High Voltage LED Series
Chip on Board

COB D-Gen.2 Plus

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

Table of Contents

1.	Characteristics	----------	3
2.	Product Code Information	----------	11
3.	Typical Characteristics Graphs	----------	34
4.	Outline Drawing & Dimension	----------	42
5.	Reliability Test Items & Conditions	----------	45
6.	Label Structure	----------	46
7.	Packing structure	----------	47
8.	Precautions in Handling & Use	----------	53

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Model	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-	-40 ~ +105	ºC	-
Storage Temperature	T_{stg}	-	-40 ~ +120	ºC	-
LED Junction Temperature	T_J	-	150	ºC	-
Case Temperature	Tc	-	115	ºC	-
Forward Current / Power Dissipation	I_F / P_D	LC003D	180 / 6.6, 360 / 6.6	mA / W	-
		LC006D	360 / 13.3		-
		LC009D	540 / 19.9		-
		LC013D	720 / 26.6		-
		LC016D	900 / 33.2		-
		LC019D	1080 / 39.9		-
		LC026D	1440 / 53.1		-
		LC033D	1800 / 66.4		-
		LC040D	2160 / 79.7		-
		LC060D	2160 / 119.4		-
		LC080D	3240 / 179.2		-
ESD (HBM)	-	-	±2	kV	-

b) Electro-optical Characteristics (I_F = Sorting Current, T_J = 85 ºC)

Item	Unit	Model	Rank	Min.	Typ.	Max.
Forward Voltage (V_F)	V	All model	WJ	15.6	17.0	18.5
			YZ	31.2	34.0	36.9
			1Z	46.9	51.1	55.3
Color Rendering Index (R_a)	-	All model	3	70	-	-
			5	80	-	-
			7	90	-	-
Beam Angle	°	-	-	-	115	-
Nominal Power / Sorting Current	W / mA	LC003D	-	-	3.1 / 90 3.1 / 180	-
		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	-	-	55.2 / 1080	-
		LC080D	-	-	82.8 / 1620	-
Thermal Resistance (Junction to chip case)	℃/W	LC003D	-	-	2.56	-
		LC006D	-	-	1.48	-
		LC009D	-	-	0.99	-
		LC013D	-	-	0.85	-
		LC016D	-	-	0.67	-
		LC019D	-	-	0.6	-
		LC026D	-	-	0.47	-
		LC033D	-	-	0.4	-
		LC040D	-	-	0.32	-
		LC060D	-	-	0.24	-
		LC080D	-	-	0.16	-

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 °C)
2) Samsungmaintains measurement tolerance of: forward voltage = ±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.
LC003DB	80	2700	DB	440	468	-
		3000	DB	456	485	-
		3500	DB	471	501	-
		4000	DB	479	510	-
		5000	DB	485	516	-
		5700	DB	485	516	-
		6500	DB	479	510	-
	90	2700	DB	368	392	-
		3000	DB	385	410	-
		3500	DB	398	423	-
		4000	DB	406	432	-
		5000	DB	414	440	-
LC006DB	80	2700	DB	873	928	-
		3000	DB	913	971	-
		3500	DB	941	1001	-
		4000	DB	963	1024	-
		5000	DB	959	1020	-
		5700	DB	949	1010	-
		6500	DB	948	1008	-
	90	2700	DB	739	786	-
		3000	DB	775	824	-
		3500	DB	801	853	-
		4000	DB	818	870	-
		5000	DB	825	878	-

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) Samsungmaintains 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.
LC009DB	70	3000	DB	1455	1548	-
		4000	DB	1496	1591	-
		5000	DB	1529	1626	-
	80	2700	DB	1299	1382	-
		3000	DB	1340	1425	-
		3500	DB	1378	1466	-
		4000	DB	1412	1502	-
		5000	DB	1423	1513	-
		5700	DB	1423	1513	-
		6500	DB	1406	1496	-
	90	2700	DB	1088	1158	-
		3000	DB	1139	1212	-
		3500	DB	1182	1257	-
		4000	DB	1208	1285	-
		5000	DB	1226	1304	-
LC013DB	70	3000	DB	1885	2006	-
		4000	DB	1946	2070	-
		5000	DB	1936	2060	-
	80	2700	DB	1667	1773	-
		3000	DB	1746	1857	-
		3500	DB	1764	1877	
		4000	DB	1815	1930	-
		5000	DB	1822	1938	-
		5700	DB	1812	1928	-
		6500	DB	1804	1919	-
	90	2700	DB	1397	1486	-
		3000	DB	1463	1556	-
		3500	DB	1537	1635	-
		4000	DB	1570	1670	-
		5000	DB	1574	1674	-

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) Samsungmaintains 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.
LC016DB	70	3000	DB	2460	2617	-
		4000	DB	2513	2674	-
		5000	DB	2526	2688	-
	80	2700	DB	2167	2305	-
		3000	DB	2255	2399	-
		3500	DB	2315	2463	-
		4000	DB	2369	2520	-
		5000	DB	2377	2529	-
		5700	DB	2377	2529	-
		6500	DB	2357	2507	-
	90	2700	DB	1669	1776	-
		3000	DB	1867	1986	-
		3500	DB	1969	2094	-
		4000	DB	2027	2156	-
		5000	DB	2068	2200	-
LC019DB	70	3000	DB	2921	3107	-
		4000	DB	3014	3207	-
		5000	DB	3000	3191	-
	80	2700	DB	2577	2742	-
		3000	DB	2704	2877	-
		3500	DB	2746	2921	-
		4000	DB	2816	2996	-
		5000	DB	2832	3013	-
		5700	DB	2818	2998	-
		6500	DB	2788	2966	-
	90	2700	DB	2163	2301	-
		3000	DB	2268	2413	-
		3500	DB	2375	2526	-
		4000	DB	2426	2581	-
		5000	DB	2441	2596	-

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) Samsungmaintains 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.
LC026DB	70	3000	DB	3819	4063	-
		4000	DB	3941	4193	-
		5000	DB	3942	4194	-
	80	2700	DB	3399	3616	-
		3000	DB	3536	3762	-
		3500	DB	3640	3872	-
		4000	DB	3713	3950	-
		5000	DB	3744	3983	-
		5700	DB	3706	3943	-
		6500	DB	3694	3930	-
	90	2700	DB	2865	3048	-
		3000	DB	2999	3190	-
		3500	DB	3119	3319	-
		4000	DB	3184	3387	-
		5000	DB	3227	3433	-
LC033DB	70	3000	DB	4713	5014	-
		4000	DB	4865	5175	-
		5000	DB	4890	5202	-
	80	2700	DB	4195	4462	-
		3000	DB	4364	4643	-
		3500	DB	4492	4779	-
		4000	DB	4582	4875	-
		5000	DB	4621	4916	-
		5700	DB	4598	4891	-
		6500	DB	4582	4875	-
	90	2700	DB	3554	3781	-
		3000	DB	3739	3977	-
		3500	DB	3850	4096	-
		4000	DB	3929	4180	-
		5000	DB	3983	4237	-

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) Samsungmaintains 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.
LC040DB	70	3000	DB	5926	6304	-
		4000	DB	6115	6506	-
		5000	DB	6086	6474	-
	80	2700	DB	5241	5575	-
		3000	DB	5487	5837	-
		3500	DB	5570	5925	-
		4000	DB	5719	6084	-
		5000	DB	5746	6113	-
		5700	DB	5716	6081	-
		6500	DB	5654	6015	-
	90	2700	DB	4380	4660	-
		3000	DB	4628	4923	-
		3500	DB	4794	5100	-
		4000	DB	4900	5213	-
		5000	DB	5006	5325	-
LC060DB	70	3000	DB	8672	9225	-
		4000	DB	8949	9521	-
		5000	DB	8906	9475	-
	80	2700	DB	7659	8148	-
		3000	DB	7989	8499	-
		3500	DB	8159	8680	-
		4000	DB	8370	8905	-
		5000	DB	8412	8949	-
		5700	DB	8368	8902	-
		6500	DB	8323	8855	-
	90	2700	DB	6443	6854	-
		3000	DB	6773	7205	-
		3500	DB	7087	7539	-
		4000	DB	7171	7629	-
		5000	DB	7326	7793	-

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) Samsungmaintains 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.
LC080DB	70	3000	DB	12658	13465	-
		4000	DB	13128	13966	-
		5000	DB	13199	14041	-
	80	2700	DB	11328	12051	-
		3000	DB	11720	12468	-
		3500	DB	12081	12852	-
		4000	DB	12335	13123	-
		5000	DB	12404	13196	-
		5700	DB	12338	13126	-
		6500	DB	12334	13121	-
	90	2700	DB	9548	10157	-
		3000	DB	10037	10678	-
		3500	DB	10344	11004	-
		4000	DB	10573	11247	-
		5000	DB	10746	11432	-

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) Samsungmaintains 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	B

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℃)
		5	Min. 80 (85℃)
		7	Min. 90 (85℃)
13 14	Forward Voltage (V)	WJ	15.6~18.5
		YZ	31.2~36.9
		1Z	46.9~55.3
15	CCT (K)	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)	DB	COB D-series Gen.2 Plus

a) Binning Structure

※ LC003D(I_F = 180 mA, T_J = 85 ºC)

CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Color Rank	Flux Rank	Flux Range (Φ_v, lm)
80	2700	SPHWHAHDNA25WJW1DB	WJ	W1	DB	440~
		SPHWHAHDNA25WJW2DB		W2		
		SPHWHAHDNA25WJW3DB		W3		
	3000	SPHWHAHDNA25WJV1DB	WJ	V1	DB	456~
		SPHWHAHDNA25WJV2DB		V2		
		SPHWHAHDNA25WJV3DB		V3		
	3500	SPHWHAHDNA25WJU1DB	WJ	U1	DB	471~
		SPHWHAHDNA25WJU2DB		U2		
		SPHWHAHDNA25WJU3DB		U3		
	4000	SPHWHAHDNA25WJT1DB	WJ	T1	DB	479~
		SPHWHAHDNA25WJT2DB		T2		
		SPHWHAHDNA25WJT3DB		T3		
	5000	SPHWHAHDNA25WJR2DB	WJ	R2	DB	485~
		SPHWHAHDNA25WJR3DB		R3		
	5700	SPHWHAHDNA25WJQ2DB	WJ	Q2	DB	458~
		SPHWHAHDNA25WJQ3DB		Q3		
	6500	SPHWHAHDNA25WJP2DB	WJ	P2	DB	479~
		SPHWHAHDNA25WJP3DB		P3		
90	2700	SPHWHAHDNA27WJW1DB	WJ	W1	DB	368~
		SPHWHAHDNA27WJW2DB		W2		
		SPHWHAHDNA27WJW3DB		W3		
	3000	SPHWHAHDNA27WJV1DB	WJ	V1	DB	385~
		SPHWHAHDNA27WJV2DB		V2		
		SPHWHAHDNA27WJV3DB		V3		
	3500	SPHWHAHDNA27WJU1DB	WJ	U1	DB	398~
		SPHWHAHDNA27WJU2DB		U2		
		SPHWHAHDNA27WJU3DB		U3		
	4000	SPHWHAHDNA27WJT1DB	WJ	T1	DB	406~
		SPHWHAHDNA27WJT2DB		T2		
		SPHWHAHDNA27WJT3DB		T3		
	5000	SPHWHAHDNA27WJR2DB	WJ	R2	DB	414~
		SPHWHAHDNA27WJR3DB		R3		

※ 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	SPHWHAHDNA25YZW1DB	YZ	W1	DB	440~
		SPHWHAHDNA25YZW2DB		W2		
		SPHWHAHDNA25YZW3DB		W3		
	3000	SPHWHAHDNA25YZV1DB	YZ	V1	DB	456~
		SPHWHAHDNA25YZV2DB		V2		
		SPHWHAHDNA25YZV3DB		V3		
	3500	SPHWHAHDNA25YZU1DB	YZ	U1	DB	471~
		SPHWHAHDNA25YZU2DB		U2		
		SPHWHAHDNA25YZU3DB		U3		
	4000	SPHWHAHDNA25YZT1DB	YZ	T1	DB	479~
		SPHWHAHDNA25YZT2DB		T2		
		SPHWHAHDNA25YZT3DB		T3		
	5000	SPHWHAHDNA25YZR2DB	YZ	R2	DB	485~
		SPHWHAHDNA25YZR3DB		R3		
	5700	SPHWHAHDNA25YZQ2DB	YZ	Q2	DB	458~
		SPHWHAHDNA25YZQ3DB		Q3		
	6500	SPHWHAHDNA25YZP2DB	YZ	P2	DB	479~
		SPHWHAHDNA25YZP3DB		P3		
90	2700	SPHWHAHDNA27YZW1DB	YZ	W1	DB	368~
		SPHWHAHDNA27YZW2DB		W2		
		SPHWHAHDNA27YZW3DB		W3		
	3000	SPHWHAHDNA27YZV1DB	YZ	V1	DB	385~
		SPHWHAHDNA27YZV2DB		V2		
		SPHWHAHDNA27YZV3DB		V3		
	3500	SPHWHAHDNA27YZU1DB	YZ	U1	DB	398~
		SPHWHAHDNA27YZU2DB		U2		
		SPHWHAHDNA27YZU3DB		U3		
	4000	SPHWHAHDNA27YZT1DB	YZ	T1	DB	406~
		SPHWHAHDNA27YZT2DB		T2		
		SPHWHAHDNA27YZT3DB		T3		
	5000	SPHWHAHDNA27YZR2DB	YZ	R2	DB	414~
		SPHWHAHDNA27YZR3DB		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	SPHWHAHDNB25YZW1DB	YZ	W1	DB	873~
		SPHWHAHDNB25YZW2DB		W2		
		SPHWHAHDNB25YZW3DB		W3		
	3000	SPHWHAHDNB25YZV1DB	YZ	V1	DB	913~
		SPHWHAHDNB25YZV2DB		V2		
		SPHWHAHDNB25YZV3DB		V3		
	3500	SPHWHAHDNB25YZU1DB	YZ	U1	DB	941~
		SPHWHAHDNB25YZU2DB		U2		
		SPHWHAHDNB25YZU3DB		U3		
	4000	SPHWHAHDNB25YZT1DB	YZ	T1	DB	963~
		SPHWHAHDNB25YZT2DB		T2		
		SPHWHAHDNB25YZT3DB		T3		
	5000	SPHWHAHDNB25YZR2DB	YZ	R2	DB	959~
		SPHWHAHDNB25YZR3DB		R3		
	5700	SPHWHAHDNB25YZQ2DB	YZ	Q2	DB	959~
		SPHWHAHDNB25YZQ3DB		Q3		
	6500	SPHWHAHDNB25YZP2DB	YZ	P2	DB	948~
		SPHWHAHDNB25YZP3DB		P3		
90	2700	SPHWHAHDNB27YZW1DB	YZ	W1	DB	739~
		SPHWHAHDNB27YZW2DB		W2		
		SPHWHAHDNB27YZW3DB		W3		
	3000	SPHWHAHDNB27YZV1DB	YZ	V1	DB	775~
		SPHWHAHDNB27YZV2DB		V2		
		SPHWHAHDNB27YZV3DB		V3		
	3500	SPHWHAHDNB27YZU1DB	YZ	U1	DB	801~
		SPHWHAHDNB27YZU2DB		U2		
		SPHWHAHDNB27YZU3DB		U3		
	4000	SPHWHAHDNB27YZT1DB	YZ	T1	DB	818~
		SPHWHAHDNB27YZT2DB		T2		
		SPHWHAHDNB27YZT3DB		T3		
	5000	SPHWHAHDNB27YZR2DB	YZ	R2	DB	825~
		SPHWHAHDNB27YZR3DB		R3		

