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Middle Power LED Series
2835 1.0W 9V Ra90 Hot bin

LM283B+



Designed for better lm/\$ (Lamps)

Features & Benefits

- 0.9W Class mid power LED
- Standard form factor for design flexibility (2.8 × 3.5 × 0.65mm)



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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	125	°C	-
Forward Current	I_F	110	mA	-
Peak Pulsed Forward Current	I_{FP}	200	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 ($I_F = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

Item	Unit	Rank	Bin	Min.	Typ.	Max.
Forward Voltage (VF)	V	SG or SK	GZ	8.8	-	9.1
			G1	9.1	-	9.4
			G2	9.4	-	9.7
			G3	9.7	-	10.0
Color Rendering Index (Ra)	-	7		90	-	-
Special CRI (R9)	-	-		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 = 100 mA, T_s = 25 °C)

Item	CRI (R _a) Min.	Nominal CCT (K)	Bin	100mA	
				Min.	Max.
Luminous Flux (Φ _v)	90	2700	SA	88	94
			SB	94	104
		3000	SA	91	98
			SB	98	108
		3500	SA	93	100
			SB	100	110
		4000	SA	96	103
			SB	103	113
		5000	SA	98	105
			SB	105	115
		5700	SA	97	104
			SB	104	114
		6500	SA	96	103
			SB	103	113

Note:

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

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	9	A	Q	7	S	G	R	0	S	A

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	229	2.8 x 3.5 x 0.65 mm; 2 pads; 3chip;			
10	Sorting Current (mA)	A	100 mA			
11	Chromaticity Coordinates	Q	Hot bin			
12	CRI	7	Min. 90			
13 14	Forward Voltage (V)	SG or SK	8.8~10.0 Bin Code	GZ	8.8 ~ 9.1	
				G1	9.1 ~ 9.4	
				G2	9.4 ~ 9.7	
				G3	9.7 ~ 10.0	
			SG : 4,000ea per reel ,SK : 12,000ea per reel			
15 16	CCT (K)	W☆	2700	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG		
		V☆	3000	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG		
		U☆	3500	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG		
		T☆	4000	Bin Code:	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG	
		R☆	5000		R1, R2, R3, R4, R5, R6, R7, R8, R9,RA,RB,RC,RD,RE,RF,RG	
		Q☆	5700		Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9,QA,QB,QC,QD,QE,QF,QG	
		P☆	6500		P1, P2, P3, P4, P5, P6, P7, P8, P9,PA,PB,PC,PD,PE,PF,PG	
			☆ : "0" (Whole bin) "M" (Quarter bin) or "K" (kitting bin)			
17 18	Luminous Flux	SA		SA		
		SB	Bin Code:	SB		

a) Luminous Flux Bins ($I_f = 100 \text{ mA}$, $T_s = 25^\circ\text{C}$)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ_v , lm)
90	2700	SPMWH1229AQ7SGW☆SA	SA	88 ~ 94
		SPMWH1229AQ7SGW☆SB	SB	94 ~ 104
	3000	SPMWH1229AQ7SGV☆SA	SA	91 ~ 98
		SPMWH1229AQ7SGV☆SB	SB	98 ~ 108
	3500	SPMWH1229AQ7SGU☆SA	SA	93 ~ 100
		SPMWH1229AQ7SGU☆SB	SB	100 ~ 110
	4000	SPMWH1229AQ7SGT☆SA	SA	96 ~ 103
		SPMWH1229AQ7SGT☆SB	SB	103 ~ 113
	5000	SPMWH1229AQ7SGR☆SA	SA	98 ~ 105
		SPMWH1229AQ7SGR☆SB	SB	105 ~ 115
	5700	SPMWH1229AQ7SGQ☆SA	SA	97 ~ 104
		SPMWH1229AQ7SGQ☆SB	SB	104 ~ 114
	6500	SPMWH1229AQ7SGP☆SA	SA	96 ~ 103
		SPMWH1229AQ7SGP☆SB	SB	103 ~ 113

Note: ☆" can be "0" (Whole bin), "M" (Quarter bin) or "K" (Kitting bin) of the color binning

b) Kitting rule

1) 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 (GZ+GZ), (G1+G1), (G2+G2) or (G3+G3).
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	GZ	GZ
	G1	G1
	G2	G2
	G3	G3
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 ($I_F = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
90	2700	SPMWH1229AQ7SGW0S★	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		SPMWH1229AQ7SGWMS★	WM (Quarter bin)	W6, W7, WA, WB
		SPMWH1229AQ7SGWKS★	WK (Kitting bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		SPMWH1229AQ7SGV0S★	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
		SPMWH1229AQ7SGVMS★	VM (Quarter bin)	V6, V7, VA, VB
		SPMWH1229AQ7SGVKS★	VK (Kitting bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3000	SPMWH1229AQ7SGU0S★	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		SPMWH1229AQ7SGUMS★	UM (Quarter bin)	U6, U7, UA, UB
		SPMWH1229AQ7SGUKS★	UK (Kitting bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		SPMWH1229AQ7SGT0S★	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
		SPMWH1229AQ7SGTMS★	TM (Quarter bin)	T6, T7, TA, TB
		SPMWH1229AQ7SGTKS★	TK (Kitting bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	5000	SPMWH1229AQ7SGR0S★	R0 (Whole bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG
		SPMWH1229AQ7SGRMS★	RM (Quarter bin)	R6, R7, RA, RB
		SPMWH1229AQ7SGRKS★	RK (Kitting bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG
		SPMWH1229AQ7SGQ0S★	Q0 (Whole bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG
		SPMWH1229AQ7SGQMS★	QM (Quarter bin)	Q6, Q7, QA, QB
		SPMWH1229AQ7SGQKS★	QK (Kitting bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG
	6500	SPMWH1229AQ7SGP0S★	P0 (Whole bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG
		SPMWH1229AQ7SGPMS★	PM (Quarter bin)	P6, P7, PA, PB
		SPMWH1229AQ7SGPKS★	PK (Kitting bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG

