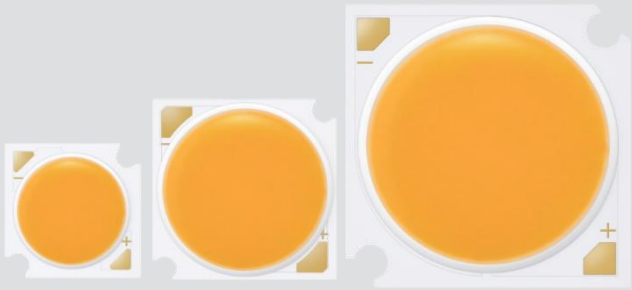
High VoltageLED Series
Chip on Board

COB D-Gen.2



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

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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	230 / 8.6	mA / W	-
		LC006D	460 / 17.2		-
		LC009D	690 / 25.9		-
		LC013D	920 / 34.5		-
		LC016D	1150 / 43.1		-
		LC019D	1380 / 51.8		-
		LC026D	1840 / 69.0		-
		LC033D	2300 / 86.0		-
		LC040D	2760 / 103.5		-
		LC060D	2760 / 155.1		-
		LC080D	4140 / 232.6		-
ESD (HBM)	-	-	±2	kV	-
ESD (MM)	-	-	±0.5	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	YZ	31.8	34.6	37.5
			1Z	47.8	52.0	56.2
Color Rendering Index (R_a)	-	All model	3	70	-	
			5	80	-	-
			7	90	-	-
Beam Angle	º	-	-	-	115	-
Nominal Power / Sorting Current	W / mA	LC003D	-	-	3.1 / 90	-
		LC006D	-	-	6.2 / 180	-
		LC009D	-	-	9.3 / 270	-
		LC013D	-	-	12.5 / 360	-
		LC016D	-	-	15.6 / 450	-
		LC019D	-	-	18.7 / 540	-
		LC026D	-	-	24.9 / 720	-
		LC033D	-	-	31.1 / 900	-
		LC040D	-	-	37.4 / 1080	-
		LC060D	-	-	56.2 / 1080	-
		LC080D	-	-	84.2 / 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.
LC003D2	80	2700	D2	436	459	-
		3000	D2	459	483	-
		3500	D2	476	501	-
		4000	D2	482	507	-
		5000	D2	488	513	-
		5700	D2	488	513	-
		6500	D2	482	507	-
	90	2700	D2	368	388	-
		3000	D2	385	406	-
		3500	D2	398	419	-
		4000	D2	406	427	-
		5000	D2	409	430	-
LC006D2	80	2700	D2	877	924	-
		3000	D2	922	971	-
		3500	D2	951	1001	-
		4000	D2	973	1024	-
		5000	D2	979	1030	-
		5700	D2	979	1030	-
		6500	D2	967	1018	-
	90	2700	D2	747	786	-
		3000	D2	783	824	-
		3500	D2	810	853	-
		4000	D2	827	870	-
		5000	D2	830	874	-

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.
LC009D2	70	3000	D2	1428	1503	-
		4000	D2	1497	1576	-
		5000	D2	1545	1626	-
	80	2700	D2	1275	1342	-
		3000	D2	1347	1418	-
		3500	D2	1386	1459	-
		4000	D2	1419	1494	-
		5000	D2	1431	1506	-
		5700	D2	1431	1506	-
		6500	D2	1414	1488	-
	90	2700	D2	1094	1152	-
		3000	D2	1146	1206	-
		3500	D2	1182	1245	-
		4000	D2	1209	1273	-
		5000	D2	1214	1278	-
LC013D2	70	3000	D2	1905	2006	-
		4000	D2	1966	2070	-
		5000	D2	1997	2102	-
	80	2700	D2	1676	1764	-
		3000	D2	1764	1857	-
		3500	D2	1819	1915	-
		4000	D2	1852	1950	-
		5000	D2	1869	1967	-
		5700	D2	1869	1967	-
		6500	D2	1841	1938	-
	90	2700	D2	1433	1509	-
		3000	D2	1501	1580	-
		3500	D2	1554	1635	-
		4000	D2	1587	1670	-
		5000	D2	1591	1674	-

Notes:

2) 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.
LC016D2	70	3000	D2	2486	2617	-
		4000	D2	2566	2701	-
		5000	D2	2605	2742	-
	80	2700	D2	2179	2293	-
		3000	D2	2302	2423	-
		3500	D2	2387	2513	-
		4000	D2	2430	2558	-
		5000	D2	2452	2581	-
		5700	D2	2452	2581	-
		6500	D2	2430	2558	-
	90	2700	D2	1868	1967	-
		3000	D2	1980	2084	-
		3500	D2	2038	2146	-
		4000	D2	2079	2189	-
		5000	D2	2098	2209	-
LC019D2	70	3000	D2	2952	3107	-
		4000	D2	3046	3207	-
		5000	D2	3093	3256	-
	80	2700	D2	2592	2728	-
		3000	D2	2733	2877	-
		3500	D2	2817	2965	-
		4000	D2	2875	3026	-
		5000	D2	2906	3059	-
		5700	D2	2906	3059	-
		6500	D2	2875	3026	-
	90	2700	D2	2219	2336	-
		3000	D2	2327	2449	-
		3500	D2	2412	2539	-
		4000	D2	2465	2594	-
		5000	D2	2467	2596	-

Notes:

3) 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.
LC026D2	70	3000	D2	3860	4063	-
		4000	D2	3983	4193	-
		5000	D2	4045	4258	-
	80	2700	D2	3401	3580	-
		3000	D2	3574	3762	-
		3500	D2	3679	3872	-
		4000	D2	3752	3950	-
		5000	D2	3784	3983	-
		5700	D2	3784	3983	-
		6500	D2	3752	3950	-
	90	2700	D2	2910	3064	-
		3000	D2	3061	3223	-
		3500	D2	3153	3319	-
		4000	D2	3218	3387	-
		5000	D2	3245	3416	-
LC033D2	70	3000	D2	4764	5014	-
		4000	D2	4916	5175	-
		5000	D2	4992	5255	-
	80	2700	D2	4197	4418	-
		3000	D2	4411	4643	-
		3500	D2	4540	4779	-
		4000	D2	4631	4875	-
		5000	D2	4670	4916	-
		5700	D2	4670	4916	-
		6500	D2	4631	4875	-
	90	2700	D2	3592	3781	-
		3000	D2	3778	3977	-
		3500	D2	3891	4096	-
		4000	D2	3971	4180	-
		5000	D2	4005	4216	-

Notes:

4) 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.
LC040D2	70	3000	D2	5989	6304	
		4000	D2	6180	6506	
		5000	D2	6276	6607	
	80	2700	D2	5270	5547	-
		3000	D2	5545	5837	-
		3500	D2	5715	6016	-
		4000	D2	5838	6146	-
		5000	D2	5866	6175	-
		5700	D2	5894	6205	-
		6500	D2	5831	6138	-
	90	2700	D2	4517	4755	-
		3000	D2	4773	5024	-
		3500	D2	4894	5152	-
		4000	D2	5002	5266	-
		5000	D2	5059	5325	-
LC060D2	70	3000	D2	8764	9225	-
		4000	D2	9045	9521	-
		5000	D2	9185	9668	-
	80	2700	D2	7702	8107	-
		3000	D2	8115	8542	-
		3500	D2	8371	8812	-
		4000	D2	8545	8995	-
		5000	D2	8587	9039	-
		5700	D2	8629	9084	-
		6500	D2	8540	8990	-
	90	2700	D2	6611	6959	-
		3000	D2	6984	7352	-
		3500	D2	7162	7539	-
		4000	D2	7320	7706	-
		5000	D2	7404	7793	-

Notes:

5) 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.
LC080D2	70	3000	D2	12792	13465	-
		4000	D2	13202	13896	-
		5000	D2	13406	14112	-
	80	2700	D2	11224	11815	-
		3000	D2	11845	12468	-
		3500	D2	12209	12852	-
		4000	D2	12466	13123	-
		5000	D2	12536	13196	-
		5700	D2	12596	13258	-
		6500	D2	12465	13121	-
	90	2700	D2	9649	10157	
		3000	D2	10195	10731	
		3500	D2	10454	11004	
		4000	D2	10685	11247	
		5000	D2	10806	11375	

Notes:

6) 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	2

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)	YZ	31.8~37.5
		1Z	47.8~56.2
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)	D2	COB D-series Gen.2 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	SPHWHAHDNA25YZW1D2 ~ SPHWHAHDNA25YZW2D2	YZ	W1 ~ W2	D2	436 ~
	3000	SPHWHAHDNA25YZV1D2 ~ SPHWHAHDNA25YZV2D2	YZ	V1 ~ V2	D2	459 ~
	3500	SPHWHAHDNA25YZU1D2 ~ SPHWHAHDNA25YZU2D2	YZ	U1 ~ U2	D2	476 ~
	4000	SPHWHAHDNA25YZT1D2 ~ SPHWHAHDNA25YZT2D2	YZ	T1 ~ T2	D2	482 ~
	5000	SPHWHAHDNA25YZR2D2 ~ SPHWHAHDNA25YZR3D2	YZ	R2 ~ R3	D2	488 ~
	5700	SPHWHAHDNA25YZQ2D2 ~ SPHWHAHDNA25YZQ3D2	YZ	Q2 ~ Q3	D2	488 ~
	6500	SPHWHAHDNA25YZP2D2 ~ SPHWHAHDNA25YZP3D2	YZ	P2 ~ P3	D2	482 ~
90	2700	SPHWHAHDNA27YZW1D2 ~ SPHWHAHDNA27YZW2D2	YZ	W1 ~ W2	D2	368 ~
	3000	SPHWHAHDNA27YZV1D2 ~ SPHWHAHDNA27YZV2D2	YZ	V1 ~ V2	D2	385 ~
	3500	SPHWHAHDNA27YZU1D2 ~ SPHWHAHDNA27YZU2D2	YZ	U1 ~ U2	D2	398 ~
	4000	SPHWHAHDNA27YZT1D2 ~ SPHWHAHDNA27YZT2D2	YZ	T1 ~ T2	D2	406 ~
	5000	SPHWHAHDNA27YZR2D2 ~ SPHWHAHDNA27YZR3D2	YZ	R2 ~ R3	D2	409 ~

※ LC006D(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	SPHWHAHDNB25YZW1D2	YZ	W1	D2	877~
		SPHWHAHDNB25YZW2D2		W2		
	3000	SPHWHAHDNB25YZV1D2	YZ	V1	D2	922~
		SPHWHAHDNB25YZV2D2		V2		
	3500	SPHWHAHDNB25YZU1D2	YZ	U1	D2	951~
		SPHWHAHDNB25YZU2D2		U2		
	4000	SPHWHAHDNB25YZT1D2	YZ	T1	D2	973~
		SPHWHAHDNB25YZT2D2		T2		
	5000	SPHWHAHDNB25YZR2D2	YZ	R2	D2	979~
		SPHWHAHDNB25YZR3D2		R3		
	5700	SPHWHAHDNB25YZQ2D2	YZ	Q2	D2	979~
		SPHWHAHDNB25YZQ3D2		Q3		
	6500	SPHWHAHDNB25YZP2D2	YZ	P2	D2	967~
		SPHWHAHDNB25YZP3D2		P3		
90	2700	SPHWHAHDNB27YZW1D2	YZ	W1	D2	747 ~
		SPHWHAHDNB27YZW2D2		W2		
	3000	SPHWHAHDNB27YZV1D2	YZ	V1	D2	783 ~
		SPHWHAHDNB27YZV2D2		V2		
	3500	SPHWHAHDNB27YZU1D2	YZ	U1	D2	810 ~
		SPHWHAHDNB27YZU2D2		U2		
	4000	SPHWHAHDNB27YZT1D2	YZ	T1	D2	827 ~
		SPHWHAHDNB27YZT2D2		T2		
	5000	SPHWHAHDNB27YZR2D2	YZ	R2	D2	830 ~
		SPHWHAHDNB27YZR3D2		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	SPHWHAHDNC23YZV2D2 ~ SPHWHAHDNC23YZV3D2	YZ	V2 ~ V3	D2	1428 ~
	4000	SPHWHAHDNC23YZT2D2 ~ SPHWHAHDNC23YZT3D2	YZ	T2 ~ T3	D2	1497 ~
	5000	SPHWHAHDNC23YZR2D2 ~ SPHWHAHDNC23YZR3D2	YZ	R2 ~ R3	D2	1545 ~
80	2700	SPHWHAHDNC25YZW1D2 ~ SPHWHAHDNC25YZW2D2	YZ	W1 ~ W2	D2	1275 ~
	3000	SPHWHAHDNC25YZV1D2 ~ SPHWHAHDNC25YZV2D2	YZ	V1 ~ V2	D2	1347 ~
	3500	SPHWHAHDNC25YZU1D2 ~ SPHWHAHDNC25YZU2D2	YZ	U1 ~ U2	D2	1386 ~
	4000	SPHWHAHDNC25YZT1D2 ~ SPHWHAHDNC25YZT2D2	YZ	T1 ~ T2	D2	1419 ~
	5000	SPHWHAHDNC25YZR2D2 ~ SPHWHAHDNC25YZR3D2	YZ	R2 ~ R3	D2	1431 ~
	5700	SPHWHAHDNC25YZQ2D2 ~ SPHWHAHDNC25YZQ3D2	YZ	Q2 ~ Q3	D2	1431 ~
	6500	SPHWHAHDNC25YZP2D2 ~ SPHWHAHDNC25YZP3D2	YZ	P2 ~ P3	D2	1414 ~
90	2700	SPHWHAHDNC27YZW1D2 ~ SPHWHAHDNC27YZW2D2	YZ	W1 ~ W2	D2	1094 ~
	3000	SPHWHAHDNC27YZV1D2 ~ SPHWHAHDNC27YZV2D2	YZ	V1 ~ V2	D2	1146 ~
	3500	SPHWHAHDNC27YZU1D2 ~ SPHWHAHDNC27YZU2D2	YZ	U1 ~ U2	D2	1182 ~
	4000	SPHWHAHDNC27YZT1D2 ~ SPHWHAHDNC27YZT2D2	YZ	T1 ~ T2	D2	1209 ~
	5000	SPHWHAHDNC27YZR2D2 ~ SPHWHAHDNC27YZR3D2	YZ	R2 ~ R3	D2	1214 ~

