

Middle Power LED Series
2835 6V Hot temp CIE

LM282B+

SA SB Rank



Designed for better lm/\$ (Lamps)

Features & Benefits

- 0.9W Class mid power LED
- Standard form factor for design flexibility (2.8 × 3.5mm)



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1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +85	°C	-
Storage Temperature	T_{stg}	-40 ~ +85	°C	-
LED Junction Temperature	T_j	115	°C	-
Forward Current	I_F	160	mA	-
Peak Pulsed Forward Current	I_{Fp}	320	mA	Duty 1/10, pulse width 10ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	2	kV	-

Note:

Proper current derating must be observed to maintain junction temperature below the maximum at all time.

b) Electro-optical Characteristics ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

Item	Unit	Rank	Bin	Min.	Typ.	Max.
Forward Voltage (VF)	V	GB or GK	G1	5.7	-	6.0
			G2	6.0	-	6.3
			G3	6.3	-	6.6
			G4	6.6	-	6.9
Color Rendering Index (Ra)	-	5		80	-	-
				90	-	-
Special CRI (R9)	For Ra 90			50		
Thermal Resistance (junction to solder point)	$^\circ\text{C/W}$			-	15	-
Beam Angle	$^\circ$			-	120	-

Note:

Samsung maintains measurement tolerance of: forward voltage = $\pm 0.1 \text{ V}$, CRI = ± 3 , R9 = ± 6.5

b) Electro-optical Characteristics (I_F = 150 mA, T_s = 25 °C)

Item	CRI (R _a) Min.	Nominal CCT (K)	Bin	150mA			
				Min.	Max.		
Luminous Flux (Φ _v)	80	2700	SA	111.0	121.0		
			SB	121.0	131.0		
		3000	SA	115.0	125.0		
			SB	125.0	135.0		
		3500	SA	117.0	127.0		
			SB	127.0	137.0		
		4000	SA	121.0	131.0		
			SB	131.0	141.0		
		5000	SA	123.0	133.0		
			SB	133.0	143.0		
		5700	SA	122.0	132.0		
			SB	132.0	142.0		
		6500	SA	121.0	131.0		
			SB	131.0	141.0		
		Luminous Flux (Φ _v)	90	2700	SA	92.5	102.5
					SB	102.5	112.5
3000	SA			96.5	106.5		
	SB			106.5	116.5		
3500	SA			97.5	107.5		
	SB			107.5	117.5		
4000	SA			101.5	111.5		
	SB			111.5	121.5		
5000	SA			103.0	113.0		
	SB			113.0	123.0		
5700	SA			102.0	112.0		
	SB			112.0	122.0		
6500	SA			101.5	111.5		
	SB			111.5	121.5		

Note:

Samsung maintains measurement tolerance of: forward voltage = ±0.1V, luminous flux = ±5 %, CRI = ±3, R9 = ±6.5

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	P	M	W	H	1	2	2	1	F	Q	5	G	B	R	0	S	B

Digit	PKG Information	Code	Specification			
1 2 3	Samsung Package Middle Power	SPM	Middle power			
4 5	Color	WH	White			
6	Product Version	1	1 st version			
7 8 9	Form Factor	221	2.8 x 3.5 x 0.7 mm; 2 pads; 2chip;			
10	Sorting Current (mA)	F	150 mA			
11	Chromaticity Coordinates	Q	Hot Bin			
12	CRI	5	Min. 80			
		7	Min. 90			
13 14	Forward Voltage (V)	GB or GK	5.7~6.9	Bin Code	G1	5.7 ~ 6.0
					G2	6.0 ~ 6.3
				G3	6.3 ~ 6.6	
				G4	6.6 ~ 6.9	
			GB : 4,000ea per reel ,GK : 16,000ea per reel			
15 16	CCT (K)	W★	2700	WN, WP, WQ, WR, WS, WT, WU W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG VN, VP, VQ, VR, VS, VT, VU		
		V★	3000	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG		
		U★	3500	UN, UP, UQ, UR, US, UT, UU U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG		
		T★	4000	TN, TP, TQ, TR, TS, TT, TU T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG		
		R★	5000	RN, RP, RQ, RR, RS, RT, RU R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG		
		Q★	5700	QN, QP, QQ, QR, QS, QT, QU Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG		
		P★	6500	PN, PP, PQ, PR, PS, PT, PU P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG		
					★: "0" (Whole bin), "M" (Quarter bin), "K" (kitting bin), "Y" (Kitting bin) or "U" (Mac3 Only)	
17 18	Luminous Flux	SA		Bin Code:	SA	
		SB			SB	

a) Luminous Flux Bins ($I_F = 150 \text{ mA}$, $T_s = 25^\circ\text{C}$)

CRI (R _s) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ_v , lm)	
80	2700	SPMWH1221FQ5GBW☆SA	SA	111.0 ~ 121.0	
		SPMWH1221FQ5GBW☆SB	SB	121.0 ~ 131.0	
	3000	SPMWH1221FQ5GBV☆SA	SA	115.0 ~ 125.0	
		SPMWH1221FQ5GBV☆SB	SB	125.0 ~ 135.0	
	3500	SPMWH1221FQ5GBU☆SA	SA	117.0 ~ 127.0	
		SPMWH1221FQ5GBU☆SB	SB	127.0 ~ 137.0	
	4000	SPMWH1221FQ5GBT☆SA	SA	121.0 ~ 131.0	
		SPMWH1221FQ5GBT☆SB	SB	131.0 ~ 141.0	
	5000	SPMWH1221FQ5GBR☆SA	SA	123.0 ~ 133.0	
		SPMWH1221FQ5GBR☆SB	SB	133.0 ~ 143.0	
	5700	SPMWH1221FQ5GBQ☆SA	SA	122.0 ~ 132.0	
		SPMWH1221FQ5GBQ☆SB	SB	132.0 ~ 142.0	
	6500	SPMWH1221FQ5GBP☆SA	SA	121.0 ~ 131.0	
		SPMWH1221FQ5GBP☆SB	SB	131.0 ~ 141.0	
	90	2700	SPMWH1221FQ7GBW☆SA	SA	92.5 ~ 102.5
			SPMWH1221FQ7GBW☆SB	SB	102.5 ~ 112.5
3000		SPMWH1221FQ7GBV☆SA	SA	96.5 ~ 106.5	
		SPMWH1221FQ7GBV☆SB	SB	106.5 ~ 116.5	
3500		SPMWH1221FQ7GBU☆SA	SA	97.5 ~ 107.5	
		SPMWH1221FQ7GBU☆SB	SB	107.5 ~ 117.5	
4000		SPMWH1221FQ7GBT☆SA	SA	101.5 ~ 111.5	
		SPMWH1221FQ7GBT☆SB	SB	111.5 ~ 121.5	
5000		SPMWH1221FQ7GBR☆SA	SA	103.0 ~ 113.0	
		SPMWH1221FQ7GBR☆SB	SB	113.0 ~ 123.0	
5700		SPMWH1221FQ7GBQ☆SA	SA	102.0 ~ 112.0	
		SPMWH1221FQ7GBQ☆SB	SB	112.0 ~ 122.0	
6500		SPMWH1221FQ7GBP☆SA	SA	101.5 ~ 111.5	
		SPMWH1221FQ7GBP☆SB	SB	111.5 ~ 121.5	

Note:

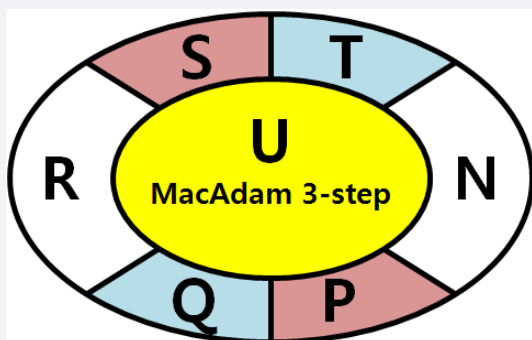
“☆” can be “0” (Whole bin), “M” (Quarter bin), “K” (K Kitting bin), “Y”(Y Kitting bin) or “U” (Mac3 only) of the color binning

b) Kitting rule

1) Y Kitting bin Concept

1. Under agreement between customer and SAMSUNG ELECTRONICS, SAMSUNG can supply kitting bin (VF, Color, Im).
2. A forward voltage (VF) of kitting bin is combined by a pair of same VF rank such as (G1+G1), (G2+G2), (G3+G3) or (G4+G4)
3. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure. (below kitting simulation)

[Kitting example]



[Binning Information]

	Bin #1	Bin #2
VF	G1	G1
	G2	G2
	G3	G3
	G4	G4
CIE	U	U
	N	R
	P	S
	Q	T

2) Kitting bin Concept

1. Under agreement between customer and SAMSUNG ELECTRONICS, SAMSUNG can supply kitting bin (VF, Color, Im).
2. A forward voltage (VF) of kitting bin is combined by a pair of same VF rank such as (G1+G1), (G2+G2), (G3+G3) or (G4+G4).
3. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure. (below kitting simulation)

[Kitting example]

D	E	F	G
9	A	B	C
5	6	7	8
1	2	3	4

[Binning Information]

	Bin #1	Bin #2
VF	G1	G1
	G2	G2
	G3	G3
	G4	G4
CIE	1, 2, 5 bin	C, F, G bin
	6, 7, A, B bin	6, 7, A, B bin
	3, 4, 8 bin	9, D, E bin

c) Color Bins ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
2700		SPMWH1221FQ☆SGW0S★	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		SPMWH1221FQ☆SGWMS★	WM (Quarter bin)	W6, W7, WA, WB
		SPMWH1221FQ☆SGWKS★	WK (K Kitting bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		SPMWH1221FQ☆SGWYS★	WY (Y Kitting bin)	WN, WP, WQ, WR, WS, WT, WU
		SPMWH1221FQ☆SGWUS★	WU (Mac3 only)	WU
3000		SPMWH1221FQ☆SGV0S★	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
		SPMWH1221FQ☆SGVMS★	VM (Quarter bin)	V6, V7, VA, VB
		SPMWH1221FQ☆SGVKS★	VK (K Kitting bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
		SPMWH1221FQ☆SGVYS★	VY (Y Kitting bin)	VN, VP, VQ, VR, VS, VT, VU
		SPMWH1221FQ☆SGVUS★	VU (Mac3 only)	VU
3500		SPMWH1221FQ☆SGU0S★	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		SPMWH1221FQ☆SGUMS★	UM (Quarter bin)	U6, U7, UA, UB
		SPMWH1221FQ☆SGUKS★	UK (K Kitting bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		SPMWH1221FQ☆SGUYS★	UY (Y Kitting bin)	UN, UP, UQ, UR, US, UT, UU
		SPMWH1221FQ☆SGUUS★	UU (Mac3 only)	UU
80 or 90	4000	SPMWH1221FQ☆SGT0S★	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
		SPMWH1221FQ☆SGTMS★	TM (Quarter bin)	T6, T7, TA, TB
		SPMWH1221FQ☆SGTKS★	TK (K Kitting bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
		SPMWH1221FQ☆SGTYS★	TY (Y Kitting bin)	TN, TP, TQ, TR, TS, TT, TU
		SPMWH1221FQ☆SGTUS★	TU (Mac3 only)	TU
5000		SPMWH1221FQ☆SGR0S★	R0 (Whole bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG
		SPMWH1221FQ☆SGRMS★	RM (Quarter bin)	R6, R7, RA, RB
		SPMWH1221FQ☆SGRKS★	RK (K Kitting bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG
		SPMWH1221FQ☆SGRYS★	RY (Y Kitting bin)	RN, RP, RQ, RR, RS, RT, RU
		SPMWH1221FQ☆SGRUS★	RU (Mac3 only)	RU
5700		SPMWH1221FQ☆SGQ0S★	Q0 (Whole bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG
		SPMWH1221FQ☆SGQMS★	QM (Quarter bin)	Q6, Q7, QA, QB
		SPMWH1221FQ☆SGQKS★	QK (K Kitting bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG
		SPMWH1221FQ☆SGQYS★	QY (Y Kitting bin)	QN, QP, QQ, QR, QS, QT, QU
		SPMWH1221FQ☆SGQUS★	QU (Mac3 only)	QU
6500		SPMWH1221FQ☆SGP0S★	P0 (Whole bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG
		SPMWH1221FQ☆SGPMS★	PM (Quarter bin)	P6, P7, PA, PB
		SPMWH1221FQ☆SGPKS★	PK (K Kitting bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG
		SPMWH1221FQ☆SGPYS★	PY (Y Kitting bin)	PN, PP, PQ, PR, PS, PT, PU
		SPMWH1221FQ☆SGPUS★	PU (Mac3 only)	PU