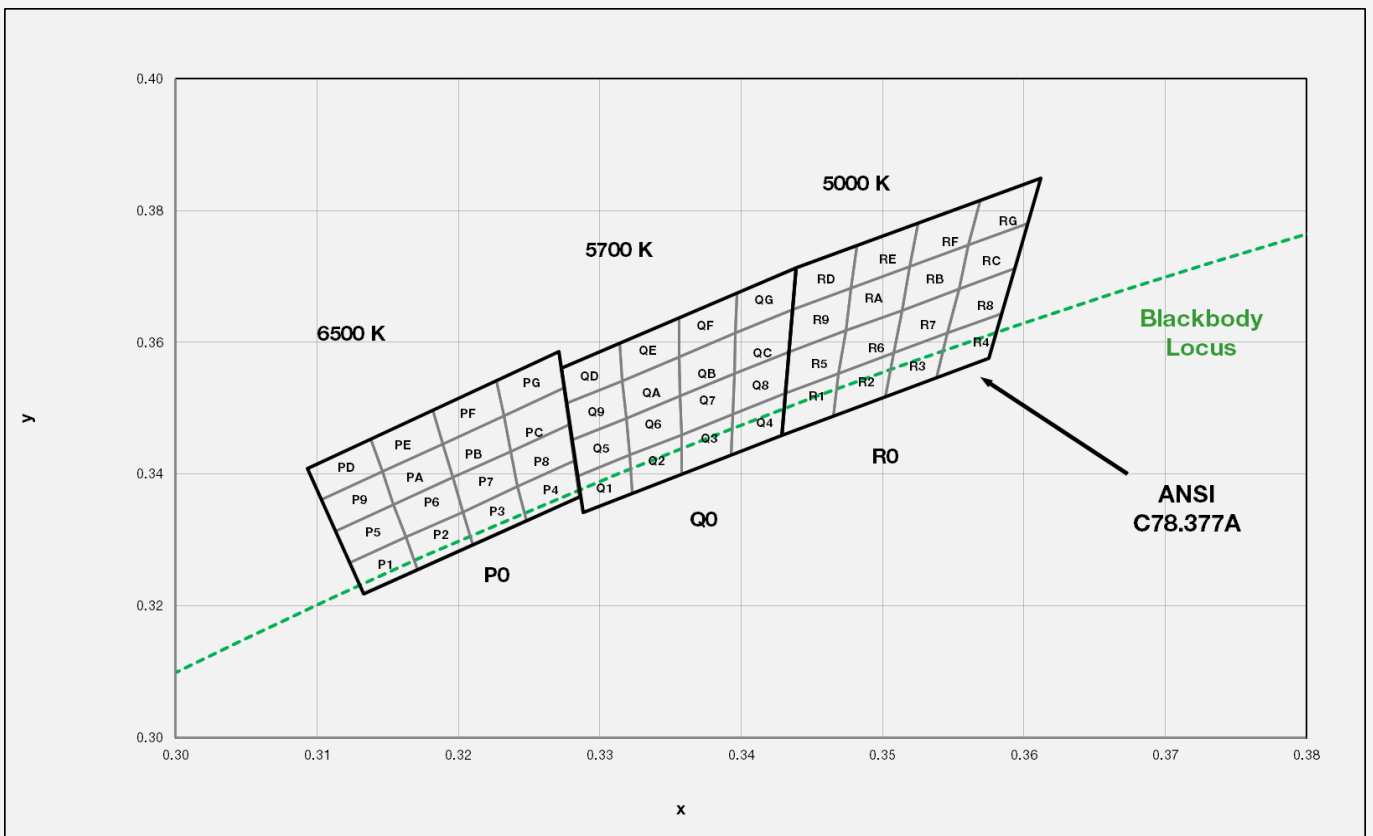
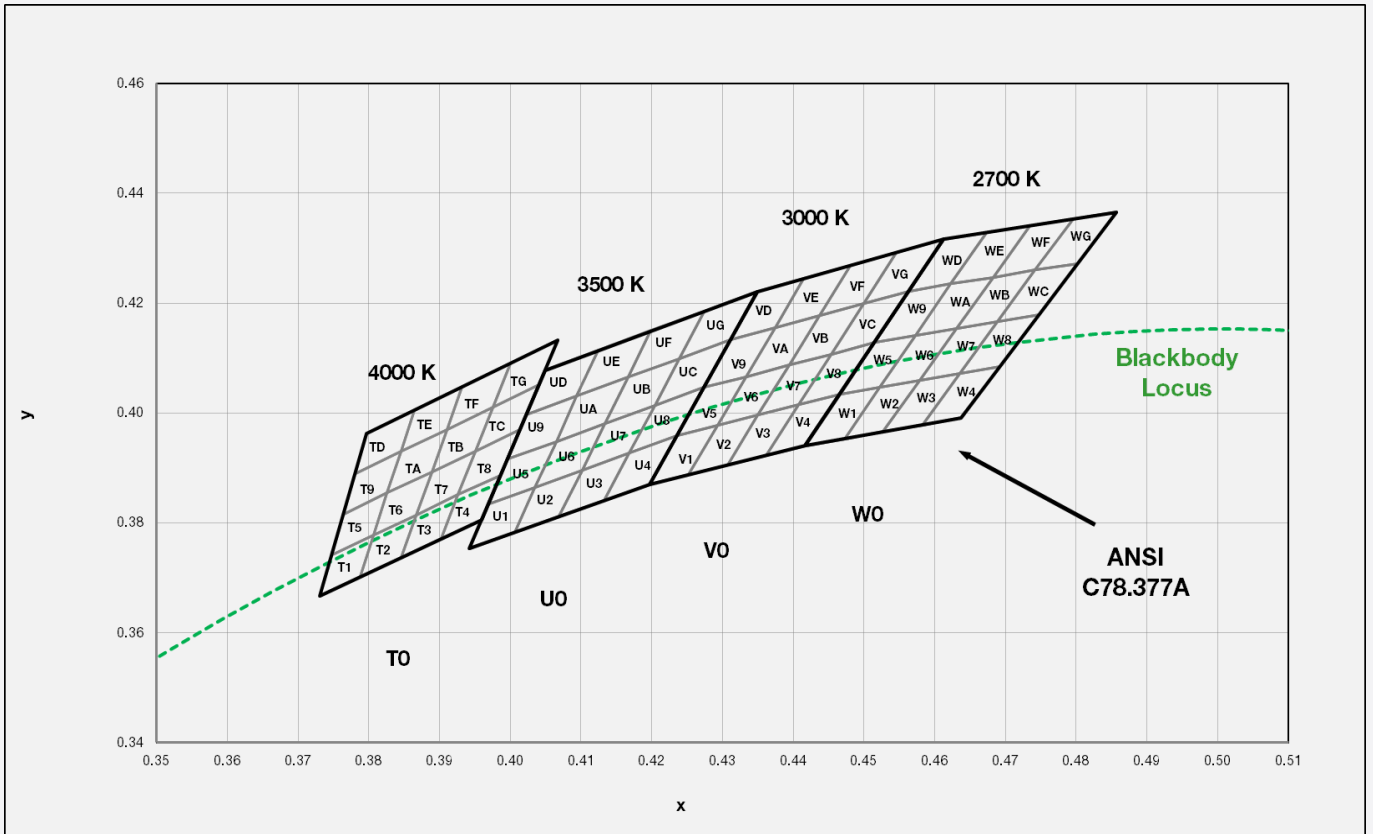
Note:

★ can be "SA" or "SB" of luminous flux bin

d) Voltage Bins ($I_f = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

CRI (R_a) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-		GZ	8.8 ~ 9.1
			SG	G1	9.1 ~ 9.4
			or		
			SK	G2	9.4 ~ 9.7
				G3	9.7 ~ 10.0

e) Chromaticity Region & Coordinates ($I_F = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



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

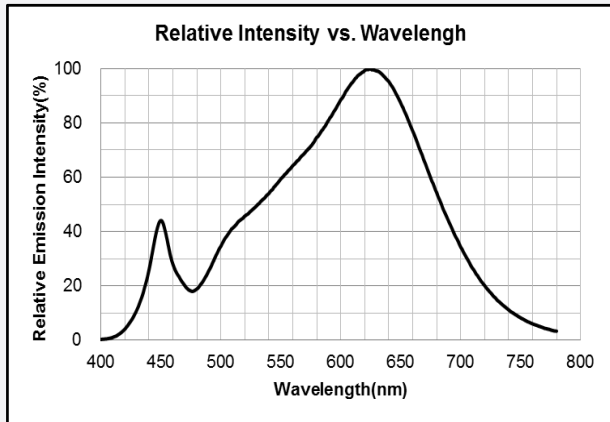
Region	CIE x	CIE y	Region	CIE x	CIE y
P rank (6500 K)					
P1	0.3133	0.3218	P9	0.3113	0.3314
	0.3171	0.3255		0.3154	0.3354
	0.3163	0.3305		0.3146	0.3404
	0.3123	0.3266		0.3103	0.3361
P2	0.3171	0.3255	PA	0.3154	0.3354
	0.3210	0.3292		0.3196	0.3395
	0.3203	0.3343		0.3189	0.3446
	0.3163	0.3305		0.3146	0.3404
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: $C_x, C_y = \pm 0.005$

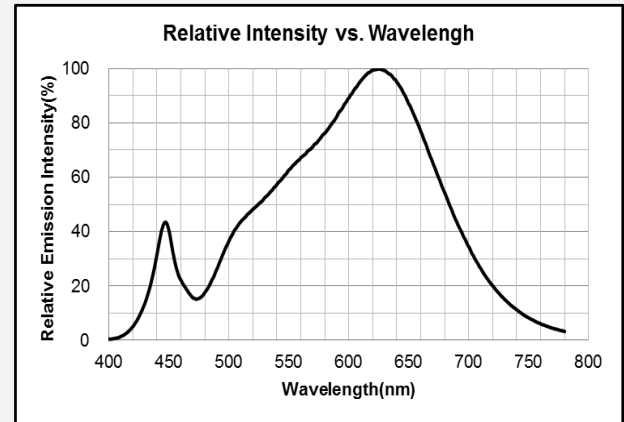
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_f = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

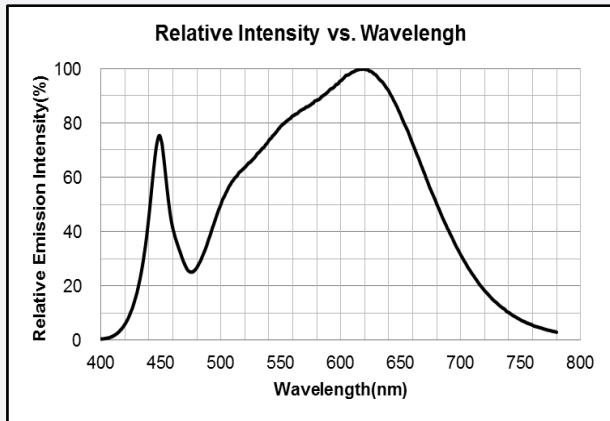
CCT: 2700 K (90 CRI)



