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# LM561B – 5630 Middle Power LED



## Introduction

### Features

- Beam Angle: 120°
- Precondition : JEDEC Level 2a
- Dimension : 5.6 x 3.0 x 0.8 mm
- ESD withstand Voltage : up to  $\pm 5$ KV [HBM]

## SAMSUNG ELECTRONICS

95, Samsung2-Ro, Giheung-Gu,  
Yongin-City, Gyeonggi-Do 446-711, KOREA

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# 1. Product Code Information

## 1) Luminous Flux Bins ( $T_s = 25^\circ\text{C}$ )

Nominal CCT	Product Code	Flux Rank	Sorting Condition $I_m @65\text{mA}$
			Flux Range ( $\Phi_v, I_m$ )
2700K	SPMWHT541MD5W★W☆SB	S2	26.0 ~ 28.0
		S3	28.0 ~ 30.0
	SPMWHT541MD5W★W☆SC	S3	28.0 ~ 30.0
		S4	30.0 ~ 32.0
	SPMWHT541MD5W★W☆SD	S4	30.0 ~ 32.0
S5		32.0 ~ 34.0	
3000K	SPMWHT541MD5W★V☆SB	S2	26.5 ~ 28.5
		S3	28.5 ~ 30.5
	SPMWHT541MD5W★V☆SC	S3	28.5 ~ 30.5
		S4	30.5 ~ 32.5
	SPMWHT541MD5W★V☆SD	S4	30.5 ~ 32.5
S5		32.5 ~ 34.5	
3500K	SPMWHT541MD5W★U☆SB	S2	27.0 ~ 29.0
		S3	29.0 ~ 31.0
	SPMWHT541MD5W★U☆SC	S3	29.0 ~ 31.0
		S4	31.0 ~ 33.0
	SPMWHT541MD5W★U☆SD	S4	31.0 ~ 33.0
S5		33.0 ~ 35.0	
4000K	SPMWHT541MD5W★T☆SB	S2	28.0 ~ 30.0
		S3	30.0 ~ 32.0
	SPMWHT541MD5W★T☆SC	S3	30.0 ~ 32.0
		S4	32.0 ~ 34.0
	SPMWHT541MD5W★T☆SD	S4	32.0 ~ 34.0
S5		34.0 ~ 36.0	
5000K	SPMWHT541MD5W★R☆SB	S2	29.0 ~ 31.0
		S3	31.0 ~ 33.0
	SPMWHT541MD5W★R☆SC	S3	31.0 ~ 33.0
		S4	33.0 ~ 35.0
	SPMWHT541MD5W★R☆SD	S4	33.0 ~ 35.0
S5		35.0 ~ 37.0	

### 1) Luminous Flux Bins ( $T_s = 25^\circ\text{C}$ )

Nominal CCT	Product Code	Flux Rank	Sorting Condition $I_m$ @65mA
			Flux Range ( $\Phi_v$ , lm)
5700K	SPMWHT541MD5W★Q☆SB	S2	28.5 ~ 30.5
		S3	30.5 ~ 32.5
	SPMWHT541MD5W★Q☆SC	S3	30.5 ~ 32.5
		S4	32.5 ~ 34.5
	SPMWHT541MD5W★Q☆SD	S4	32.5 ~ 34.5
S5		34.5 ~ 36.5	
6500K	SPMWHT541MD5W★P☆SB	S2	28.0 ~ 30.0
		S3	30.0 ~ 32.0
	SPMWHT541MD5W★P☆SC	S3	30.0 ~ 32.0
		S4	32.0 ~ 34.0
	SPMWHT541MD5W★P☆SD	S4	32.0 ~ 34.0
S5		34.0 ~ 36.0	

**Notes:**

- 1) SAMSUNG ELECTRONICS maintains a tolerance of  $\pm 5\%$  on Luminous Flux measurements.
- 2) "★" can be "WA(VF 2.7~3.2V step 0.1V + 2500EA), WK(VF 2.7~3.2V step 0.1V + 10,000EA)"
- 3) Warm white : "☆" can be "0"(Whole Bin), "H"(Half Bin) or "M"(Quarter Bin) of the color binning.  
Cool white : "☆" can be "0"(Whole Bin) or "M"(Quarter Bin) of the color binning.





