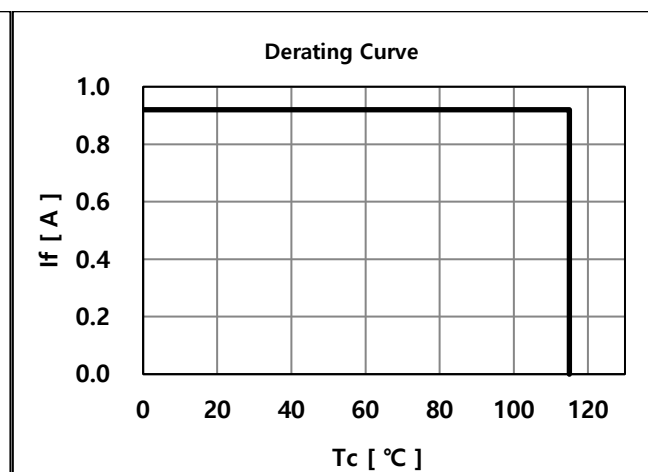
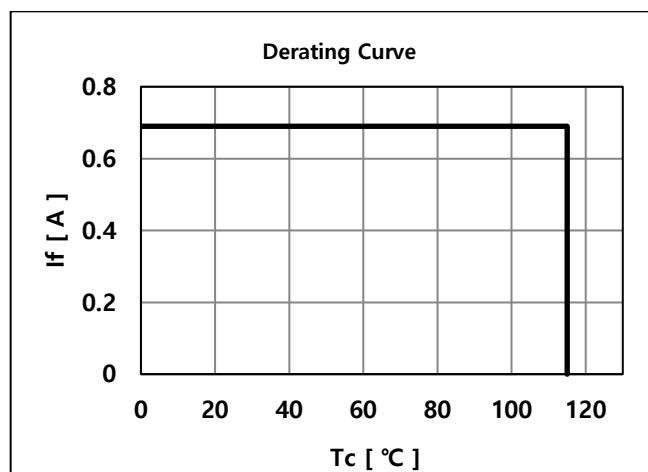
1) LC003D