※ LC009D(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	SPHWHAHDNC23YZV2DB	YZ	V2	DB	1455~
		SPHWHAHDNC23YZV3DB		V3		
	4000	SPHWHAHDNC23YZT2DB	YZ	T2	DB	1496~
		SPHWHAHDNC23YZT3DB		T3		
	5000	SPHWHAHDNC23YZR2DB	YZ	R2	DB	1529~
		SPHWHAHDNC23YZR3DB		R3		
80	2700	SPHWHAHDNC25YZW1DB	YZ	W1	DB	1299~
		SPHWHAHDNC25YZW2DB		W2		
		SPHWHAHDNC25YZW3DB		W3		
	3000	SPHWHAHDNC25YZV1DB	YZ	V1	DB	1340~
		SPHWHAHDNC25YZV2DB		V2		
		SPHWHAHDNC25YZV3DB		V3		
	3500	SPHWHAHDNC25YZU1DB	YZ	U1	DB	1378~
		SPHWHAHDNC25YZU2DB		U2		
		SPHWHAHDNC25YZU3DB		U3		
	4000	SPHWHAHDNC25YZT1DB	YZ	T1	DB	1412~
		SPHWHAHDNC25YZT2DB		T2		
		SPHWHAHDNC25YZT3DB		T3		
	5000	SPHWHAHDNC25YZR2DB	YZ	R2	DB	1423~
		SPHWHAHDNC25YZR3DB		R3		
	5700	SPHWHAHDNC25YZQ2DB	YZ	Q2	DB	1423~
		SPHWHAHDNC25YZQ3DB		Q3		
	6500	SPHWHAHDNC25YZP2DB	YZ	P2	DB	1406~
		SPHWHAHDNC25YZP3DB		P3		

※ LC009D(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)
90	2700	SPHWHAHDNC27YZW1DB	YZ	W1	DB	1088~
		SPHWHAHDNC27YZW2DB		W2		
		SPHWHAHDNC27YZW3DB		W3		
	3000	SPHWHAHDNC27YZV1DB	YZ	V1	DB	1139~
		SPHWHAHDNC27YZV2DB		V2		
		SPHWHAHDNC27YZV3DB		V3		
	3500	SPHWHAHDNC27YZU1DB	YZ	U1	DB	1182~
		SPHWHAHDNC27YZU2DB		U2		
		SPHWHAHDNC27YZU3DB		U3		
	4000	SPHWHAHDNC27YZT1DB	YZ	T1	DB	1208~
		SPHWHAHDNC27YZT2DB		T2		
		SPHWHAHDNC27YZT3DB		T3		
	5000	SPHWHAHDNC27YZR2DB	YZ	R2	DB	1226~
		SPHWHAHDNC27YZR3DB		R3		

※ LC013D(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	3000	SPHWHAHDND23YZV2DB	YZ	V2	DB	1885~
		SPHWHAHDND23YZV3DB		V3		
	4000	SPHWHAHDND23YZT2DB	YZ	T2	DB	1946~
		SPHWHAHDND23YZT3DB		T3		
	5000	SPHWHAHDND23YZR2DB	YZ	R2	DB	1936~
		SPHWHAHDND23YZR3DB		R3		
80	2700	SPHWHAHDND25YZW1DB	YZ	W1	DB	1667~
		SPHWHAHDND25YZW2DB		W2		
		SPHWHAHDND25YZW3DB		W3		
	3000	SPHWHAHDND25YZV1DB	YZ	V1	DB	1746~
		SPHWHAHDND25YZV2DB		V2		
		SPHWHAHDND25YZV3DB		V3		
	3500	SPHWHAHDND25YZU1DB	YZ	U1	DB	1764~
		SPHWHAHDND25YZU2DB		U2		
		SPHWHAHDND25YZU3DB		U3		
	4000	SPHWHAHDND25YZT1DB	YZ	T1	DB	1815~
		SPHWHAHDND25YZT2DB		T2		
		SPHWHAHDND25YZT3DB		T3		
	5000	SPHWHAHDND25YZR2DB	YZ	R2	DB	1822~
		SPHWHAHDND25YZR3DB		R3		
	5700	SPHWHAHDND25YZQ2DB	YZ	Q2	DB	1812~
		SPHWHAHDND25YZQ3DB		Q3		
	6500	SPHWHAHDND25YZP2DB	YZ	P2	DB	1804~
		SPHWHAHDND25YZP3DB		P3		

※ LC013D(I_F = 360 mA, T_J = 85 ºC)

CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Color Rank	Flux Rank	Flux Range (Φ_v, lm)
90	2700	SPHWHAHDND27YZW1DB	YZ	W1	DB	1397~
		SPHWHAHDND27YZW2DB		W2		
		SPHWHAHDND27YZW3DB		W3		
	3000	SPHWHAHDND27YZV1DB	YZ	V1	DB	1463~
		SPHWHAHDND27YZV2DB		V2		
		SPHWHAHDND27YZV3DB		V3		
	3500	SPHWHAHDND27YZU1DB	YZ	U1	DB	1537~
		SPHWHAHDND27YZU2DB		U2		
		SPHWHAHDND27YZU3DB		U3		
	4000	SPHWHAHDND27YZT1DB	YZ	T1	DB	1570~
		SPHWHAHDND27YZT2DB		T2		
		SPHWHAHDND27YZT3DB		T3		
	5000	SPHWHAHDND27YZR2DB	YZ	R2	DB	1574~
		SPHWHAHDND27YZR3DB		R3		

※ LC016D(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	3000	SPHWHAHDNE23YZV2DB	YZ	V2	DB	2460~
		SPHWHAHDNE23YZV3DB		V3		
	4000	SPHWHAHDNE23YZT2DB	YZ	T2	DB	2513~
		SPHWHAHDNE23YZT3DB		T3		
	5000	SPHWHAHDNE23YZR2DB	YZ	R2	DB	2526~
		SPHWHAHDNE23YZR3DB		R3		
80	2700	SPHWHAHDNE25YZW1DB	YZ	W1	DB	2167~
		SPHWHAHDNE25YZW2DB		W2		
		SPHWHAHDNE25YZW3DB		W3		
	3000	SPHWHAHDNE25YZV1DB	YZ	V1	DB	2255~
		SPHWHAHDNE25YZV2DB		V2		
		SPHWHAHDNE25YZV3DB		V3		
	3500	SPHWHAHDNE25YZU1DB	YZ	U1	DB	2315~
		SPHWHAHDNE25YZU2DB		U2		
		SPHWHAHDNE25YZU3DB		U3		
	4000	SPHWHAHDNE25YZT1DB	YZ	T1	DB	2369~
		SPHWHAHDNE25YZT2DB		T2		
		SPHWHAHDNE25YZT3DB		T3		
	5000	SPHWHAHDNE25YZR2DB	YZ	R2	DB	2377~
		SPHWHAHDNE25YZR3DB		R3		
	5700	SPHWHAHDNE25YZQ2DB	YZ	Q2	DB	2377~
		SPHWHAHDNE25YZQ3DB		Q3		
	6500	SPHWHAHDNE25YZP2DB	YZ	P2	DB	2357~
		SPHWHAHDNE25YZP3DB		P3		

※ LC016D(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)
90	2700	SPHWHAHDNE27YZW1DB	YZ	W1	DB	1669~
		SPHWHAHDNE27YZW2DB		W2		
		SPHWHAHDNE27YZW3DB		W3		
	3000	SPHWHAHDNE27YZV1DB	YZ	V1	DB	1867~
		SPHWHAHDNE27YZV2DB		V2		
		SPHWHAHDNE27YZV3DB		V3		
	3500	SPHWHAHDNE27YZU1DB	YZ	U1	DB	1969~
		SPHWHAHDNE27YZU2DB		U2		
		SPHWHAHDNE27YZU3DB		U3		
	4000	SPHWHAHDNE27YZT1DB	YZ	T1	DB	2027~
		SPHWHAHDNE27YZT2DB		T2		
		SPHWHAHDNE27YZT3DB		T3		
	5000	SPHWHAHDNE27YZR2DB	YZ	R2	DB	2068~
		SPHWHAHDNE27YZR3DB		R3		

※ LC019D(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	3000	SPHWHAHDNF23YZV2DB	YZ	V2	DB	2921~
		SPHWHAHDNF23YZV3DB		V3		
	4000	SPHWHAHDNF23YZT2DB	YZ	T2	DB	3014~
		SPHWHAHDNF23YZT3DB		T3		
	5000	SPHWHAHDNF23YZR2DB	YZ	R2	DB	3000~
		SPHWHAHDNF23YZR3DB		R3		
80	2700	SPHWHAHDNF25YZW1DB	YZ	W1	DB	2577~
		SPHWHAHDNF25YZW2DB		W2		
		SPHWHAHDNF25YZW3DB		W3		
	3000	SPHWHAHDNF25YZV1DB	YZ	V1	DB	2704~
		SPHWHAHDNF25YZV2DB		V2		
		SPHWHAHDNF25YZV3DB		V3		
	3500	SPHWHAHDNF25YZU1DB	YZ	U1	DB	2746~
		SPHWHAHDNF25YZU2DB		U2		
		SPHWHAHDNF25YZU3DB		U3		
	4000	SPHWHAHDNF25YZT1DB	YZ	T1	DB	2816~
		SPHWHAHDNF25YZT2DB		T2		
		SPHWHAHDNF25YZT3DB		T3		
	5000	SPHWHAHDNF25YZR2DB	YZ	R2	DB	2832~
		SPHWHAHDNF25YZR3DB		R3		
	5700	SPHWHAHDNF25YZQ2DB	YZ	Q2	DB	2818~
		SPHWHAHDNF25YZQ3DB		Q3		
	6500	SPHWHAHDNF25YZP2DB	YZ	P2	DB	2788~
		SPHWHAHDNF25YZP3DB		P3		

※ LC019D(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)
90	2700	SPHWHAHDNF27YZW1DB	YZ	W1	DB	2163~
		SPHWHAHDNF27YZW2DB		W2		
		SPHWHAHDNF27YZW3DB		W3		
	3000	SPHWHAHDNF27YZV1DB	YZ	V1	DB	2268~
		SPHWHAHDNF27YZV2DB		V2		
		SPHWHAHDNF27YZV3DB		V3		
	3500	SPHWHAHDNF27YZU1DB	YZ	U1	DB	2375~
		SPHWHAHDNF27YZU2DB		U2		
		SPHWHAHDNF27YZU3DB		U3		
	4000	SPHWHAHDNF27YZT1DB	YZ	T1	DB	2426~
		SPHWHAHDNF27YZT2DB		T2		
		SPHWHAHDNF27YZT3DB		T3		
	5000	SPHWHAHDNF27YZR2DB	YZ	R2	DB	2441~
		SPHWHAHDNF27YZR3DB		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	3000	SPHWHAHDNG23YZV2DB	YZ	V2	DB	3819~
		SPHWHAHDNG23YZV3DB		V3		
	4000	SPHWHAHDNG23YZT2DB	YZ	T2	DB	3941~
		SPHWHAHDNG23YZT3DB		T3		
	5000	SPHWHAHDNG23YZR2DB	YZ	R2	DB	3942~
		SPHWHAHDNG23YZR3DB		R3		
80	2700	SPHWHAHDNG25YZW1DB	YZ	W1	DB	3399~
		SPHWHAHDNG25YZW2DB		W2		
		SPHWHAHDNG25YZW3DB		W3		
	3000	SPHWHAHDNG25YZV1DB	YZ	V1	DB	3536~
		SPHWHAHDNG25YZV2DB		V2		
		SPHWHAHDNG25YZV3DB		V3		
	3500	SPHWHAHDNG25YZU1DB	YZ	U1	DB	3640~
		SPHWHAHDNG25YZU2DB		U2		
		SPHWHAHDNG25YZU3DB		U3		
	4000	SPHWHAHDNG25YZT1DB	YZ	T1	DB	3713 ~
		SPHWHAHDNG25YZT2DB		T2		
		SPHWHAHDNG25YZT3DB		T3		
	5000	SPHWHAHDNG25YZR2DB	YZ	R2	DB	3744 ~
		SPHWHAHDNG25YZR3DB		R3		
	5700	SPHWHAHDNG25YZQ2DB	YZ	Q2	DB	3706~
		SPHWHAHDNG25YZQ3DB		Q3		
	6500	SPHWHAHDNG25YZP2DB	YZ	P2	DB	3694~
		SPHWHAHDNG25YZP3DB		P3		