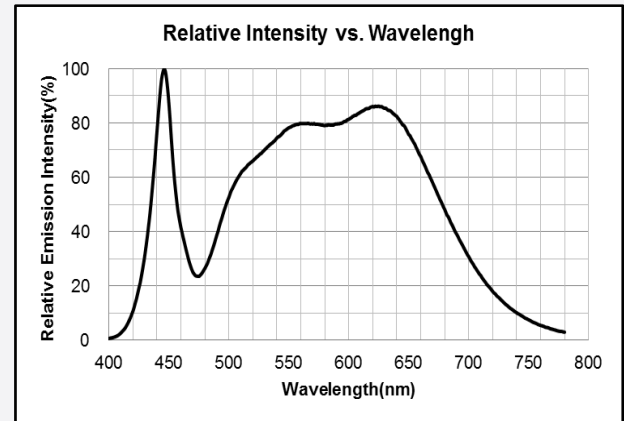
CCT: 3000 K (90 CRI)



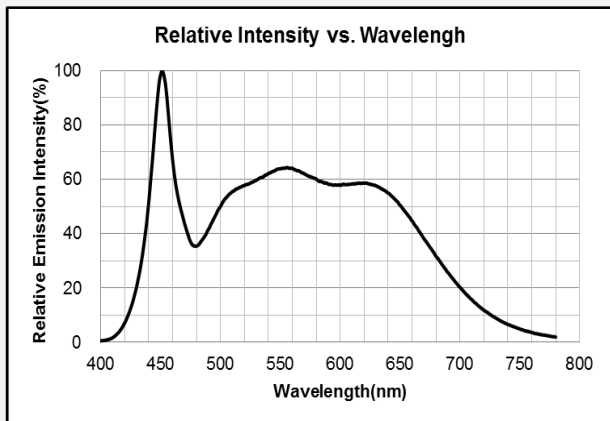
CCT: 3500 K (90 CRI)



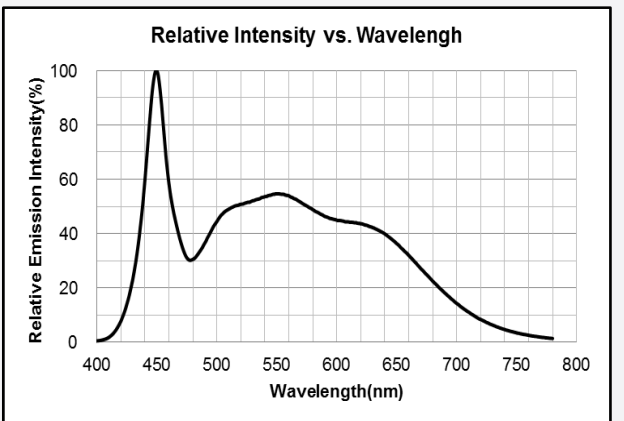
CCT: 4000 K (90 CRI)



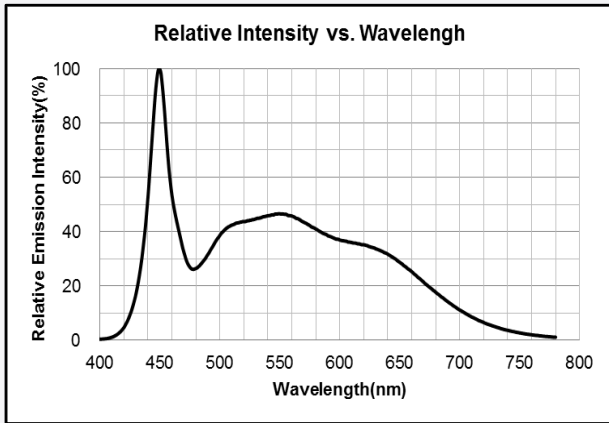
CCT: 5000 K (90 CRI)



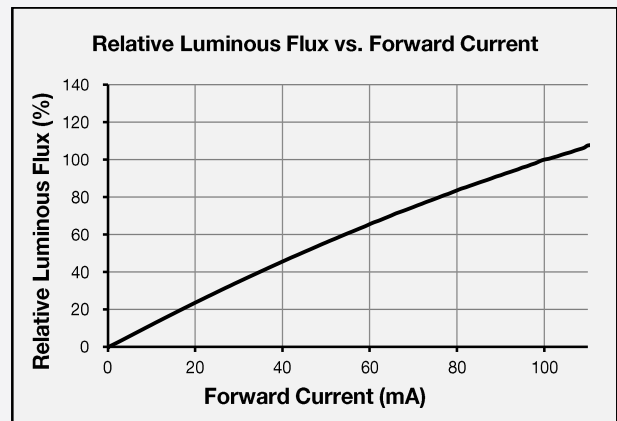
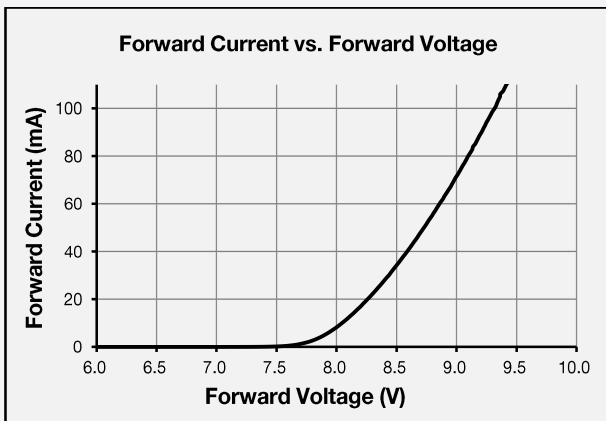
CCT: 5700 K (90 CRI)