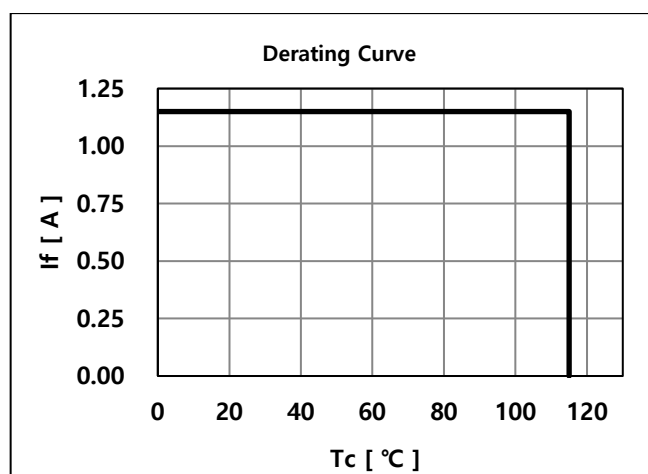
2) LC006D



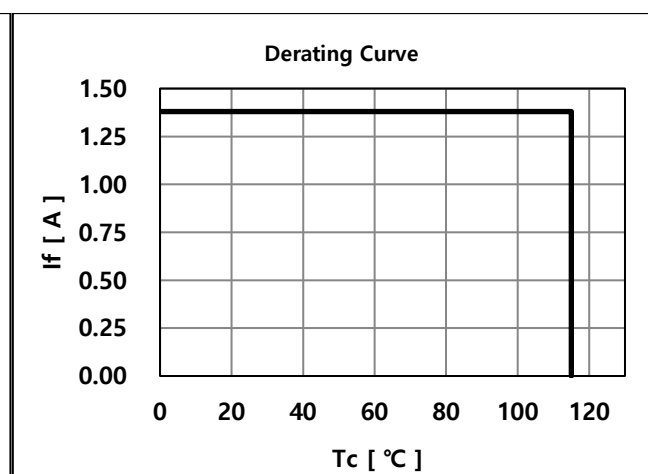
3) LC009D4) LC0013D



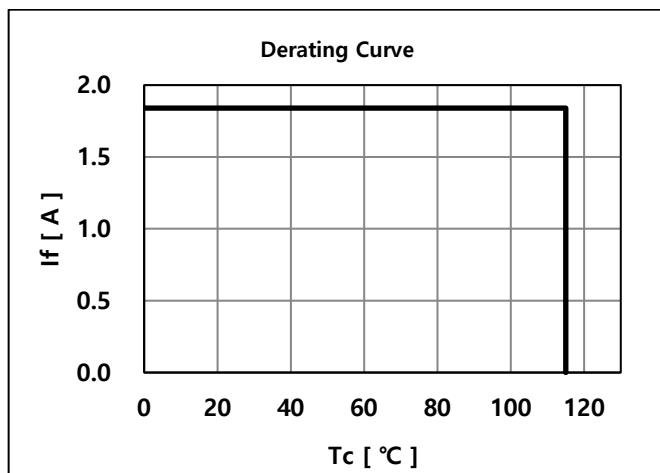
5) LC016D



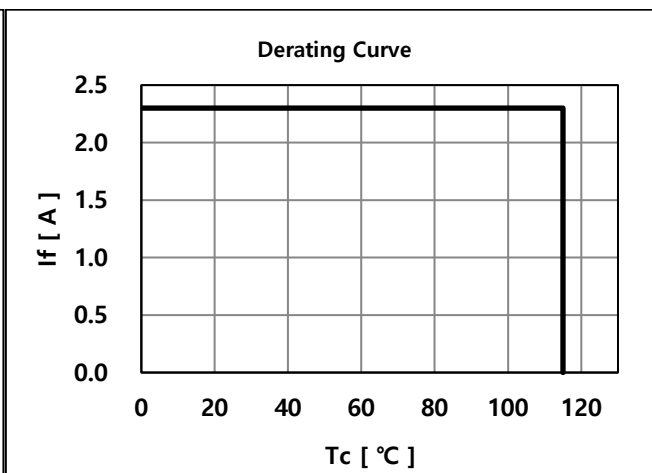
6) LC0019D



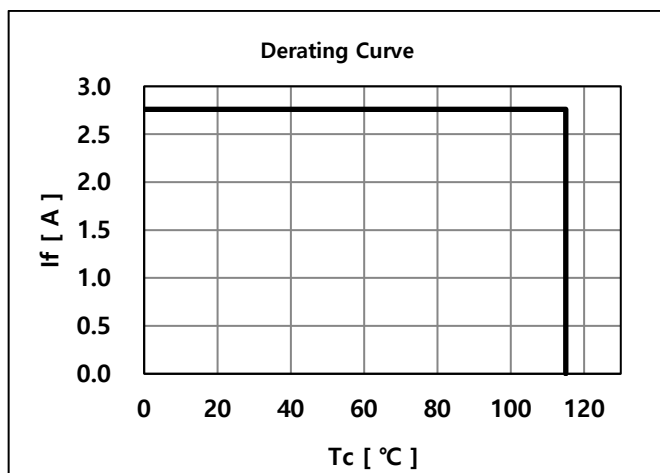
7) LC026D