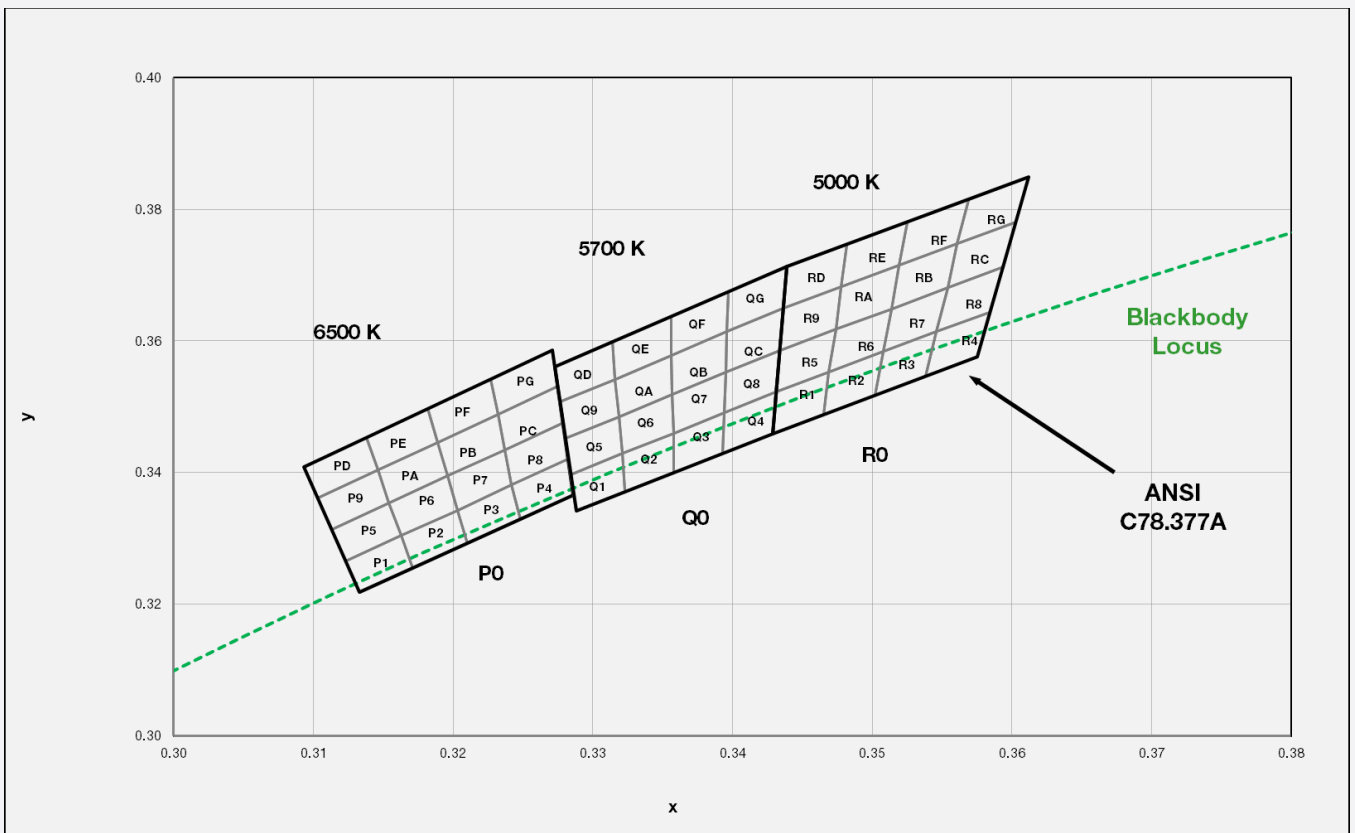
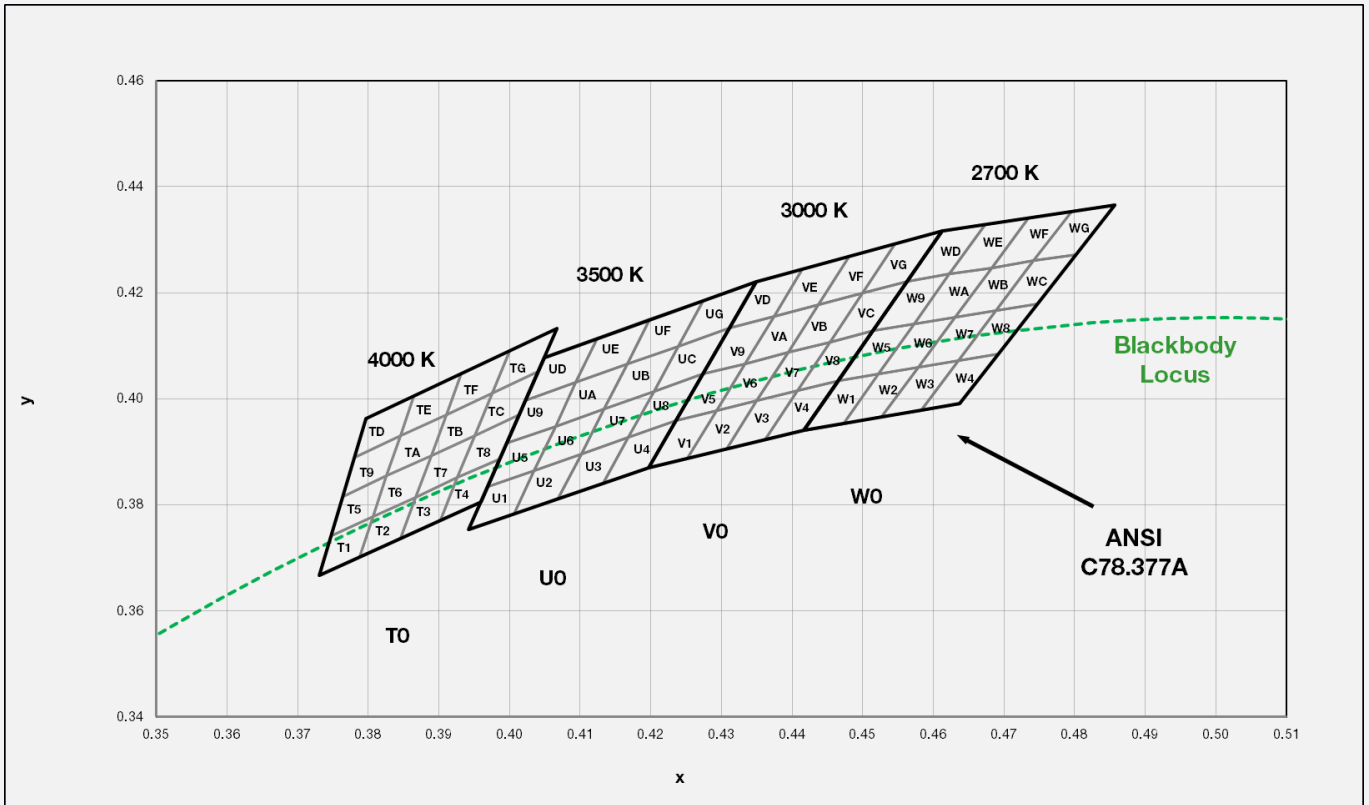
Note:

"☆" can be "5"(Ra 80) or "7"(Ra 90), "★" can be "SA" or "SB" of luminous flux bin

d) Voltage Bins ($I_F = 150 \text{ mA}$, $T_s = 25^\circ\text{C}$)

CRI (R_a) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-		G1	5.7 ~ 6.0
			GB	G2	6.0 ~ 6.3
			or		
			GK	G3	6.3 ~ 6.6
				G4	6.6 ~ 6.9

e) Chromaticity Region & Coordinates ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



e) Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
W rank (2700 K)					
W1	0.4417	0.3940	W9	0.4515	0.4128
	0.4472	0.3953		0.4573	0.4141
	0.4522	0.4047		0.4623	0.4235
	0.4466	0.4034		0.4563	0.4222
W2	0.4472	0.3953	WA	0.4573	0.4141
	0.4527	0.3966		0.4631	0.4153
	0.4579	0.4059		0.4683	0.4247
	0.4522	0.4047		0.4623	0.4235
W3	0.4527	0.3966	WB	0.4631	0.4153
	0.4582	0.3978		0.4689	0.4166
	0.4635	0.4072		0.4742	0.4260
	0.4579	0.4059		0.4683	0.4247
W4	0.4582	0.3978	WC	0.4689	0.4166
	0.4637	0.3991		0.4747	0.4179
	0.4692	0.4085		0.4802	0.4272
	0.4635	0.4072		0.4742	0.4260
W5	0.4466	0.4034	WD	0.4563	0.4222
	0.4522	0.4047		0.4623	0.4235
	0.4573	0.4141		0.4673	0.4329
	0.4515	0.4128		0.4612	0.4316
W6	0.4522	0.4047	WE	0.4623	0.4235
	0.4579	0.4059		0.4683	0.4247
	0.4631	0.4153		0.4735	0.4341
	0.4573	0.4141		0.4673	0.4329
W7	0.4579	0.4059	WF	0.4683	0.4247
	0.4635	0.4072		0.4742	0.4260
	0.4689	0.4166		0.4796	0.4354
	0.4631	0.4153		0.4735	0.4341
W8	0.4635	0.4072	WG	0.4742	0.4260
	0.4692	0.4085		0.4802	0.4272
	0.4747	0.4179		0.4857	0.4366
	0.4689	0.4166		0.4796	0.4354

Region	CIE x	CIE y	Region	CIE x	CIE y
V rank (3000 K)					
V1	0.4197	0.3870	V9	0.4273	0.4046
	0.4252	0.3888		0.4333	0.4066
	0.4293	0.3977		0.4374	0.4155
	0.4235	0.3958		0.4311	0.4133
V2	0.4252	0.3888	VA	0.4333	0.4066
	0.4307	0.3905		0.4394	0.4087
	0.4350	0.3996		0.4437	0.4178
	0.4293	0.3977		0.4374	0.4155
V3	0.4307	0.3905	VB	0.4394	0.4087
	0.4362	0.3923		0.4454	0.4107
	0.4408	0.4015		0.4500	0.4200
	0.4350	0.3996		0.4437	0.4178
V4	0.4362	0.3923	VC	0.4454	0.4107
	0.4417	0.3940		0.4515	0.4128
	0.4466	0.4034		0.4563	0.4222
	0.4408	0.4015		0.4500	0.4200
V5	0.4235	0.3958	VD	0.4311	0.4133
	0.4293	0.3977		0.4374	0.4155
	0.4333	0.4066		0.4415	0.4245
	0.4273	0.4046		0.4349	0.4221
V6	0.4293	0.3977	VE	0.4374	0.4155
	0.4350	0.3996		0.4437	0.4178
	0.4394	0.4087		0.4481	0.4269
	0.4333	0.4066		0.4415	0.4245
V7	0.4350	0.3996	VF	0.4437	0.4178
	0.4408	0.4015		0.4500	0.4200
	0.4454	0.4107		0.4546	0.4292
	0.4394	0.4087		0.4481	0.4269
V8	0.4408	0.4015	VG	0.4500	0.4200
	0.4466	0.4034		0.4563	0.4222
	0.4515	0.4128		0.4612	0.4316
	0.4454	0.4107		0.4546	0.4292

e) Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
U rank (3500 K)					
U1	0.3942	0.3753	U9	0.3995	0.3916
	0.4006	0.3782		0.4065	0.3948
	0.4035	0.3865		0.4094	0.4031
	0.3969	0.3834		0.4022	0.3997
U2	0.4006	0.3782	UA	0.4065	0.3948
	0.4069	0.3812		0.4134	0.3981
	0.4102	0.3896		0.4167	0.4065
	0.4035	0.3865		0.4094	0.4031
U3	0.4069	0.3812	UB	0.4134	0.3981
	0.4133	0.3841		0.4204	0.4013
	0.4168	0.3927		0.4239	0.4099
	0.4102	0.3896		0.4167	0.4065
U4	0.4133	0.3841	UC	0.4204	0.4013
	0.4197	0.3870		0.4273	0.4046
	0.4235	0.3958		0.4311	0.4133
	0.4168	0.3927		0.4239	0.4099
U5	0.3969	0.3834	UD	0.4022	0.3997
	0.4035	0.3865		0.4094	0.4031
	0.4065	0.3948		0.4124	0.4114
	0.3995	0.3916		0.4049	0.4078
U6	0.4035	0.3865	UE	0.4094	0.4031
	0.4102	0.3896		0.4167	0.4065
	0.4134	0.3981		0.4199	0.4150
	0.4065	0.3948		0.4124	0.4114
U7	0.4102	0.3896	UF	0.4167	0.4065
	0.4168	0.3927		0.4239	0.4099
	0.4204	0.4013		0.4274	0.4185
	0.4134	0.3981		0.4199	0.4150
U8	0.4168	0.3927	UG	0.4239	0.4099
	0.4235	0.3958		0.4311	0.4133
	0.4273	0.4046		0.4349	0.4221
	0.4204	0.4013		0.4274	0.4185