## 2) Color Bins ( $T_s = 25^\circ\text{C}$ )

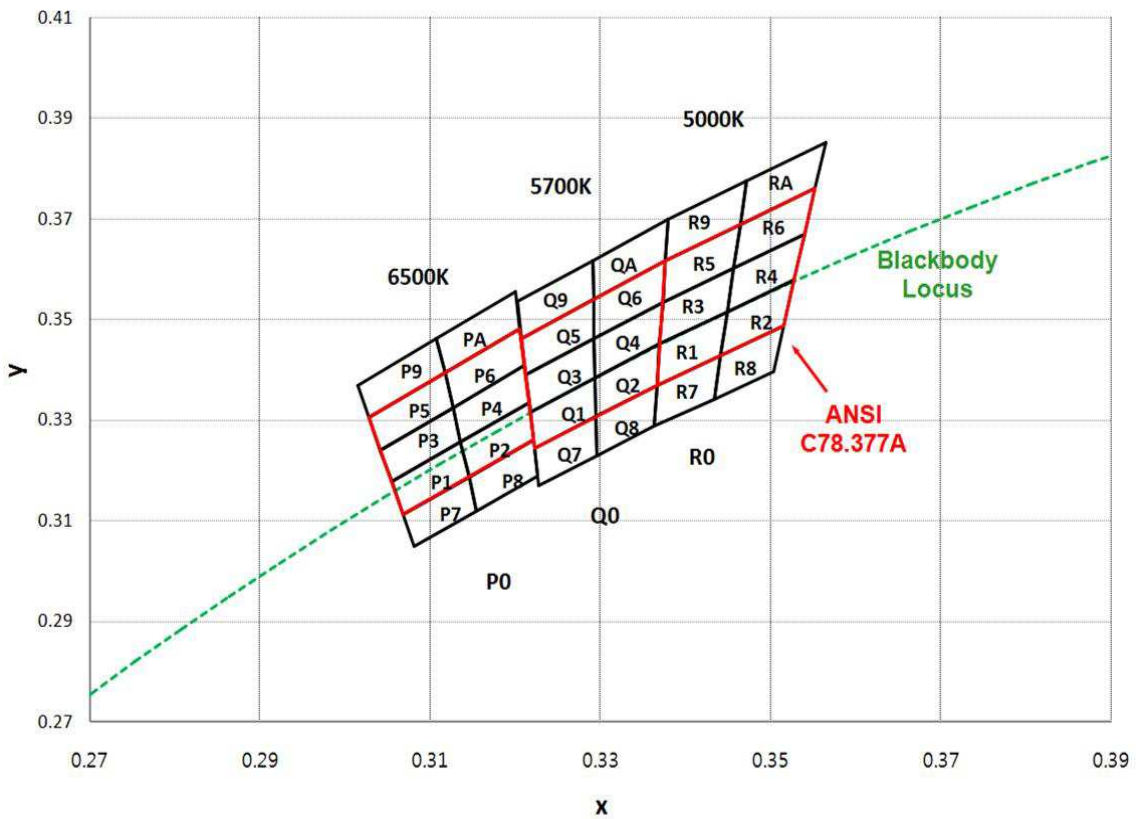
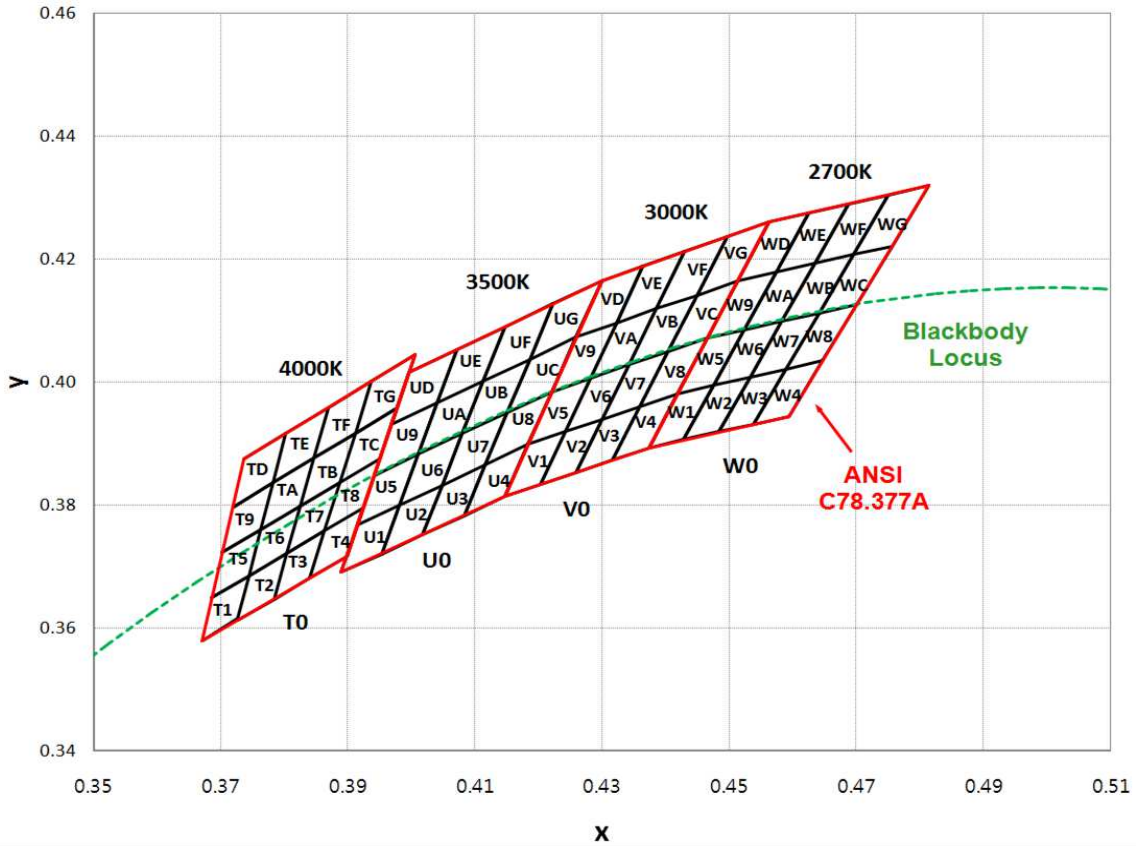
### 1) Color Binning