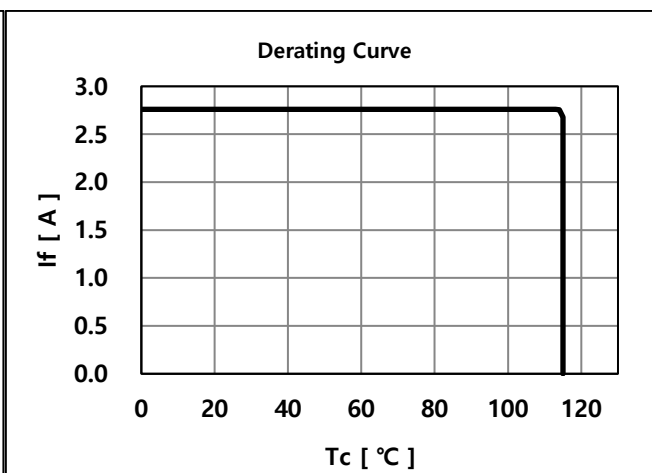
8) LC0033D



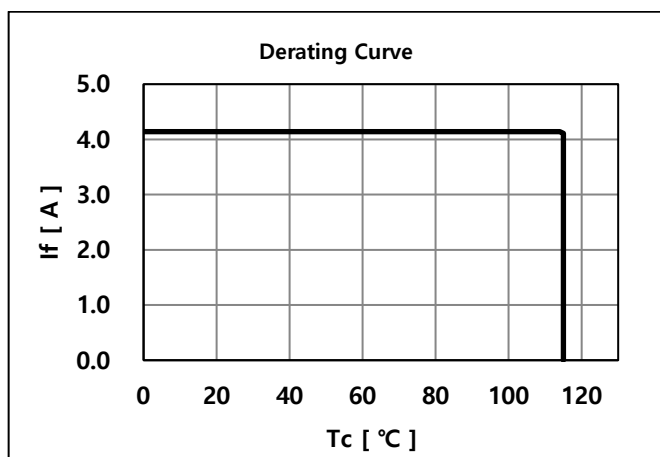
9) LC040D



10) LC060D

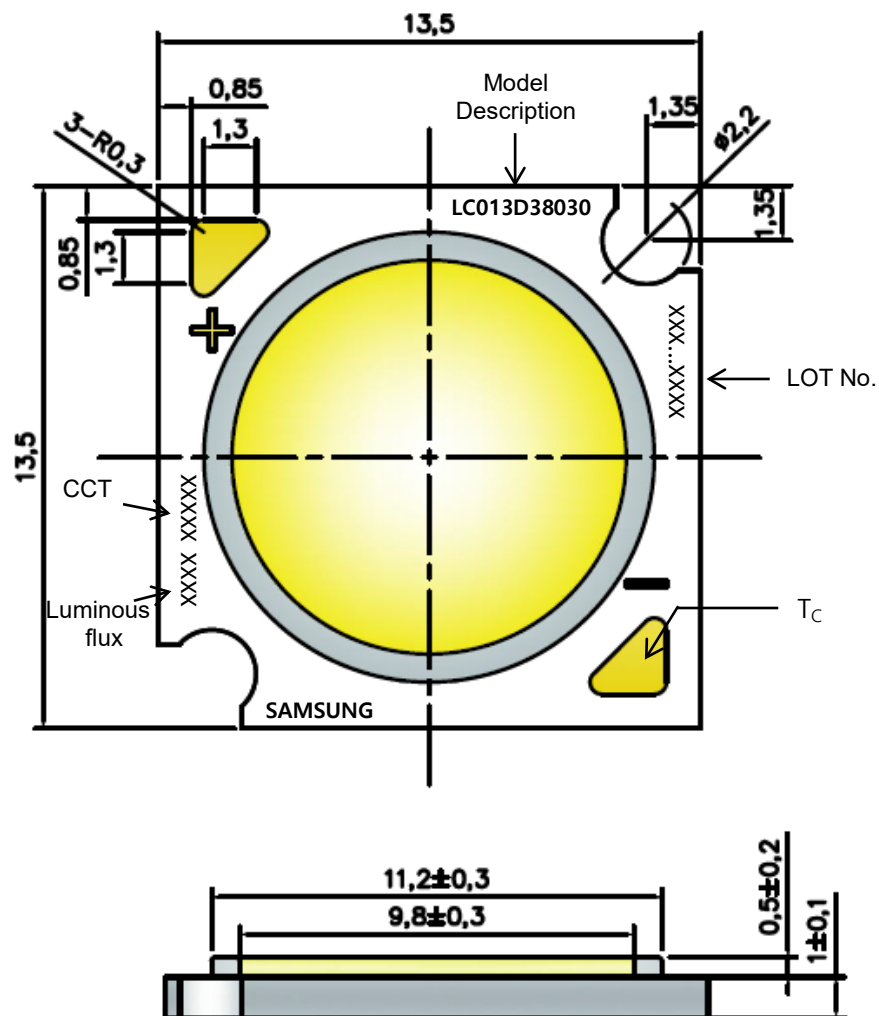


11) LC080D



4. Outline Drawing & Dimension

※ Model : LC003D, LC006D, LC009D, LC013D

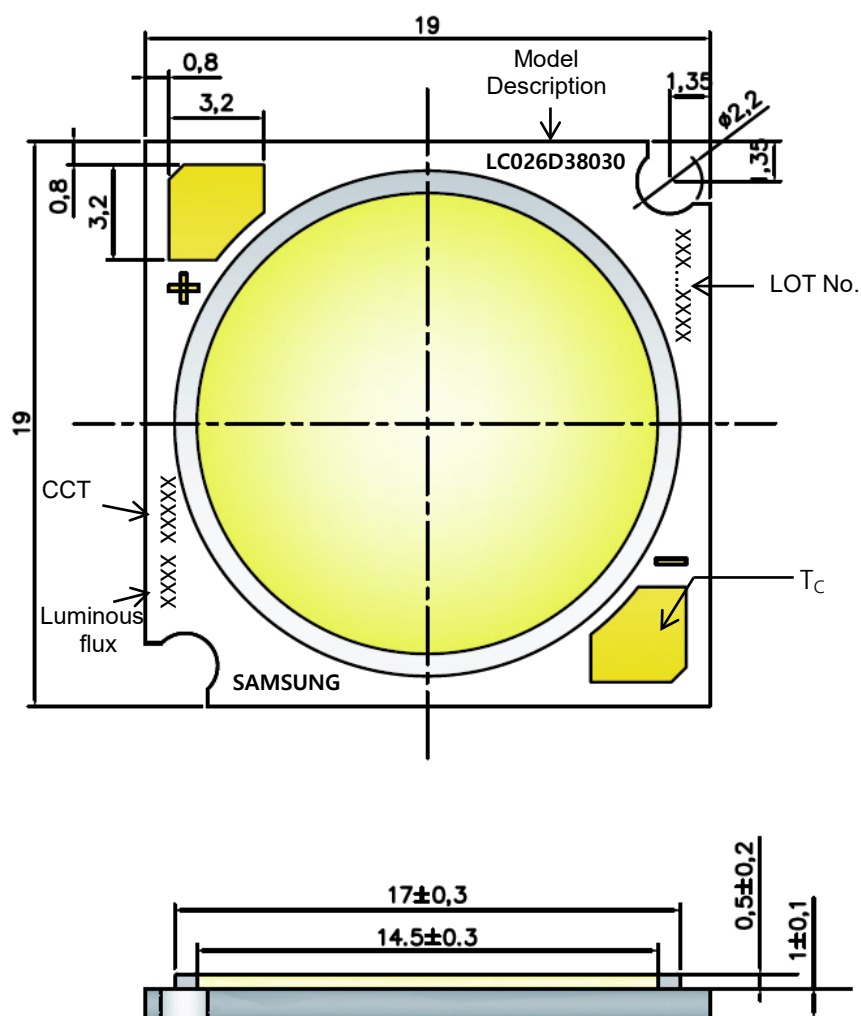


1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	13.5	±0.15	mm
Width	13.5	±0.15	mm
Height	Dam	±0.20	mm
	Substrate	±0.10	mm
LES Diameter	Light Emitting Surface	±0.30	mm

Note: Denoted product information above is only an example
(LC013D38030 :LC013D, Gen3, Ra80, 3000K)