※ LC026D(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)
90	2700	SPHWHAHDNG27YZW1DB	YZ	W1	DB	2865~
		SPHWHAHDNG27YZW2DB		W2		
		SPHWHAHDNG27YZW3DB		W3		
	3000	SPHWHAHDNG27YZV1DB	YZ	V1	DB	2999~
		SPHWHAHDNG27YZV2DB		V2		
		SPHWHAHDNG27YZV3DB		V3		
	3500	SPHWHAHDNG27YZU1DB	YZ	U1	DB	3119~
		SPHWHAHDNG27YZU2DB		U2		
		SPHWHAHDNG27YZU3DB		U3		
	4000	SPHWHAHDNG27YZT1DB	YZ	T1	DB	3184~
		SPHWHAHDNG27YZT2DB		T2		
		SPHWHAHDNG27YZT3DB		T3		
	5000	SPHWHAHDNG27YZR2DB	YZ	R2	DB	3227~
		SPHWHAHDNG27YZR3DB		R3		

※ LC033D(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	3000	SPHWHAHDNH23YZV2DB	YZ	V2	DB	4713 ~
		SPHWHAHDNH23YZV3DB		V3		
	4000	SPHWHAHDNH23YZT2DB	YZ	T2	DB	4865 ~
		SPHWHAHDNH23YZT3DB		T3		
	5000	SPHWHAHDNH23YZR2DB	YZ	R2	DB	4890~
		SPHWHAHDNH23YZR3DB		R3		
80	2700	SPHWHAHDNH25YZW1DB	YZ	W1	DB	4195~
		SPHWHAHDNH25YZW2DB		W2		
		SPHWHAHDNH25YZW3DB		W3		
	3000	SPHWHAHDNH25YZV1DB	YZ	V1	DB	4364~
		SPHWHAHDNH25YZV2DB		V2		
		SPHWHAHDNH25YZV3DB		V3		
	3500	SPHWHAHDNH25YZU1DB	YZ	U1	DB	4492~
		SPHWHAHDNH25YZU2DB		U2		
		SPHWHAHDNH25YZU3DB		U3		
	4000	SPHWHAHDNH25YZT1DB	YZ	T1	DB	4582~
		SPHWHAHDNH25YZT2DB		T2		
		SPHWHAHDNH25YZT3DB		T3		
	5000	SPHWHAHDNH25YZR2DB	YZ	R2	DB	4621~
		SPHWHAHDNH25YZR3DB		R3		
	5700	SPHWHAHDNH25YZQ2DB	YZ	Q2	DB	4598~
		SPHWHAHDNH25YZQ3DB		Q3		
	6500	SPHWHAHDNH25YZP2DB	YZ	P2	DB	4582~
		SPHWHAHDNH25YZP3DB		P3		

※ LC033D(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)
90	2700	SPHWHAHDNH27YZW1DB	YZ	W1	DB	3554~
		SPHWHAHDNH27YZW2DB		W2		
		SPHWHAHDNH27YZW3DB		W3		
	3000	SPHWHAHDNH27YZV1DB	YZ	V1	DB	3739~
		SPHWHAHDNH27YZV2DB		V2		
		SPHWHAHDNH27YZV3DB		V3		
	3500	SPHWHAHDNH27YZU1DB	YZ	U1	DB	3850~
		SPHWHAHDNH27YZU2DB		U2		
		SPHWHAHDNH27YZU3DB		U3		
	4000	SPHWHAHDNH27YZT1DB	YZ	T1	DB	3929~
		SPHWHAHDNH27YZT2DB		T2		
		SPHWHAHDNH27YZT3DB		T3		
	5000	SPHWHAHDNH27YZR2DB	YZ	R2	DB	3983~
		SPHWHAHDNH27YZR3DB		R3		

※ LC040D(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	3000	SPHWHAHDNK23YZV2DB	YZ	V2	DB	5926 ~
		SPHWHAHDNK23YZV3DB		V3		
	4000	SPHWHAHDNK23YZT2DB	YZ	T2	DB	6115~
		SPHWHAHDNK23YZT3DB		T3		
	5000	SPHWHAHDNK23YZR2DB	YZ	R2	DB	6086~
		SPHWHAHDNK23YZR3DB		R3		
80	2700	SPHWHAHDNK25YZW1DB	YZ	W1	DB	5241~
		SPHWHAHDNK25YZW2DB		W2		
		SPHWHAHDNK25YZW3DB		W3		
	3000	SPHWHAHDNK25YZV1DB	YZ	V1	DB	5487~
		SPHWHAHDNK25YZV2DB		V2		
		SPHWHAHDNK25YZV3DB		V3		
	3500	SPHWHAHDNK25YZU1DB	YZ	U1	DB	5570~
		SPHWHAHDNK25YZU2DB		U2		
		SPHWHAHDNK25YZU3DB		U3		
	4000	SPHWHAHDNK25YZT1DB	YZ	T1	DB	5719~
		SPHWHAHDNK25YZT2DB		T2		
		SPHWHAHDNK25YZT3DB		T3		
	5000	SPHWHAHDNK25YZR2DB	YZ	R2	DB	5746~
		SPHWHAHDNK25YZR3DB		R3		
	5700	SPHWHAHDNK25YZQ2DB	YZ	Q2	DB	5716~
		SPHWHAHDNK25YZQ3DB		Q3		
	6500	SPHWHAHDNK25YZP2DB	YZ	P2	DB	5654~
		SPHWHAHDNK25YZP3DB		P3		

※ LC040D(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)
90	2700	SPHWHAHDNK27YZW1DB	YZ	W1	DB	4380~
		SPHWHAHDNK27YZW2DB		W2		
		SPHWHAHDNK27YZW3DB		W3		
	3000	SPHWHAHDNK27YZV1DB	YZ	V1	DB	4628~
		SPHWHAHDNK27YZV2DB		V2		
		SPHWHAHDNK27YZV3DB		V3		
	3500	SPHWHAHDNK27YZU1DB	YZ	U1	DB	4794~
		SPHWHAHDNK27YZU2DB		U2		
		SPHWHAHDNK27YZU3DB		U3		
	4000	SPHWHAHDNK27YZT1DB	YZ	T1	DB	4900~
		SPHWHAHDNK27YZT2DB		T2		
		SPHWHAHDNK27YZT3DB		T3		
	5000	SPHWHAHDNK27YZR2DB	YZ	R2	DB	5006 ~
		SPHWHAHDNK27YZR3DB		R3		

※ LC060D(I_F = 1080 mA, T_J = 85 ºC)

CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ_v, lm)
70	3000	SPHWHAHDNL231ZV2DB	1Z	V2	DB	8672 ~
		SPHWHAHDNL231ZV3DB		V3		
	4000	SPHWHAHDNL231ZT2DB	1Z	T2	DB	8949~
		SPHWHAHDNL231ZT3DB		T3		
	5000	SPHWHAHDNL231ZR2DB	1Z	R2	DB	8906~
		SPHWHAHDNL231ZR3DB		R3		
80	2700	SPHWHAHDNL251ZW1DB	1Z	W1	DB	7659~
		SPHWHAHDNL251ZW2DB		W2		
		SPHWHAHDNL251ZW3DB		W3		
	3000	SPHWHAHDNL251ZV1DB	1Z	V1	DB	7989~
		SPHWHAHDNL251ZV2DB		V2		
		SPHWHAHDNL251ZV3DB		V3		
	3500	SPHWHAHDNL251ZU1DB	1Z	U1	DB	8159~
		SPHWHAHDNL251ZU2DB		U2		
		SPHWHAHDNL251ZU3DB		U3		
	4000	SPHWHAHDNL251ZT1DB	1Z	T1	DB	8370~
		SPHWHAHDNL251ZT2DB		T2		
		SPHWHAHDNL251ZT3DB		T3		
	5000	SPHWHAHDNL251ZR2DB	1Z	R2	DB	8412~
		SPHWHAHDNL251ZR3DB		R3		
	5700	SPHWHAHDNL251ZQ2DB	1Z	Q2	DB	8368~
		SPHWHAHDNL251ZQ3DB		Q3		
	6500	SPHWHAHDNL251ZP2DB	1Z	P2	DB	8323~
		SPHWHAHDNL251ZP3DB		P3		

※ LC060D(I_F = 1080 mA, T_J = 85 ºC)

CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ_v, lm)
90	2700	SPHWHAHDNL271ZW1DB	1Z	W1	DB	6443~
		SPHWHAHDNL271ZW2DB		W2		
		SPHWHAHDNL271ZW3DB		W3		
	3000	SPHWHAHDNL271ZV1DB	1Z	V1	DB	6773~
		SPHWHAHDNL271ZV2DB		V2		
		SPHWHAHDNL271ZV3DB		V3		
	3500	SPHWHAHDNL271ZU1DB	1Z	U1	DB	7087~
		SPHWHAHDNL271ZU2DB		U2		
		SPHWHAHDNL271ZU3DB		U3		
	4000	SPHWHAHDNL271ZT1DB	1Z	T1	DB	7171~
		SPHWHAHDNL271ZT2DB		T2		
		SPHWHAHDNL271ZT3DB		T3		
	5000	SPHWHAHDNL271ZR2DB	1Z	R2	DB	7326~
		SPHWHAHDNL271ZR3DB		R3		

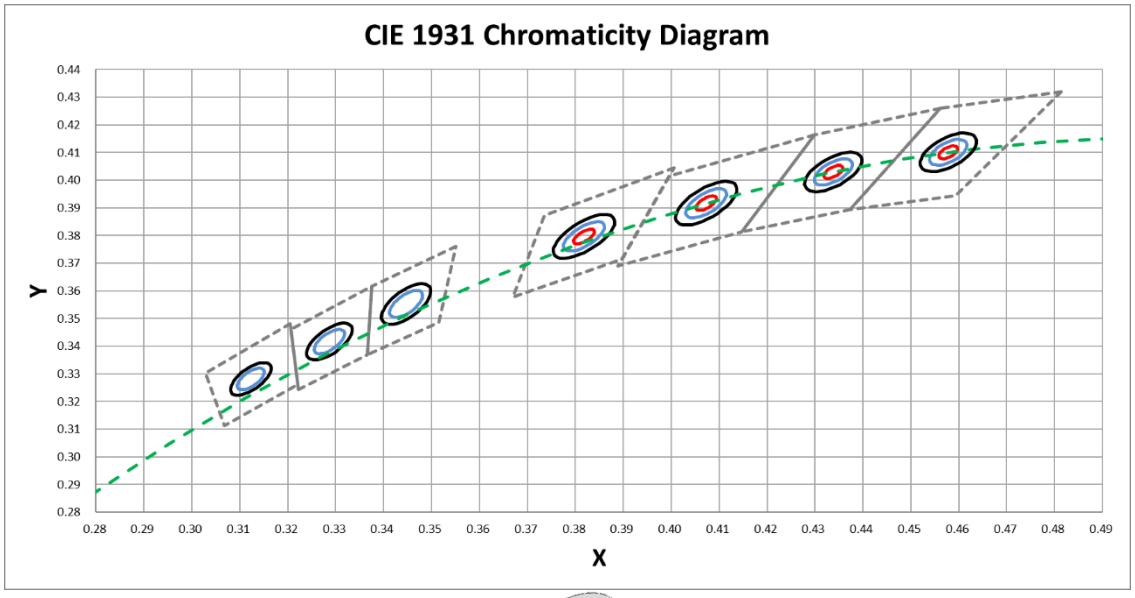
※ LCo8oD(I_F = 1620 mA, T_J = 85 ºC)

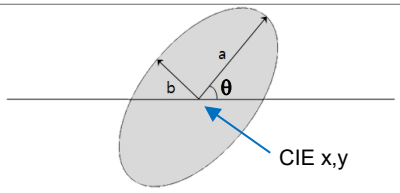
CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ_v, lm)
70	3000	SPHWHAHDNM231ZV2DB	1Z	V2	DB	12658~
		SPHWHAHDNM231ZV3DB		V3		
	4000	SPHWHAHDNM231ZT2DB	1Z	T2	DB	13128~
		SPHWHAHDNM231ZT3DB		T3		
	5000	SPHWHAHDNM231ZR2DB	1Z	R2	DB	13199~
		SPHWHAHDNM231ZR3DB		R3		
80	2700	SPHWHAHDNM251ZW1DB	1Z	W1	DB	11328~
		SPHWHAHDNM251ZW2DB		W2		
		SPHWHAHDNM251ZW3DB		W3		
	3000	SPHWHAHDNM251ZV1DB	1Z	V1	DB	11720 ~
		SPHWHAHDNM251ZV2DB		V2		
		SPHWHAHDNM251ZV3DB		V3		
	3500	SPHWHAHDNM251ZU1DB	1Z	U1	DB	12081 ~
		SPHWHAHDNM251ZU2DB		U2		
		SPHWHAHDNM251ZU3DB		U3		
	4000	SPHWHAHDNM251ZT1DB	1Z	T1	DB	12335~
		SPHWHAHDNM251ZT2DB		T2		
		SPHWHAHDNM251ZT3DB		T3		
	5000	SPHWHAHDNM251ZR2DB	1Z	R2	DB	12404~
		SPHWHAHDNM251ZR3DB		R3		
	5700	SPHWHAHDNM251ZQ2DB	1Z	Q2	DB	12338~
		SPHWHAHDNM251ZQ3DB		Q3		
	6500	SPHWHAHDNM251ZP2DB	1Z	P2	DB	12334 ~
		SPHWHAHDNM251ZP3DB		P3		

※ LCo8oD(I_F = 1620 mA, T_J = 85 ºC)

CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ_v, lm)
90	2700	SPHWHAHDNM271ZW1DB	1Z	W1	DB	9548~
		SPHWHAHDNM271ZW2DB		W2		
		SPHWHAHDNM271ZW3DB		W3		
	3000	SPHWHAHDNM271ZV1DB	1Z	V1	DB	10037~
		SPHWHAHDNM271ZV2DB		V2		
		SPHWHAHDNM271ZV3DB		V3		
	3500	SPHWHAHDNM271ZU1DB	1Z	U1	DB	10344 ~
		SPHWHAHDNM271ZU2DB		U2		
		SPHWHAHDNM271ZU3DB		U3		
	4000	SPHWHAHDNM271ZT1DB	1Z	T1	DB	10573~
		SPHWHAHDNM271ZT2DB		T2		
		SPHWHAHDNM271ZT3DB		T3		
	5000	SPHWHAHDNM271ZR2DB	1Z	R2	DB	10746~
		SPHWHAHDNM271ZR3DB		R3		