Nominal CCT	Product Code	Color Rank	Chromaticity Bins
2700K	SPMWHT541MD5W★W0SB SPMWHT541MD5W★W0SC SPMWHT541MD5W★W0SD	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
	SPMWHT541MD5W★WHSB SPMWHT541MD5W★WHSC SPMWHT541MD5W★WHSD	WH (Half bin)	W5, W6, W7, W8, W9, WA, WB, WC
	SPMWHT541MD5W★WMSB SPMWHT541MD5W★WMSC SPMWHT541MD5W★WMSD	WM (Quarter bin)	W6, W7, WA, WB
3000K	SPMWHT541MD5W★V0SB SPMWHT541MD5W★V0SC SPMWHT541MD5W★V0SD	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	SPMWHT541MD5W★VHSB SPMWHT541MD5W★VHSC SPMWHT541MD5W★VHSD	VH (Half bin)	V5, V6, V7, V8, V9, VA, VB, VC
	SPMWHT541MD5W★VMSB SPMWHT541MD5W★VMSC SPMWHT541MD5W★VMSD	VM (Quarter bin)	V6, V7, VA, VB
3500K	SPMWHT541MD5W★U0SB SPMWHT541MD5W★U0SC SPMWHT541MD5W★U0SD	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	SPMWHT541MD5W★UHSB SPMWHT541MD5W★UHSC SPMWHT541MD5W★UHSD	UH (Half bin)	U5, U6, U7, U8, U9, UA, UB, UC
	SPMWHT541MD5W★UMSB SPMWHT541MD5W★UMSC SPMWHT541MD5W★UMSD	UM (Quarter bin)	U6, U7, UA, UB

### 1) Color Binning (Continued)

Nominal CCT	Product Code	Color Rank	Chromaticity Bins
4000K	SPMWHT541MD5W★T0SB SPMWHT541MD5W★T0SC SPMWHT541MD5W★T0SD	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	SPMWHT541MD5W★THSB SPMWHT541MD5W★THSC SPMWHT541MD5W★THSD	TH (Half bin)	T5, T6, T7, T8, T9, TA, TB, TC
	SPMWHT541MD5W★TMSB SPMWHT541MD5W★TMSC SPMWHT541MD5W★TMSD	TM (Quarter bin)	T6, T7, TA, TB
5000K	SPMWHT541MD5W★R0SB SPMWHT541MD5W★R0SC SPMWHT541MD5W★R0SD	R0 (Whole bin)	R1, R2, R3, R4, R5 R6, R7, R8, R9 ,RA
	SPMWHT541MD5W★RMSB SPMWHT541MD5W★RMSC SPMWHT541MD5W★RMSD	RM (Quarter bin)	R1, R2, R3, R4, R5, R6
5700K	SPMWHT541MD5W★Q0SB SPMWHT541MD5W★Q0SC SPMWHT541MD5W★Q0SD	Q0 (Whole bin)	Q1, Q2, Q3, Q4, Q5 Q6, Q7, Q8, Q9, QA
	SPMWHT541MD5W★QMSB SPMWHT541MD5W★QMSC SPMWHT541MD5W★QMSD	QM (Quarter bin)	Q1, Q2, Q3, Q4, Q5, Q6
6500K	SPMWHT541MD5W★P0SB SPMWHT541MD5W★P0SC SPMWHT541MD5W★P0SD	P0 (Whole bin)	P1, P2, P3, P4, P5 P6, P7, P8, P9, PA
	SPMWHT541MD5W★PMSB SPMWHT541MD5W★PMSC SPMWHT541MD5W★PMSD	PM (Quarter bin)	P1, P2, P3, P4, P5, P6

## 2) Chromaticity Region & Coordinates







## 2) Chromaticity Region & Coordinates (Continued)

Region	CIE X	CIE Y	Region	CIE X	CIE Y
W rank (2700K)					
W1	0.4373	0.3893	W9	0.4465	0.4071
	0.4418	0.3981		0.4513	0.4164
	0.4475	0.3994		0.4573	0.4178
	0.4428	0.3906		0.4523	0.4085
W2	0.4428	0.3906	WA	0.4523	0.4085
	0.4475	0.3994		0.4573	0.4178
	0.4532	0.4008		0.4634	0.4193
	0.4483	0.3919		0.4582	0.4099
W3	0.4483	0.3919	WB	0.4582	0.4099
	0.4532	0.4008		0.4634	0.4193
	0.4589	0.4021		0.4695	0.4207
	0.4538	0.3931		0.4641	0.4112
W4	0.4538	0.3931	WC	0.4641	0.4112
	0.4589	0.4021		0.4695	0.4207
	0.4646	0.4034		0.4756	0.4221
	0.4593	0.3944		0.4700	0.4126
W5	0.4418	0.3981	WD	0.4513	0.4164
	0.4465	0.4071		0.4562	0.4260
	0.4523	0.4085		0.4624	0.4274
	0.4475	0.3994		0.4573	0.4178
W6	0.4475	0.3994	WE	0.4573	0.4178
	0.4523	0.4085		0.4624	0.4274
	0.4582	0.4099		0.4687	0.4289
	0.4532	0.4008		0.4634	0.4193
W7	0.4532	0.4008	WF	0.4634	0.4193
	0.4582	0.4099		0.4687	0.4289
	0.4641	0.4112		0.4750	0.4304
	0.4589	0.4021		0.4695	0.4207
W8	0.4589	0.4021	WG	0.4695	0.4207
	0.4641	0.4112		0.4750	0.4304
	0.4700	0.4126		0.4813	0.4319
	0.4646	0.4034		0.4756	0.4221