※ Model : LC016D, LC019D, LC026D, LC033D

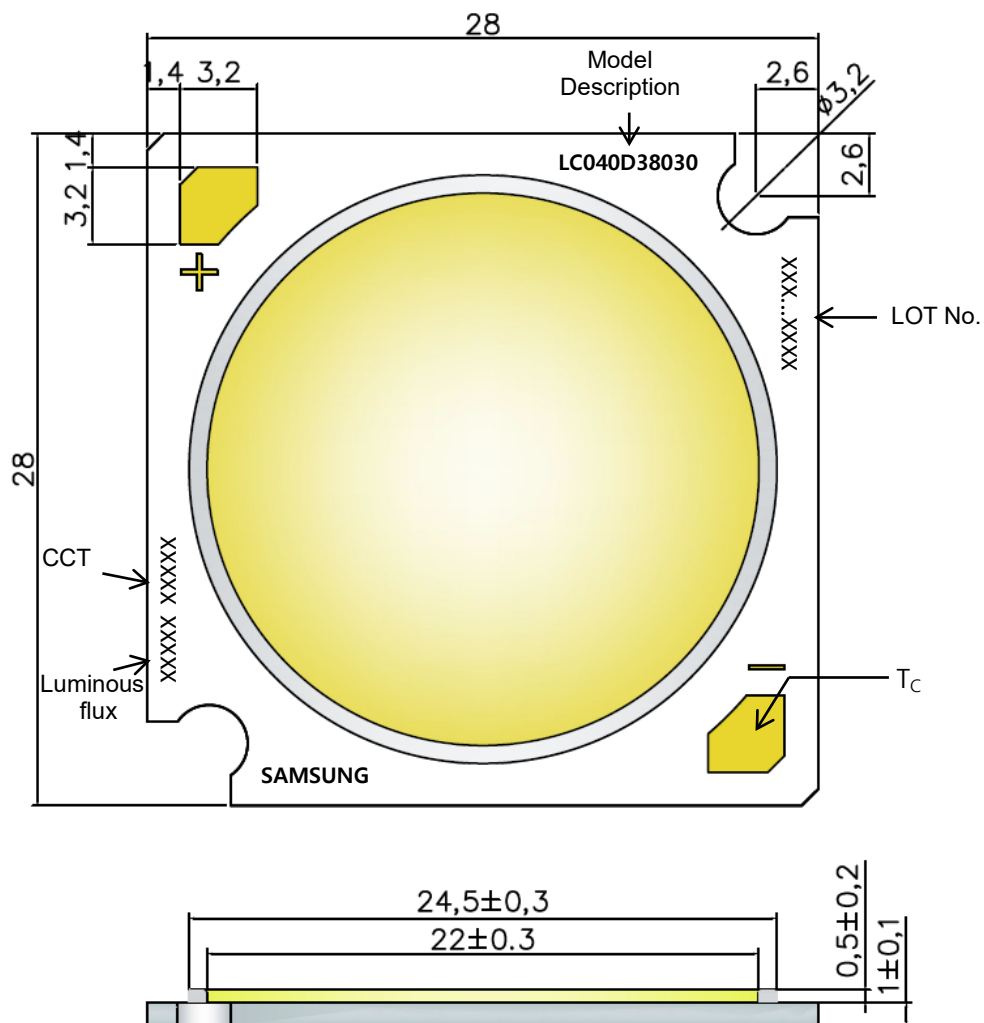


1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	19.0	±0.15	mm
Width	19.0	±0.15	mm
Height	Dam	0.5	±0.20
	Substrate	1.0	±0.10
LES Diameter	Light Emitting Surface	14.5	±0.30

Note: Denoted product information above is only an example
(LC026D38030 : LC026D, Gen3, CRI80+, 3000K)

※ Model : LC040D, LC060D, LC080D



1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	28.0	± 0.15	mm
Width	28.0	± 0.15	mm
Height	Dam	± 0.20	mm
	Substrate	± 0.10	mm
LES Diameter	Light Emitting Surface	± 0.30	mm

Note: Denoted product information above is only an example
(LC040D38030 : LC040D, Gen3, CRI80+, 3000K)

5. Reliability Test Items & Conditions

a) Test Items

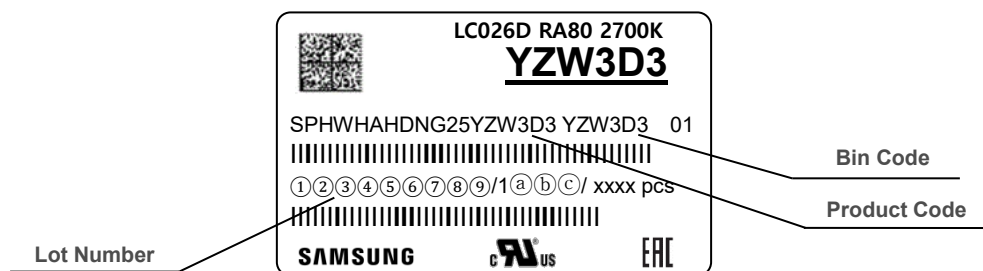
Test Item	Test Condition	Test Hour / Cycle
Wet High Temperature Operating Life Test (WHTOL)	60 °C, 90 % RH., DC Derating, I_F	1000 h
High Temperature Operating Life Test (HTOL)	85 °C, DC Derating, I_F	1000 h
Low Temperature Operating Life Test (LTOL)	-40 °C, DC, Derating I_F	1000 h
High Temperature Storage	110 °C	1000 h
Low Temperature Storage	-40 °C	1000 h
Wet High Temperature Storage Test	85°C, 85% RH	1000h
Temperature Cycling	-45 °C / 15min ~ 125 °C / 15min Temperature change within 5min	500 cycle
Powered Temperature Cycle (PTC)	-40 °C/ 85 °C each 10 min, 20 min transfer power on/off each 5 min, DC Derating, I_F = max	100 cycles
ESD (HBM)	R_1 : 10 M Ω R_2 : 1.5 k Ω C: 100 pF V: ± 2 kV	5 times
Vibrations Variable Frequency	20~ 80 Hz (displacement: 0.06 inch, max. 20 g) 80 ~ 2 kHz (max. 20 g) min. frequency $\leftrightarrow$ max. frequency 4 min transfer	4 times
Mechanical Shock Test	1500g, 0.5 ms each of the 6 surfaces (3 axis x 2 sides)	5 times
Hydrogen Sulphide(H ₂ S)	25 °C 75%R.H. H ₂ S concentration 15ppm	504h

b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T _c = 25 °C)	Limit	
			Min.	Max.
Forward Voltage	V _F	I_F = Sorting Current	L.S.L. * 0.9	U.S.L. * 1.1
Luminous Flux	Φ_v	I_F = Sorting Current	L.S.L. * 0.7	U.S.L. * 1.3

6. Label Structure

a) Label Structure



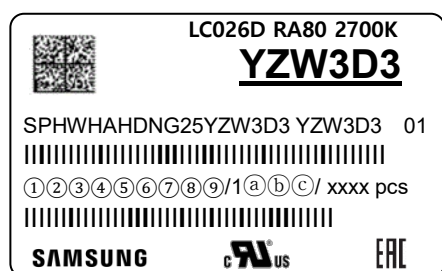
Note: Denoted bincode and product code above is only an example (see description on page 5)