※ 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	SPHWHAHDND23YZV2D2	YZ	V2	D2	1905 ~
		SPHWHAHDND23YZV3D2		V3		
	4000	SPHWHAHDND23YZT2D2	YZ	T2	D2	1966 ~
		SPHWHAHDND23YZT3D2		T3		
	5000	SPHWHAHDND23YZR2D2	YZ	R2	D2	1997 ~
		SPHWHAHDND23YZR3D2		R3		
80	2700	SPHWHAHDND25YZW1D2	YZ	W1	D2	1676 ~
		SPHWHAHDND25YZW2D2		W2		
	3000	SPHWHAHDND25YZV1D2	YZ	V1	D2	1764 ~
		SPHWHAHDND25YZV2D2		V2		
	3500	SPHWHAHDND25YZU1D2	YZ	U1	D2	1819 ~
		SPHWHAHDND25YZU2D2		U2		
	4000	SPHWHAHDND25YZT1D2	YZ	T1	D2	1852 ~
		SPHWHAHDND25YZT2D2		T2		
	5000	SPHWHAHDND25YZR2D2	YZ	R2	D2	1869 ~
		SPHWHAHDND25YZR3D2		R3		
	5700	SPHWHAHDND25YZQ2D2	YZ	Q2	D2	1869 ~
		SPHWHAHDND25YZQ3D2		Q3		
	6500	SPHWHAHDND25YZP2D2	YZ	P2	D2	1841 ~
		SPHWHAHDND25YZP3D2		P3		
90	2700	SPHWHAHDND27YZW1D2	YZ	W1	D2	1433 ~
		SPHWHAHDND27YZW2D2		W2		
	3000	SPHWHAHDND27YZV1D2	YZ	V1	D2	1501 ~
		SPHWHAHDND27YZV2D2		V2		
	3500	SPHWHAHDND27YZU1D2	YZ	U1	D2	1554 ~
		SPHWHAHDND27YZU2D2		U2		
	4000	SPHWHAHDND27YZT1D2	YZ	T1	D2	1587 ~
		SPHWHAHDND27YZT2D2		T2		
	5000	SPHWHAHDND27YZR2D2	YZ	R2	D2	1591 ~
		SPHWHAHDND27YZR3D2		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	SPHWHAHDNE23YZV2D2	YZ	V2	D2	2486 ~
		SPHWHAHDNE23YZV3D2		V3		
	4000	SPHWHAHDNE23YZT2D2	YZ	T2	D2	2566 ~
		SPHWHAHDNE23YZT3D2		T3		
	5000	SPHWHAHDNE23YZR2D2	YZ	R2	D2	2605 ~
		SPHWHAHDNE23YZR3D2		R3		
80	2700	SPHWHAHDNE25YZW1D2	YZ	W1	D2	2179 ~
		SPHWHAHDNE25YZW2D2		W2		
	3000	SPHWHAHDNE25YZV1D2	YZ	V1	D2	2302 ~
		SPHWHAHDNE25YZV2D2		V2		
	3500	SPHWHAHDNE25YZU1D2	YZ	U1	D2	2387 ~
		SPHWHAHDNE25YZU2D2		U2		
	4000	SPHWHAHDNE25YZT1D2	YZ	T1	D2	2430 ~
		SPHWHAHDNE25YZT2D2		T2		
	5000	SPHWHAHDNE25YZR2D2	YZ	R2	D2	2452 ~
		SPHWHAHDNE25YZR3D2		R3		
	5700	SPHWHAHDNE25YZQ2D2	YZ	Q2	D2	2452 ~
		SPHWHAHDNE25YZQ3D2		Q3		
	6500	SPHWHAHDNE25YZP2D2	YZ	P2	D2	2430 ~
		SPHWHAHDNE25YZP3D2		P3		
90	2700	SPHWHAHDNE27YZW1D2	YZ	W1	D2	1868 ~
		SPHWHAHDNE27YZW2D2		W2		
	3000	SPHWHAHDNE27YZV1D2	YZ	V1	D2	1980 ~
		SPHWHAHDNE27YZV2D2		V2		
	3500	SPHWHAHDNE27YZU1D2	YZ	U1	D2	2038 ~
		SPHWHAHDNE27YZU2D2		U2		
	4000	SPHWHAHDNE27YZT1D2	YZ	T1	D2	2079 ~
		SPHWHAHDNE27YZT2D2		T2		
	5000	SPHWHAHDNE27YZR2D2	YZ	R2	D2	2098 ~
		SPHWHAHDNE27YZR3D2		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	SPHWHAHDNF23YZV2D2	YZ	V2	D2	2952 ~
		SPHWHAHDNF23YZV3D2		V3		
	4000	SPHWHAHDNF23YZT2D2	YZ	T2	D2	3046 ~
		SPHWHAHDNF23YZT3D2		T3		
	5000	SPHWHAHDNF23YZR2D2	YZ	R2	D2	3093 ~
		SPHWHAHDNF23YZR3D2		R3		
80	2700	SPHWHAHDNF25YZW1D2	YZ	W1	D2	2592 ~
		SPHWHAHDNF25YZW2D2		W2		
	3000	SPHWHAHDNF25YZV1D2	YZ	V1	D2	2733 ~
		SPHWHAHDNF25YZV2D2		V2		
	3500	SPHWHAHDNF25YZU1D2	YZ	U1	D2	2817 ~
		SPHWHAHDNF25YZU2D2		U2		
	4000	SPHWHAHDNF25YZT1D2	YZ	T1	D2	2875 ~
		SPHWHAHDNF25YZT2D2		T2		
	5000	SPHWHAHDNF25YZR2D2	YZ	R2	D2	2906 ~
		SPHWHAHDNF25YZR3D2		R3		
	5700	SPHWHAHDNF25YZQ2D2	YZ	Q2	D2	2906 ~
		SPHWHAHDNF25YZQ3D2		Q3		
	6500	SPHWHAHDNF25YZP2D2	YZ	P2	D2	2875 ~
		SPHWHAHDNF25YZP3D2		P3		
90	2700	SPHWHAHDNF27YZW1D2	YZ	W1	D2	2219 ~
		SPHWHAHDNF27YZW2D2		W2		
	3000	SPHWHAHDNF27YZV1D2	YZ	V1	D2	2327 ~
		SPHWHAHDNF27YZV2D2		V2		
	3500	SPHWHAHDNF27YZU1D2	YZ	U1	D2	2412 ~
		SPHWHAHDNF27YZU2D2		U2		
	4000	SPHWHAHDNF27YZT1D2	YZ	T1	D2	2465 ~
		SPHWHAHDNF27YZT2D2		T2		
	5000	SPHWHAHDNF27YZR2D2	YZ	R2	D2	2467 ~
		SPHWHAHDNF27YZR3D2		R3		

※ 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)
70	3000	SPHWHAHDNG23YZV2D2	YZ	V2	D2	3860 ~
		SPHWHAHDNG23YZV3D2		V3		
	4000	SPHWHAHDNG23YZT2D2	YZ	T2	D2	3983 ~
		SPHWHAHDNG23YZT3D2		T3		
	5000	SPHWHAHDNG23YZR2D2	YZ	R2	D2	4045 ~
		SPHWHAHDNG23YZR3D2		R3		
80	2700	SPHWHAHDNG25YZW1D2	YZ	W1	D2	3401 ~
		SPHWHAHDNG25YZW2D2		W2		
	3000	SPHWHAHDNG25YZV1D2	YZ	V1	D2	3574 ~
		SPHWHAHDNG25YZV2D2		V2		
	3500	SPHWHAHDNG25YZU1D2	YZ	U1	D2	3679 ~
		SPHWHAHDNG25YZU2D2		U2		
	4000	SPHWHAHDNG25YZT1D2	YZ	T1	D2	3752 ~
		SPHWHAHDNG25YZT2D2		T2		
	5000	SPHWHAHDNG25YZR2D2	YZ	R2	D2	3784 ~
		SPHWHAHDNG25YZR3D2		R3		
	5700	SPHWHAHDNG25YZQ2D2	YZ	Q2	D2	3784 ~
		SPHWHAHDNG25YZQ3D2		Q3		
	6500	SPHWHAHDNG25YZP2D2	YZ	P2	D2	3752 ~
		SPHWHAHDNG25YZP3D2		P3		
90	2700	SPHWHAHDNG27YZW1D2	YZ	W1	D2	2910 ~
		SPHWHAHDNG27YZW2D2		W2		
	3000	SPHWHAHDNG27YZV1D2	YZ	V1	D2	3061 ~
		SPHWHAHDNG27YZV2D2		V2		
	3500	SPHWHAHDNG27YZU1D2	YZ	U1	D2	3153 ~
		SPHWHAHDNG27YZU2D2		U2		
	4000	SPHWHAHDNG27YZT1D2	YZ	T1	D2	3218 ~
		SPHWHAHDNG27YZT2D2		T2		
	5000	SPHWHAHDNG27YZR2D2	YZ	R2	D2	3245 ~
		SPHWHAHDNG27YZR3D2		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	SPHWHAHDNH23YZV2D2	YZ	V2	D2	4764 ~
		SPHWHAHDNH23YZV3D2		V3		
	4000	SPHWHAHDNH23YZT2D2	YZ	T2	D2	4916 ~
		SPHWHAHDNH23YZT3D2		T3		
	5000	SPHWHAHDNH23YZR2D2	YZ	R2	D2	4992 ~
		SPHWHAHDNH23YZR3D2		R3		
80	2700	SPHWHAHDNH25YZW1D2	YZ	W1	D2	4197 ~
		SPHWHAHDNH25YZW2D2		W2		
	3000	SPHWHAHDNH25YZV1D2	YZ	V1	D2	4411 ~
		SPHWHAHDNH25YZV2D2		V2		
	3500	SPHWHAHDNH25YZU1D2	YZ	U1	D2	4540 ~
		SPHWHAHDNH25YZU2D2		U2		
	4000	SPHWHAHDNH25YZT1D2	YZ	T1	D2	4631 ~
		SPHWHAHDNH25YZT2D2		T2		
	5000	SPHWHAHDNH25YZR2D2	YZ	R2	D2	4670 ~
		SPHWHAHDNH25YZR3D2		R3		
	5700	SPHWHAHDNH25YZQ2D2	YZ	Q2	D2	4670 ~
		SPHWHAHDNH25YZQ3D2		Q3		
	6500	SPHWHAHDNH25YZP2D2	YZ	P2	D2	4631 ~
		SPHWHAHDNH25YZP3D2		P3		
90	2700	SPHWHAHDNH27YZW1D2	YZ	W1	D2	3592 ~
		SPHWHAHDNH27YZW2D2		W2		
	3000	SPHWHAHDNH27YZV1D2	YZ	V1	D2	3778 ~
		SPHWHAHDNH27YZV2D2		V2		
	3500	SPHWHAHDNH27YZU1D2	YZ	U1	D2	3891 ~
		SPHWHAHDNH27YZU2D2		U2		
	4000	SPHWHAHDNH27YZT1D2	YZ	T1	D2	3971 ~
		SPHWHAHDNH27YZT2D2		T2		
	5000	SPHWHAHDNH27YZR2D2	YZ	R2	D2	4005 ~
		SPHWHAHDNH27YZR3D2		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	SPHWHAHDNK23YZV2D2	YZ	V2	D2	5989 ~
		SPHWHAHDNK23YZV3D2		V3		
	4000	SPHWHAHDNK23YZT2D2	YZ	T2	D2	6180 ~
		SPHWHAHDNK23YZT3D2		T3		
	5000	SPHWHAHDNK23YZR2D2	YZ	R2	D2	6276 ~
		SPHWHAHDNK23YZR3D2		R3		
80	2700	SPHWHAHDNK25YZW1D2	YZ	W1	D2	5270 ~
		SPHWHAHDNK25YZW2D2		W2		
	3000	SPHWHAHDNK25YZV1D2	YZ	V1	D2	5545 ~
		SPHWHAHDNK25YZV2D2		V2		
	3500	SPHWHAHDNK25YZU1D2	YZ	U1	D2	5715 ~
		SPHWHAHDNK25YZU2D2		U2		
	4000	SPHWHAHDNK25YZT1D2	YZ	T1	D2	5838 ~
		SPHWHAHDNK25YZT2D2		T2		
	5000	SPHWHAHDNK25YZR2D2	YZ	R2	D2	5866 ~
		SPHWHAHDNK25YZR3D2		R3		
	5700	SPHWHAHDNK25YZQ2D2	YZ	Q2	D2	5894 ~
		SPHWHAHDNK25YZQ3D2		Q3		
	6500	SPHWHAHDNK25YZP2D2	YZ	P2	D2	5831 ~
		SPHWHAHDNK25YZP3D2		P3		
90	2700	SPHWHAHDNK27YZW1D2	YZ	W1	D2	4517 ~
		SPHWHAHDNK27YZW2D2		W2		
	3000	SPHWHAHDNK27YZV1D2	YZ	V1	D2	4773 ~
		SPHWHAHDNK27YZV2D2		V2		
	3500	SPHWHAHDNK27YZU2D2	YZ	U1	D2	4894 ~
		SPHWHAHDNK27YZU2D2		U2		
	4000	SPHWHAHDNK27YZT1D2	YZ	T1	D2	5002 ~
		SPHWHAHDNK27YZT2D2		T2		
	5000	SPHWHAHDNK27YZR2D2	YZ	R2	D2	5059 ~
		SPHWHAHDNK27YZR3D2		R3		