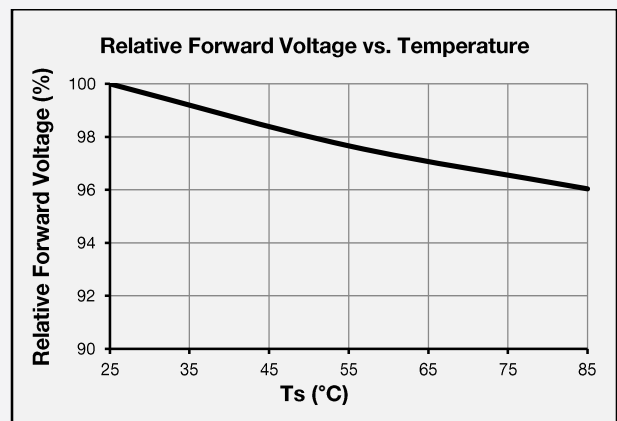
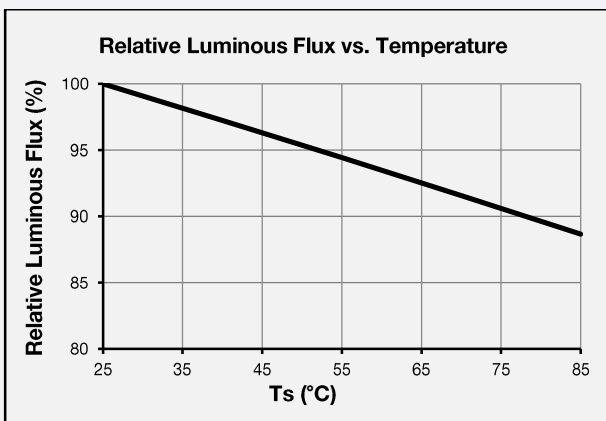
CCT: 6500 K (90 CRI)



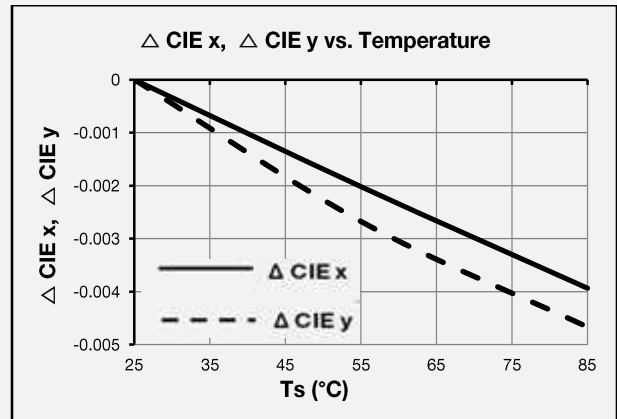
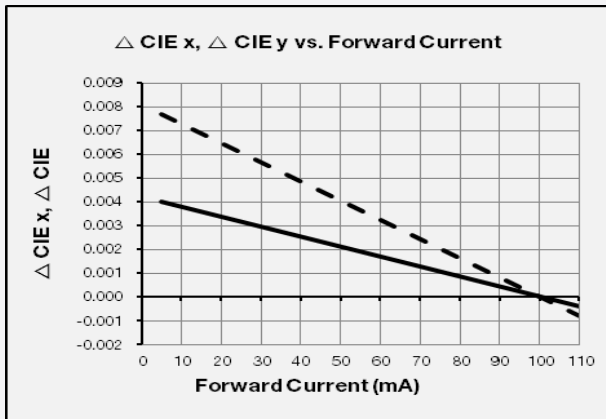
b) Forward Current Characteristics ($T_s = 25\text{ }^\circ\text{C}$)



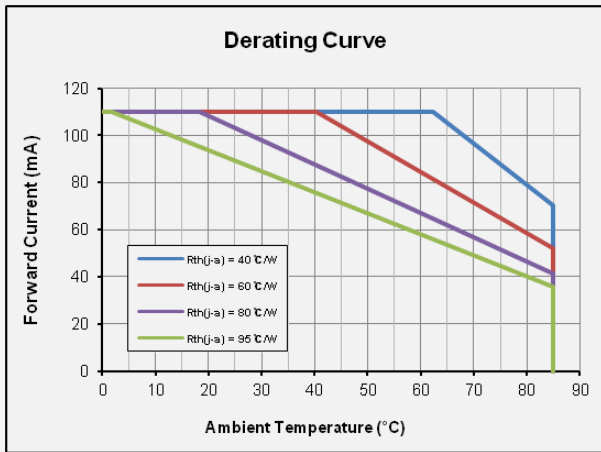
c) Temperature Characteristics ($I_F = 100\text{ mA}$)



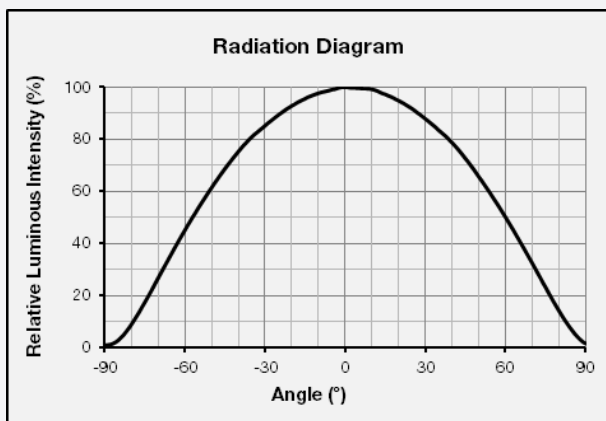
d) Color Shift Characteristics ($I_F = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