Bin Code:

- ①②: Forward Voltage bin (refer to page 9)
- ③④: Chromaticity bin (refer to page 21)
- ⑤⑥: Luminous Flux bin (refer to page 5-8)

b) Lot Number

The lot number is composed of the following characters:



① ③④⑤⑥⑦⑧⑨ / 1(a)(b)(c) / xxxx pcs

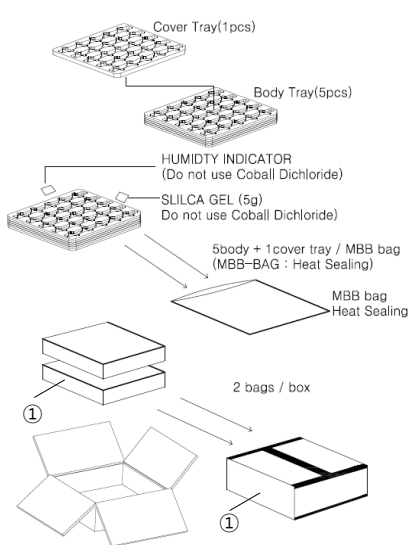
- ① : Production site (S: Giheung, Korea, G: Tianjin, China)
- ② : 4(LED)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (F: 2021, G: 2022, H: 2023...)
- ⑤ : Month (1~9, A, B, C)
- ⑥⑦⑧⑨ : Day (1~9, A, B~V)
- ①②③ : Product serial number (001 ~ 999)

7. Packing Structure

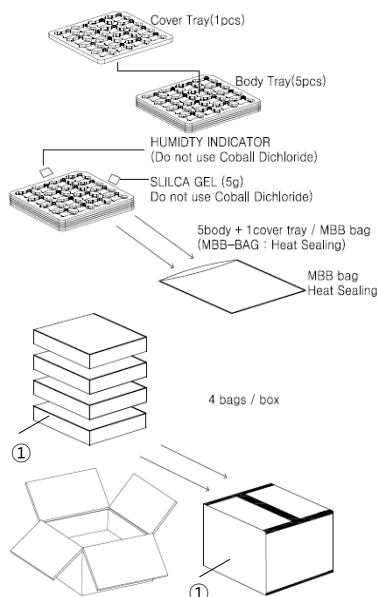
※ Model : L003D, LC006D, LC009D, LC013D

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	50	200	200	8	1
Anti-Static Bag	250 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	500 (2 bags)	225	225	65	5
Outer Box (Middle)	1000 (4 bags)	225	225	130	5

a) Packing Structure



※ Small Box



※ Middle Box



[MBB BAG drawing]