Region	CIE X	CIE Y	Region	CIE X	CIE Y
V rank (3000K)					
V1	0.4147	0.3814	V9	0.4221	0.3984
	0.4183	0.3898		0.4259	0.4073
	0.4242	0.3919		0.4322	0.4096
	0.4203	0.3833		0.4281	0.4006
V2	0.4203	0.3833	VA	0.4281	0.4006
	0.4242	0.3919		0.4322	0.4096
	0.4300	0.3939		0.4385	0.4119
	0.4259	0.3853		0.4342	0.4028
V3	0.4259	0.3853	VB	0.4342	0.4028
	0.4300	0.3939		0.4385	0.4119
	0.4359	0.3960		0.4449	0.4141
	0.4316	0.3873		0.4403	0.4049
V4	0.4316	0.3873	VC	0.4403	0.4049
	0.4359	0.3960		0.4449	0.4141
	0.4418	0.3981		0.4513	0.4164
	0.4373	0.3893		0.4465	0.4071
V5	0.4183	0.3898	VD	0.4259	0.4073
	0.4221	0.3984		0.4299	0.4165
	0.4281	0.4006		0.4364	0.4188
	0.4242	0.3919		0.4322	0.4096
V6	0.4242	0.3919	VE	0.4322	0.4096
	0.4281	0.4006		0.4364	0.4188
	0.4342	0.4028		0.4430	0.4212
	0.4300	0.3939		0.4385	0.4119
V7	0.4300	0.3939	VF	0.4385	0.4119
	0.4342	0.4028		0.4430	0.4212
	0.4403	0.4049		0.4496	0.4236
	0.4359	0.3960		0.4449	0.4141
V8	0.4359	0.3960	VG	0.4449	0.4141
	0.4403	0.4049		0.4496	0.4236
	0.4465	0.4071		0.4562	0.4260
	0.4418	0.3981		0.4513	0.4164

## 2) Chromaticity Region & Coordinates (Continued)

Region	CIE X	CIE Y	Region	CIE X	CIE Y
U rank (3500K)					
U1	0.3889	0.3690	U9	0.3941	0.3848
	0.3915	0.3768		0.3968	0.3930
	0.3981	0.3800		0.4040	0.3966
	0.3953	0.3720		0.4010	0.3882
U2	0.3953	0.3720	UA	0.4010	0.3882
	0.3981	0.3800		0.4040	0.3966
	0.4048	0.3832		0.4113	0.4001
	0.4017	0.3751		0.4080	0.3916
U3	0.4017	0.3751	UB	0.4080	0.3916
	0.4048	0.3832		0.4113	0.4001
	0.4116	0.3865		0.4186	0.4037
	0.4082	0.3782		0.4150	0.3950
U4	0.4082	0.3782	UC	0.4150	0.3950
	0.4116	0.3865		0.4186	0.4037
	0.4183	0.3898		0.4259	0.4073
	0.4147	0.3814		0.4221	0.3984
U5	0.3915	0.3768	UD	0.3968	0.3930
	0.3941	0.3848		0.3996	0.4015
	0.4010	0.3882		0.4071	0.4052
	0.3981	0.3800		0.4040	0.3966
U6	0.3981	0.3800	UE	0.4040	0.3966
	0.4010	0.3882		0.4071	0.4052
	0.4080	0.3916		0.4146	0.4089
	0.4048	0.3832		0.4113	0.4001
U7	0.4048	0.3832	UF	0.4113	0.4001
	0.4080	0.3916		0.4146	0.4089
	0.4150	0.3950		0.4222	0.4127
	0.4116	0.3865		0.4186	0.4037
U8	0.4116	0.3865	UG	0.4186	0.4037
	0.4150	0.3950		0.4222	0.4127
	0.4221	0.3984		0.4299	0.4165
	0.4183	0.3898		0.4259	0.4073