Region	CIE x	CIE y	Region	CIE x	CIE y
T rank (4000 K)					
T1	0.3731	0.3667	T9	0.3764	0.3815
	0.3788	0.3702		0.3826	0.3854
	0.3807	0.3778		0.3845	0.3930
	0.3748	0.3741		0.3781	0.3889
T2	0.3788	0.3702	TA	0.3826	0.3854
	0.3845	0.3736		0.3889	0.3892
	0.3867	0.3814		0.3910	0.3970
	0.3807	0.3778		0.3845	0.3930
T3	0.3845	0.3736	TB	0.3889	0.3892
	0.3902	0.3771		0.3951	0.3931
	0.3926	0.3851		0.3975	0.4011
	0.3867	0.3814		0.3910	0.3970
T4	0.3902	0.3771	TC	0.3951	0.3931
	0.3959	0.3805		0.4013	0.3969
	0.3986	0.3887		0.4040	0.4051
	0.3926	0.3851		0.3975	0.4011
T5	0.3748	0.3741	TD	0.3781	0.3889
	0.3807	0.3778		0.3845	0.3930
	0.3826	0.3854		0.3865	0.4006
	0.3764	0.3815		0.3797	0.3963
T6	0.3807	0.3778	TE	0.3845	0.3930
	0.3867	0.3814		0.3910	0.3970
	0.3889	0.3892		0.3932	0.4048
	0.3826	0.3854		0.3865	0.4006
T7	0.3867	0.3814	TF	0.3910	0.3970
	0.3926	0.3851		0.3975	0.4011
	0.3951	0.3931		0.4000	0.4091
	0.3889	0.3892		0.3932	0.4048
T8	0.3926	0.3851	TG	0.3975	0.4011
	0.3986	0.3887		0.4040	0.4051
	0.4013	0.3969		0.4067	0.4133
	0.3951	0.3931		0.4000	0.4091

e) Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
R rank (5000 K)					
R1	0.3429	0.3459	R9	0.3434	0.3586
	0.3465	0.3489		0.3474	0.3618
	0.3469	0.3553		0.3478	0.3682
	0.3431	0.3523		0.3436	0.3650
R2	0.3465	0.3489	RA	0.3474	0.3618
	0.3502	0.3518		0.3514	0.3649
	0.3508	0.3584		0.3519	0.3715
	0.3469	0.3553		0.3478	0.3682
R3	0.3502	0.3518	RB	0.3514	0.3649
	0.3538	0.3547		0.3554	0.3681
	0.3546	0.3614		0.3561	0.3748
	0.3508	0.3584		0.3519	0.3715
R4	0.3538	0.3547	RC	0.3554	0.3681
	0.3575	0.3576		0.3594	0.3713
	0.3584	0.3644		0.3603	0.3781
	0.3546	0.3614		0.3561	0.3748
R5	0.3431	0.3523	RD	0.3436	0.3650
	0.3469	0.3553		0.3478	0.3682
	0.3474	0.3618		0.3482	0.3747
	0.3434	0.3586		0.3439	0.3713
R6	0.3469	0.3553	RE	0.3478	0.3682
	0.3508	0.3584		0.3519	0.3715
	0.3514	0.3649		0.3525	0.3781
	0.3474	0.3618		0.3482	0.3747
R7	0.3508	0.3584	RF	0.3519	0.3715
	0.3546	0.3614		0.3561	0.3748
	0.3554	0.3681		0.3569	0.3815
	0.3514	0.3649		0.3525	0.3781
R8	0.3546	0.3614	RG	0.3561	0.3748
	0.3584	0.3644		0.3603	0.3781
	0.3594	0.3713		0.3612	0.3849
	0.3554	0.3681		0.3569	0.3815

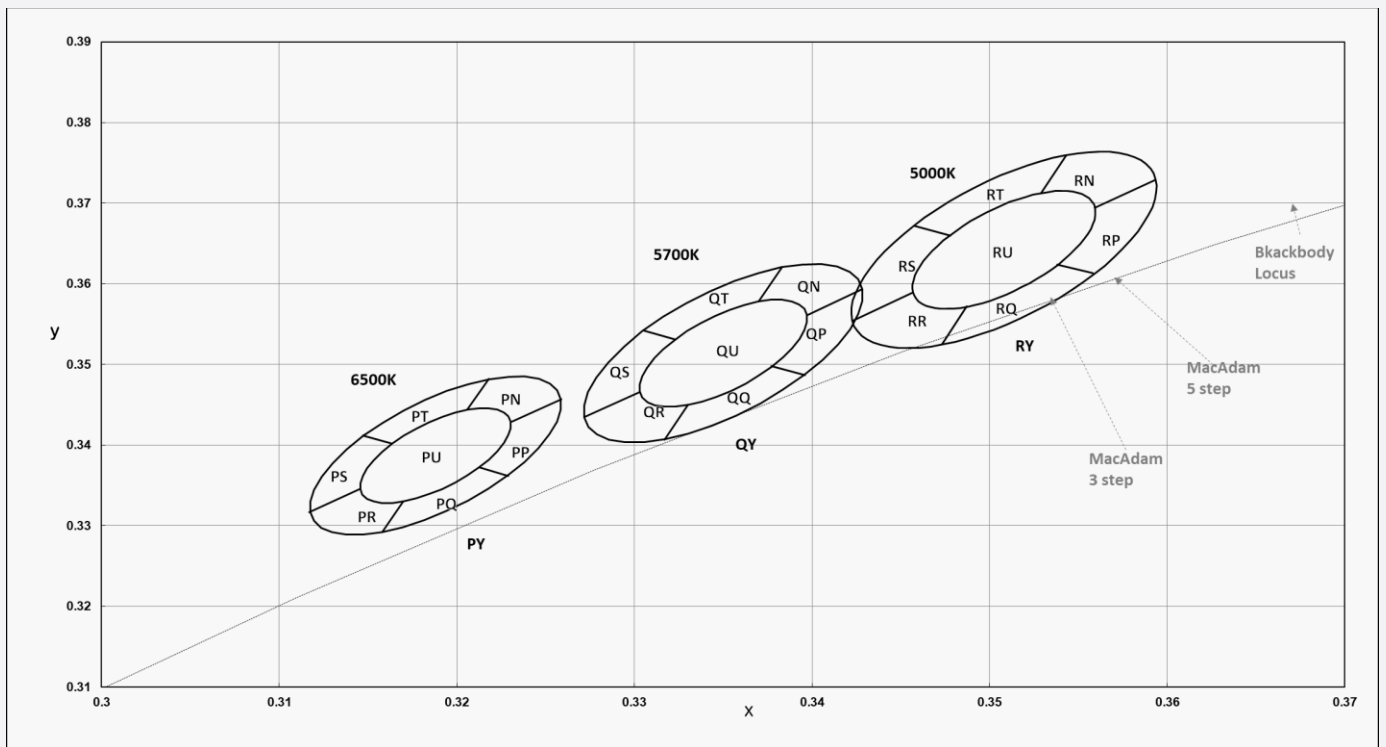
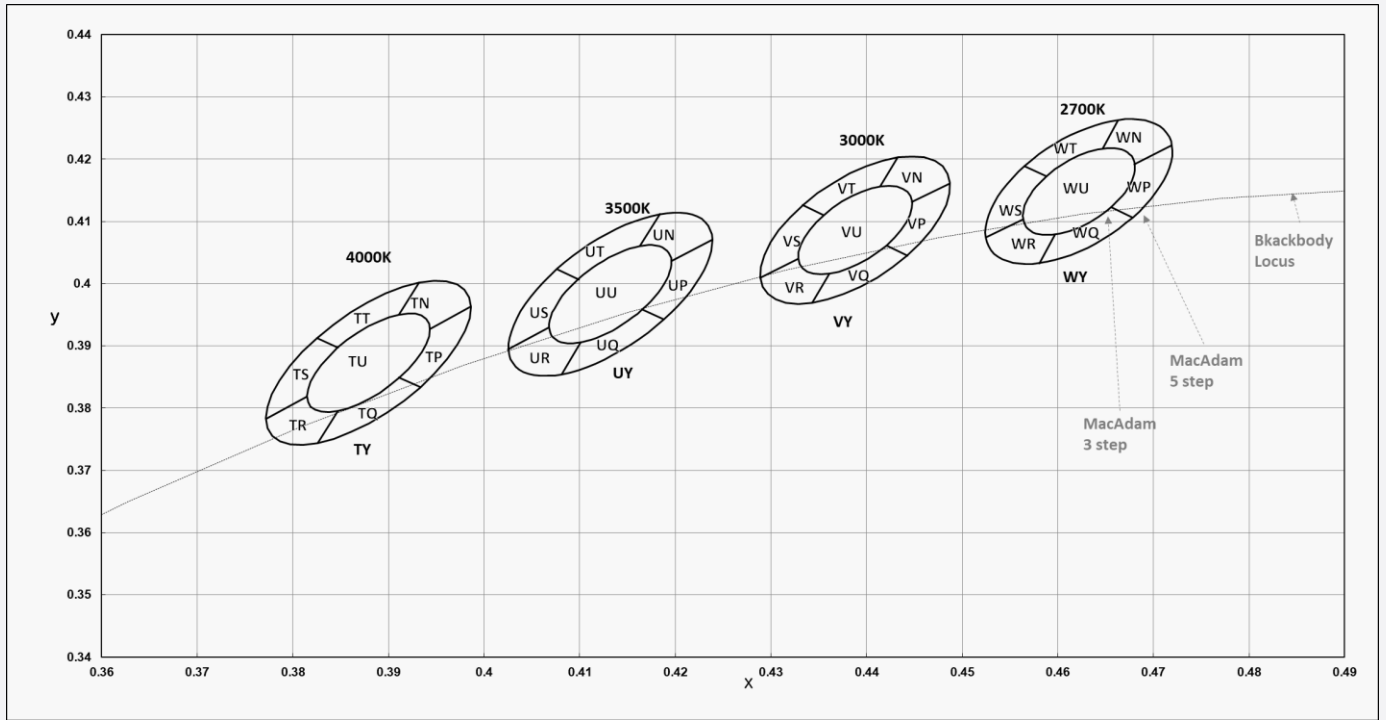
Region	CIE x	CIE y	Region	CIE x	CIE y
Q rank (5700 K)					
Q1	0.3288	0.3342	Q9	0.3280	0.3452
	0.3323	0.3372		0.3319	0.3485
	0.3321	0.3429		0.3316	0.3542
	0.3284	0.3397		0.3276	0.3507
Q2	0.3323	0.3372	QA	0.3319	0.3485
	0.3358	0.3401		0.3357	0.3519
	0.3358	0.3460		0.3356	0.3578
	0.3321	0.3429		0.3316	0.3542
Q3	0.3358	0.3401	QB	0.3357	0.3519
	0.3393	0.3430		0.3395	0.3553
	0.3394	0.3491		0.3396	0.3614
	0.3358	0.3460		0.3356	0.3578
Q4	0.3393	0.3430	QC	0.3395	0.3553
	0.3429	0.3459		0.3434	0.3586
	0.3431	0.3523		0.3436	0.3650
	0.3394	0.3491		0.3396	0.3614
Q5	0.3284	0.3397	QD	0.3276	0.3507
	0.3321	0.3429		0.3316	0.3542
	0.3319	0.3485		0.3314	0.3599
	0.3280	0.3452		0.3273	0.3561
Q6	0.3321	0.3429	QE	0.3316	0.3542
	0.3358	0.3460		0.3356	0.3578
	0.3357	0.3519		0.3356	0.3637
	0.3319	0.3485		0.3314	0.3599
Q7	0.3358	0.3460	QF	0.3356	0.3578
	0.3394	0.3491		0.3396	0.3614
	0.3395	0.3553		0.3397	0.3675
	0.3357	0.3519		0.3356	0.3637
Q8	0.3394	0.3491	QG	0.3396	0.3614
	0.3431	0.3523		0.3436	0.3650
	0.3434	0.3586		0.3439	0.3713
	0.3395	0.3553		0.3397	0.3675