① Side Label



LC013D RA80 2700K
YZW3D3

SPHWAHDND25YZW3D3 YZW3D3 01

|||||

G4AZC4001/1001/ xxxx pcs

|||||

SAMSUNG  

(1P) Supplier Part Number : SPHWAHDND25YZW3D3



(Q) Quantity : XXXX



(33P) Bin Code / YZW3D3



(100) Data Code : 2109



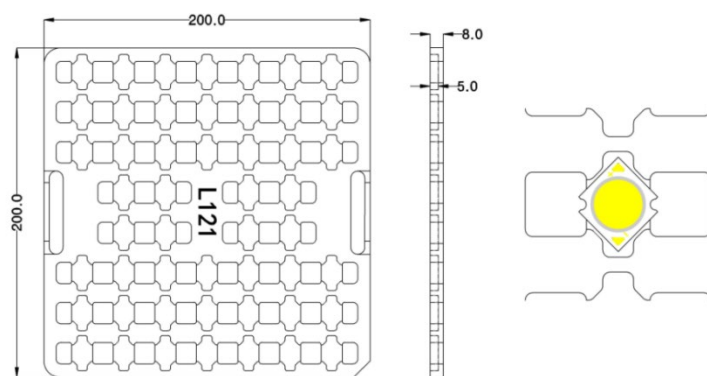
(1T) Lot Number / 1001



(4L) Country of Origin : CN



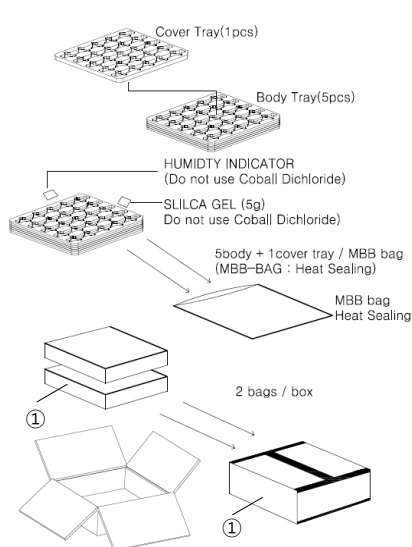
b) Tray



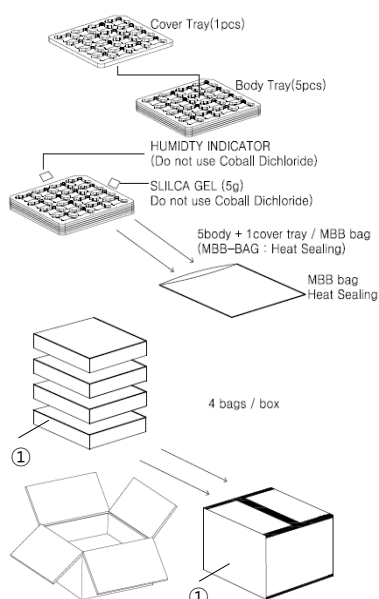
※ Model : LC016D, LC019D, LC026D, LC033D

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	25	200	200	8	1
Anti-Static Bag	125 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	250 (2 bags)	225	225	65	5
Outer Box (Middle)	500 (4 bags)	225	225	130	5

a) Packing Structure



※ Small Box



※ Middle Box

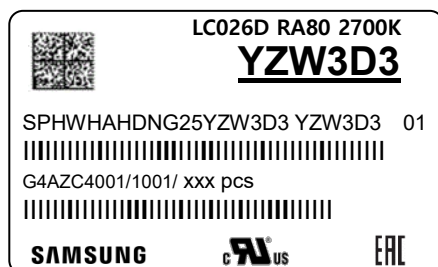


[MBB BAG drawing]



[SILICA GEL (5g)]

① Side Label



(1P) Supplier Part Number : SPHWHADNG25YZW3D3



(Q) Quantity : XXX



(33P) Bin Code / YZW3D3



(100) Data Code : 2109



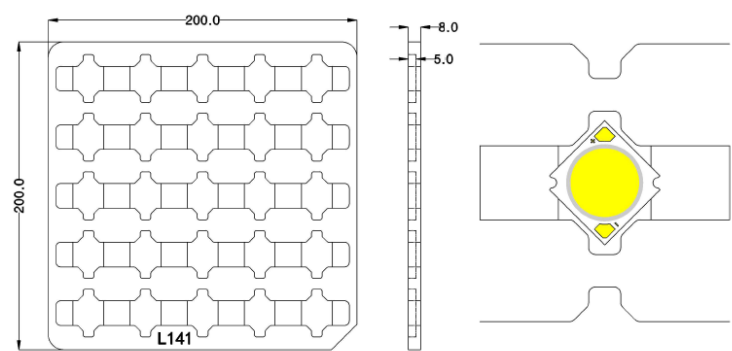
(1T) Lot Number / 1001



(4L) Country of Origin : CN



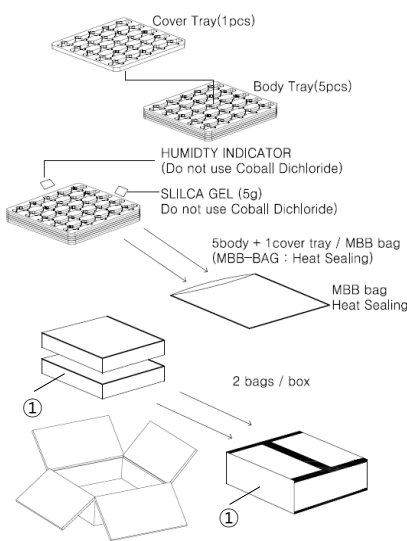
b) Tray



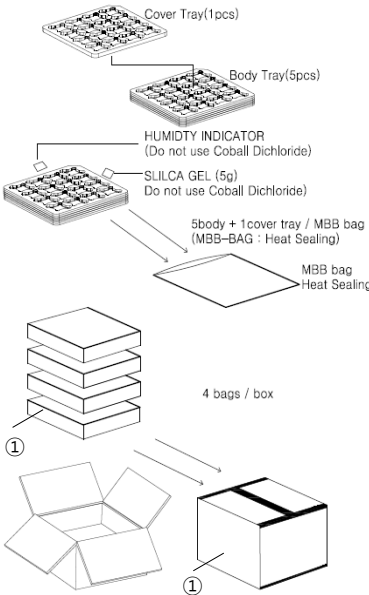
※ Model : LC040D, LC060D, LC080D

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	16	200	200	8	1
Anti-Static Bag	80 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	160 (2 bags)	225	225	65	5
Outer Box (Middle)	320 (4 bags)	225	225	130	5

a) Packing Structure



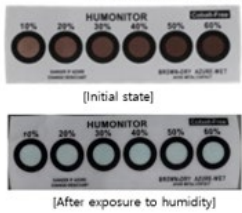
※ Small Box



※ Middle Box



[MBB BAG drawing]