Region	CIE X	CIE Y	Region	CIE X	CIE Y
T rank (4000K)					
T1	0.367	0.3578	T9	0.3702	0.3722
	0.3726	0.3612		0.3763	0.376
	0.3744	0.3685		0.3782	0.3837
	0.3686	0.3649		0.3719	0.3797
T2	0.3726	0.3612	TA	0.3763	0.3760
	0.3783	0.3646		0.3825	0.3798
	0.3804	0.3721		0.3847	0.3877
	0.3744	0.3685		0.3782	0.3837
T3	0.3783	0.3646	TB	0.3825	0.3798
	0.3840	0.3681		0.3887	0.3836
	0.3863	0.3758		0.3912	0.3917
	0.3804	0.3721		0.3847	0.3877
T4	0.384	0.3681	TC	0.3887	0.3837
	0.3898	0.3716		0.395	0.3875
	0.3924	0.3794		0.3978	0.3958
	0.3863	0.3758		0.3912	0.3917
T5	0.3686	0.3649	TD	0.3719	0.3797
	0.3744	0.3685		0.3782	0.3837
	0.3763	0.376		0.3802	0.3916
	0.3702	0.3722		0.3736	0.3874
T6	0.3744	0.3685	TE	0.3782	0.3837
	0.3804	0.3721		0.3847	0.3877
	0.3825	0.3798		0.3869	0.3958
	0.3763	0.376		0.3802	0.3916
T7	0.3804	0.3721	TF	0.3847	0.3877
	0.3863	0.3758		0.3912	0.3917
	0.3887	0.3836		0.3937	0.4001
	0.3825	0.3798		0.3869	0.3958
T8	0.3863	0.3758	TG	0.3912	0.3917
	0.3924	0.3794		0.3978	0.3958
	0.395	0.3875		0.4006	0.4044
	0.3887	0.3836		0.3937	0.4001



## 2) Chromaticity Region & Coordinates (Continued)

Region	CIE X	CIE Y	Region	CIE X	CIE Y
R rank (5000K)					
R1	0.3366	0.3369	R6	0.3456	0.3601
	0.3441	0.3428		0.3539	0.3669
	0.3449	0.3515		0.3551	0.3760
	0.3369	0.3451		0.3464	0.3688
R2	0.3441	0.3428	R7	0.3363	0.3287
	0.3515	0.3487		0.3433	0.3341
	0.3527	0.3578		0.3441	0.3428
	0.3449	0.3515		0.3366	0.3369
R3	0.3369	0.3451	R8	0.3433	0.3341
	0.3449	0.3515		0.3503	0.3396
	0.3456	0.3601		0.3515	0.3487
	0.3373	0.3534		0.3441	0.3428
R4	0.3449	0.3515	R9	0.3376	0.3616
	0.3527	0.3578		0.3464	0.3688
	0.3539	0.3669		0.3471	0.3775
	0.3456	0.3601		0.3379	0.3698
R5	0.3373	0.3534	RA	0.3464	0.3688
	0.3456	0.3601		0.3551	0.3760
	0.3464	0.3688		0.3564	0.3851
	0.3376	0.3616		0.3471	0.3775
Q rank (5700K)					
Q1	0.3222	0.3243	Q6	0.3292	0.3461
	0.3294	0.3306		0.3373	0.3534
	0.3293	0.3384		0.3376	0.3616
	0.3217	0.3316		0.3292	0.3539
Q2	0.3294	0.3306	Q7	0.3227	0.3170
	0.3366	0.3369		0.3295	0.3228
	0.3369	0.3451		0.3294	0.3306
	0.3293	0.3384		0.3222	0.3243
Q3	0.3217	0.3316	Q8	0.3295	0.3228
	0.3293	0.3384		0.3363	0.3287
	0.3292	0.3461		0.3366	0.3369
	0.3212	0.3389		0.3294	0.3306
Q4	0.3293	0.3384	Q9	0.3207	0.3462
	0.3369	0.3451		0.3292	0.3539
	0.3373	0.3534		0.3291	0.3617
	0.3292	0.3461		0.3202	0.3535
Q5	0.3212	0.3389	QA	0.3292	0.3539
	0.3292	0.3461		0.3376	0.3616
	0.3292	0.3539		0.3379	0.3698
	0.3207	0.3462		0.3291	0.3617

Region	CIE X	CIE Y	Region	CIE X	CIE Y
P rank (6500K)					
P1	0.3068	0.3113	P6	0.3126	0.3324
	0.3145	0.3187		0.3210	0.3408
	0.3135	0.3256		0.3205	0.3481
	0.3055	0.3177		0.3117	0.3393
P2	0.3145	0.3187	P7	0.3081	0.3049
	0.3221	0.3261		0.3154	0.3119
	0.3216	0.3334		0.3145	0.3187
	0.3135	0.3256		0.3068	0.3113
P3	0.3055	0.3177	P8	0.3154	0.3119
	0.3135	0.3256		0.3226	0.3188
	0.3126	0.3324		0.3221	0.3261
	0.3041	0.3240		0.3145	0.3187
P4	0.3135	0.3256	P9	0.3028	0.3304
	0.3216	0.3334		0.3117	0.3393
	0.3210	0.3408		0.3107	0.3461
	0.3126	0.3324		0.3015	0.3368
P5	0.3041	0.3240	PA	0.3117	0.3393
	0.3126	0.3324		0.3205	0.3481
	0.3117	0.3393		0.3200	0.3554
	0.3028	0.3304		0.3107	0.3461