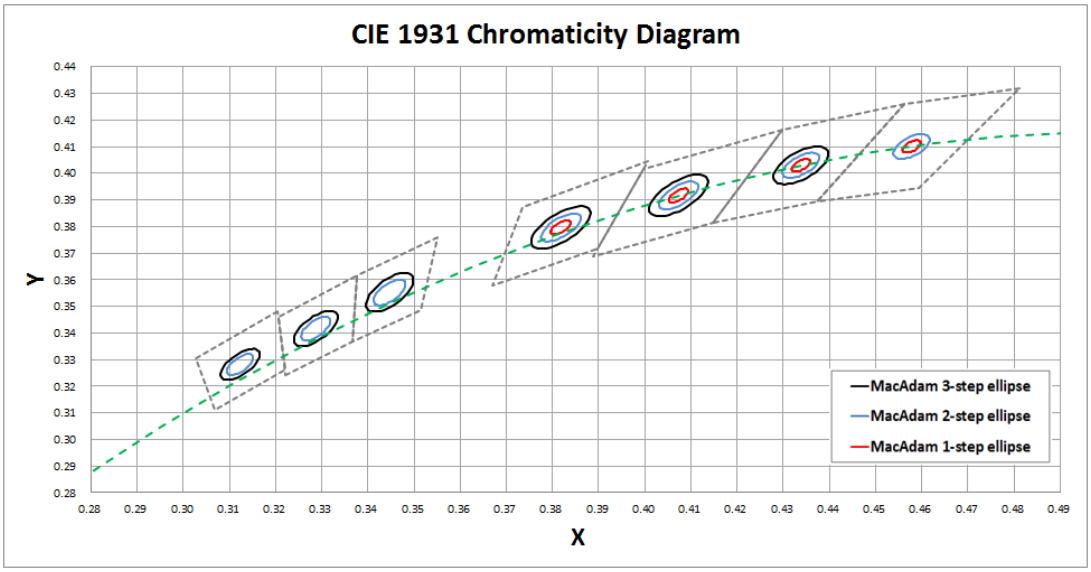
※ LC060D(I_F = 1080 mA, T_J = 85 °C)

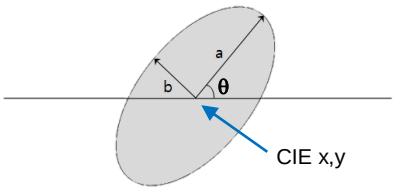
CRI(R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Chrom. Bin	Flux Rank	Flux Range (Φ_v, lm)
70	3000	SPHWHAHDNL231ZV2D2	1Z	V2	D2	8764 ~
		SPHWHAHDNL231ZV3D2		V3		
	4000	SPHWHAHDNL231ZT2D2	1Z	T2	D2	9045 ~
		SPHWHAHDNL231ZT3D2		T3		
	5000	SPHWHAHDNL231ZR2D2	1Z	R2	D2	9185 ~
		SPHWHAHDNL231ZR3D2		R3		
80	2700	SPHWHAHDNL251ZW1D2	1Z	W1	D2	7702 ~
		SPHWHAHDNL251ZW2D2		W2		
	3000	SPHWHAHDNL251ZV1D2	1Z	V1	D2	8115 ~
		SPHWHAHDNL251ZV2D2		V2		
	3500	SPHWHAHDNL251ZU1D2	1Z	U1	D2	8371 ~
		SPHWHAHDNL251ZU2D2		U2		
	4000	SPHWHAHDNL251ZT1D2	1Z	T1	D2	8545 ~
		SPHWHAHDNL251ZT2D2		T2		
	5000	SPHWHAHDNL251ZR2D2	1Z	R2	D2	8587 ~
		SPHWHAHDNL251ZR3D2		R3		
	5700	SPHWHAHDNL251ZQ2D2	1Z	Q2	D2	8629 ~
		SPHWHAHDNL251ZQ3D2		Q3		
	6500	SPHWHAHDNL251ZP2D2	1Z	P2	D2	8540 ~
		SPHWHAHDNL251ZP3D2		P3		
90	2700	SPHWHAHDNL271ZW1D2	1Z	W1	D2	6611 ~
		SPHWHAHDNL271ZW2D2		W2		
	3000	SPHWHAHDNL271ZV1D2	1Z	V1	D2	6984 ~
		SPHWHAHDNL271ZV2D2		V2		
	3500	SPHWHAHDNL271ZU1D2	1Z	U1	D2	7162 ~
		SPHWHAHDNL271ZU2D2		U2		
	4000	SPHWHAHDNL271ZT1D2	1Z	T1	D2	7320 ~
		SPHWHAHDNL271ZT2D2		T2		
	5000	SPHWHAHDNL271ZR2D2	1Z	R2	D2	7404 ~
		SPHWHAHDNL271ZR3D2		R3		

※ LC08oD(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	3000	SPHWHAHDNM231ZV2D2	1Z	V2	D2	12792 ~
		SPHWHAHDNM231ZV3D2		V3		
	4000	SPHWHAHDNM231ZT2D2	1Z	T2	D2	13202 ~
		SPHWHAHDNM231ZT3D2		T3		
	5000	SPHWHAHDNM231ZR2D2	1Z	R2	D2	13406 ~
		SPHWHAHDNM231ZR3D2		R3		
80	2700	SPHWHAHDNM251ZW1D2	1Z	W1	D2	11224 ~
		SPHWHAHDNM251ZW2D2		W2		
	3000	SPHWHAHDNM251ZV1D2	1Z	V1	D2	11845 ~
		SPHWHAHDNM251ZV2D2		V2		
	3500	SPHWHAHDNM251ZU1D2	1Z	U1	D2	12209 ~
		SPHWHAHDNM251ZU2D2		U2		
	4000	SPHWHAHDNM251ZT1D2	1Z	T1	D2	12466 ~
		SPHWHAHDNM251ZT2D2		T2		
	5000	SPHWHAHDNM251ZR2D2	1Z	R2	D2	12536 ~
		SPHWHAHDNM251ZR3D2		R3		
	5700	SPHWHAHDNM251ZQ2D2	1Z	Q2	D2	12596 ~
		SPHWHAHDNM251ZQ3D2		Q3		
	6500	SPHWHAHDNM251ZP2D2	1Z	P2	D2	12465 ~
		SPHWHAHDNM251ZP3D2		P3		
90	2700	SPHWHAHDNM271ZW1D2	1Z	W1	D2	9649 ~
		SPHWHAHDNM271ZW2D2		W2		
	3000	SPHWHAHDNM271ZV1D2	1Z	V1	D2	10195 ~
		SPHWHAHDNM271ZV2D2		V2		
	3500	SPHWHAHDNM271ZU1D2	1Z	U1	D2	10454 ~
		SPHWHAHDNM271ZU2D2		U2		
	4000	SPHWHAHDNM271ZT1D2	1Z	T1	D2	10685 ~
		SPHWHAHDNM271ZT2D2		T2		
	5000	SPHWHAHDNM271ZR2D2	1Z	R2	D2	10806 ~
		SPHWHAHDNM271ZR3D2		R3		
	5700	SPHWHAHDNM271ZQ2D2	1Z	Q2	D2	10806 ~
		SPHWHAHDNM271ZQ3D2		Q3		

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

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, U3)					
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

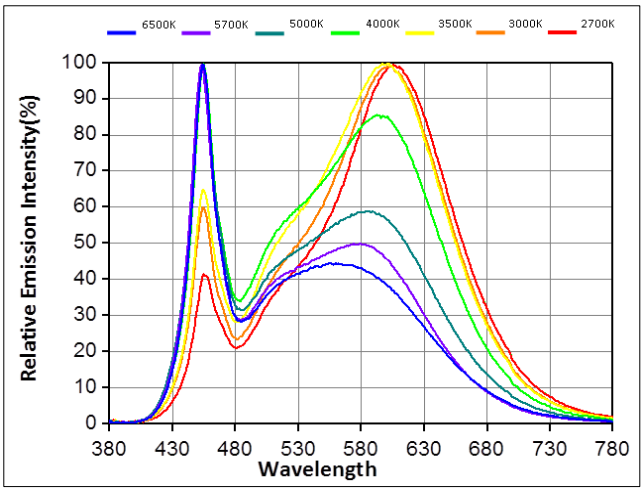
Note:

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

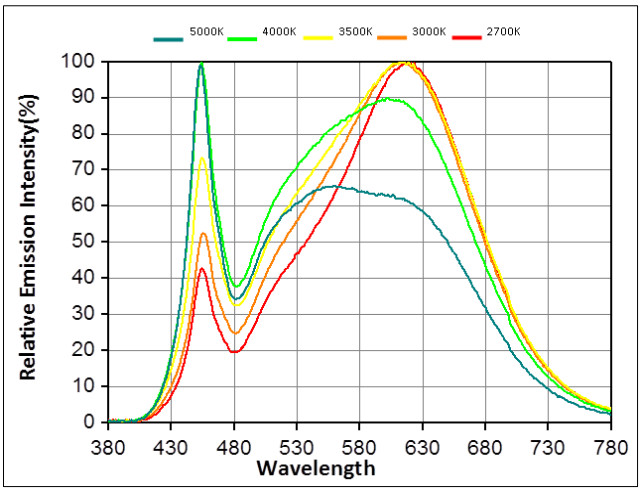
3. Typical Characteristics Graphs

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

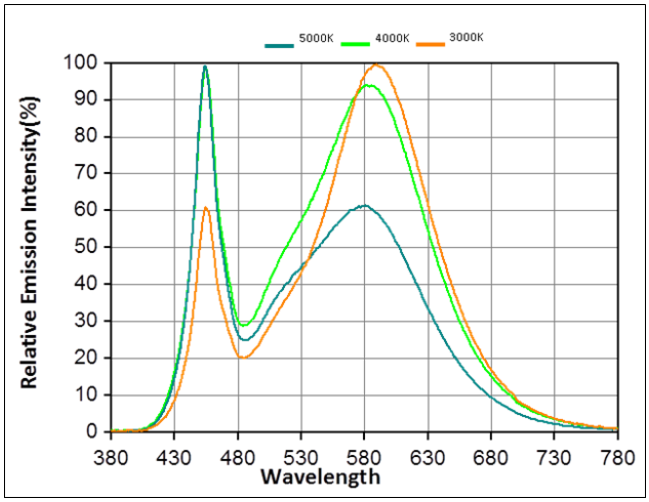
CRI Ra 80+



CRI Ra 90+

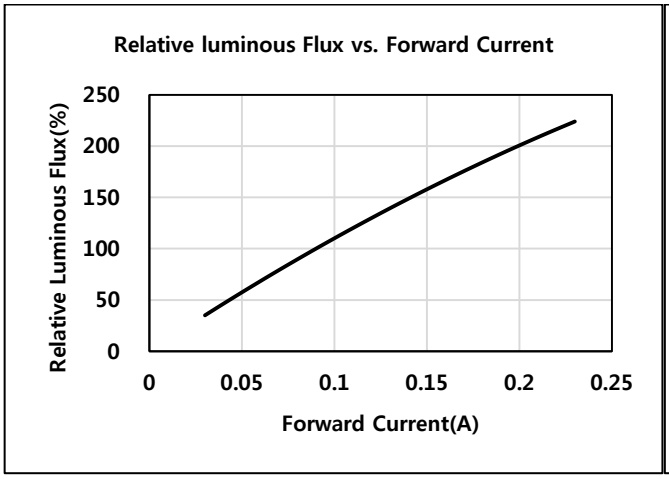


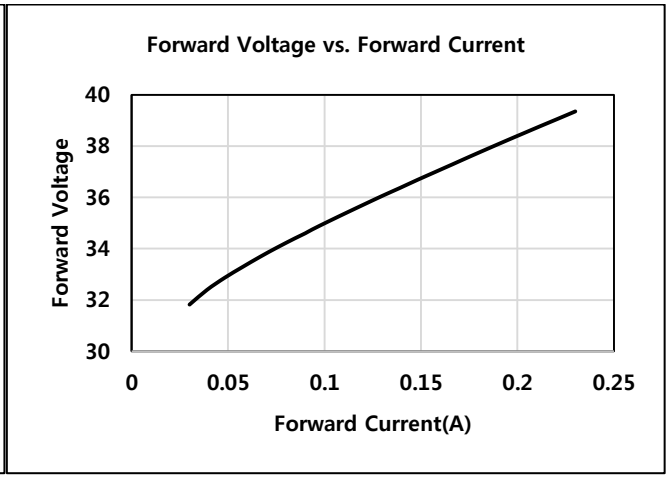
CRI Ra 70+



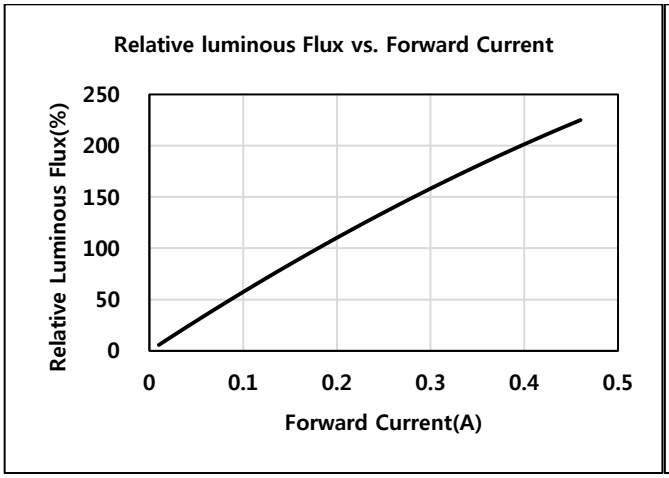
b) Forward Current Characteristics (T_J = 85 ºC)