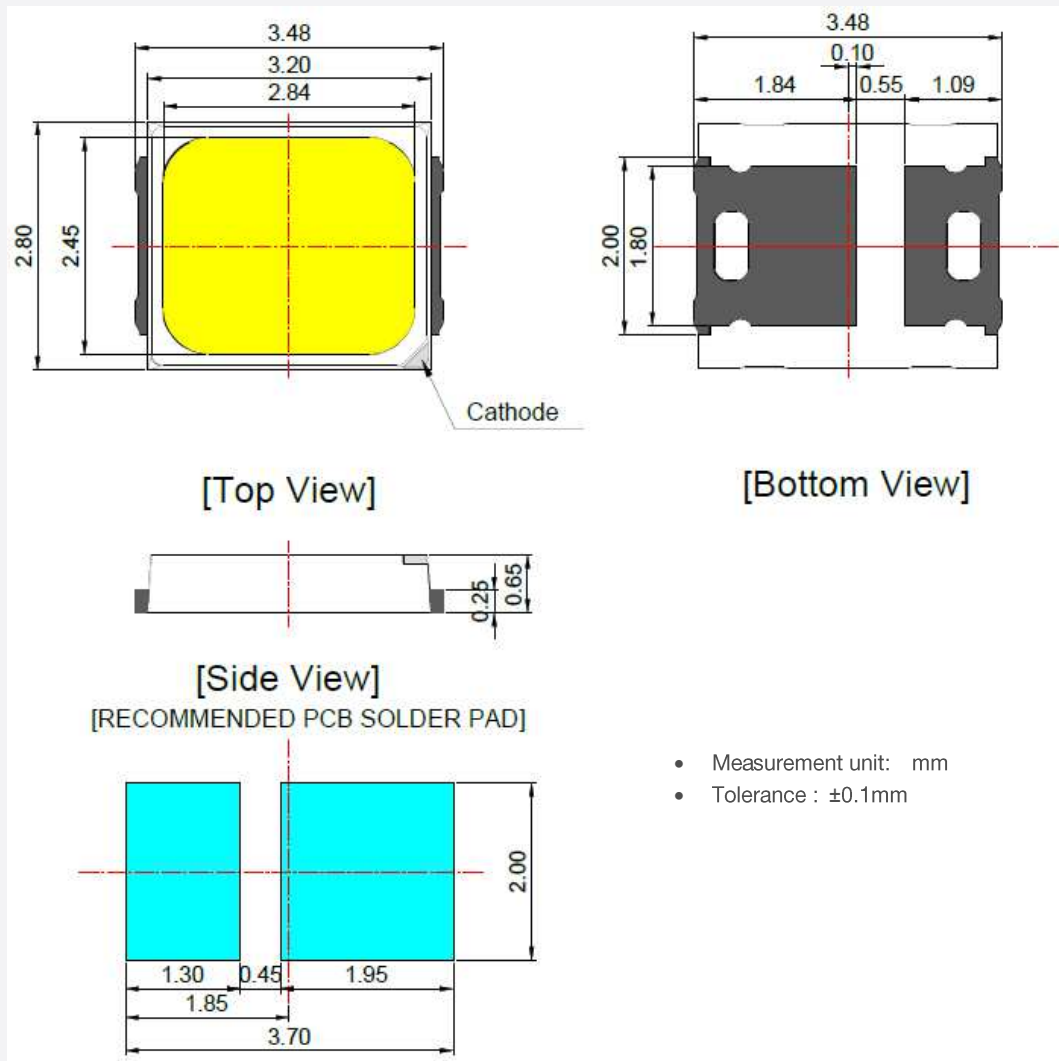
e) Derating Curve



f) Beam Angle Characteristics ($I_F = 100 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



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:

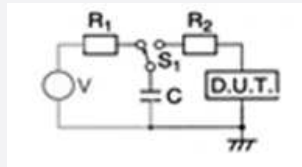
- 1) Pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid strong pressure on the LEDs. Do not put stress on the LEDs during heating.
- 2) Re-soldering should not be done after the LEDs have been soldered. If re-soldering is unavoidable, LED's characteristics 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 110 mA	1000 h	22
High Temperature Life Test	85 °C, DC 110 mA	1000 h	22
High Temperature Humidity Life Test	60 °C, 90 % RH, DC 110 mA	1000 h	22
Low Temperature Life Test	-40 °C, DC 110 mA	1000 h	22
Powered Temperature Cycle Test	-45 °C ~ 85 °C, each 20 min, on/off 5 min Temp. Change time 100min, DC 110 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)