**Notes:** SAMSUNG ELECTRONICS maintains  $\pm 0.005$  tolerance of Cx, Cy

## 2. Characteristics

### 1) Absolute Maximum Rating

Item	Symbol	Rating	Condition
Operating temperature range	$T_{op}$	-40°C ~ +85°C	-
Storage temperature range	$T_{stg}$	-40°C ~ +120°C	-
LED junction temperature	$T_J$	110°C	-
Forward Current	$I_F$	180 mA	-
Peak Pulsed Forward Current	$I_{FP}$	300 mA	Duty 1/10 pulse width 10ms
Assembly Process Temperature	-	260°C, < 10sec	-
ESD	-	5kV	HBM

### 2) Electro-optical Characteristics

Item	Unit	Nominal CCT	Product Code	Rank	Min	Typ	Max	
Forward Voltage <sup>1)</sup> ( $V_F$ ) (@65 mA, $T_s = 25^\circ\text{C}$ )	V	-	-	WA	AZ	2.70	-	2.80
					A1	2.80	-	2.90
					A2	2.90	-	3.00
					A3	3.00	-	3.10
					A4	3.10	-	3.20
Luminous Flux <sup>2)</sup> ( $\Phi_v$ ) (@65 mA, $T_s = 25^\circ\text{C}$ )	lm	2700K	*W★W☆SB	S2	26.0	-	28.0	
				S3	28.0	-	30.0	
				S3	28.0	-	30.0	
				S4	30.0	-	32.0	
				S4	30.0	-	32.0	
				S5	32.0	-	34.0	
			*W★W☆SC	S2	26.5	-	28.5	
				S3	28.5	-	30.5	
				S3	28.5	-	30.5	
				S4	30.5	-	32.5	
				S4	30.5	-	32.5	
				S5	32.5	-	34.5	
		*W★W☆SD	S2	27.0	-	29.0		
			S3	29.0	-	31.0		
			S3	29.0	-	31.0		
			S4	31.0	-	33.0		
			S4	31.0	-	33.0		
			S5	33.0	-	35.0		
		3000K	*W★V☆SB	S2	28.0	-	30.0	
				S3	30.0	-	32.0	
				S3	30.0	-	32.0	
				S4	32.0	-	34.0	
				S4	32.0	-	34.0	
				S5	34.0	-	36.0	
			*W★V☆SC	S2	29.0	-	31.0	
				S3	31.0	-	33.0	
				S3	31.0	-	33.0	
				S4	33.0	-	35.0	
				S4	33.0	-	35.0	
				S5	35.0	-	37.0	
		*W★V☆SD	S2	28.5	-	30.5		
			S3	30.5	-	32.5		
			S3	30.5	-	32.5		
			S4	32.5	-	34.5		
			S4	32.5	-	34.5		
			S5	34.5	-	36.5		
		3500K	*W★U☆SB	S2	29.0	-	31.0	
				S3	31.0	-	33.0	
				S3	31.0	-	33.0	
				S4	33.0	-	35.0	
				S4	33.0	-	35.0	
				S5	35.0	-	37.0	
			*W★U☆SC	S2	29.0	-	31.0	
				S3	31.0	-	33.0	
				S3	31.0	-	33.0	
				S4	33.0	-	35.0	
				S4	33.0	-	35.0	
				S5	35.0	-	37.0	
*W★U☆SD	S2	29.0	-	31.0				
	S3	31.0	-	33.0				
	S3	31.0	-	33.0				
	S4	33.0	-	35.0				
	S4	33.0	-	35.0				
	S5	35.0	-	37.0				
4000K	*W★T☆SB	S2	28.0	-	30.0			
		S3	30.0	-	32.0			
		S3	30.0	-	32.0			
		S4	32.0	-	34.0			
		S4	32.0	-	34.0			
		S5	34.0	-	36.0			
	*W★T☆SC	S2	29.0	-	31.0			
		S3	31.0	-	33.0			
		S3	31.0	-	33.0			
		S4	33.0	-	35.0			
		S4	33.0	-	35.0			
		S5	35.0	-	37.0			
*W★T☆SD	S2	28.5	-	30.5				
	S3	30.5	-	32.5				
	S3	30.5	-	32.5				
	S4	32.5	-	34.5				
	S4	32.5	-	34.5				
	S5	34.5	-	36.5				
5000K	*W★R☆SB	S2	28.0	-	30.0			
		S3	30.0	-	32.0			
		S3	30.0	-	32.0			
		S4	32.0	-	34.0			
		S4	32.0	-	34.0			
		S5	34.0	-	36.0			
	*W★R☆SC	S2	29.0	-	31.0			
		S3	31.0	-	33.0			
		S3	31.0	-	33.0			
		S4	33.0	-	35.0			
		S4	33.0	-	35.0			
		S5	35.0	-	37.0			
*W★R☆SD	S2	28.5	-	30.5				
	S3	30.5	-	32.5				
	S3	30.5	-	32.5				
	S4	32.5	-	34.5				
	S4	32.5	-	34.5				
	S5	34.5	-	36.5				
5700K	*W★Q☆SB	S2	28.0	-	30.0			
		S3	30.0	-	32.0			
		S3	30.0	-	32.0			
		S4	32.0	-	34.0			
		S4	32.0	-	34.0			
		S5	34.0	-	36.0			
	*W★Q☆SC	S2	29.0	-	31.0			
		S3	31.0	-	33.0			
		S3	31.0	-	33.0			
		S4	33.0	-	35.0			
		S4	33.0	-	35.0			
		S5	35.0	-	37.0			
*W★Q☆SD	S2	28.5	-	30.5				
	S3	30.5	-	32.5				
	S3	30.5	-	32.5				
	S4	32.5	-	34.5				
	S4	32.5	-	34.5				
	S5	34.5	-	36.5				
6500K	*W★P☆SB	S2	28.0	-	30.0			
		S3	30.0	-	32.0			
		S3	30.0	-	32.0			
		S4	32.0	-	34.0			
		S4	32.0	-	34.0			
		S5	34.0	-	36.0			
	*W★P☆SC	S2	29.0	-	31.0			
		S3	31.0	-	33.0			
		S3	31.0	-	33.0			
		S4	33.0	-	35.0			
		S4	33.0	-	35.0			
		S5	35.0	-	37.0			
*W★P☆SD	S2	28.5	-	30.5				
	S3	30.5	-	32.5				
	S3	30.5	-	32.5				
	S4	32.5	-	34.5				
	S4	32.5	-	34.5				
	S5	34.5	-	36.5				