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





MacAdam Ellipse (W1, W2)					
Step	CIE x	CIE y	θ	a	b
1-step	0.4578	0.4101	53.70	0.0027	0.0014
2-step	0.4578	0.4101	53.70	0.0054	0.0028
3-step	0.4338	0.4101	53.70	0.0081	0.0042

MacAdam Ellipse (V1, V2, V3)					
Step	CIE x	CIE y	θ	a	b
1-step	0.4338	0.4030	53.22	0.0028	0.0014
2-step	0.4338	0.4030	53.22	0.0056	0.0027
3-step	0.4338	0.4030	53.22	0.0083	0.0041

MacAdam Ellipse (U1, U2)					
Step	CIE x	CIE y	θ	a	b
1-step	0.4073	0.3917	54.00	0.0031	0.0014
2-step	0.4073	0.3917	54.00	0.0062	0.0028
3-step	0.4073	0.3917	54.00	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	0.0040

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	59.10	0.0050	0.0021
3-step	0.3287	0.3417	59.10	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

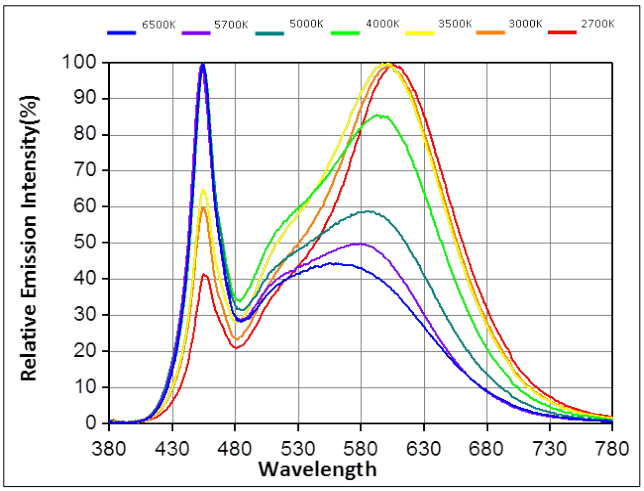
Note:

Samsung maintains measurement tolerance of: Cx, Cy = ±0.005

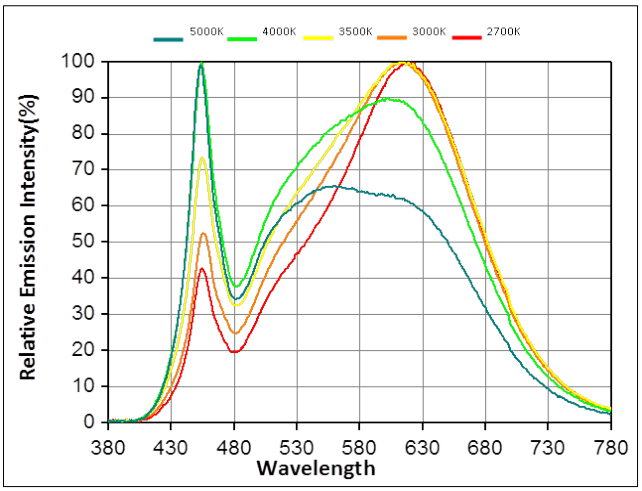
3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F = Sorting Current, T_J = 85 ºC)

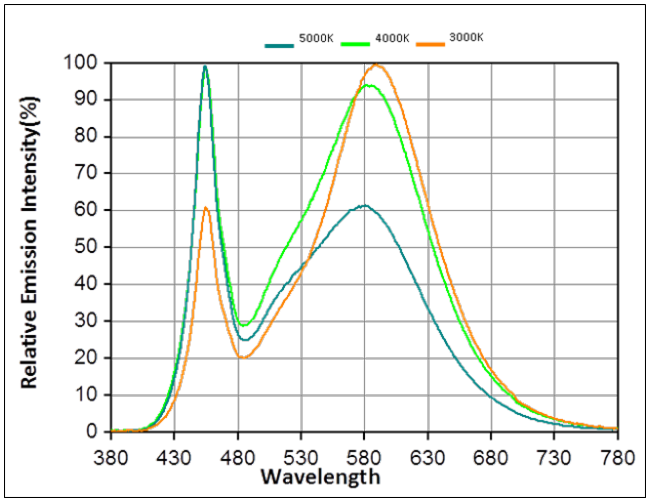
CRI Ra 80+



CRI Ra 90+

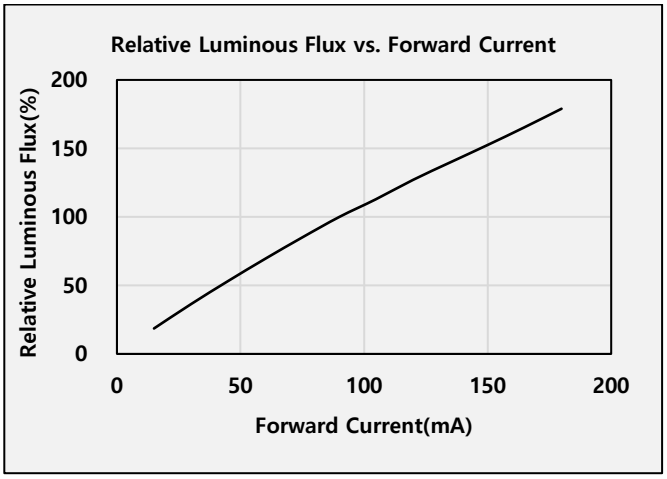


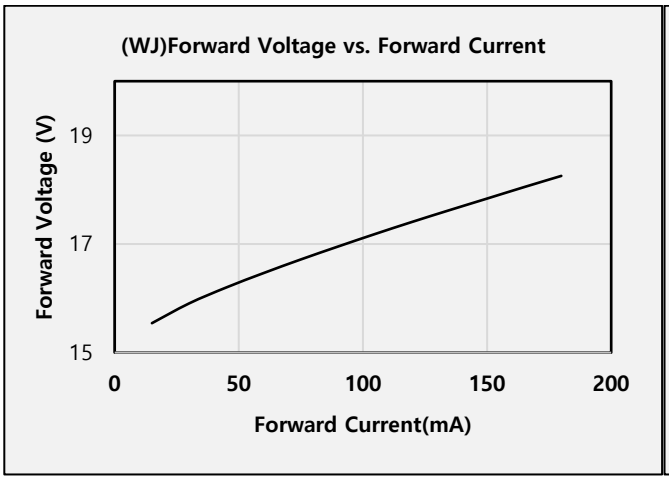
CRI Ra 70+

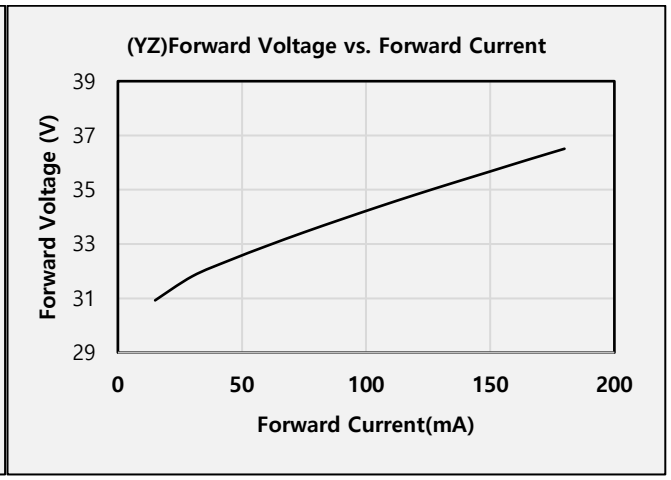


b) Forward Current Characteristics (T_J = 85 ºC)