R_1 : 10 M Ω
 R_2 : 1.5 k Ω
 C : 100 pF
 V : ± 2 kV

5 times

30

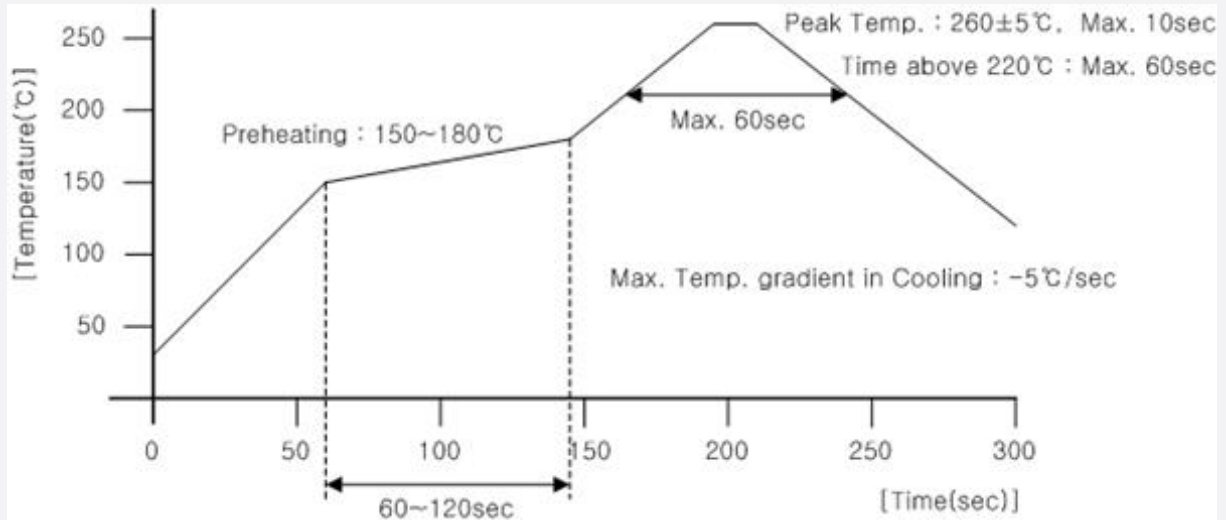
b) Criteria for Judging the Damage

Item	Symbol	Test Condition ($T_s = 25^\circ\text{C}$)	Limit	
			Min	Max
Forward Voltage	V_F	$I_F = 100$ mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ_v	$I_F = 100$ mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

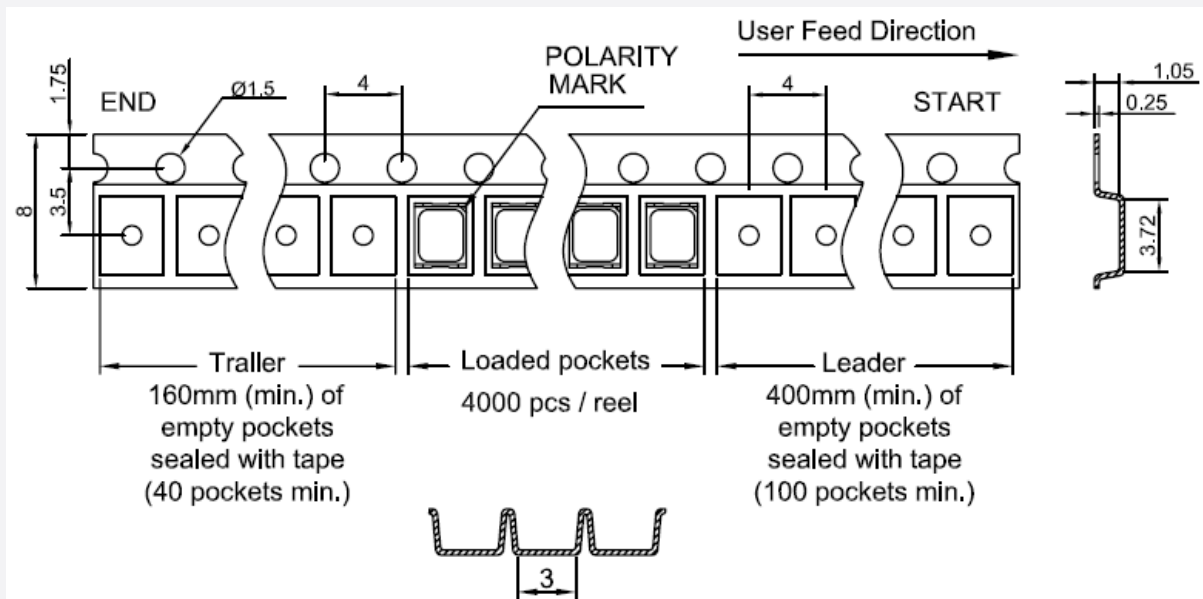


b) Manual Soldering Conditions

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

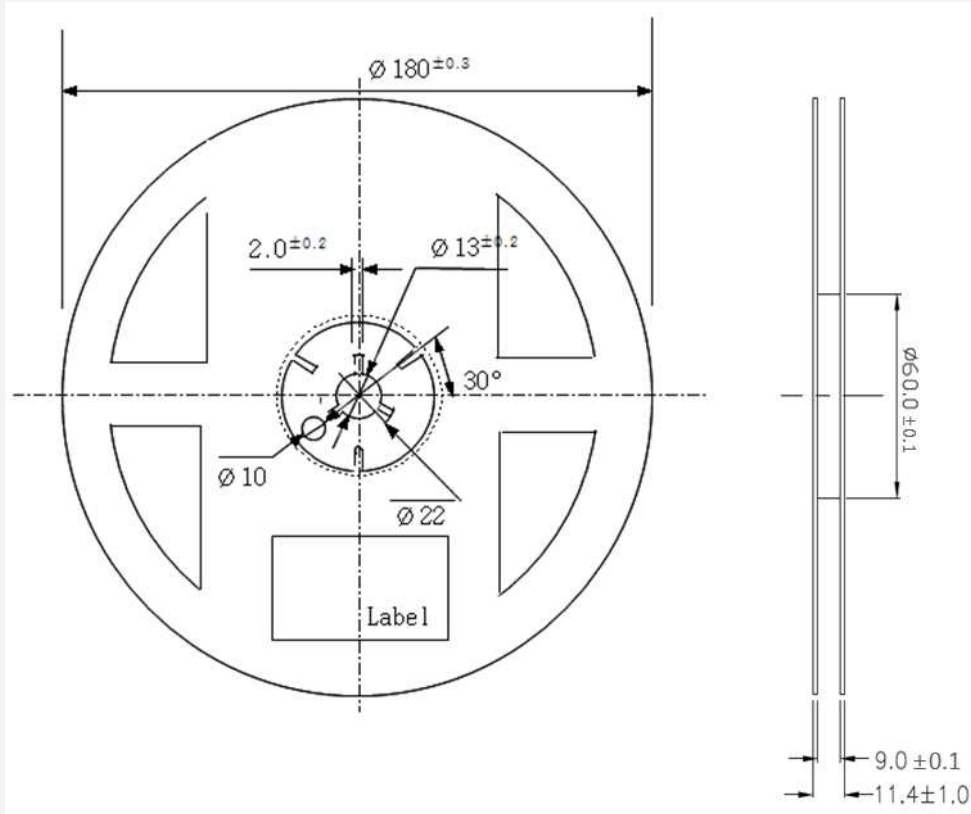
7. Tape & Reel

a) Taping Dimension



b) Reel Dimension (max 4,000 pcs)