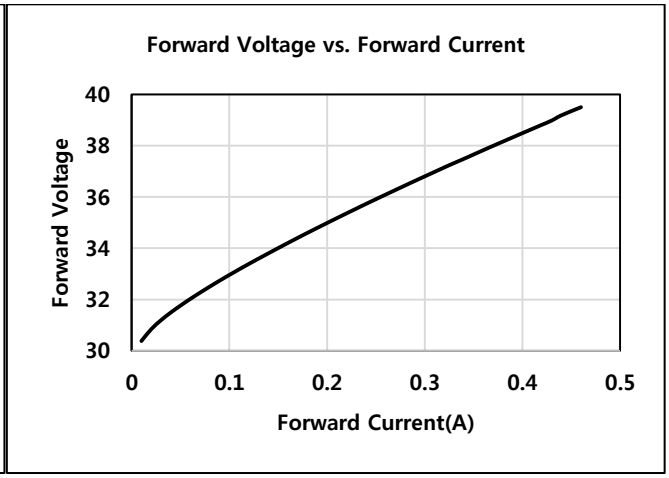
1)LC003D



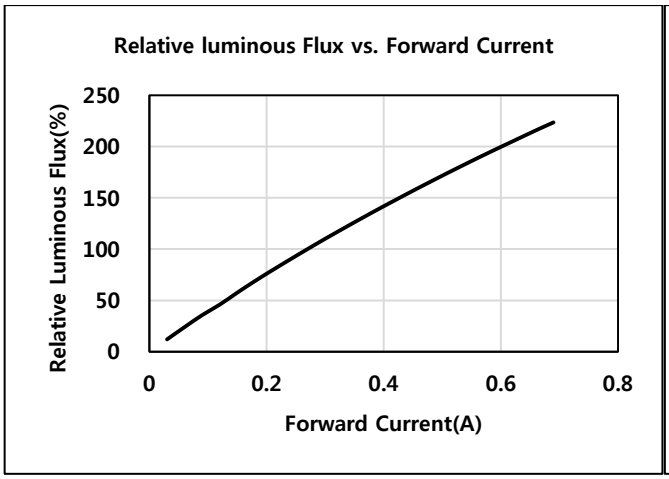


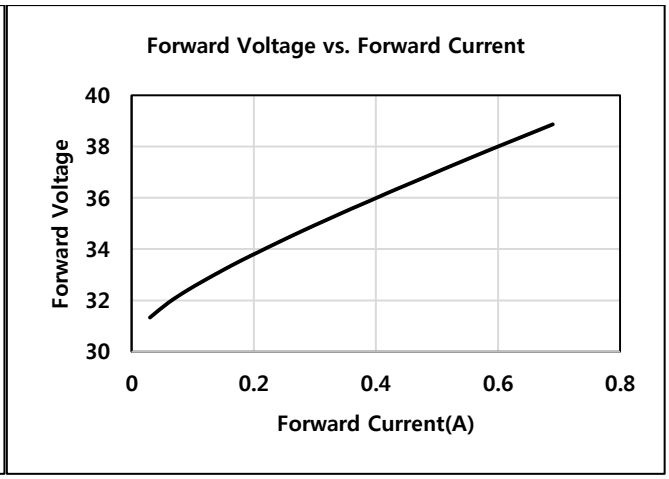
2) LC006D



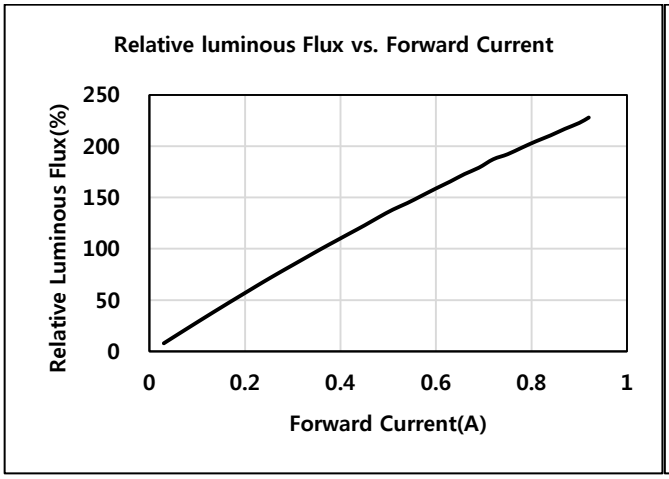


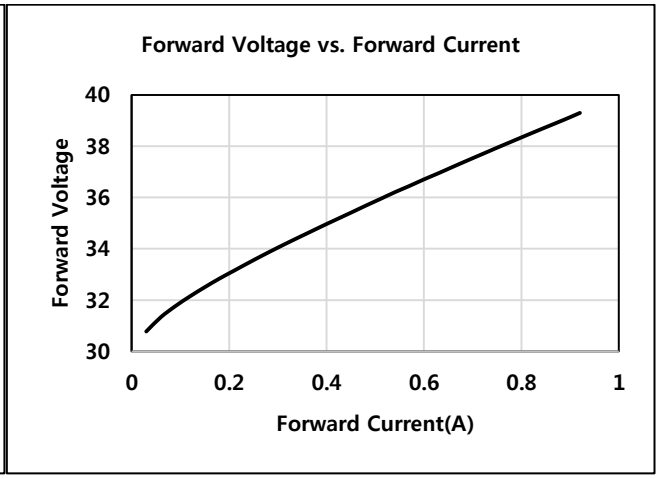
3) LC009D



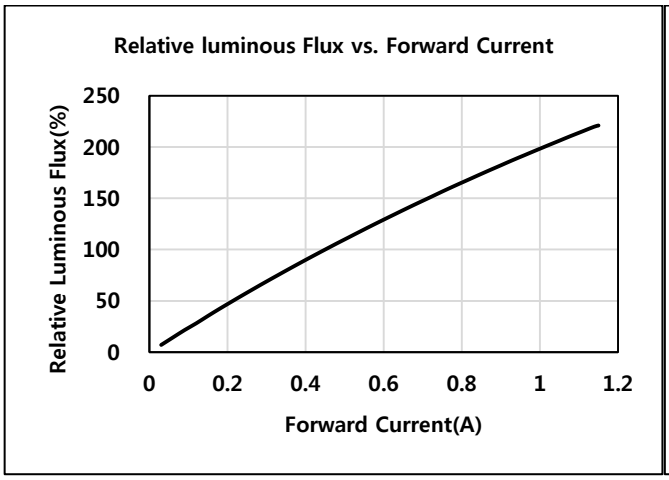


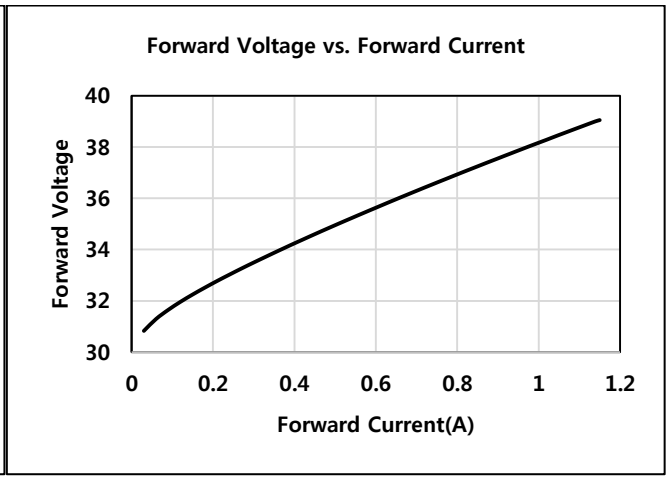
4) LC013D



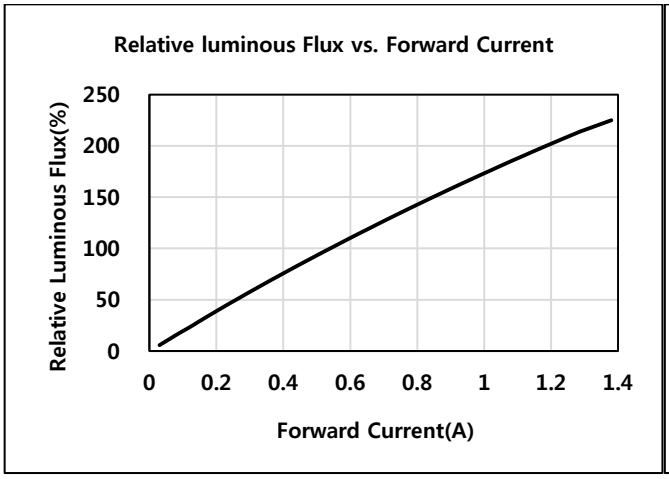


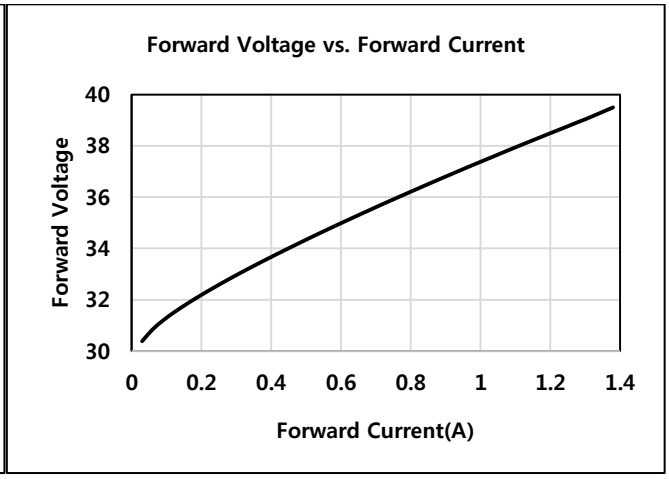
5) LC016D



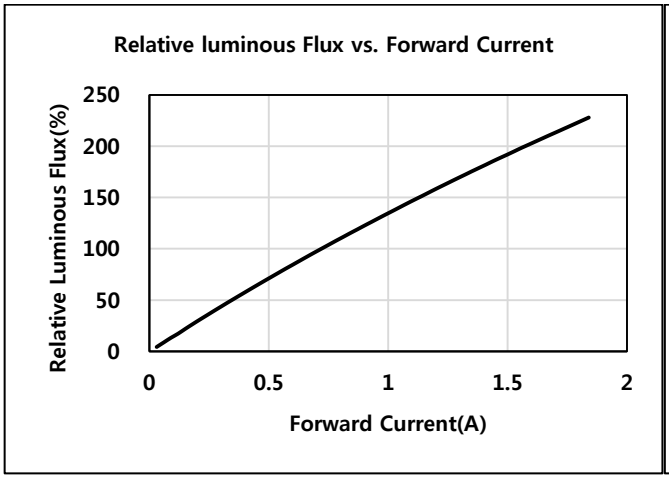


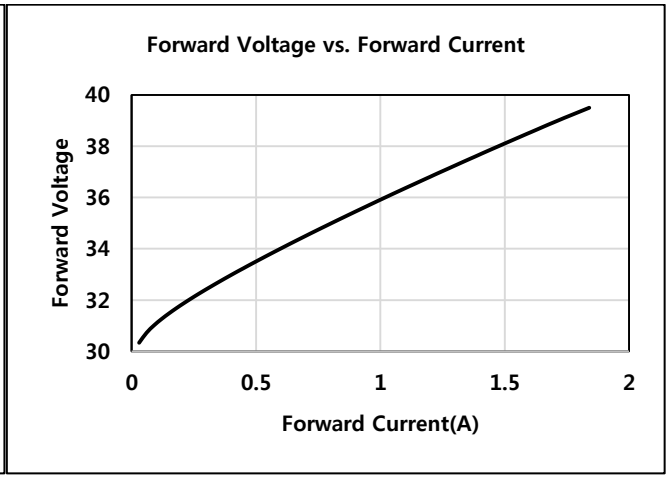
6) LC019D



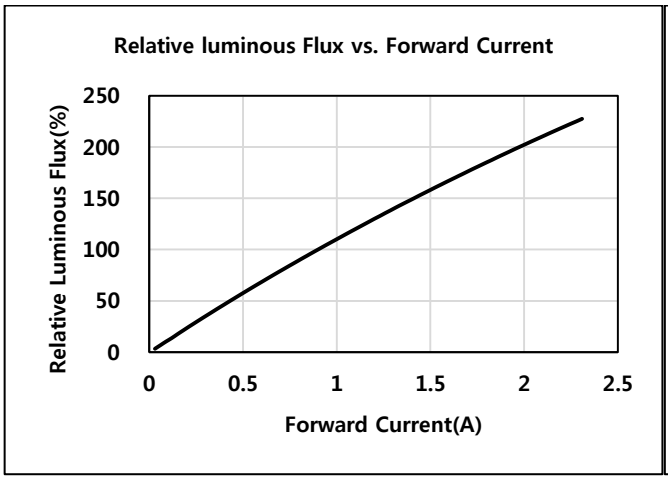


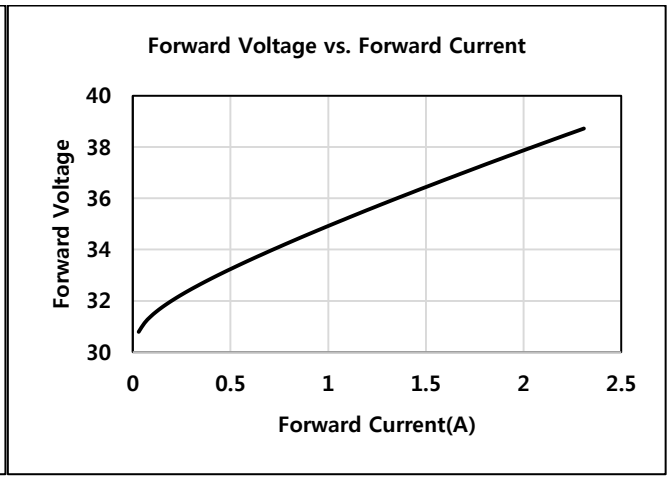
7) LC026D



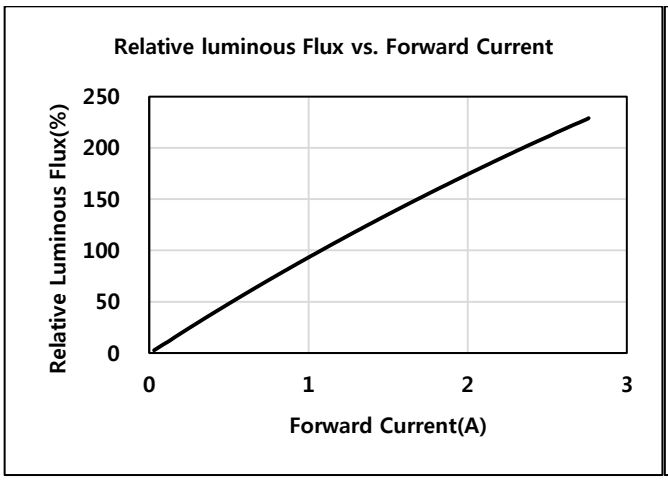


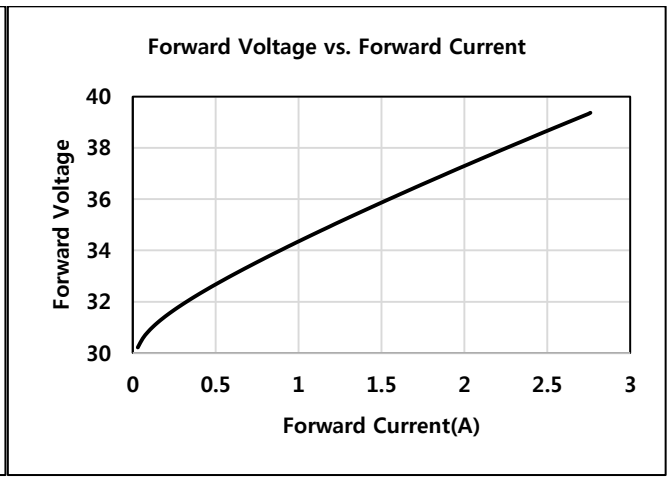