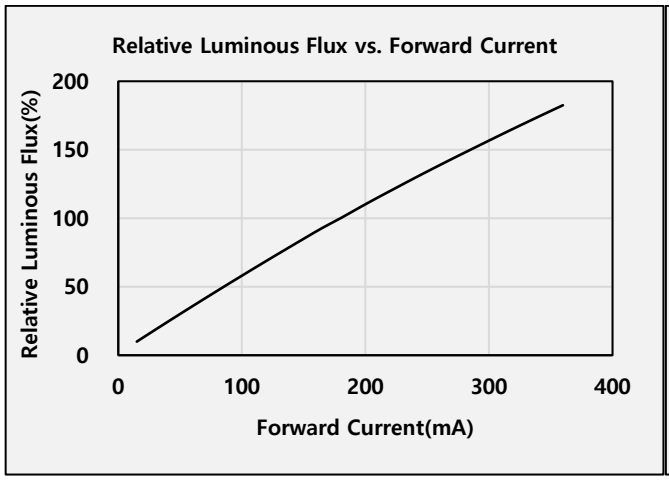
1) LC003D

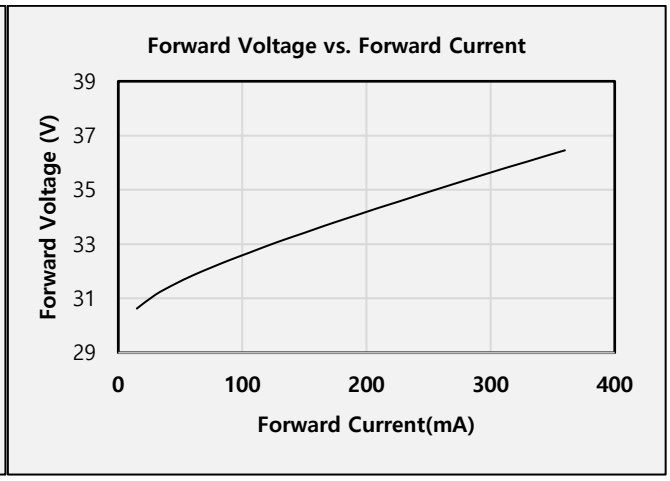




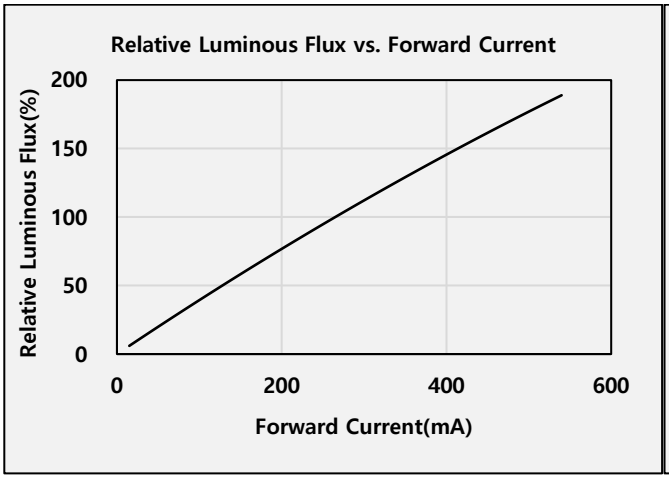


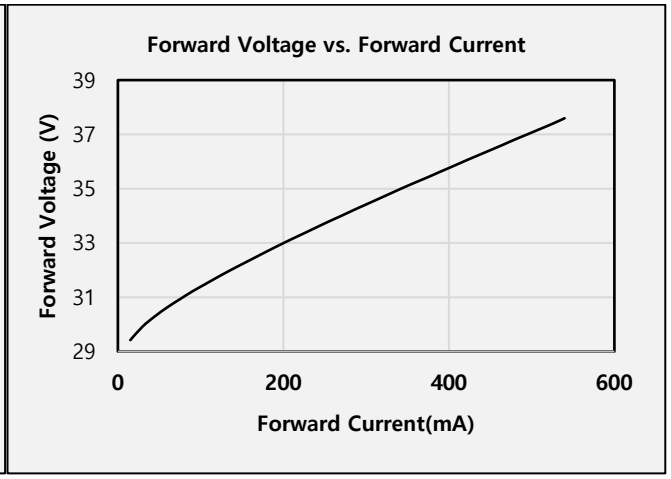
2) LC006D



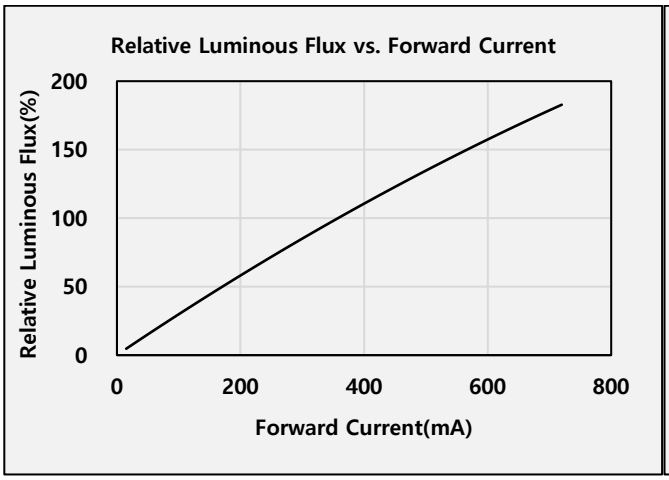


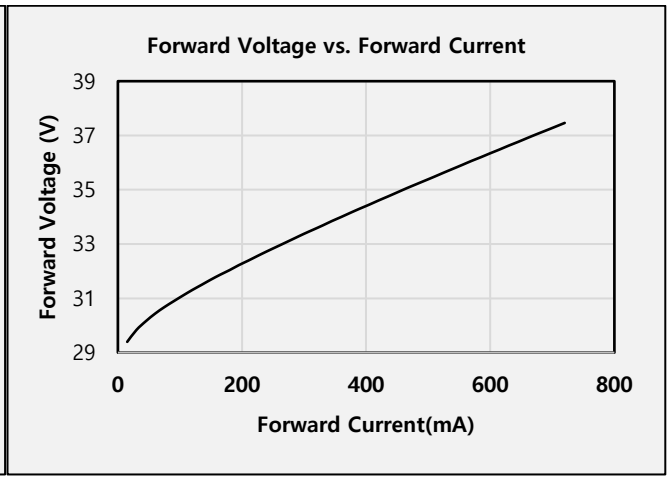
3) LC009D



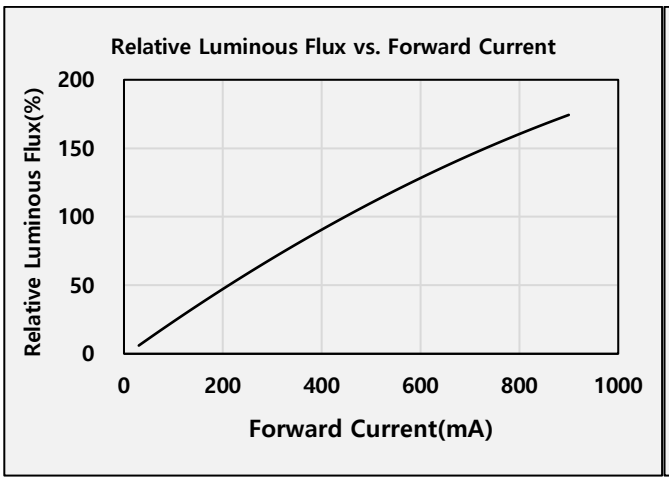


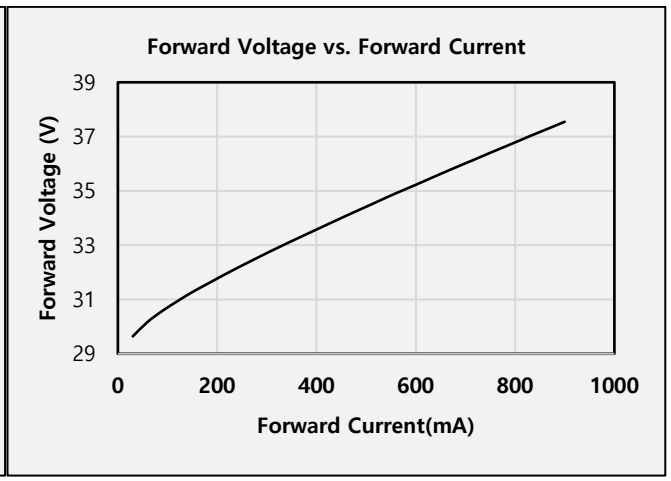
4) LC013D



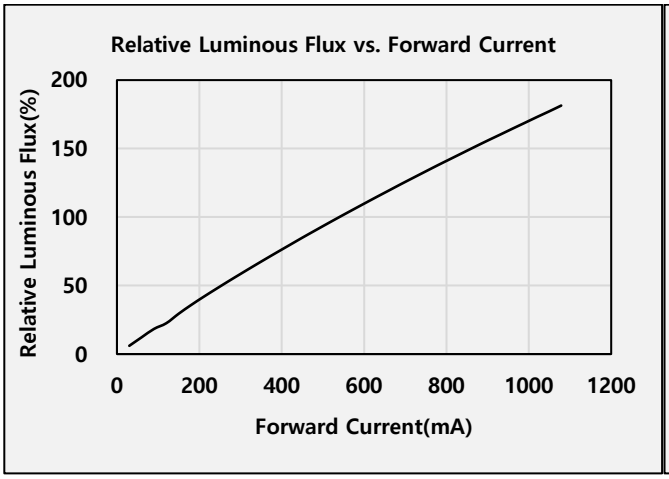


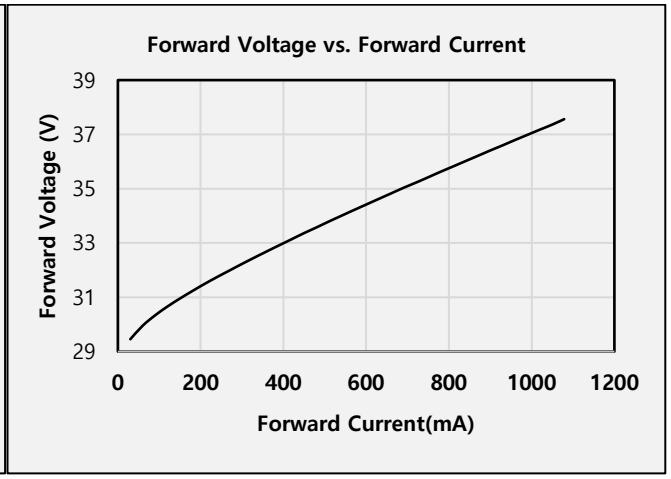
5) LC016D



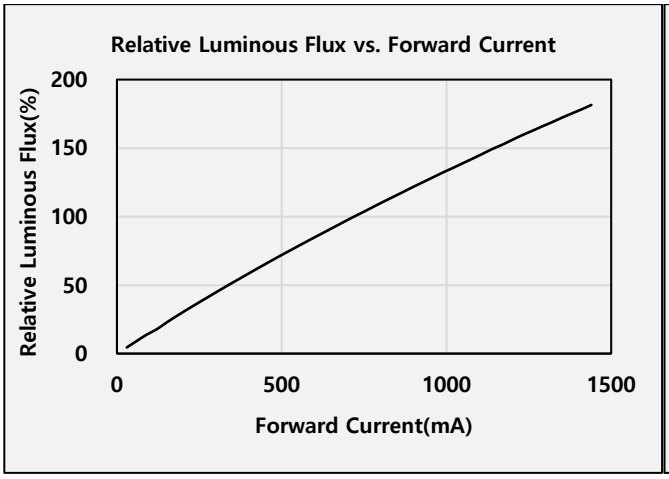


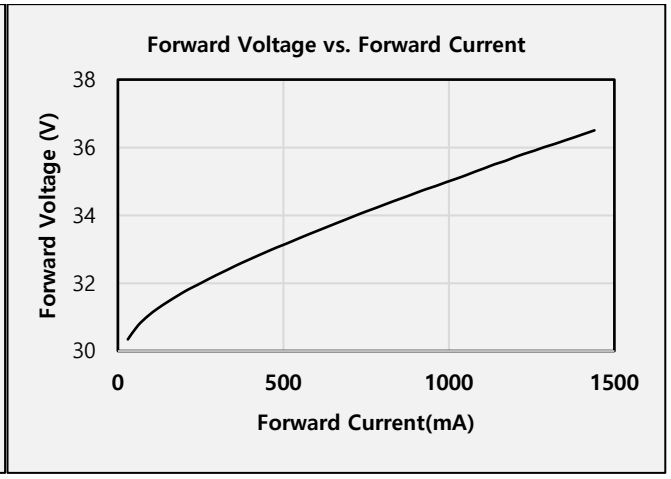
6) LC019D



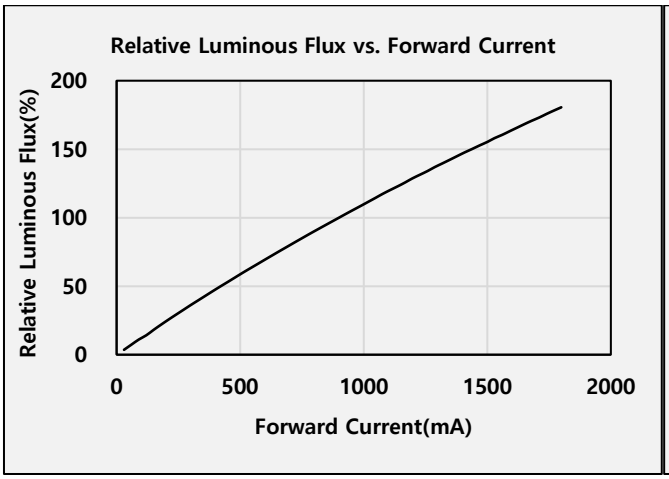


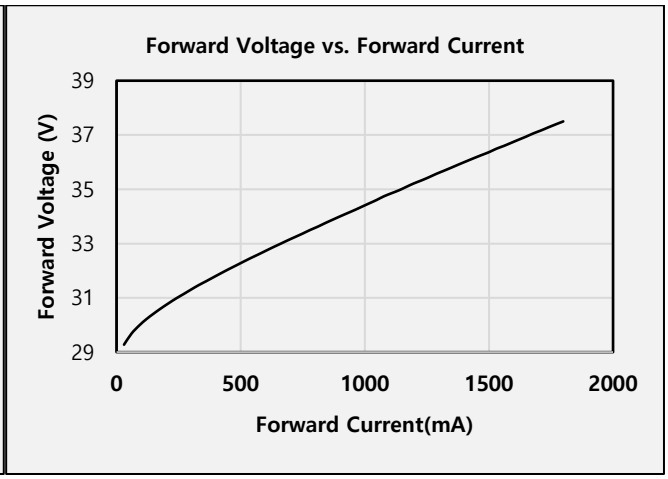
7) LC026D



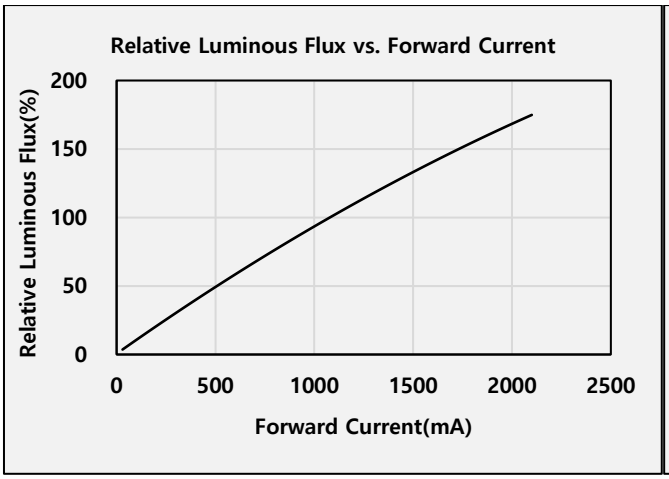