## 2) Electro-optical Characteristics

Item	Unit	Nominal CCT	Product Code	Rank	Min	Typ	Max
Reverse Voltage (@5 mA, $T_s = 25^\circ\text{C}$ )	V	-	-	-	0.7	-	1.2
Color Rendering Index <sup>3)</sup> ( $R_a$ )	-	-	-	5	80	-	-
Special CRI <sup>4)</sup> (R9)	-	-	-	-	0	-	-
Thermal resistance (Junction to solder point)	$^\circ\text{C}/\text{W}$				-	16	-

### Notes:

1)~4) SAMSUNG ELECTRONICS maintains a tolerance of  $V_F:\pm 0.1\text{ V}$ ,  $\Phi_V:\pm 5\%$ ,  $R_a:\pm 3.0$ , R9  $:\pm 6.5$  on measurements

5) " \* " is Product Code of "SPMWHT541MD5"

6) "★" can be "WA(VF 2.7~3.2V step 0.1V + 2500EA), WK(VF 2.7~3.2V step 0.1V + 10,000EA)"

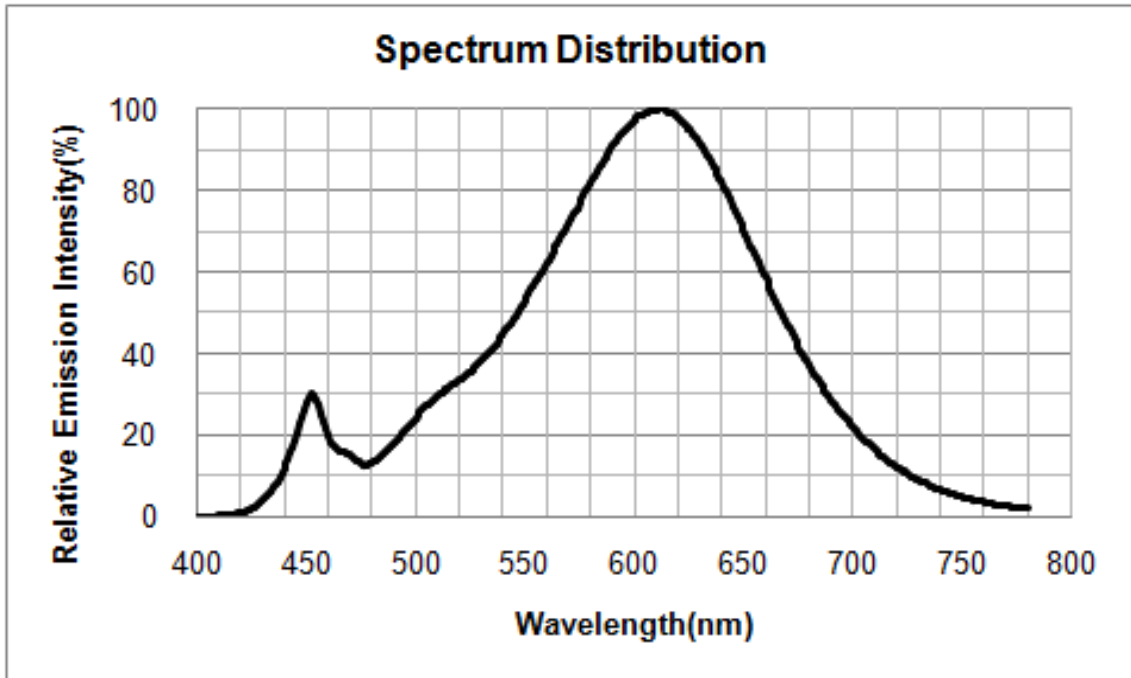
7) Warm white : "☆" can be "0"(Whole Bin), "H"(Half Bin) or "M"(Quarter Bin) of the color binning.  
Cool white : "☆" can be "0"(Whole Bin) or "M"(Quarter Bin) of the color binning.