8) LC033D



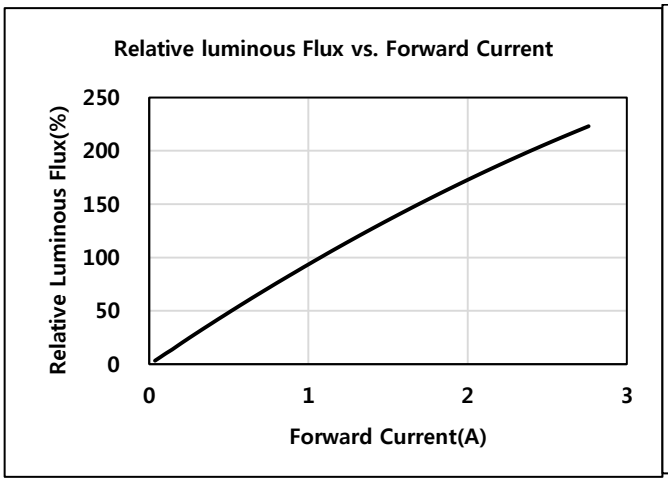


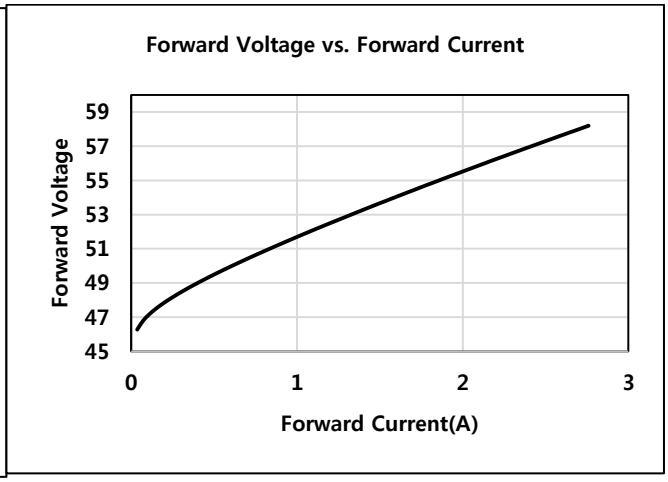
9) LC040D



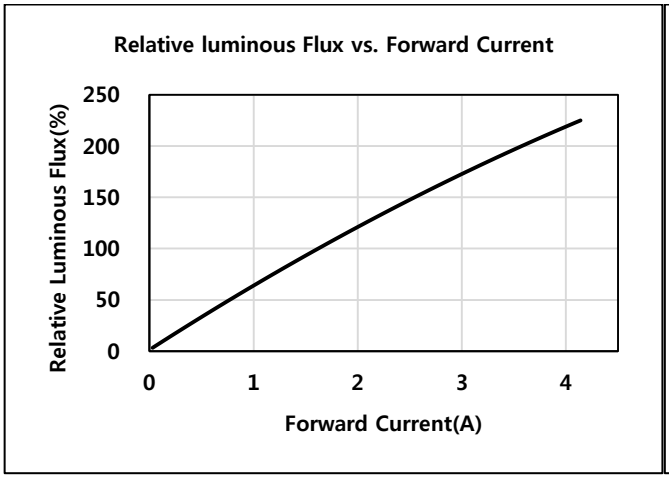


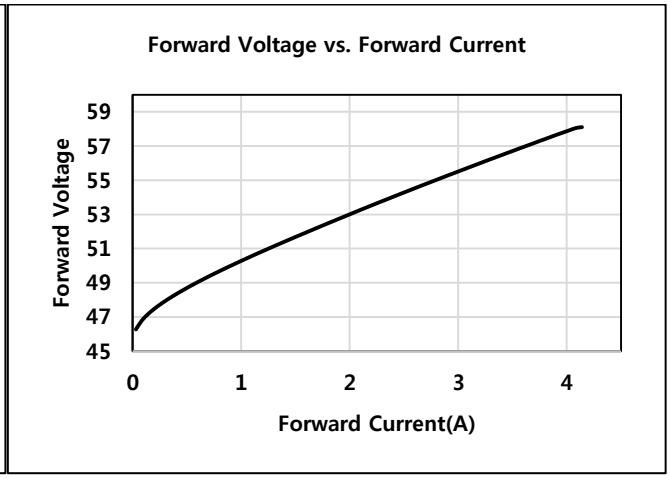
10) LC060D



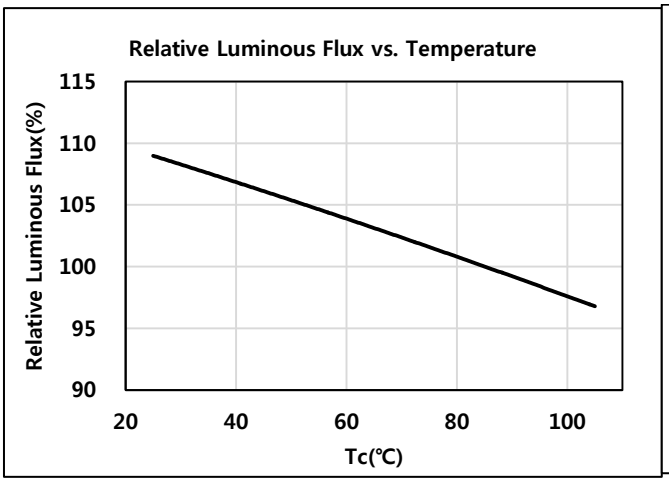


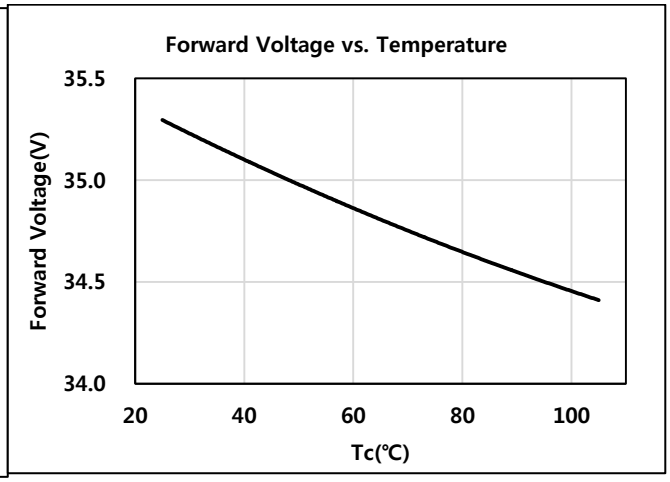
11) LC080D



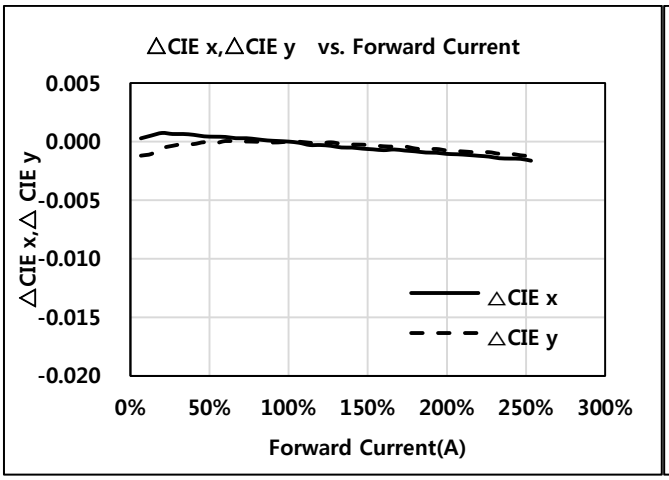


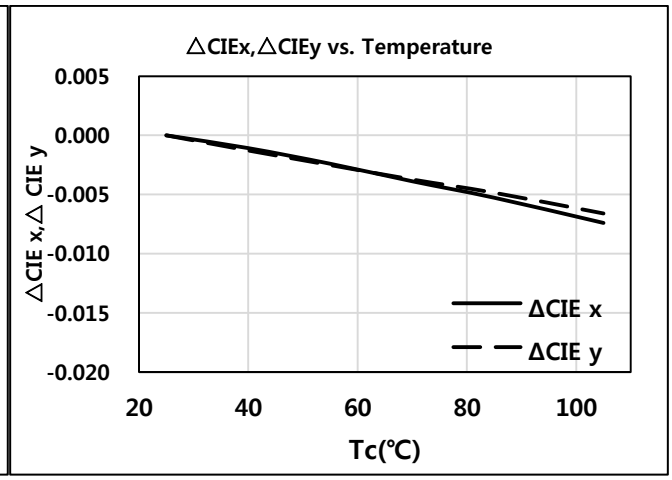
c) Temperature Characteristics(I_F = Sorting Current)



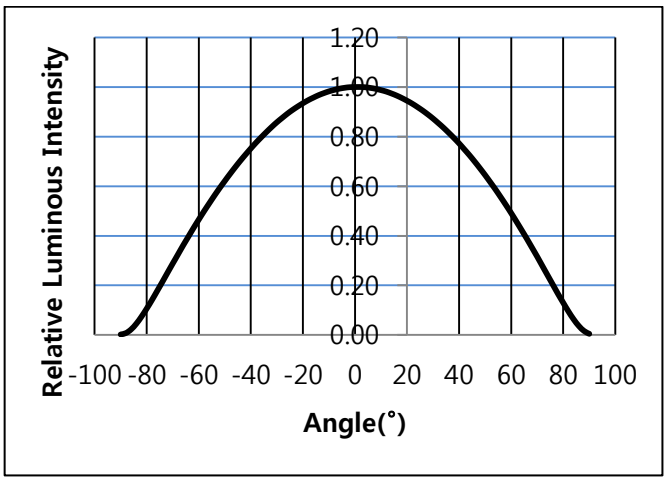


d) Color Shift Characteristics (T_J = 85 ºC, I_F =Sorting Current, CRI = 80+)



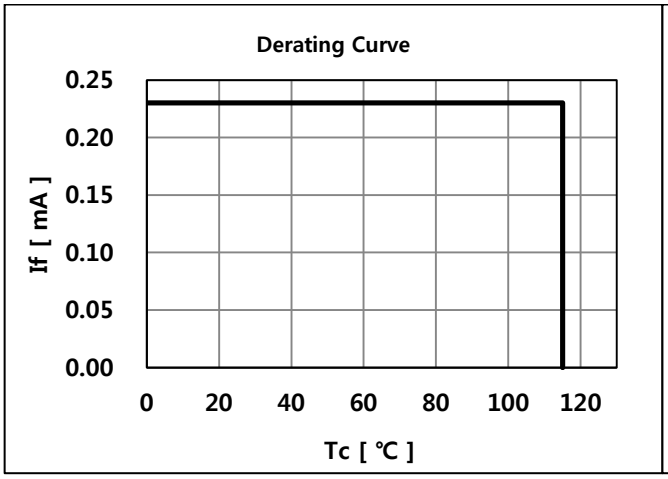


e) Beam Angle Characteristics (I_F = Sorting Current, T_J = 85 ºC)