e) Chromaticity Region & Coordinates

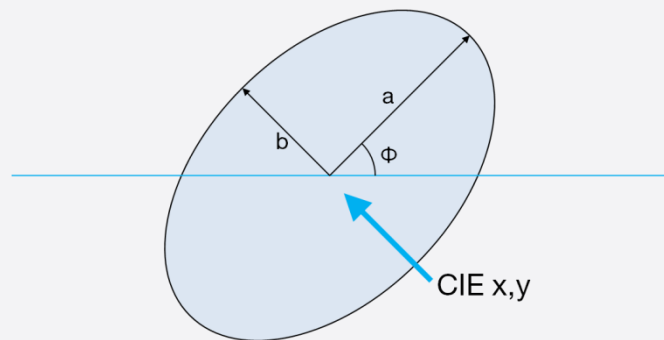
Region	CIE x	CIE y	Region	CIE x	CIE y
P rank (6500 K)					
P1	0.3133	0.3218	P9	0.3113	0.3314
	0.3171	0.3255		0.3154	0.3354
	0.3163	0.3305		0.3146	0.3404
	0.3123	0.3266		0.3103	0.3361
P2	0.3171	0.3255	PA	0.3154	0.3354
	0.3210	0.3292		0.3196	0.3395
	0.3203	0.3343		0.3189	0.3446
	0.3163	0.3305		0.3146	0.3404
P3	0.3210	0.3292	PB	0.3196	0.3395
	0.3248	0.3329		0.3237	0.3435
	0.3242	0.3382		0.3232	0.3489
	0.3203	0.3343		0.3189	0.3446
P4	0.3248	0.3329	PC	0.3237	0.3435
	0.3286	0.3366		0.3279	0.3476
	0.3282	0.3421		0.3275	0.3531
	0.3242	0.3382		0.3232	0.3489
P5	0.3123	0.3266	PD	0.3103	0.3361
	0.3163	0.3305		0.3146	0.3404
	0.3154	0.3354		0.3138	0.3453
	0.3113	0.3314		0.3093	0.3409
P6	0.3163	0.3305	PE	0.3146	0.3404
	0.3203	0.3343		0.3189	0.3446
	0.3196	0.3395		0.3182	0.3498
	0.3154	0.3354		0.3138	0.3453
P7	0.3203	0.3343	PF	0.3189	0.3446
	0.3242	0.3382		0.3232	0.3489
	0.3237	0.3435		0.3227	0.3542
	0.3196	0.3395		0.3182	0.3498
P8	0.3242	0.3382	PG	0.3232	0.3489
	0.3282	0.3421		0.3275	0.3531
	0.3279	0.3476		0.3271	0.3586
	0.3237	0.3435		0.3227	0.3542

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

e) Chromaticity Region & Coordinates ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



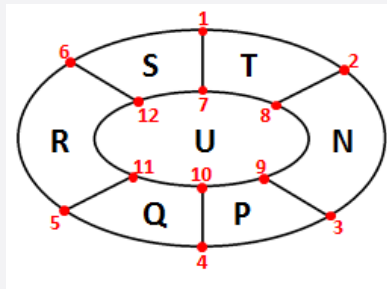
e) Chromaticity Region & Coordinates



MacAdam	CCT (K)	Center point		Major-axis	Minor-axis	Rotation
		CIE x	CIE y	a	b	φ
3 step	2700	0.4622	0.4148	0.0081	0.0042	53.70
	3000	0.4388	0.4086	0.0083	0.0041	53.22
	3500	0.4132	0.3983	0.0093	0.0041	54.00
	4000	0.3879	0.3873	0.0094	0.0040	53.72
	5000	0.3508	0.3642	0.0082	0.0035	59.62
	5700	0.3350	0.3514	0.0075	0.0032	59.10
	6500	0.3188	0.3387	0.0067	0.0029	58.57
5 step	2700	0.4622	0.4148	0.0135	0.0070	53.70
	3000	0.4388	0.4086	0.0138	0.0068	53.22
	3500	0.4132	0.3983	0.0155	0.0068	54.00
	4000	0.3879	0.3873	0.0157	0.0067	53.72
	5000	0.3508	0.3642	0.0137	0.0058	59.62
	5700	0.3350	0.3514	0.0125	0.0053	59.10
	6500	0.3188	0.3387	0.0112	0.0048	58.57

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

e) Chromaticity Region & Coordinates



CCT	Region	CIE x	CIE y	CCT	Region	CIE x	CIE y	CCT	Region	CIE x	CIE y
2700K	1	0.4618	0.4241	3000K	1	0.4389	0.4184	3500K	1	0.4138	0.4087
	2	0.4716	0.4315		2	0.4488	0.4259		2	0.4245	0.4176
	3	0.4772	0.4274		3	0.4543	0.4218		3	0.4300	0.4135
	4	0.4731	0.4158		4	0.4499	0.4102		4	0.4248	0.4007
	5	0.4634	0.4085		5	0.4399	0.4026		5	0.4142	0.3918
	6	0.4578	0.4127		6	0.4345	0.4067		6	0.4086	0.3958
	7	0.4641	0.4225		7	0.4411	0.4167		7	0.4160	0.4071
	8	0.4700	0.4269		8	0.4470	0.4213		8	0.4224	0.4124
	9	0.4733	0.4244		9	0.4503	0.4188		9	0.4257	0.4100
	10	0.4709	0.4175		10	0.4477	0.4118		10	0.4226	0.4023
	11	0.4650	0.4131		11	0.4417	0.4073		11	0.4162	0.3970
	12	0.4617	0.4156		12	0.4385	0.4097		12	0.4129	0.3994
4000K	1	0.3888	0.4008	5000K	1	0.3525	0.3768	5700K	1	0.3373	0.3644
	2	0.3995	0.4097		2	0.3610	0.3855		2	0.3451	0.3723
	3	0.4049	0.4058		3	0.3660	0.3825		3	0.3496	0.3695
	4	0.3996	0.3929		4	0.3625	0.3709		4	0.3464	0.3589
	5	0.3889	0.3839		5	0.3540	0.3621		5	0.3385	0.3509
	6	0.3835	0.3878		6	0.3490	0.3650		6	0.3340	0.3537
	7	0.3910	0.3992		7	0.3545	0.3756		7	0.3391	0.3633
	8	0.3974	0.4045		8	0.3596	0.3808		8	0.3438	0.3680
	9	0.4006	0.4022		9	0.3626	0.3790		9	0.3465	0.3663
	10	0.3974	0.3944		10	0.3605	0.3720		10	0.3445	0.3600
	11	0.3910	0.3891		11	0.3554	0.3668		11	0.3398	0.3552
	12	0.3878	0.3914		12	0.3524	0.3685		12	0.3371	0.3568

e) Chromaticity Region & Coordinates

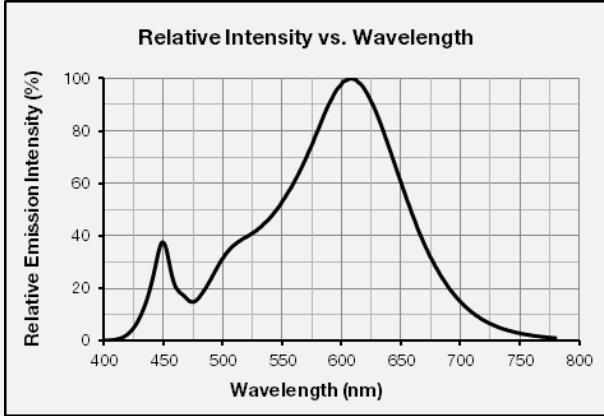
CCT	Region	CIE x	CIE y
6500K	1	0.3213	0.3514
	2	0.3284	0.3584
	3	0.3325	0.3559
	4	0.3295	0.3464
	5	0.3224	0.3394
	6	0.3183	0.3419
	7	0.3229	0.3504
	8	0.3272	0.3546
	9	0.3297	0.3531
	10	0.3279	0.3474
	11	0.3236	0.3432
	12	0.3211	0.3447

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

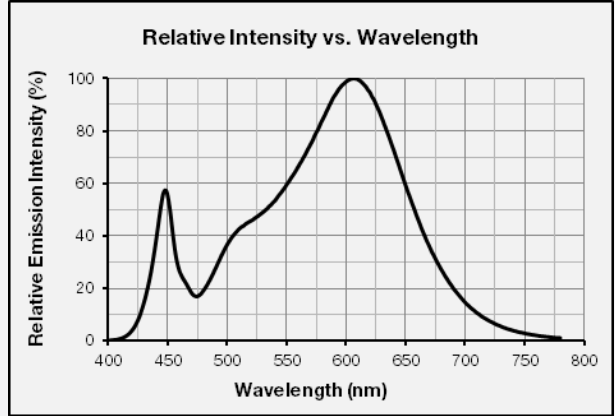
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_f = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

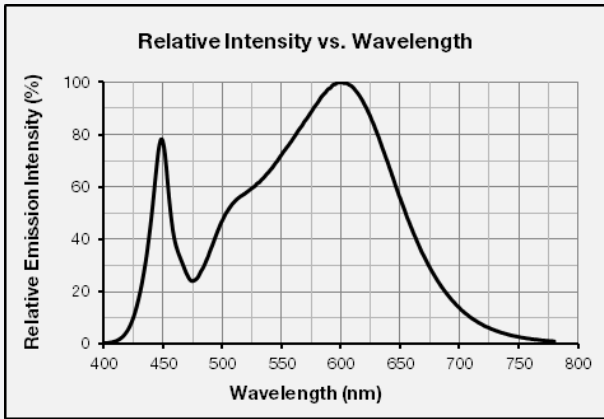
CCT: 2700 K (80 CRI)



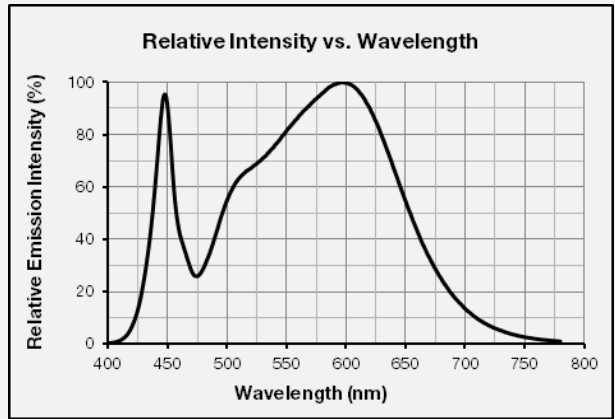
CCT: 3000 K (80 CRI)



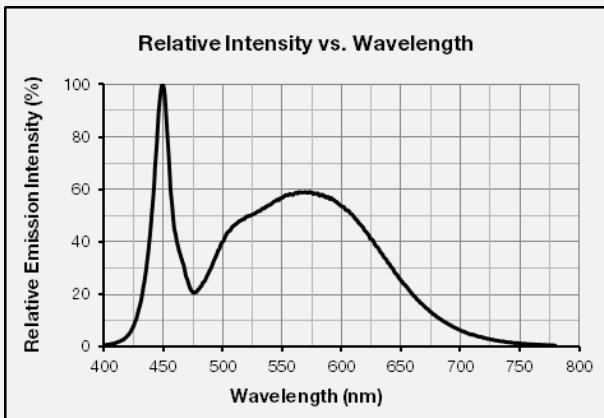
CCT: 3500 K (80 CRI)



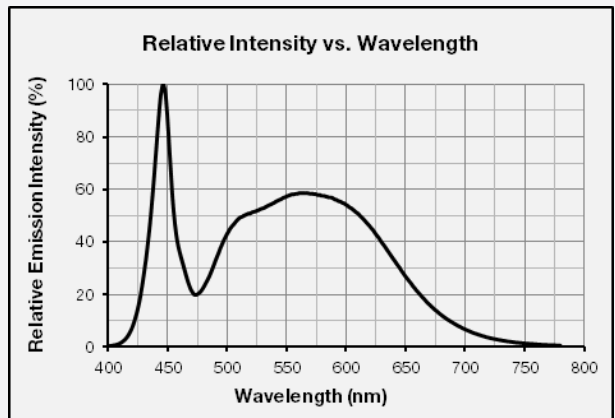
CCT: 4000 K (80 CRI)



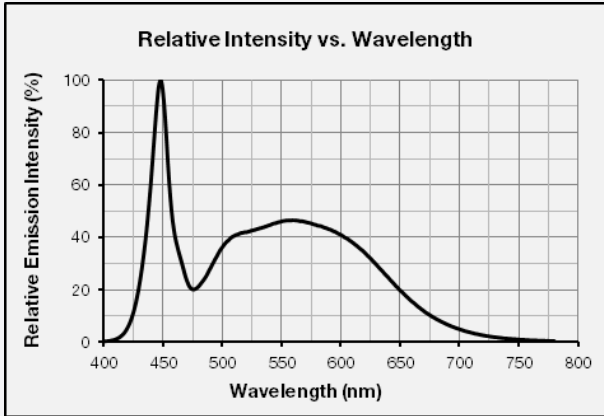
CCT: 5000 K (80 CRI)