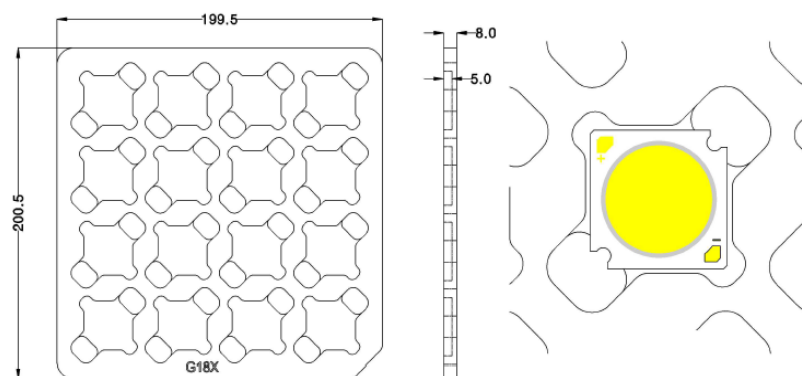


① Side Label



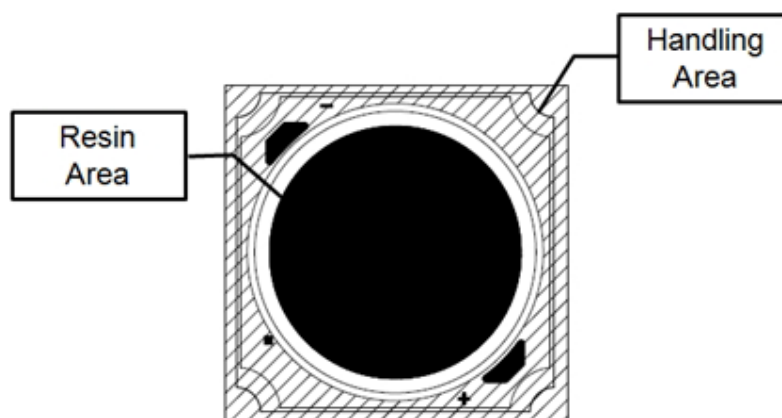
(1P) Supplier Part Number : SPHWAHDNK25YZW3D3	(Q) Quantity : XXX
(33P) Bin Code / YZW3D3	(100) Data Code : 2109
(1T) Lot Number / 1001	(4L) Country of Origin : CN

b) Tray



8. Precautions in Handling & Use

- 1) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. Some solvent-based cleaning agent may damage the silicone resins used in the device.
- 2) LEDs must be stored in a clean environment. Shelf life of sealed bags is 12 months at temperature 0~40 °C, 0~90 % RH.
- 3) After storage bag is opened, device subjected to soldering (wiring), 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, or
 - b. Stored at <10 % RH
- 4) Repack unused products with anti-moisture packing, fold to close any opening and then store in a dry place.
- 5) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 °C.
- 6) Devices must be baked for 1 hour at 60 ± 5 °C, if baking is required.
- 7) The LEDs are sensitive to the static electricity and surge current. 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 leakage current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.
- 8) The thermal management is one of the most critical factors for the LED lighting system. Especially the LED junction temperature should not exceed the absolute maximum rating while operation of LED lighting system.
For more information, please refer to Application Note 'Mechanical & Thermal Guide for COB'.
- 9) In case of driving LEDs around the minimum current level (I_{f_min}), chips might exhibit different brightness due to the variation in I-V characteristics of each one. This is normal and does not adversely affect the performance of product.
- 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 to 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. In order to prevent these problems, we recommend users to know the physical properties of materials used in luminaires and they must be carefully selected.
- 11) The resin area is very sensitive, please do not handle, press, touch, rub, clean, or pick by with tweezers on it. Instead, please pick at the handling area as indicated below.
- 12) The LED from Samsung uses an Aluminum MCPCB with Ag thin layer 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 Al-MCPCB may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of Al-MCPCB, LED should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.



Legal and additional information.

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We are also leading in the Internet of Things space through, among others, our Digital Health and Smart Home initiatives. We employ 307,000 people across 84 countries. To discover more, please visit our official website at www.samsung.com and our official blog at global.samsungtomorrow.com.

Samsung provides limited warranty for its LED products, the full text of which is available at <https://www.samsung.com/led/support/warranties>.

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Yongin-si, Gyeonggi-do, 446-711

KOREA

www.samsung.com/led

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