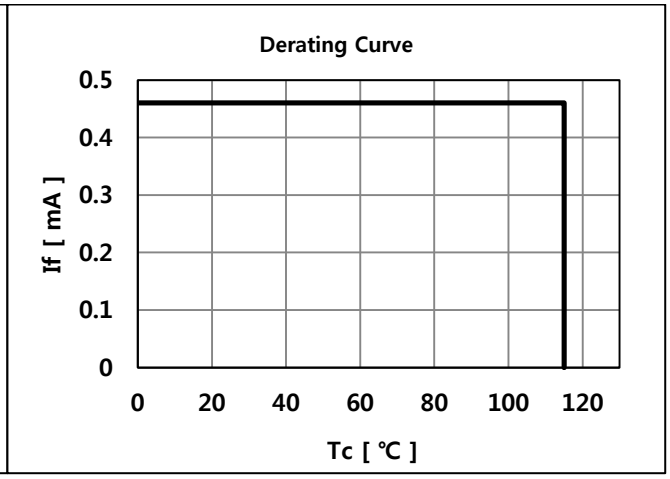


f) Derating Characteristics

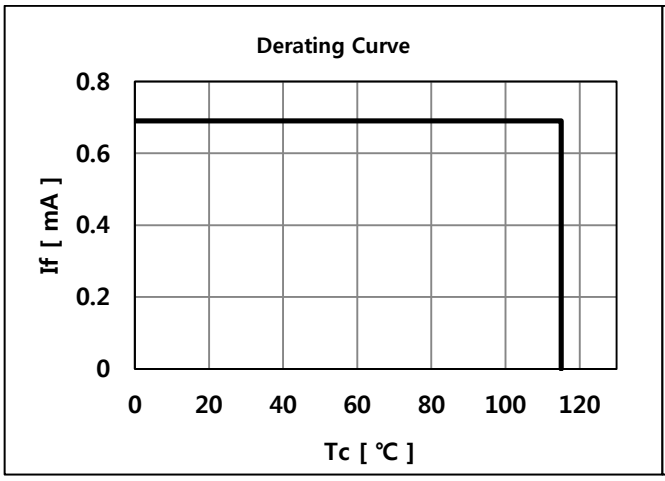
1) LC003D

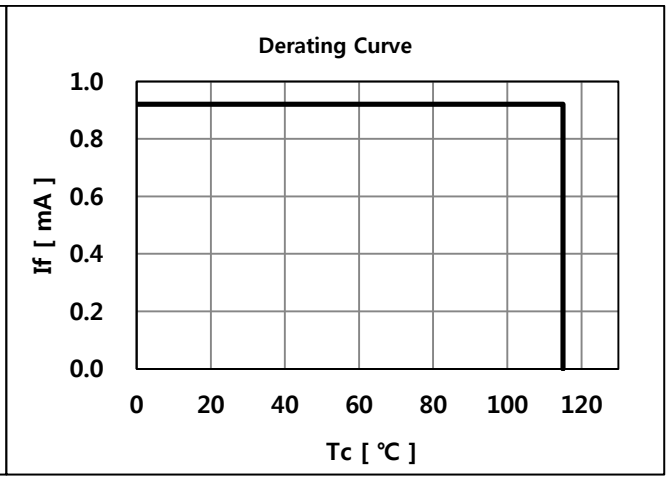


2) LC006D

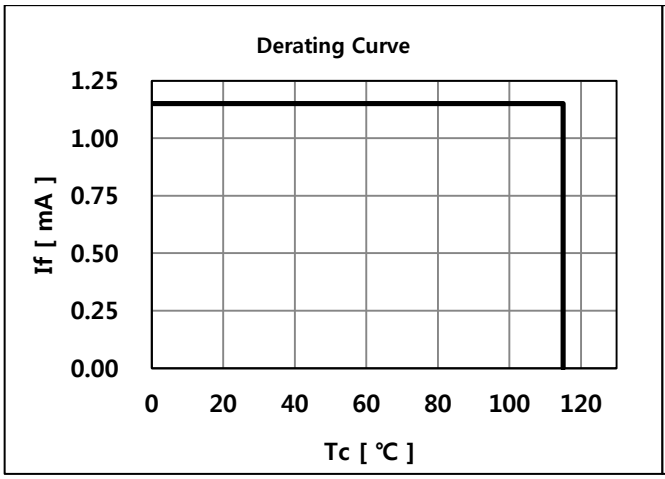


3) LC009D4) LC0013D

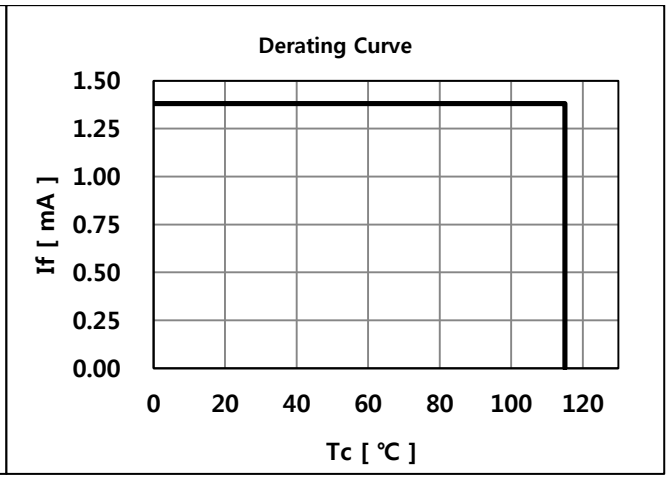




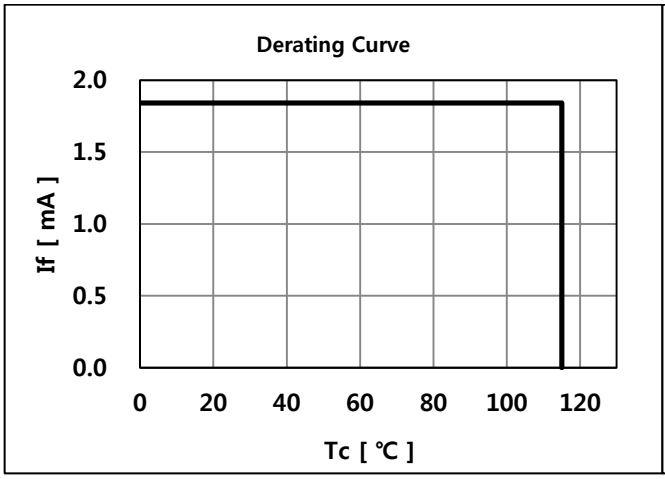
5) LC016D



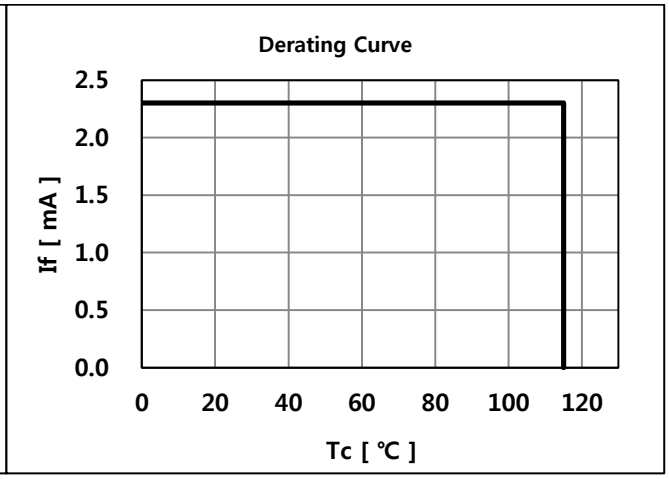
6) LC0019D



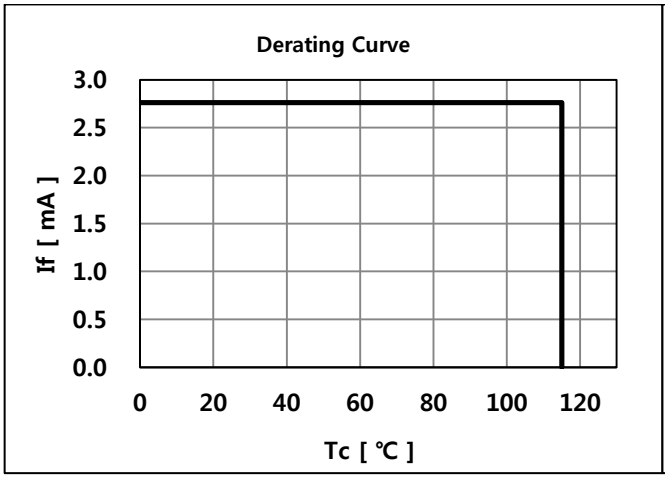
7) LC026D



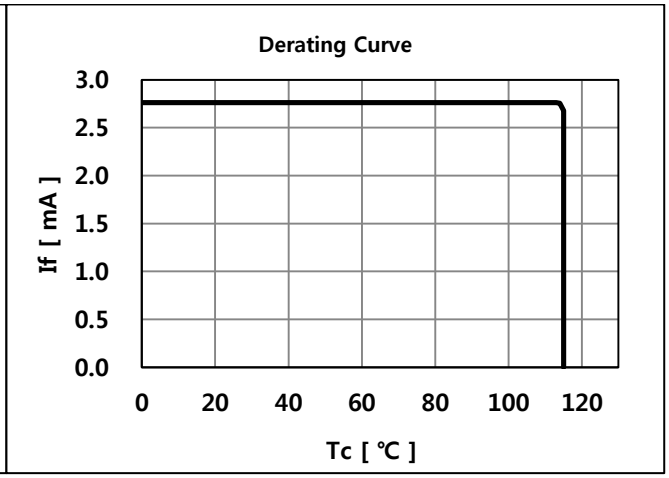
8) LC0033D



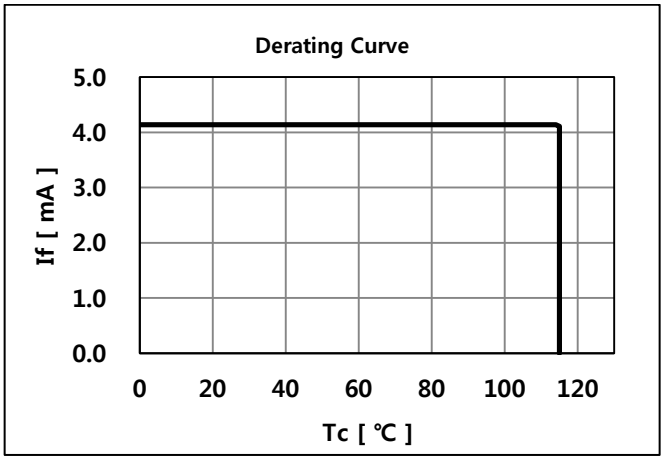
9) LC040D



10) LC060D

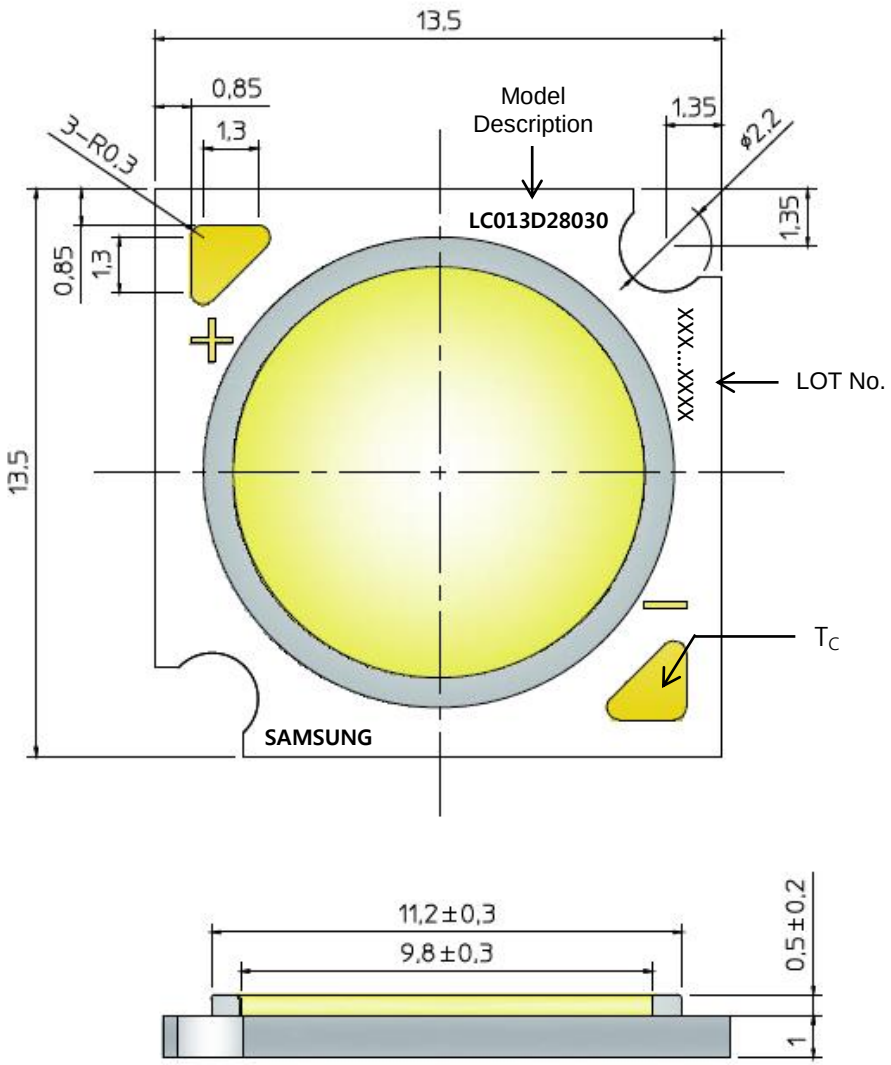


11) LC080D



4. Outline Drawing & Dimension

※ Model : LC003D, LC006D, LC009D, LC013D

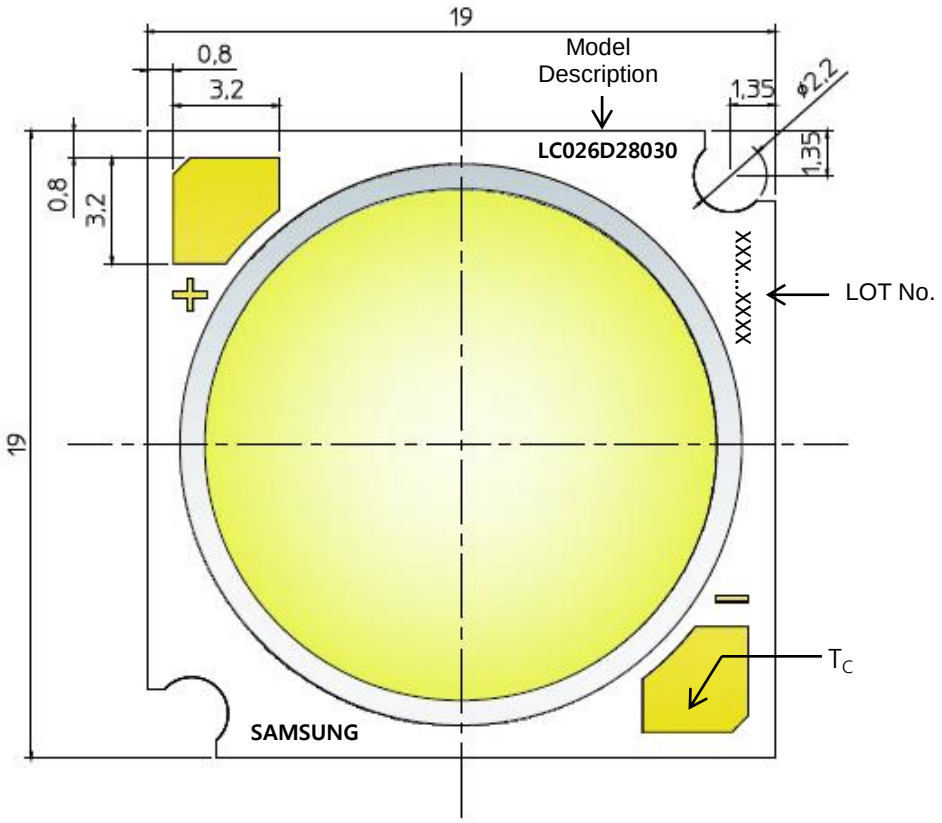


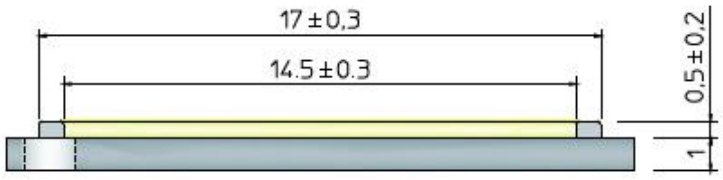
1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	13.5	±0.30	mm
Width	13.5	±0.30	mm
Height	1.50	±0.20	mm
Light Emitting Surface (LES) Diameter	9.8	±0.30	mm

Note: Denoted product information above is only an example
(LC013D28030 :LC013D, Gen3, Ra80, 3000K)

※ Model : LC016D, LC019D, LC026D, LC033D



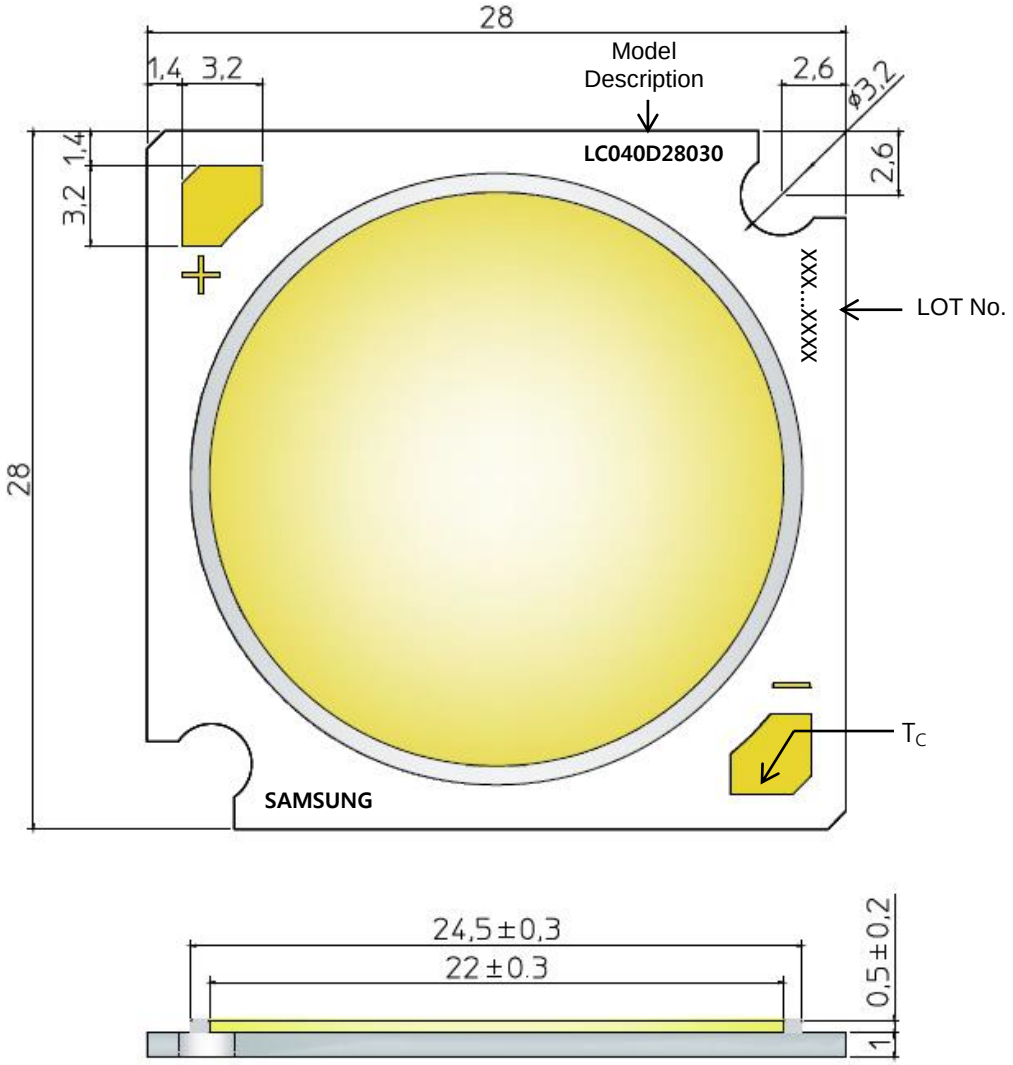


1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	19.0	±0.30	mm
Width	19.0	±0.30	mm
Height	1.50	±0.20	mm
Light Emitting Surface (LES) Diameter	14.5	±0.30	mm

Note: Denoted product information above is only an example
(LC026D28030 : LC026D, Gen3, CRI80+, 3000K)

※ Model : LC040D, LC060D, LC080D



1. Unit: mm
2. Tolerance: ± 0.3 mm

Item	Dimension	Tolerance	Unit
Length	28.0	±0.30	mm
Width	28.0	±0.30	mm
Height	1.50	±0.20	mm
Light Emitting Surface (LES) Diameter	22.0	±0.30	mm