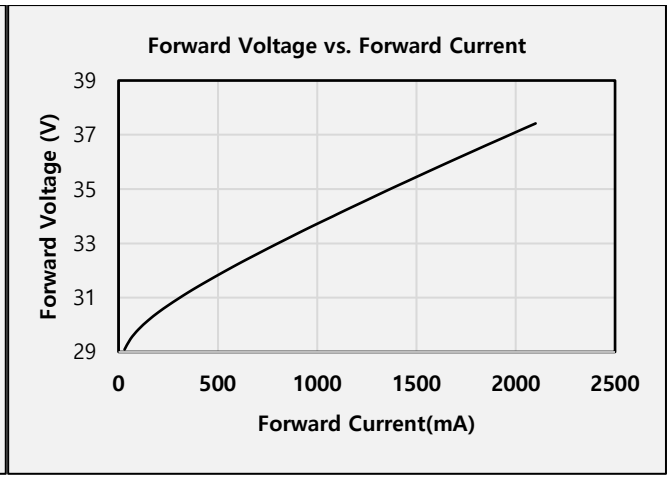
8) LC033D



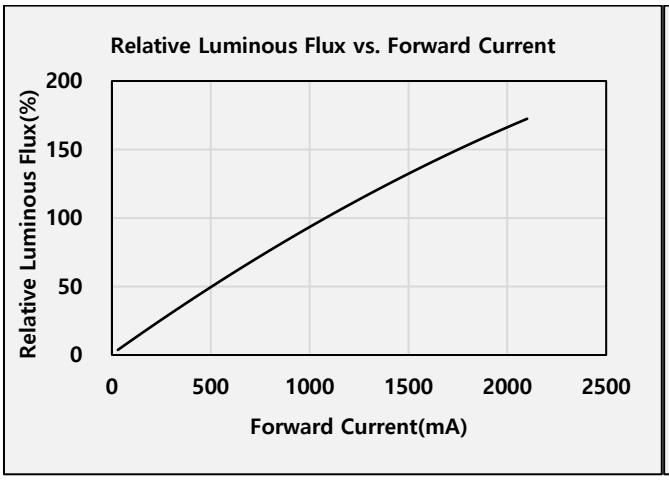


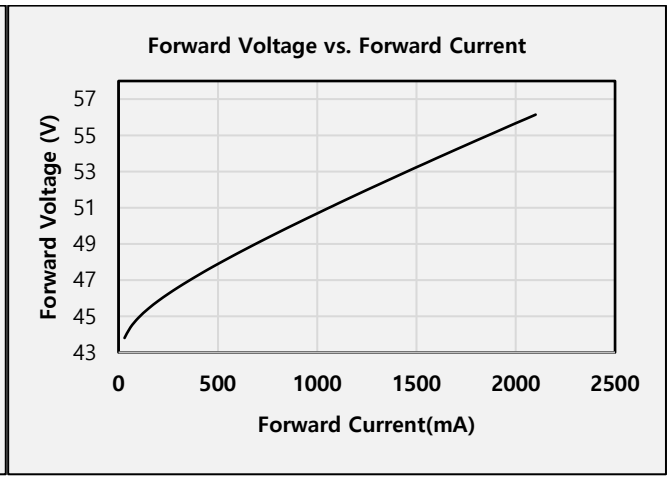
9) LC040D



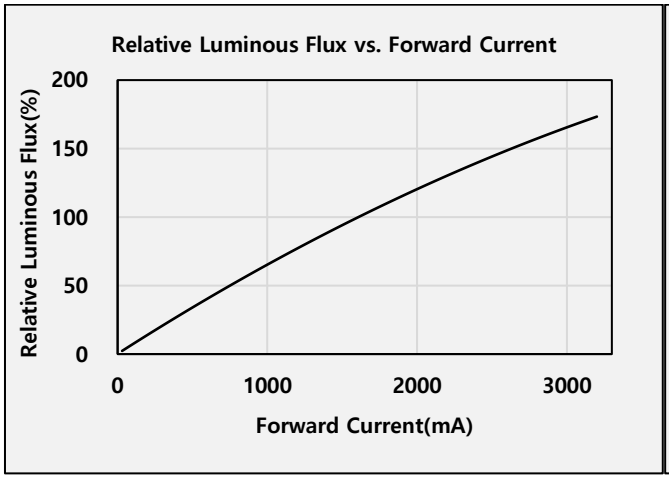


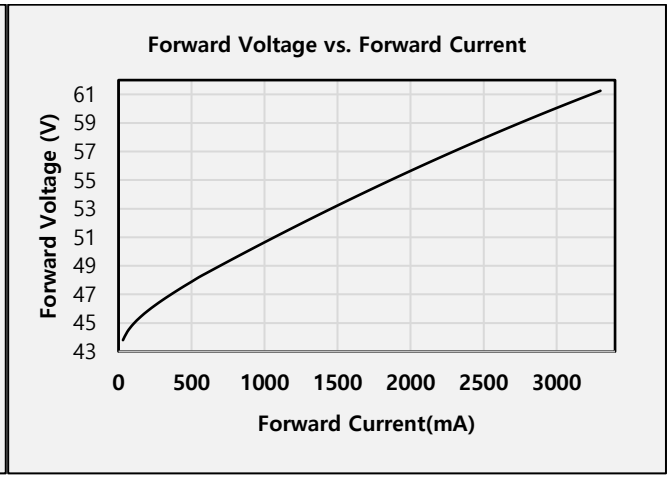
10) LC060D



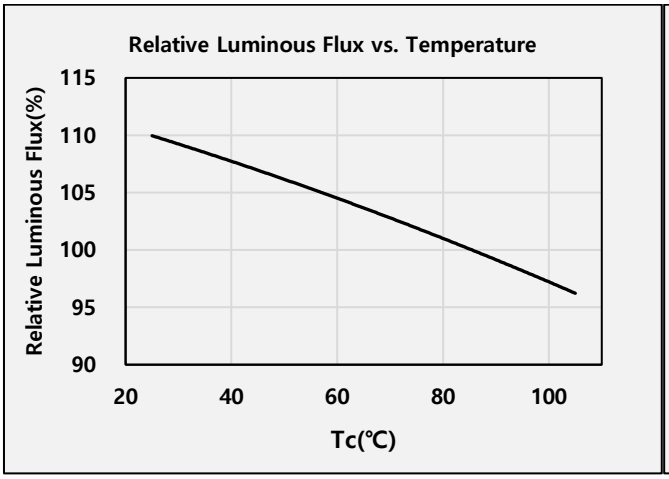


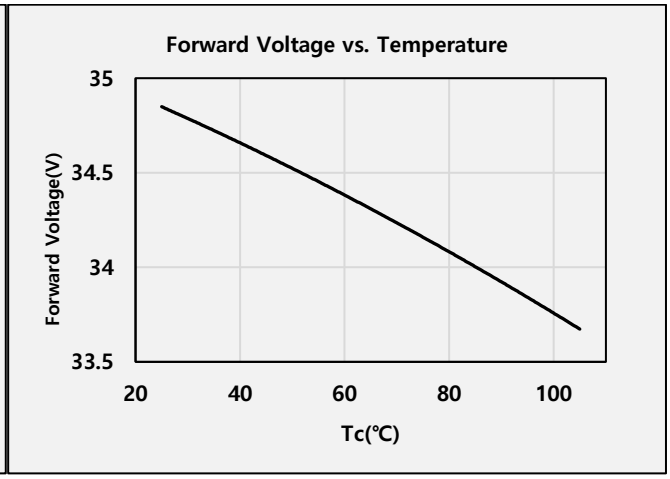
11) LC080D



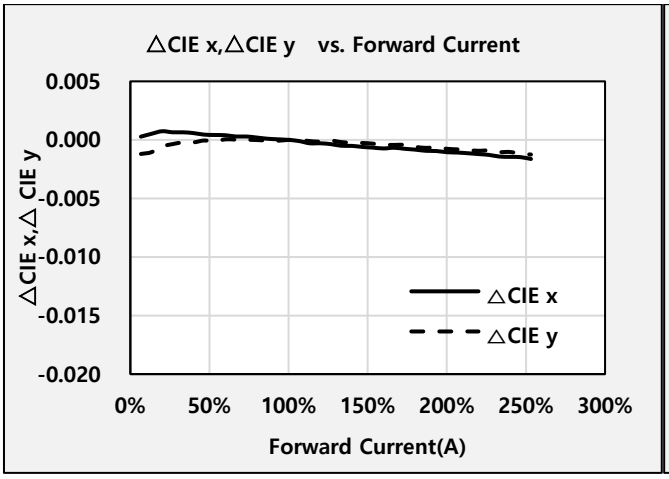


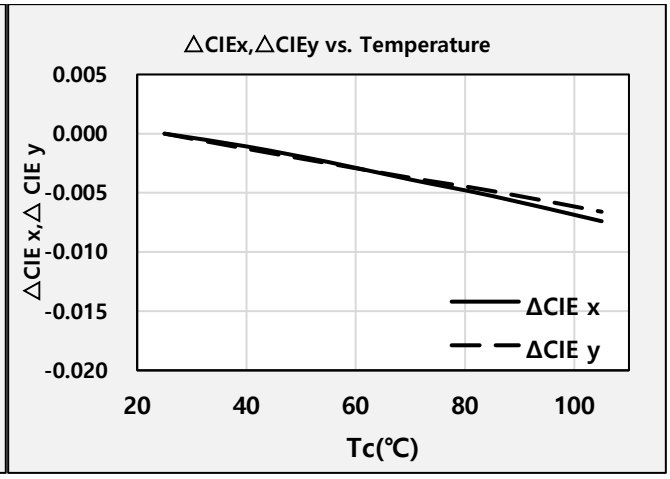
c) Temperature Characteristics(I_F = Sorting Current)



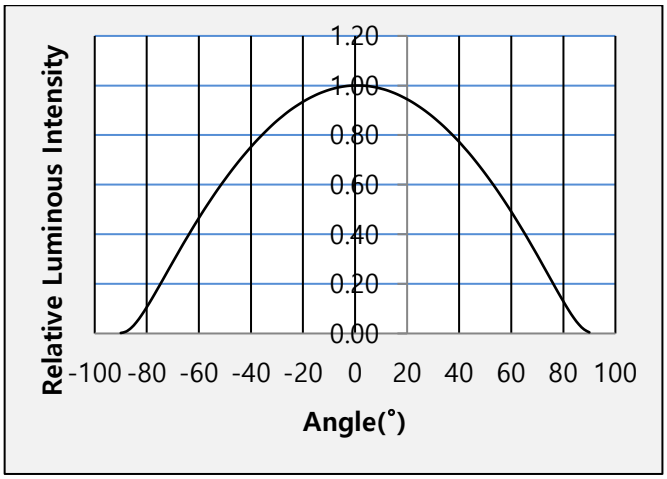


d) Color Shift Characteristics (T_J = 85 ºC, I_F =Sorting Current, CRI = 80+)



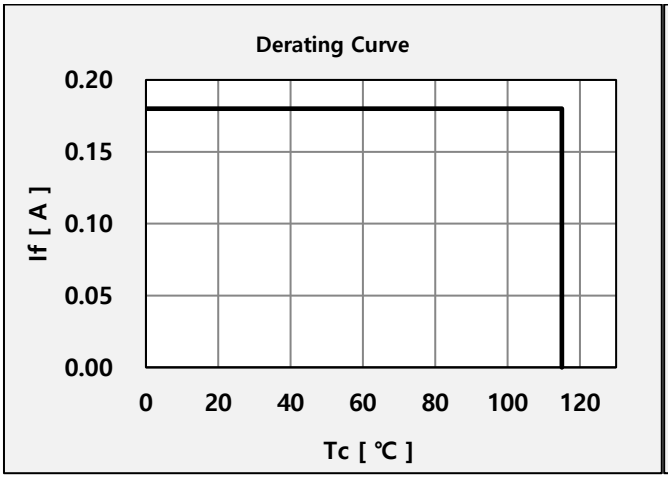


e) Beam Angle Characteristics (I_F = Sorting Current, T_J = 85 ºC)