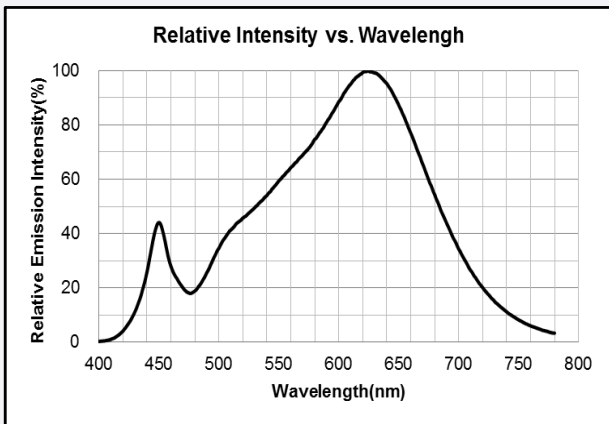
CCT: 5700 K (80 CRI)



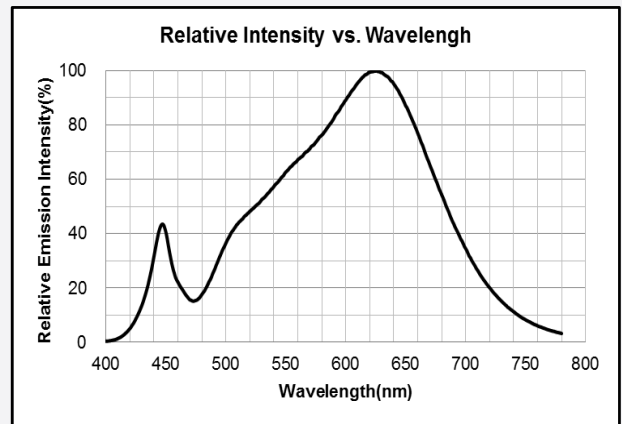
CCT: 6500 K (80 CRI)



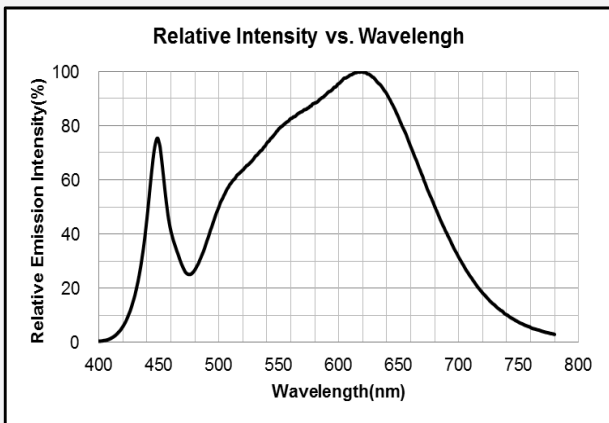
CCT: 2700 K (90 CRI)



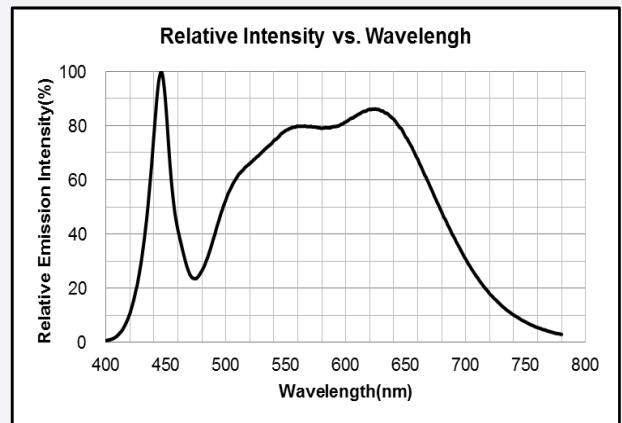
CCT: 3000 K (90 CRI)



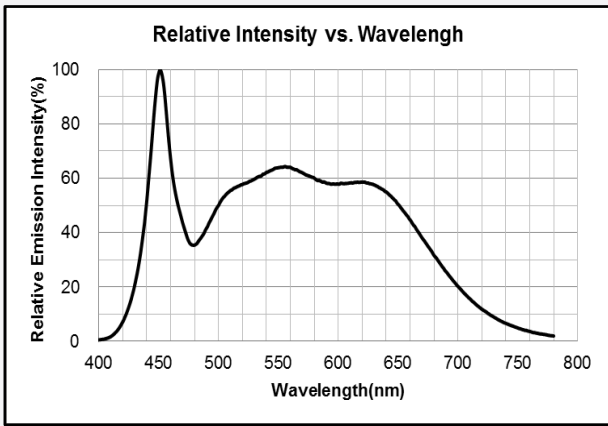
CCT: 3500 K (90 CRI)



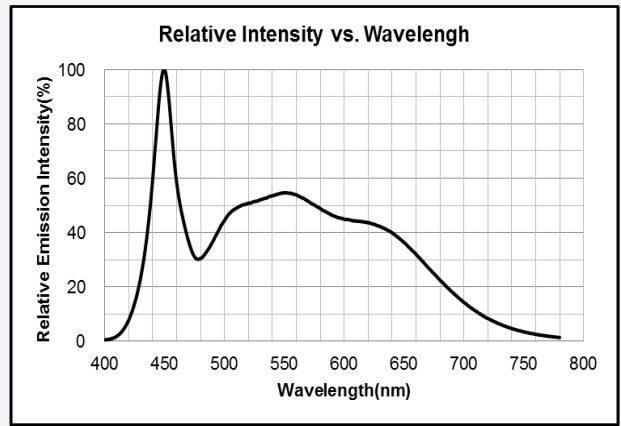
CCT: 4000 K (90 CRI)



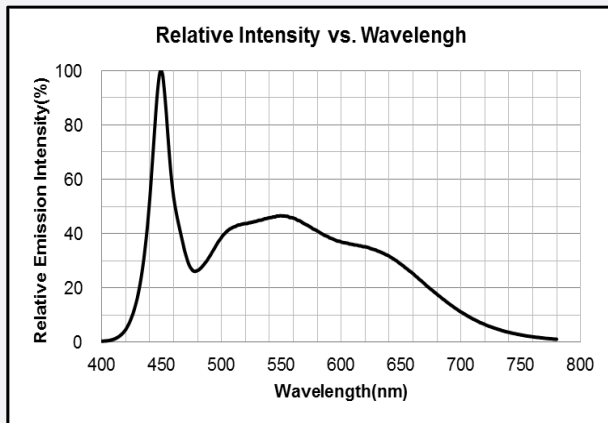
CCT: 5000 K (90 CRI)



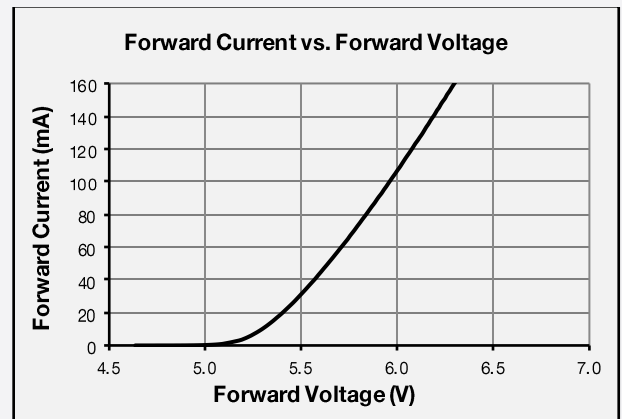
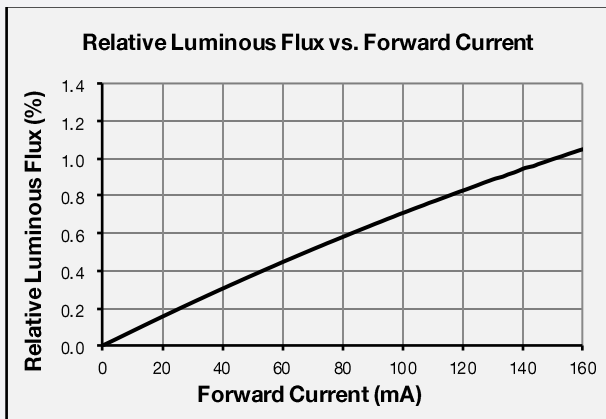
CCT: 5700 K (90 CRI)



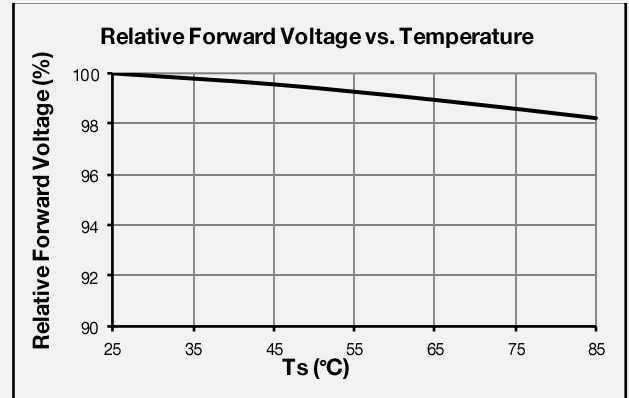
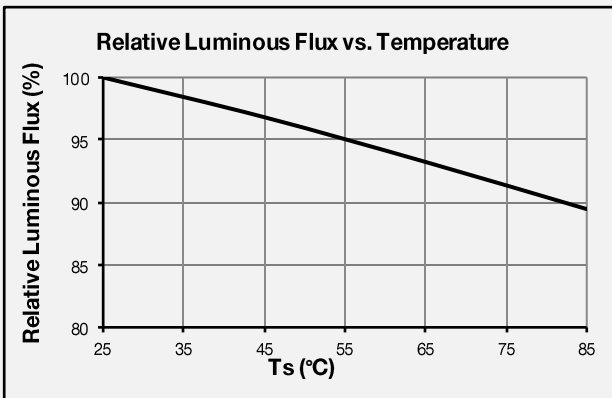
CCT: 6500 K (90 CRI)



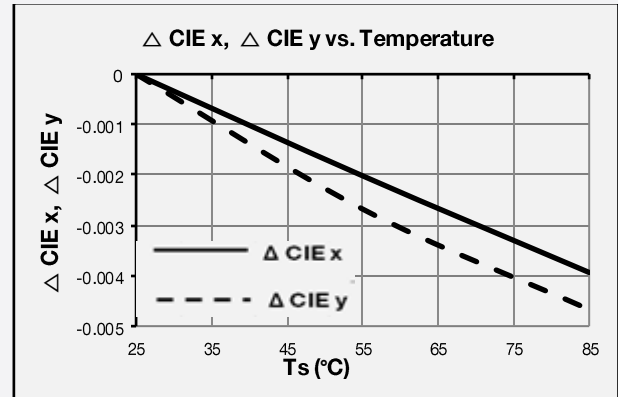
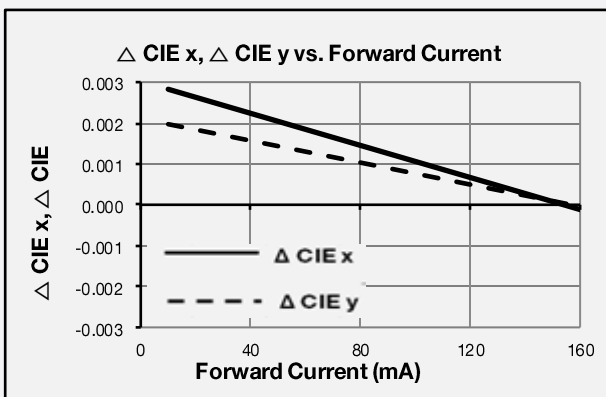
b) Forward Current Characteristics (Ts = 25 °C)



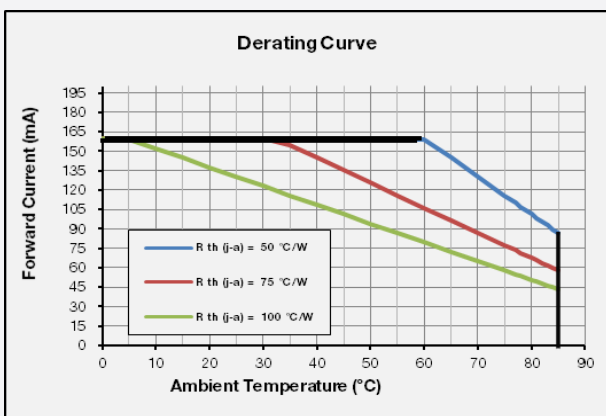
c) Temperature Characteristics ($I_F = 150 \text{ mA}$)