Note: Denoted product information above is only an example
(LC040D28030 : LC040D, Gen2, CRI80+, 3000K)

5. Reliability Test Items & Conditions

a) Test Items

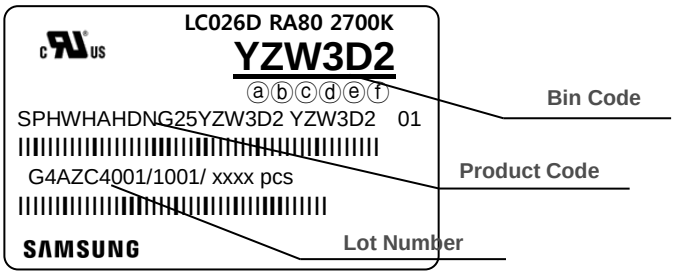
Test Item	Test Condition	Test Hour / Cycle
High Temperature Humidity Life Test	60 ºC, 90 % RH,, DC Derating, I_F	1000 h
High Temperature Life Test	85 ºC, DC Derating, I_F	1000 h
Low Temperature Life Test	-40 ºC, DC,Derating I_F	1000 h
High Temperature Storage	120 ºC	1000 h
Low Temperature Storage	-40 ºC	1000 h
Temperature Humidity Storage	60 ºC, 90% RH	1000h
TemperatureCycle On/OffTest	-40 ºC/85 ºCeach 20 min, 30mintransfer power on/offeach 5 min, DC Derating, I_F= max	100 cycles
ESD (HBM)	R_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ±2kV	5 times
ESD (MM)	R_1: 10 MΩ R_2: 0 kΩ C: 200 pF V: ±0.2kV	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 ③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / xxxx pcs

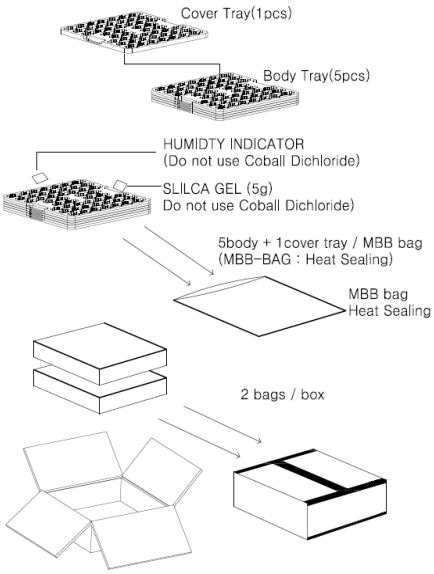
①	:	Production site (S: Giheung, Korea, G: Tianjin, China)
②	:	4(LED)
③	:	Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	:	Year (D: 2019, E: 2020, F: 2021…)
⑤	:	Month (1~9, A, B, C)
⑥⑦⑧⑨	:	Day (1~9, A, B~V)
ⓐⓑⓒ	:	Product serial number (001 ~ 999)

7. Packing Structure

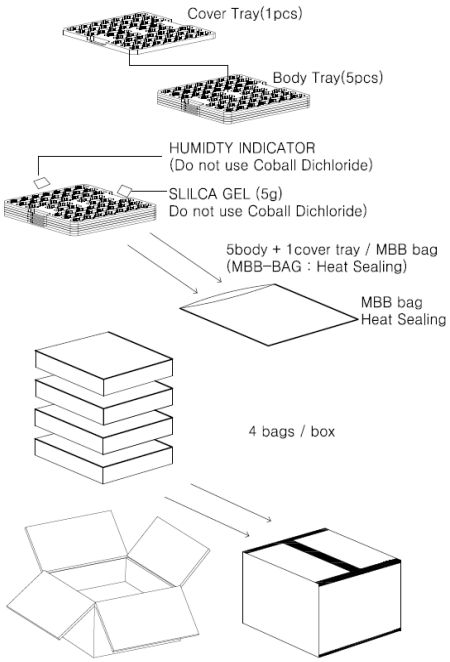
※ Model : L003D, LC006D, LC009D, LC013D

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

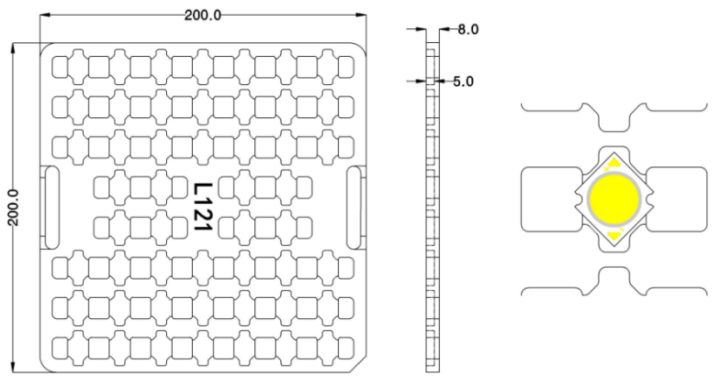


※ Small Box



※ Middle Box

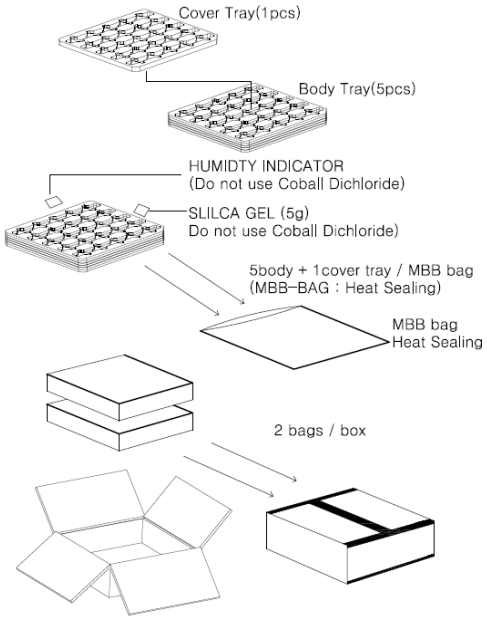
b) Tray



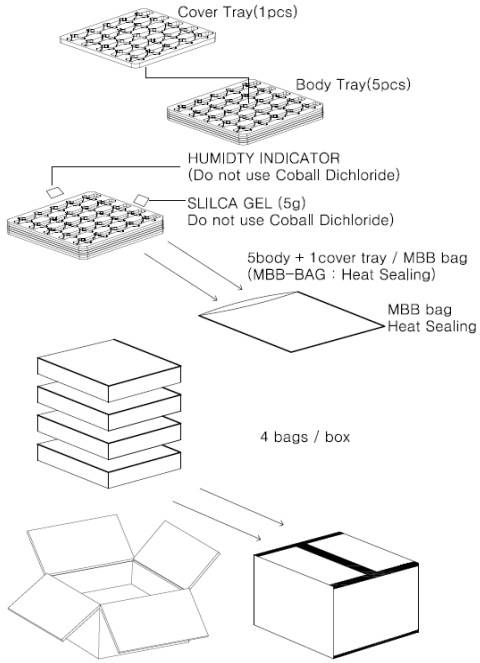
※ Model : LC016D. LC019D, LC026D, LC033D

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

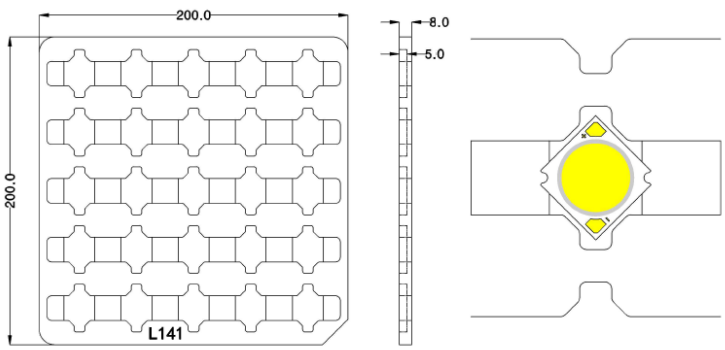


※ Small Box



※ Middle Box

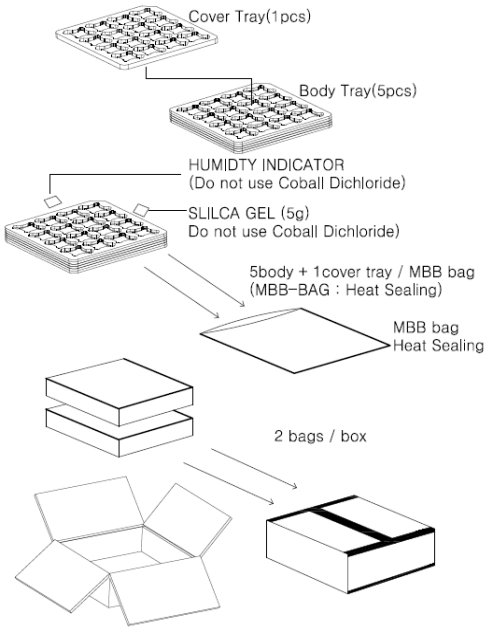
b) Tray



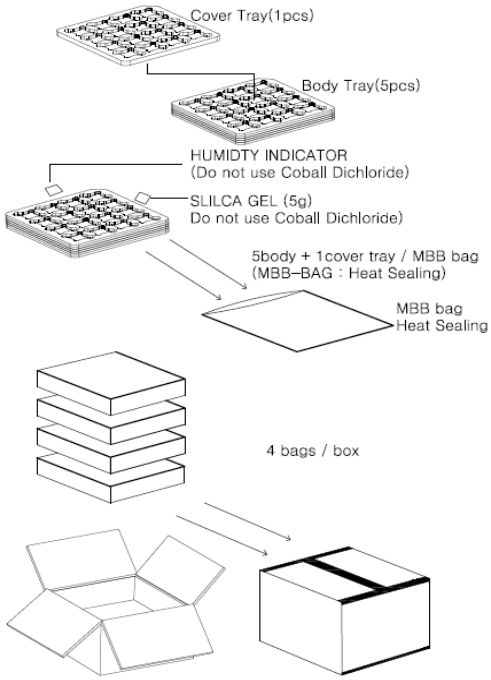
※ Model : LC040D, LC060D, LC080D

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

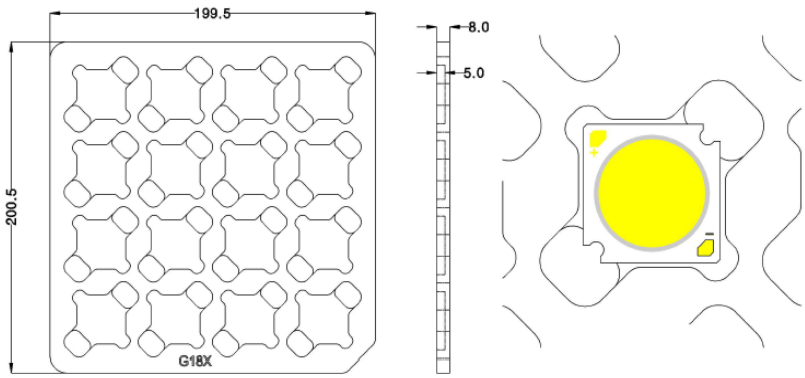


※ Small Box



※ Middle Box

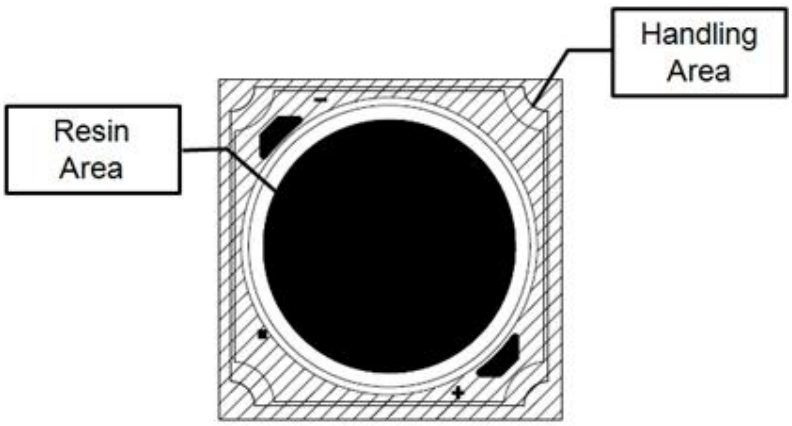
b) Tray



8. Precautions in Handling & Use

1) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When cleaning is required, IPA is recommended as the cleaning agent. Some solvent-based cleaning agent may damage the silicone resins used in the device.
2) LEDs must be stored in a clean environment. If the LEDs are to be stored for three months or more after being shipped from Samsung, they should be packed with a nitrogen-filled container (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, solder reflow, or other high temperature processes must be:
   a. Mounted within 672 hours (28 days) at an assembly line with a condition of no more than 30 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 LEDsaround 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.

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