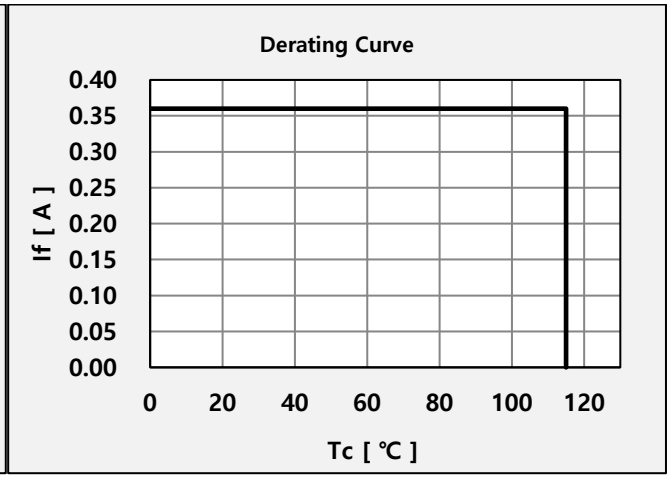


f) Derating Characteristics

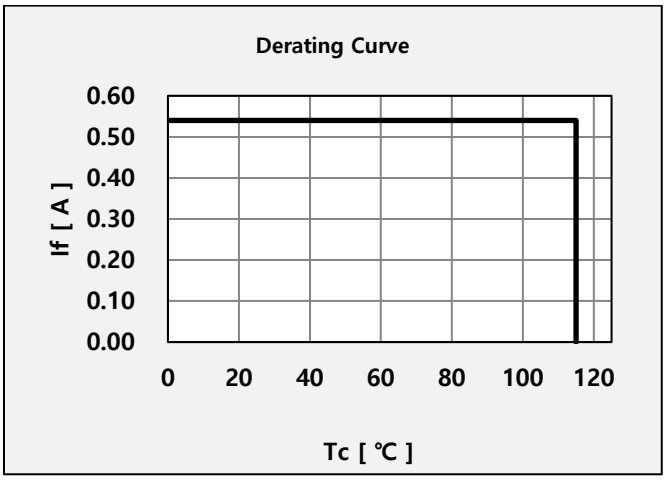
1) LC003D



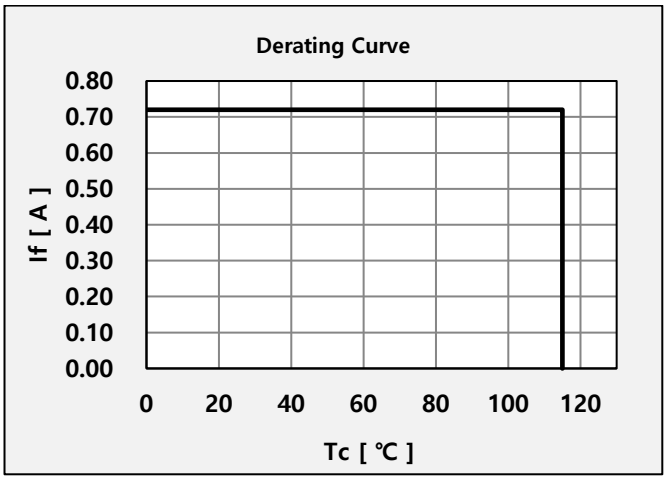
2) LC006D



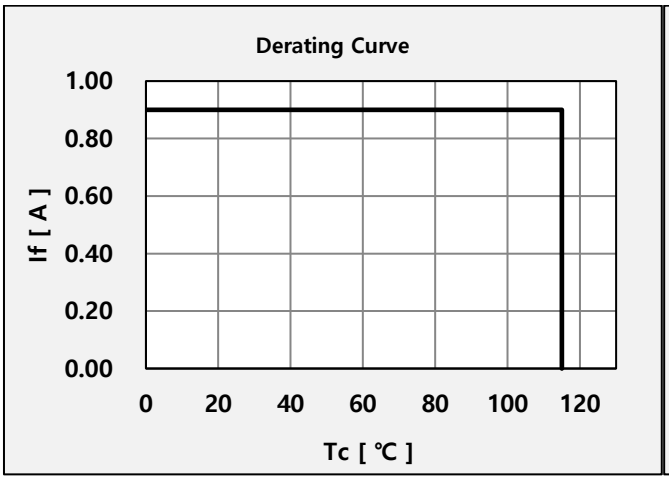
3) LC009D



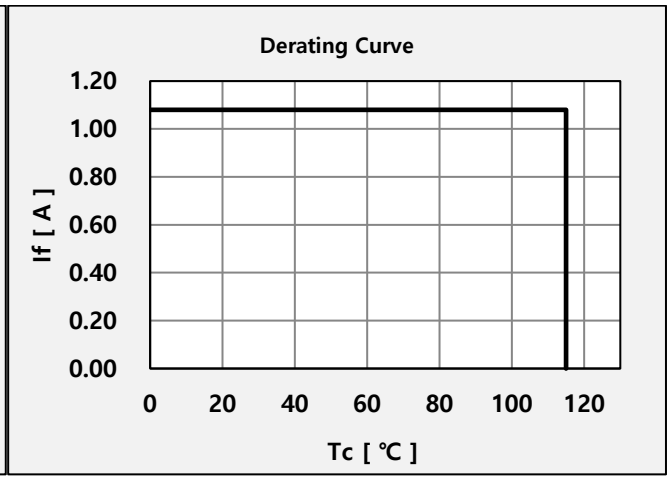
4) LC0013D



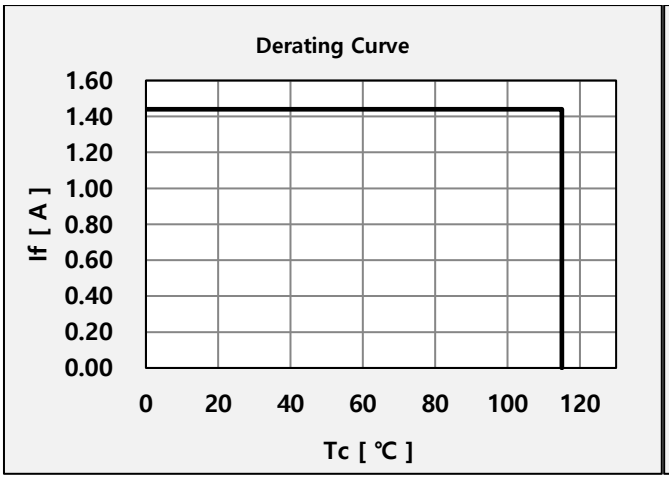
5) LC016D



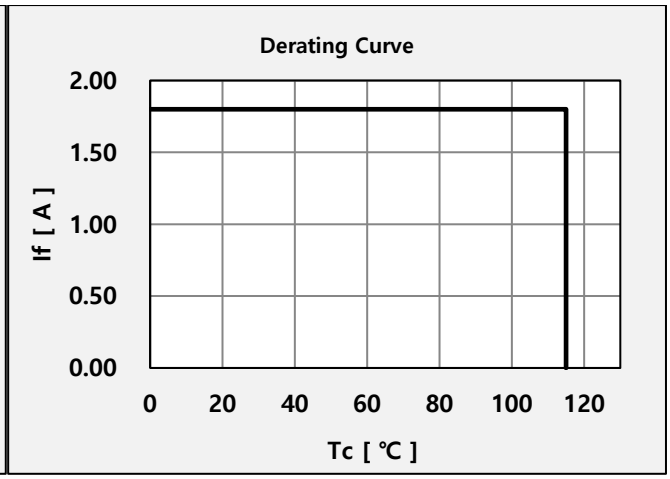
6) LC0019D



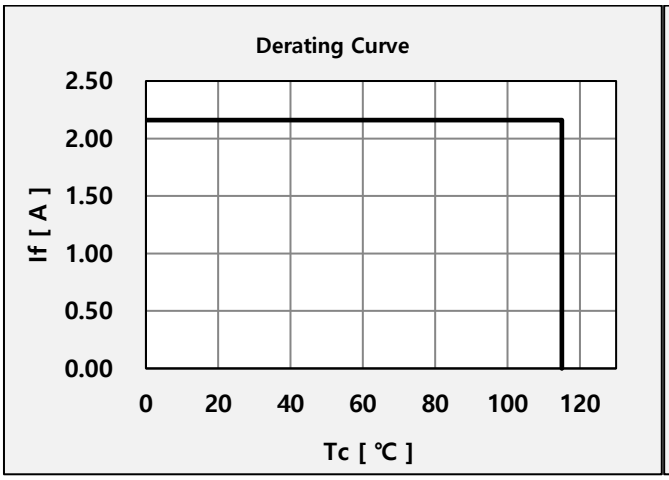
7) LC026D



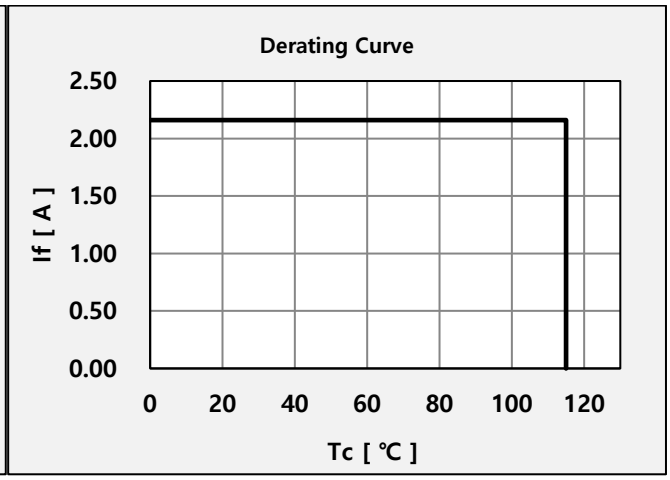
8) LC0033D



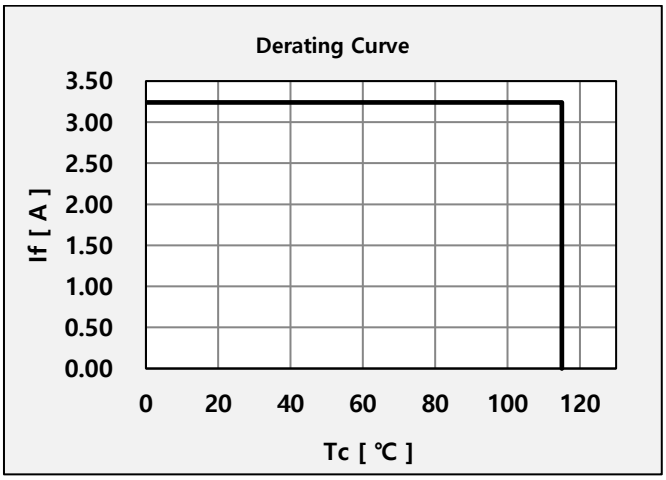
9) LC040D



10) LC060D

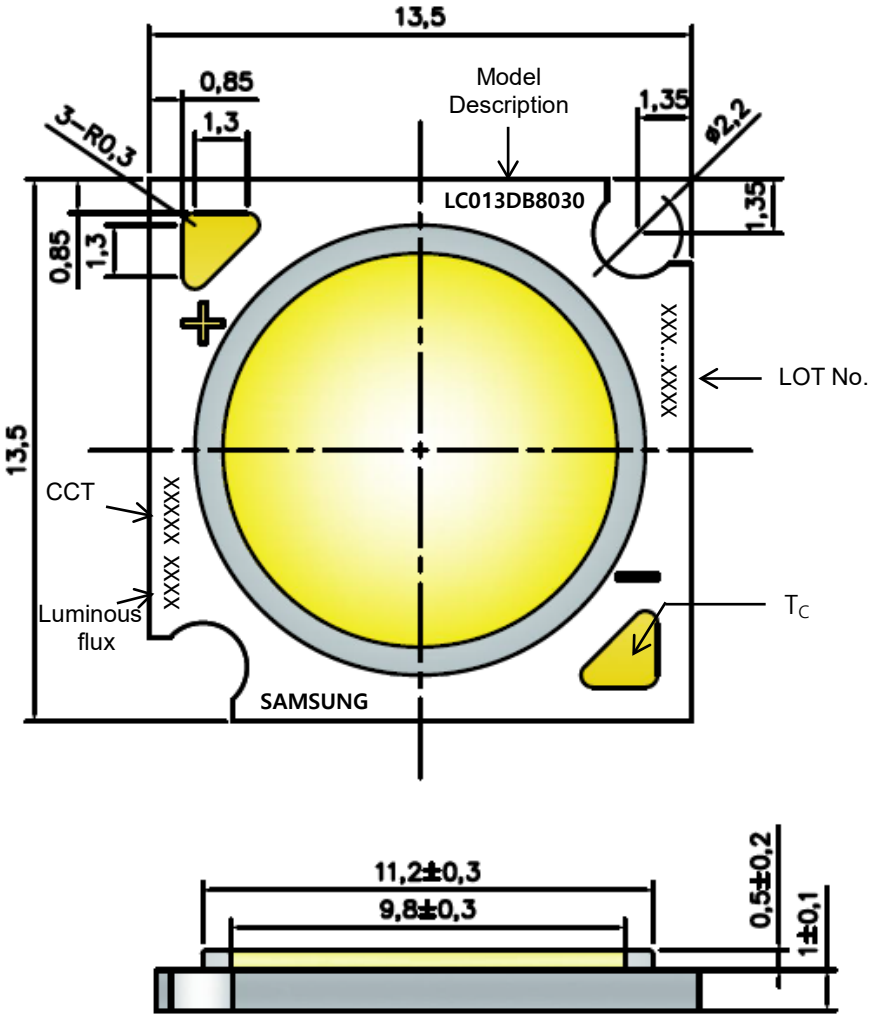


11) LC080D



4. Outline Drawing & Dimension

※ Model : LC003D, LC006D, LC009D, LC013D

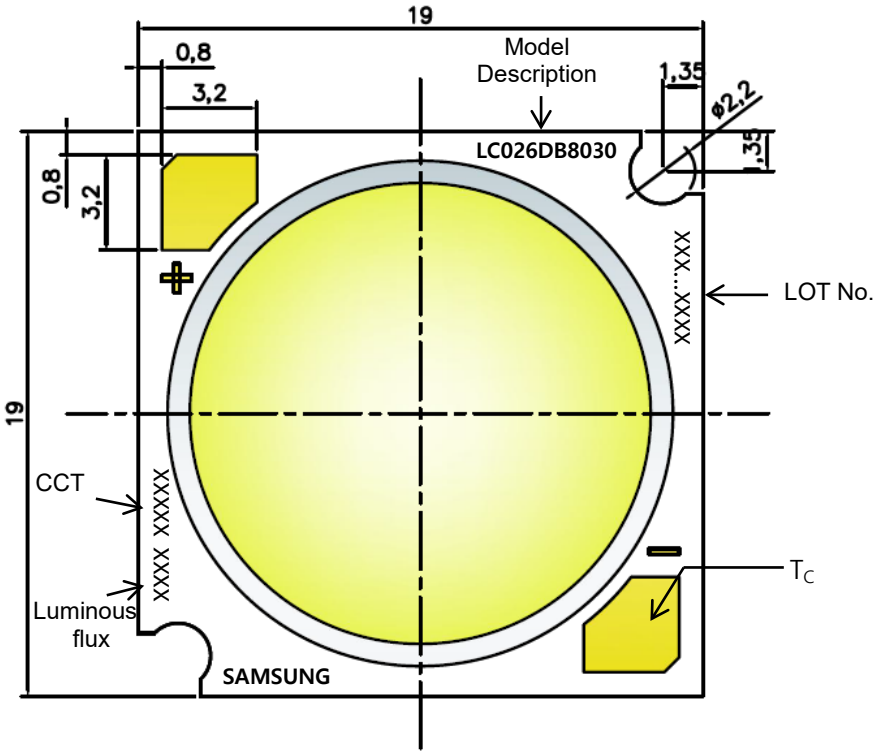


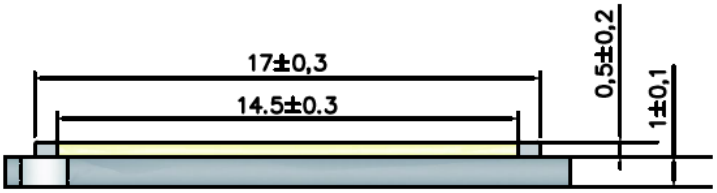
1. Unit: mm
2. Tolerance: ± 0.3 mm

Item		Dimension	Tolerance	Unit
Length		13.5	±0.15	mm
Width		13.5	±0.15	mm
Height	Dam	0.5	±0.20	mm
	Substrate	1.0	±0.10	mm
LES Diameter	Light Emitting Surface	9.8	±0.30	mm

Note: Denoted product information above is only an example
(LC013DB8030 :LC013D, Gen2 Plus, Ra80, 3000K)

※ Model : LC016D, LC019D, LC026D, LC033D



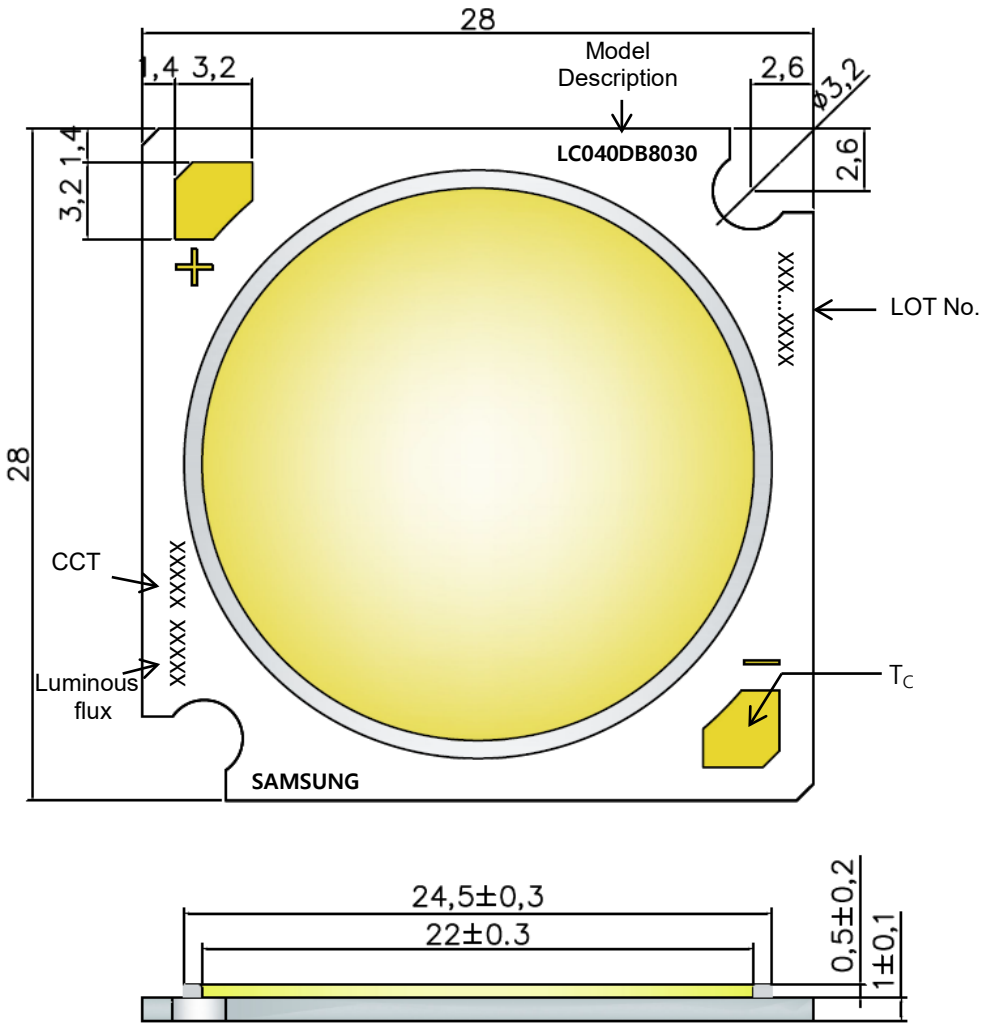


1. Unit: mm
2. Tolerance: ± 0.3 mm

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

Note: Denoted product information above is only an example
(LC026DB8030 : LC026D, Gen2 Plus, 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	0.5	±0.20	mm
	Substrate	1.0	±0.10	mm
LES Diameter	Light Emitting Surface	22.0	±0.30	mm

Note: Denoted product information above is only an example
(LC040DB8030 : LC040D, Gen2 Plus, CRI80+, 3000K)