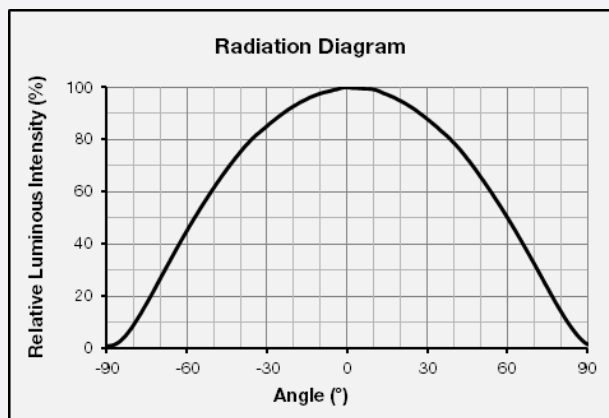
d) Color Shift Characteristics ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ °C}$)



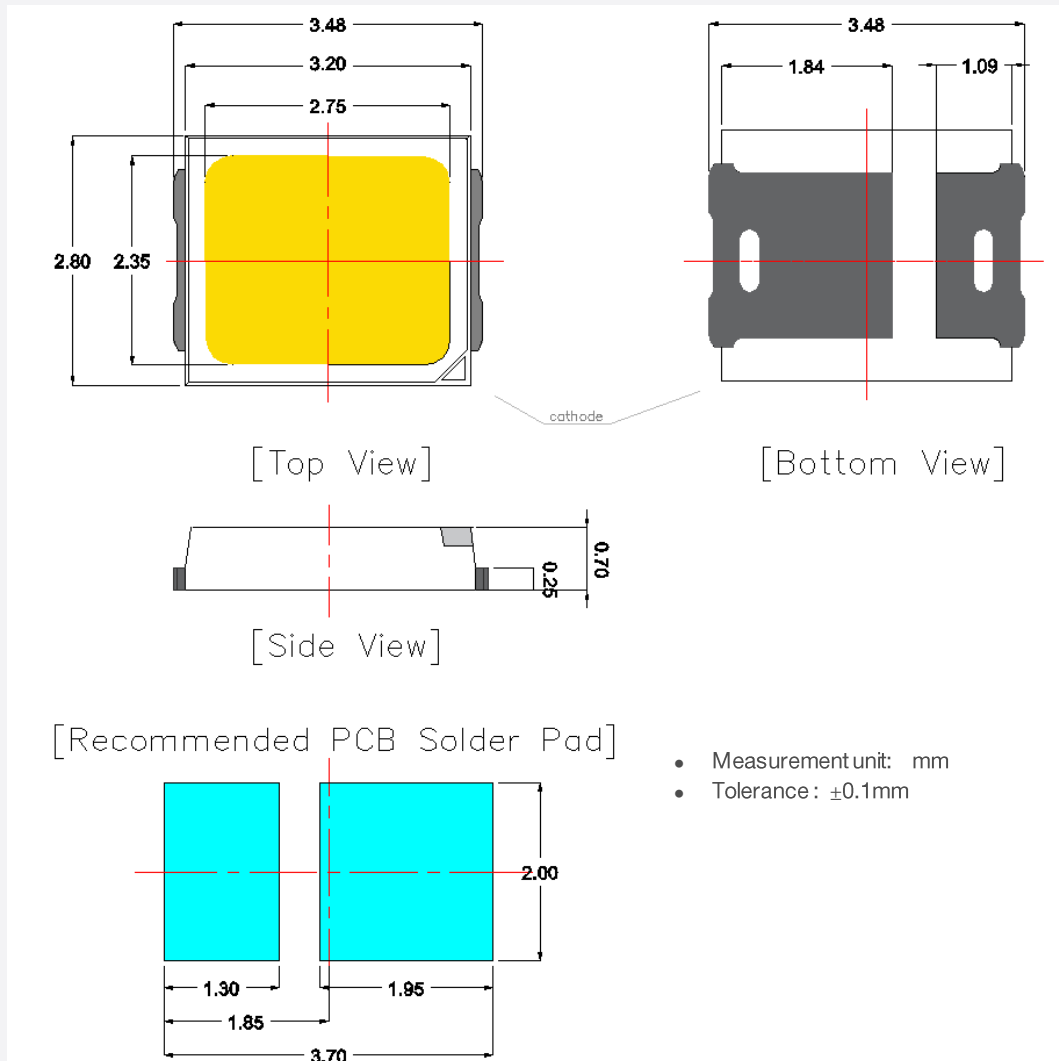
e) Derating Curve



f) Beam Angle Characteristics ($I_F = 150 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



4. Outline Drawing & Dimension



Notes:

- 1) T_s point and measurement method:
 - ① Measure one point at the cathode pad, if necessary remove PSR of PCB to reach T_s point.
 - ② All pads must be soldered to the PCB to dissipate heat properly, otherwise the LED can be damaged.

Precautions:

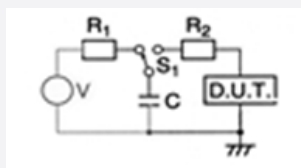
- 1) Pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid strong pressure on the LEDs. Do not put stress on the LEDs during heating.
- 2) Re-soldering should not be done after the LEDs have been soldered. If re-soldering is unavoidable, LED's characteristics should be carefully checked before and after such repair.
- 3) Do not stack assembled PCBs together. Since materials of LEDs is soft, abrasion between two PCB assembled with LED might cause catastrophic failure of the LEDs.

5. Reliability Test Items & Conditions

a) Test Items

Test Item	Test Condition	Test Hour / Cycle	Sample No.
Room Temperature Life Test	25 °C, DC 160 mA	1000 h	22
High Temperature Life Test	85 °C, DC 160 mA	1000 h	22
High Temperature Humidity Life Test	85 °C, 85 % RH, DC 160 mA	1000 h	22
Low Temperature Life Test	-40 °C, DC 160 mA	1000 h	22
Powered Temperature Cycle Test	-45 °C ~ 85 °C, each 20 min, on/off 5 min Temp. Change time 100min, DC 160 mA	100 cycles	22
Temperature Cycling	-45 °C / 15 min ↔ 125 °C / 15 min	200 cycles	100
High Temperature Storage	85°C	1000 h	11
Low Temperature Storage	-40 °C	1000 h	11

ESD (HBM)

R₁: 10 MΩR₂: 1.5 kΩ

C: 100 pF

V: ±2 kV

5 times

30

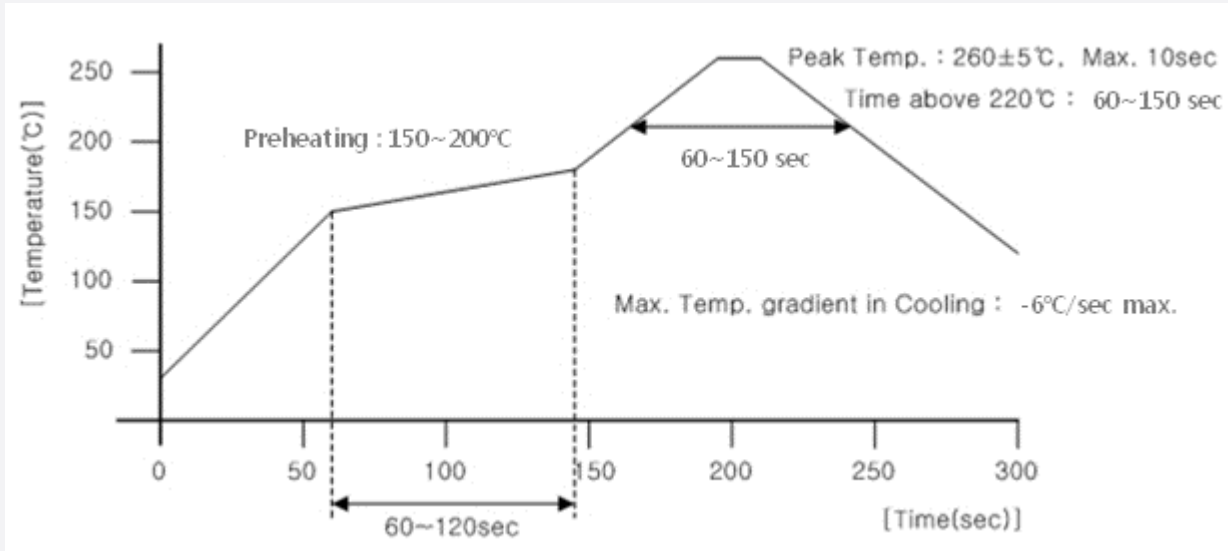
b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T _s = 25 °C)	Limit	
			Min	Max
Forward Voltage	V _F	I _F = 150 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ _v	I _F = 150 mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



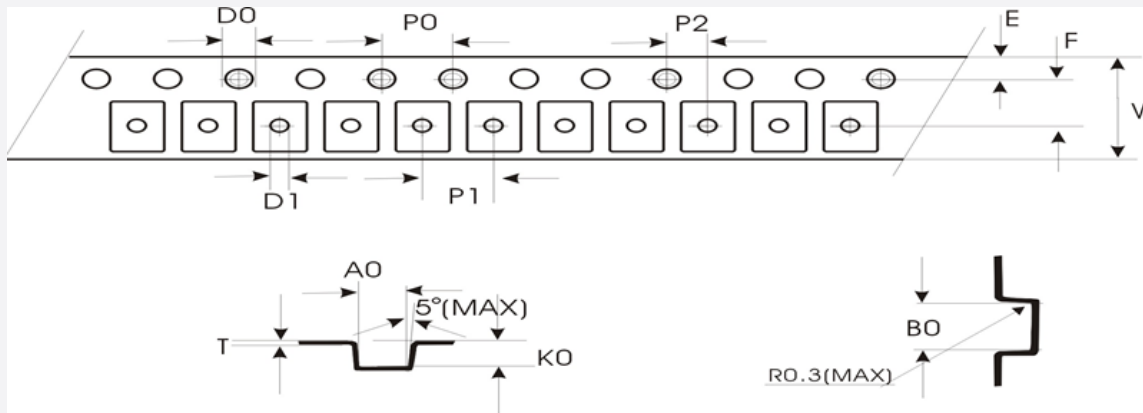
b) Manual Soldering Conditions

Not more than 5 seconds @ max. 300°C, under soldering iron.

7. Tape & Reel

a) Taping Dimension

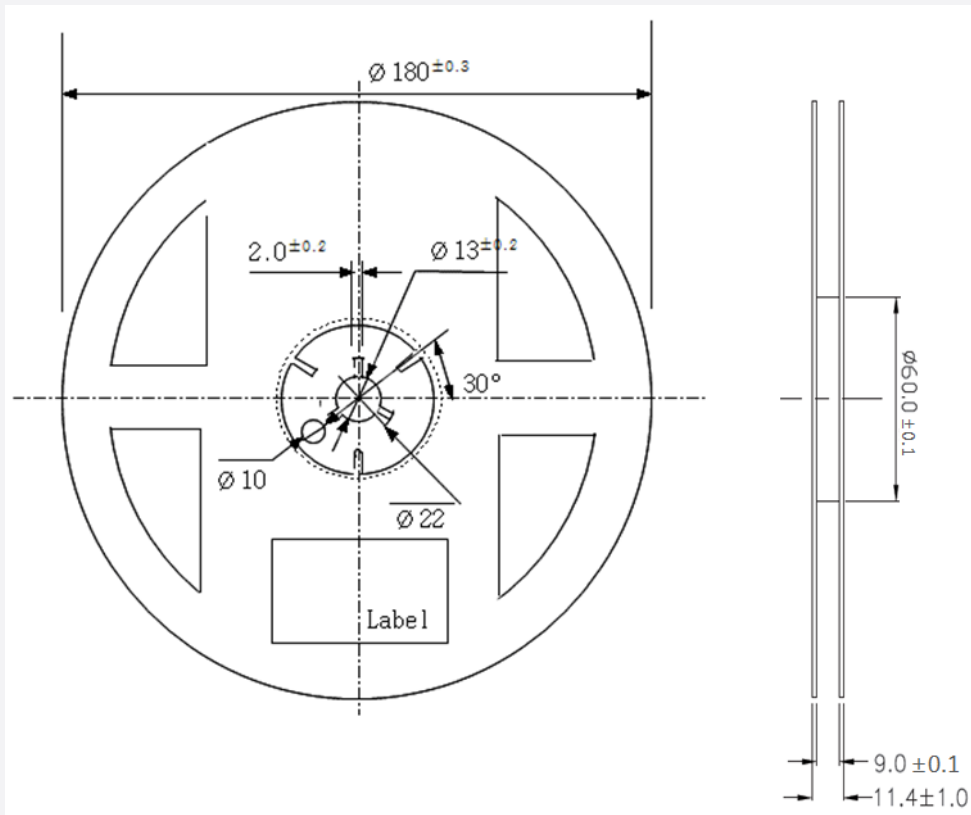
(unit: mm)