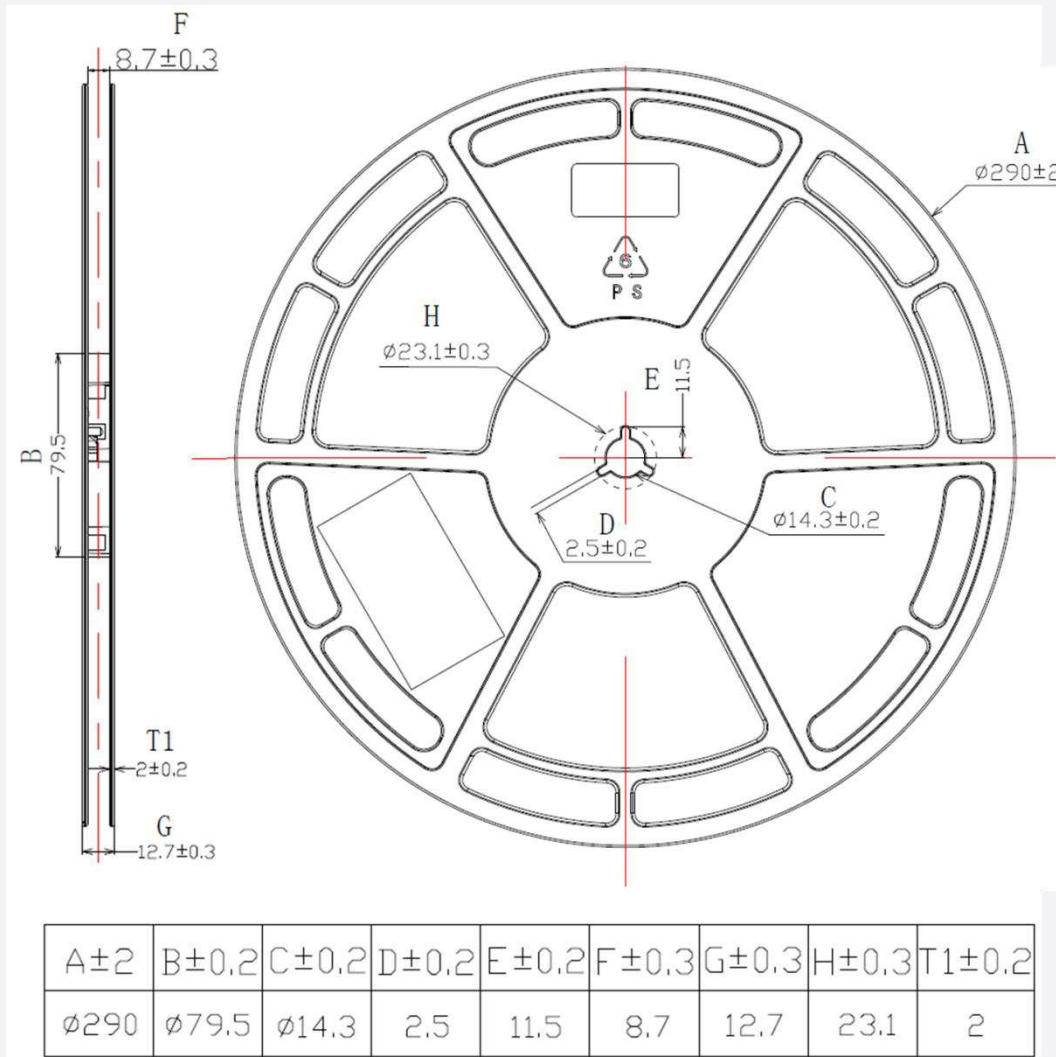
(unit: mm)

**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 12,000 pcs)

(unit: mm)

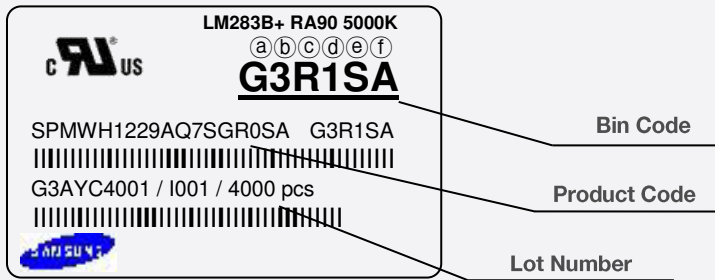


Notes:

- 1) Quantity: The quantity/reel is 12,000 pcs
- 2) All dimensions are millimeters (tolerance : ±0.2mm)
- 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 8-15)
- ⒺⒻ: Luminous Flux bin (refer to page 7)

b) Lot Number

The lot number is composed of the following characters:



①②③④⑤⑥⑦⑧⑨ / |ⒶⒷⒸ / 4,000 pcs

- ① : Production site (S: Giheung, Korea, G: Tianjin, China)
- ② : 3 (LED)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (Z: 2015, A: 2016, B: 2017...)
- ⑤ : Month (1~9, A, B, C)
- ⑥ : Day (1~9, A, B~V)
- ⑦⑧⑨ ⒶⒷⒸ : Product serial number