5. Reliability Test Items & Conditions

a) Test Items

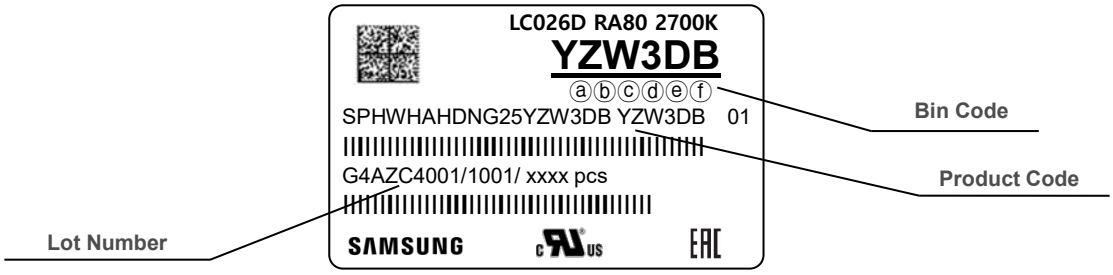
Test Item	Test Condition	Test Hour / Cycle
High Temperature Humidity Life Test	60 ºC, 90 % RH,, DC Derating, I_F	1000 h
High Temperature Life Test	85 ºC, DC Derating, I_F	1000 h
Low Temperature Life Test	-40 ºC, DC,Derating I_F	1000 h
High Temperature Storage	120 ºC	1000 h
Low Temperature Storage	-40 ºC	1000 h
Temperature Humidity Storage	60 ºC, 90% RH	1000h
Thermal shock	-40 °C to 125 °C, Transfer Time : < 20 seconds	200 cycles
ESD (HBM)	R_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ±2kV	5 times
Vibration Test	20~80 Hz(displacement: 0.06 inch, max. 20 g) 80 ~ 2 kHz (max. 20 g) min. frequency ↔max. frequency 4 min transfer	4 times
Mechanical Shock Test	1500g, 0.5 ms each of the 6 surfaces (3axis x 2 sides)	5 times
Sulfur Resistance	25 °C, 75%, H2S 15 ppm	504h
High Temperature Humidity Life Test	60 ºC, 90 % RH,, DC Derating, I_F	1000 h

b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_c = 25 ºC)	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:

ⓐⓑ: Forward Voltage bin (refer to page 9)

ⓒⓓ: Chromaticity bin (refer to page 21)

ⓔⓕ: Luminous Flux bin (refer to page 5-8)

b) Lot Number

The lot number is composed of the following characters:

① ②③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / xxxx pcs

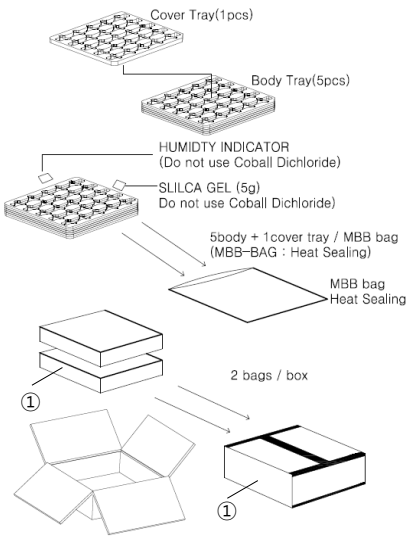
①	:	Production site (S: Giheung, Korea, G: Tianjin, China)
②	:	4(LED)
③	:	Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	:	Year (F: 2021, G: 2022, H: 2023…)
⑤	:	Month (1~9, A, B, C)
⑥⑦⑧⑨	:	Day (1~9, A, B~V)
ⓐⓑⓒ	:	Product serial number (001 ~ 999)

7. Packing Structure

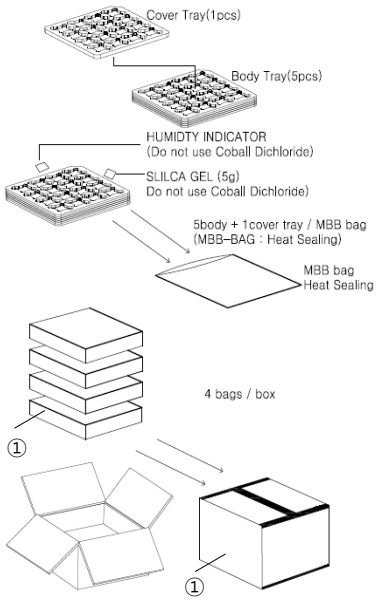
※ Model : L003D, LC006D, LC009D, LC013D

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**

(1P) Supplier Part Number : SPHWHAHDND25YZW3DB

(Q) Quantity : XXXX

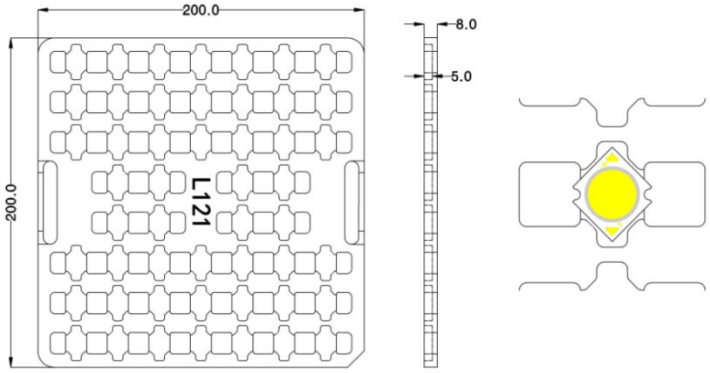
(33P) Bin Code / YZW3DB

(100) Data Code : 2109

(1T) Lot Number / 1001

(4L) Country of Origin : CN

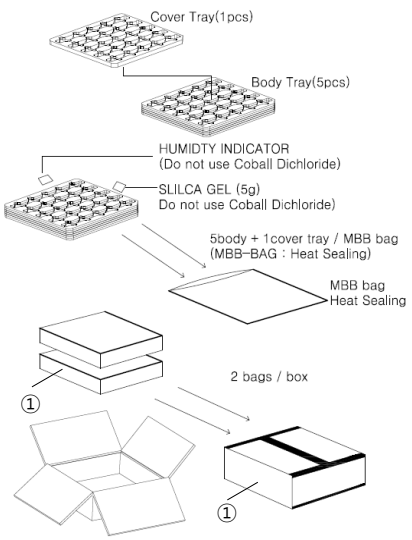
b) Tray



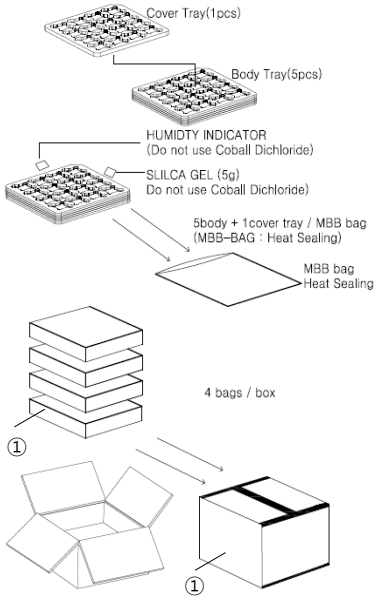
※ Model : LC016D. LC019D, LC026D, LC033D

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

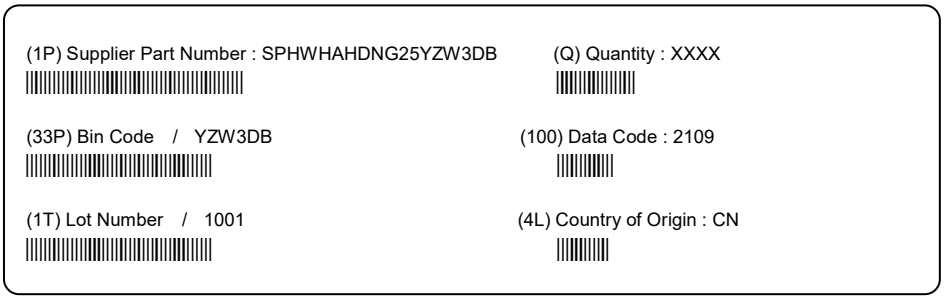


※ Small Box

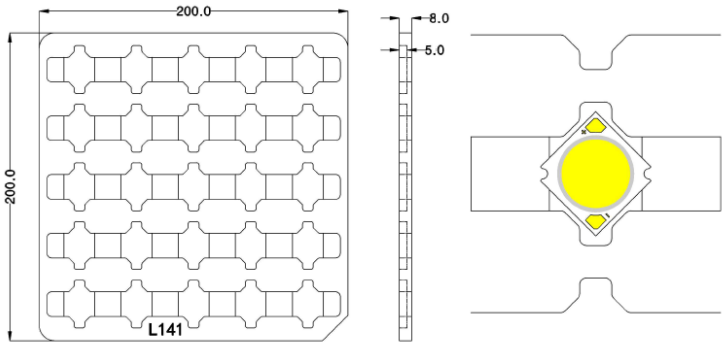


※ Middle Box

① **Side Label**



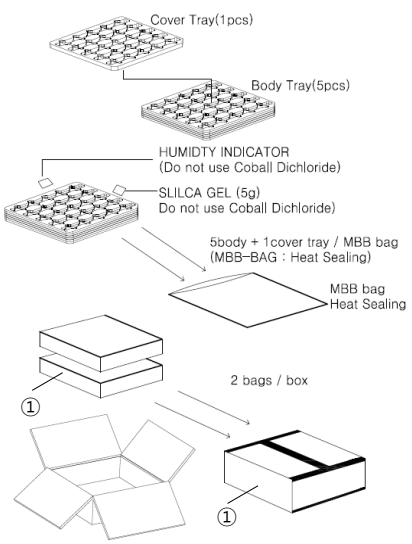
b) Tray



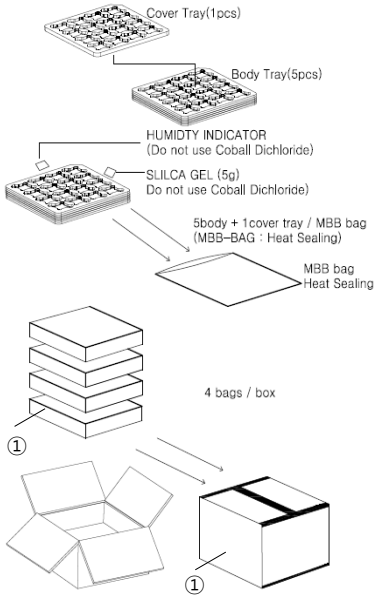
※ Model : LC040D, LC060D, LC080D

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]

[Initial state]

[After exposure to humidity]

[SILICA GEL (5g)]

① Side Label

LC040D RA80 2700K

YZW3DB

SPHWHAHDNK25YZW3DB YZW3DB 01

G4AZC4001/1001/ xxxx pcs

SAMSUNG

(1P) Supplier Part Number : SPHWHAHDNK25YZW3DB

(Q) Quantity : XXXX

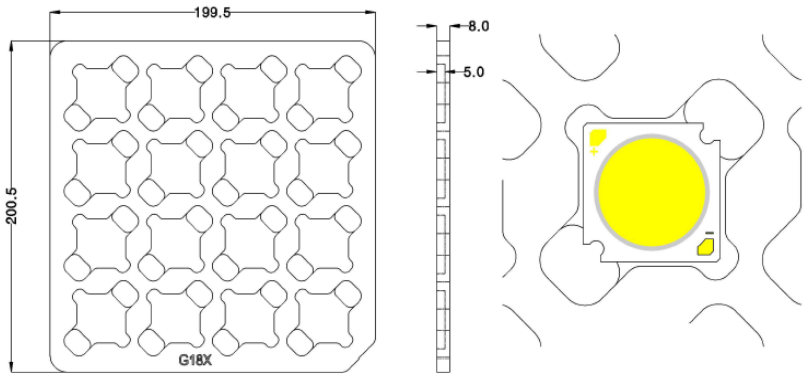
(33P) Bin Code / YZW3DB

(100) Data Code : 2109

(1T) Lot Number / 1001

(4L) Country of Origin : CN

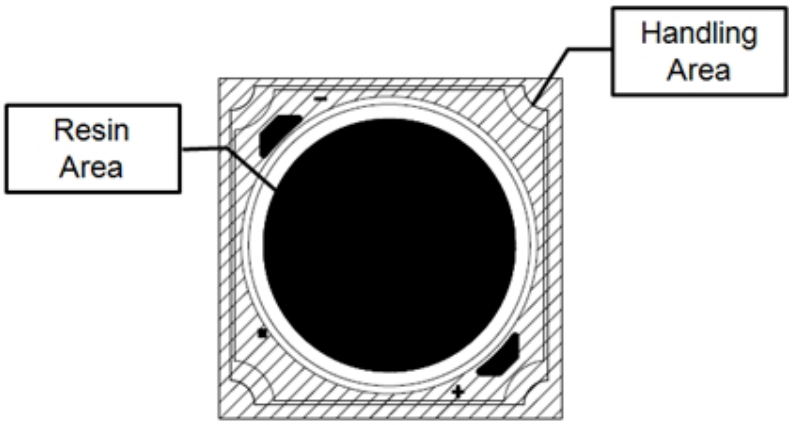
b) Tray



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 ºC, 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 ºC / 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 ºC.
6) Devices must be baked for 1 hour at 60 ± 5 ºC, 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 (If_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.



Legal and additional information.

About Samsung Electronics Co., Ltd.

Samsung Electronics Co., Ltd. inspires the world and shapes the future with transformative ideas and technologies, redefining the worlds of TVs, smartphones, wearable devices, tablets, cameras, digital appliances, printers, medical equipment, network systems and semiconductors. 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.

Copyright © 2015 Samsung Electronics Co., Ltd. All rights reserved. Samsung is a registered trademark of Samsung Electronics Co., Ltd. Specifications and designs are subject to change without notice. Non-metric weights and measurements are approximate. All data were deemed correct at time of creation. Samsung is not liable for errors or omissions. All brand, product, service names and logos are trademarks and/or registered trademarks of their respective owners and are hereby recognized and acknowledged.

Samsung Electronics Co., Ltd.
95, Samsung 2-ro
Giheung-gu
Yongin-si, Gyeonggi-do, 446-711
KOREA

www.samsung.com/led

SAMSUNG