A0	3.10 ± 0.1	P0	4.00 ± 0.1	T	0.20 ± 0.05	D0	1.60(MAX)
B0	3.70 ± 0.1	P1	4.00 ± 0.1	E	1.75 ± 0.1	D1	1.05(MIN)
K0	1.00 ± 0.1	P2	2.00 ± 0.1	F	3.50 ± 0.05	V	8.00 ± 0.1

b) Reel Dimension (max 4,000 pcs)

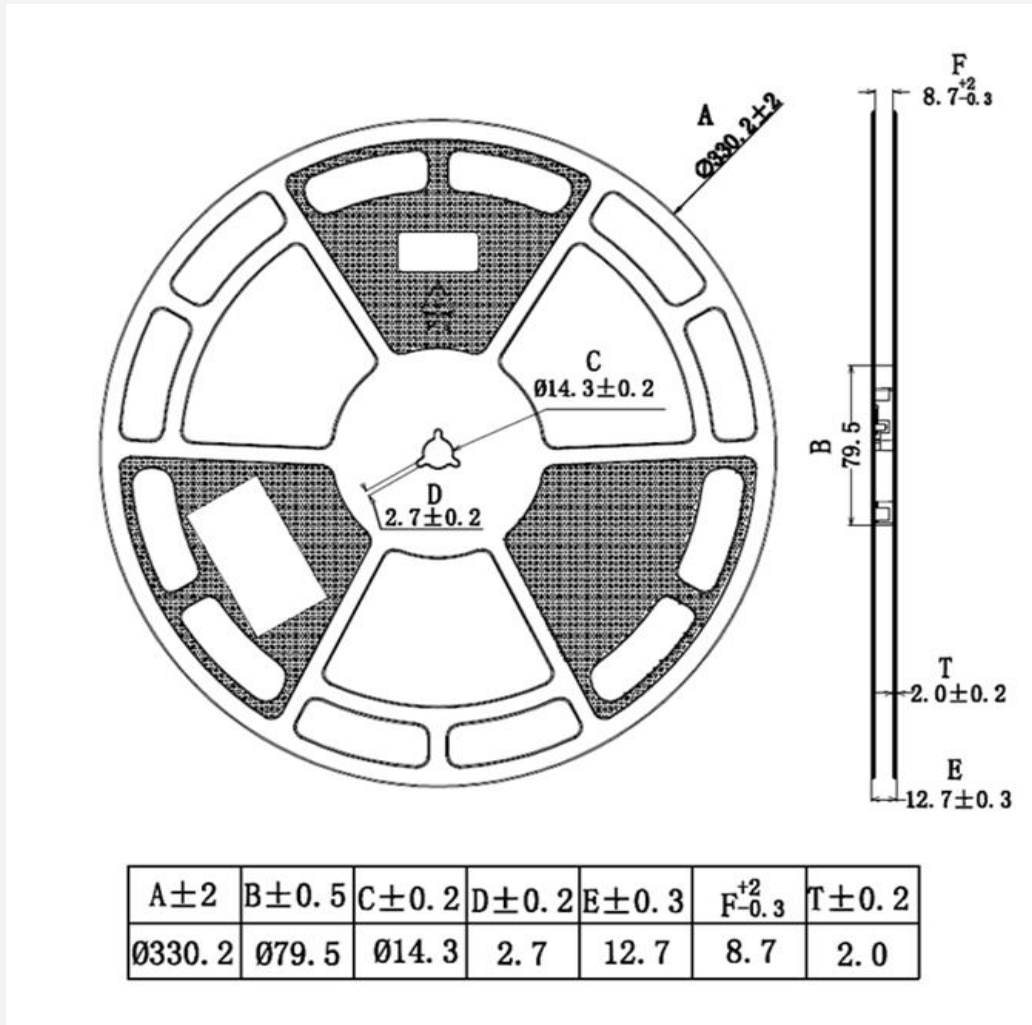
(unit: mm)

**Notes:**

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) All dimensions are millimeters (tolerance : ± 0.2 mm)
- 3) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

c) Reel Dimension (max 16,000 pcs)

(unit: mm)

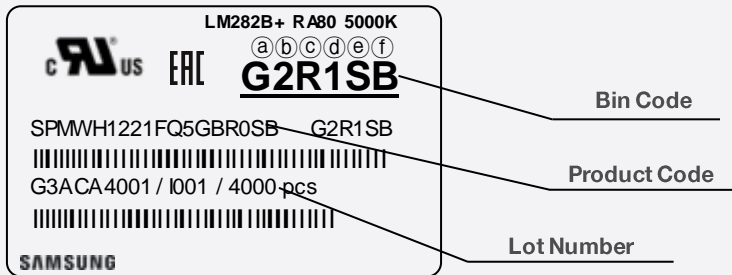


Notes:

- 1) Quantity: The quantity/reel is 16,000 pcs
- 2) All dimensions are millimeters (tolerance : $\pm 0.2\text{mm}$)
- 3) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

8. Label Structure

a) Label Structure



Note: Denoted bin code and product code above is only an example (see description on page 6)

Bin Code:

- ⒶⒷ: Forward Voltage bin (refer to page 10)
- ⒸⒹ: Chromaticity bin (refer to page 11-18)
- ⒺⒻ: Luminous Flux bin (refer to page 7)

b) Lot Number

The lot number is composed of the following characters:



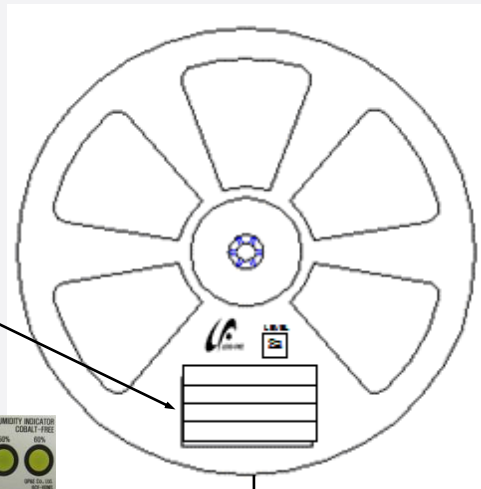
①②③④⑤⑥⑦⑧⑨ / IⒶⒷⒸ / 4,000 pcs

- ①② : Production site (G3 or GP : Shenzhen, China)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (C: 2018, D: 2019, E: 2020...)
- ⑤ : Month (1~9, A, B, C)
- ⑥ : Day (1~9, A, B~V)
- ⑦⑧⑨ ⒶⒷⒸ : Product serial number

9. Packing Structure

a) Packing Process

Reel



Aluminum Vinyl Packing Bag

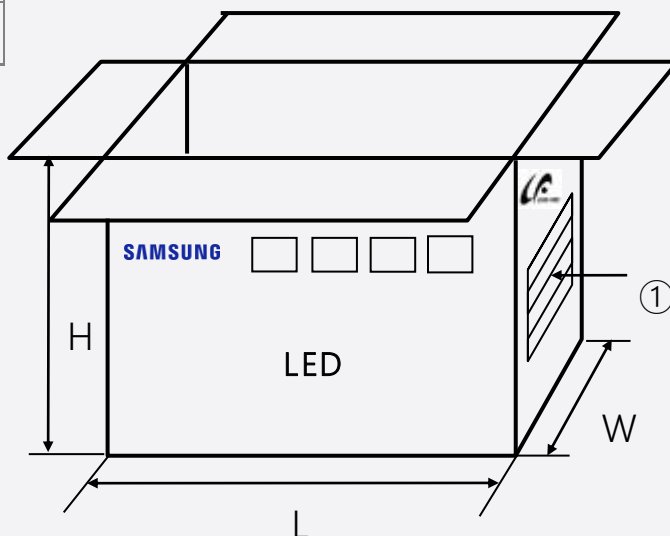
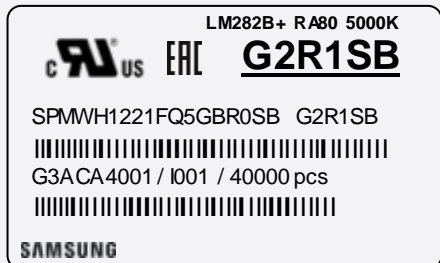


Outer Box

Material: Paper (SW3B(B))


Type	Size (mm)			Note
	L	W	H	
7 inch L	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels
7 inch S	245 ± 5	220 ± 5	86 ± 5	Up to 5 reels

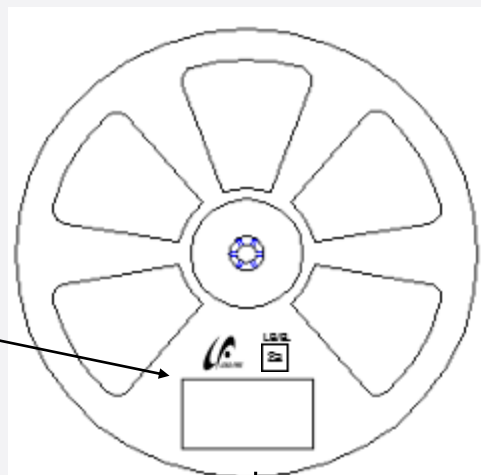
① Side Label



b) Packing Process (The quantity of PKG on the Reel to be Max 16,000 pcs)

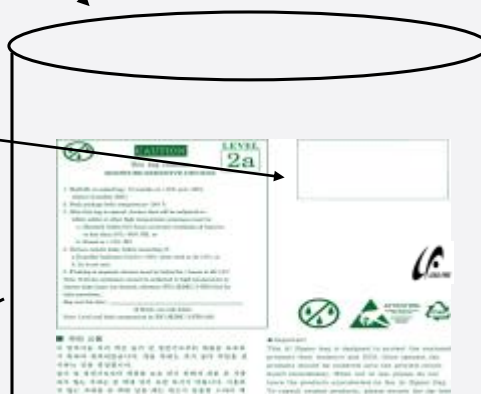
Reel

LM282B+ RA80 5000K
 **G2R1SB**
 SPMWH1221FQ5GKR0SB G2R1SB
 G3ACA4001 / IOAA / 16000 pcs
SAMSUNG



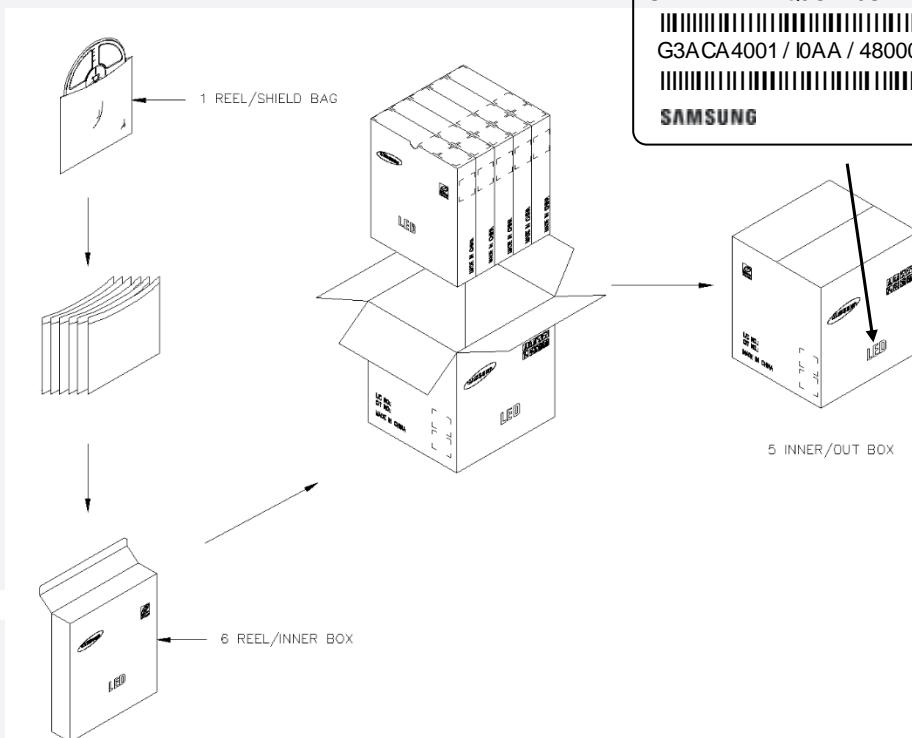
Aluminum Vinyl Packing Bag

LM282B+ RA80 5000K
 **G2R1SB**
 SPMWH1221FQ5GKR0SB G2R1SB
 G3ACA4001 / IOAA / 16000 pcs
SAMSUNG



Outer Box

LM282B+ RA80 5000K
 **G2R1SB**
 SPMWH1221FQ5GKR0SB G2R1SB
 G3ACA4001 / IOAA / 480000 pcs
SAMSUNG



c) Packing Process for kitting (The quantity of PKG on the Reel to be Max 4,000 pcs)

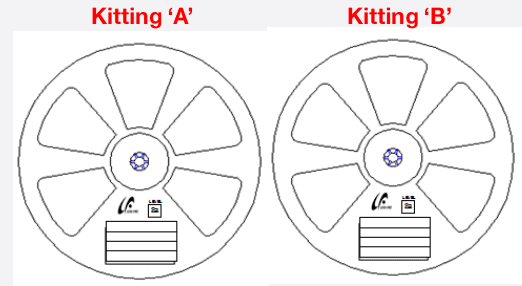
Reel

Kitting 'A'

LM282B+ RA80 ★K
ERC G2★1SB
 SPMWH1221FQ5GB★KSB G2★1SB
 G3ACA4001 / I001 / 4000 pcs
SAMSUNG

Kitting 'B'

LM282B+ RA80 ★K
ERC G2★GSB
 SPMWH1221FQ5GB★KSB G2★GSB
 G3ACA4001 / I001 / 4000 pcs
SAMSUNG



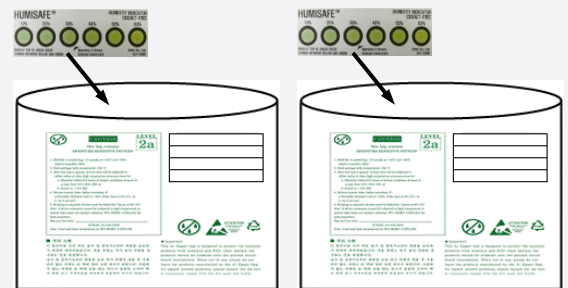
Aluminum Vinyl Packing Bag

Kitting 'A'

LM282B+ RA80 ★K
ERC G2★1SB
 SPMWH1221FQ5GB★KSB G2★1SB
 G3ACA4001 / I001 / 4000 pcs
SAMSUNG

Kitting 'B'

LM282B+ RA80 ★K
ERC G2★GSB
 SPMWH1221FQ5GB★KSB G2★GSB
 G3ACA4001 / I001 / 4000 pcs
SAMSUNG



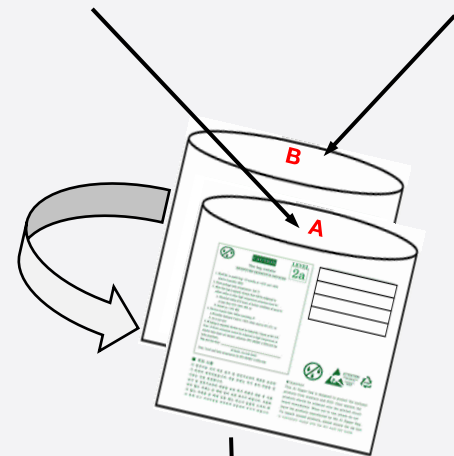
Outer Box

Kitting 'A'

LM282B+ RA80 ★K
ERC G2★1SB
 SPMWH1221FQ5GB★KSB G2★1SB
 G3ACA4001 / I001 / 20000 pcs
SAMSUNG [BOX Label]

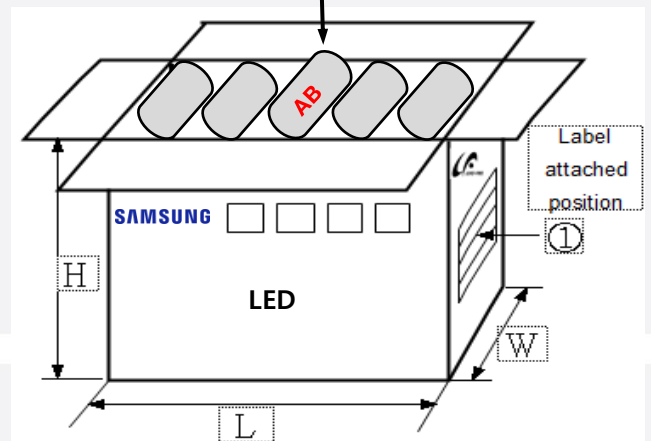
Kitting 'B'

LM282B+ RA80 ★K
ERC G2★GSB
 SPMWH1221FQ5GB★KSB G2★GSB
 G3ACA4001 / I001 / 20000 pcs
SAMSUNG [BOX Label]



Material: Paper (SW3B(B))

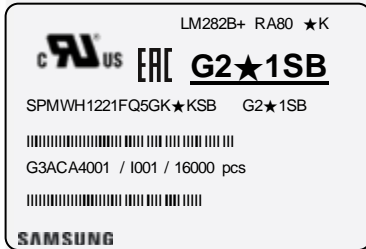
Type	Size (mm)			Note
	L	W	H	
7 inch L	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels



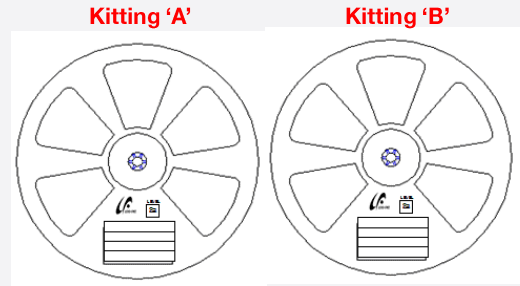
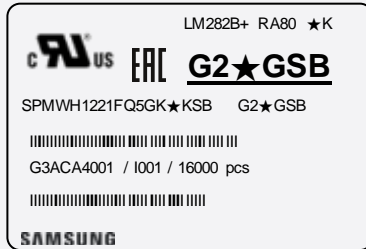
d) Packing Process for kitting (The quantity of PKG on the Reel to be Max 16,000 pcs)

Reel

Kitting 'A'

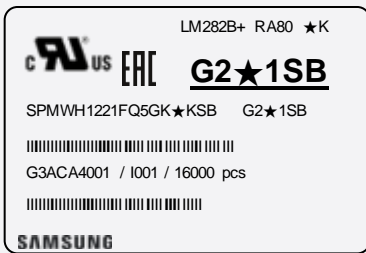


Kitting 'B'

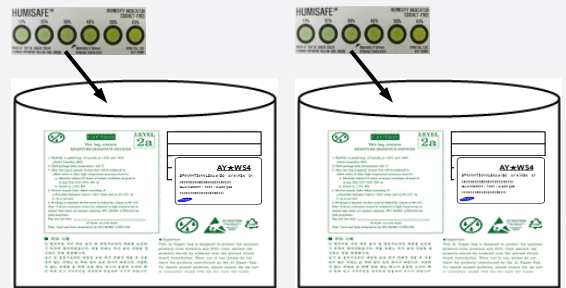
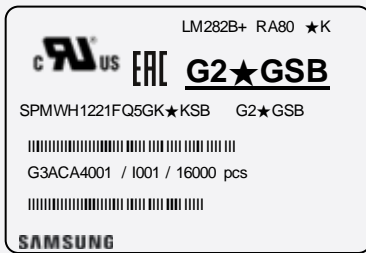


Aluminum Vinyl Packing Bag

Kitting 'A'

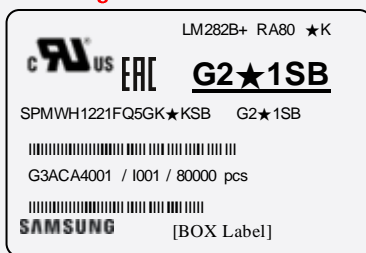


Kitting 'B'

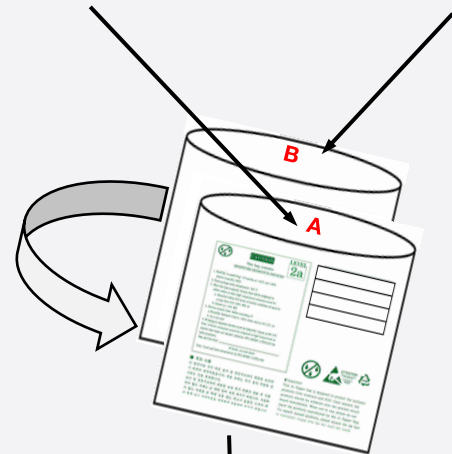
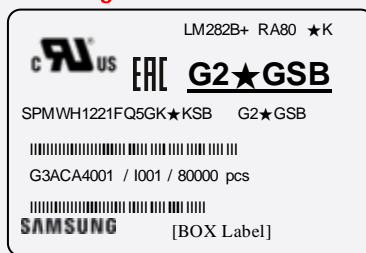


Outer Box

Kitting 'A'

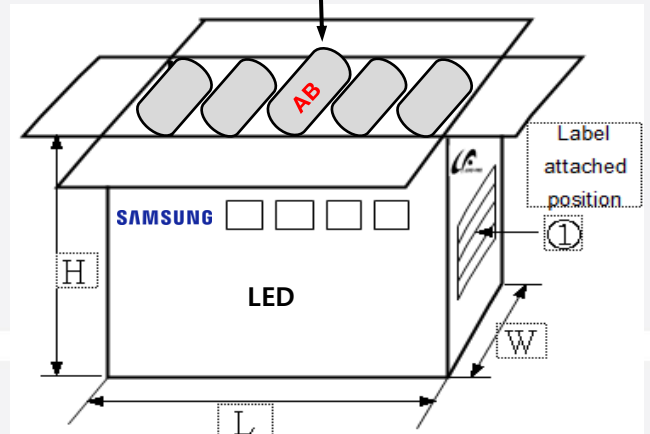


Kitting 'B'



Material: Paper (SW3B(B))

Type	Size (mm)			Note
	L	W	H	
13 inch	378 ± 5	345 ± 5	405 ± 5	Up to 10 reels



e) Aluminum Vinyl Packing Bag



CAUTION

This bag contains
MOISTURE SENSITIVE DEVICES

LEVEL

2a

LM282B+ RA80 5000K

cRU US EAC G2R1SB

SPMWH1221FQ5GBR0SB G2R1SB

G3ACA4001 / I001 / 4,000 pcs

SAMSUNG






주의 사항

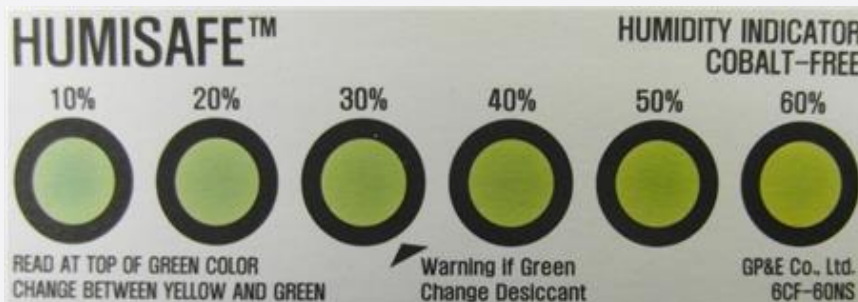
이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

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Important

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

d) Humidity Indicator Card inside Aluminum Vinyl Bag



10. Precautions in Handling & Use

- 1) For over-current protection, users are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of forward voltage.
- 2) 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.
- 3) When the device is in operation, the forward current should be carefully determined considering the maximum ambient temperature and corresponding junction temperature.
- 4) LEDs must be stored in a clean environment.
(shelf life of sealed bags is 12 months at temperature 0~40 °C, 0~90 % RH).
- 5) 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 °C / 60 % RH^{*Note 1}, or
 - b. Mounted within 24 hours (1 day) at an assembly line with a condition of more than 30 °C / 70 % RH^{*Note 2}, or
 - c. Stored at <10 % RH.

*Note 1, 2: IPC/JEDEC J-STD-033A, Recommended Equivalent Total Floor Life Table

Package Type and Body Thickness	Moisture Sensitivity Level	Maximum Percent Relative Humidity						Temperature
		40%	50%	60%	70%	80%	90%	
Body Thickness <2.1mm	Level 2a	∞	∞	28	1	1	1	30°C
		∞	∞	∞	2	1	1	25°C
		∞	∞	∞	2	2	1	20°C

- 6) Repack unused devices with anti-moisture packing, fold to close any opening and then store in a dry place.
- 7) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 °C.
- 8) Devices must be baked for 10~24 hours at 60 ± 5 °C, if baking is required.
- 9) 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.
- 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) Risk of sulfurization (or tarnishing)
The LED from Samsung uses a silver-plated lead frame and its surface color may change to black (or dark colored) when it is exposed to sulfur (S), chlorine (Cl) or other halogen compound. Sulfurization of lead frame may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of lead frame, LED should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.

Legal and additional information.

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