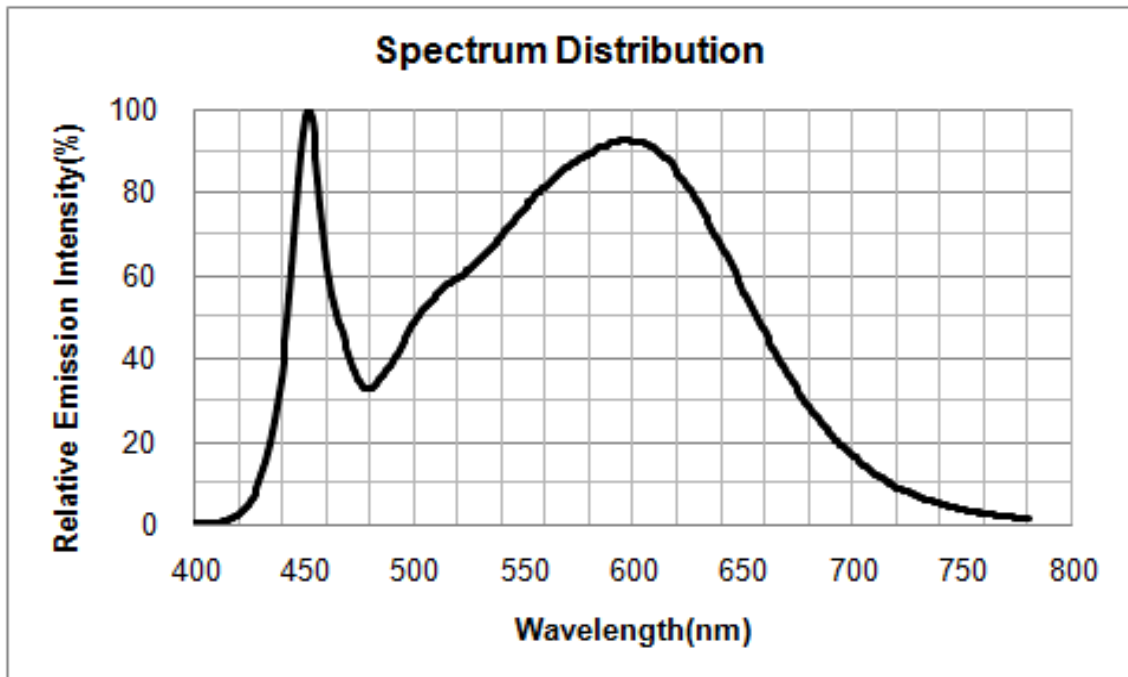
### 3. Typical Characteristics Graph ( $T_s = 25^\circ\text{C}$ )

#### 1) Spectrum Distribution

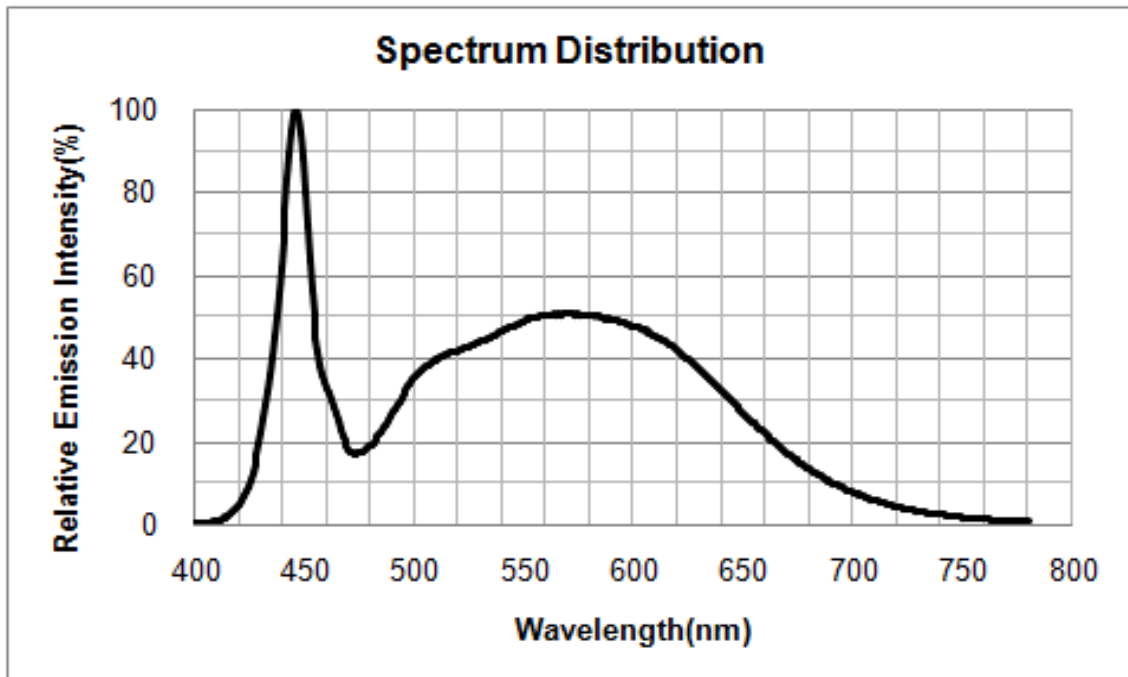
[CCT : 2700K & 3000K]



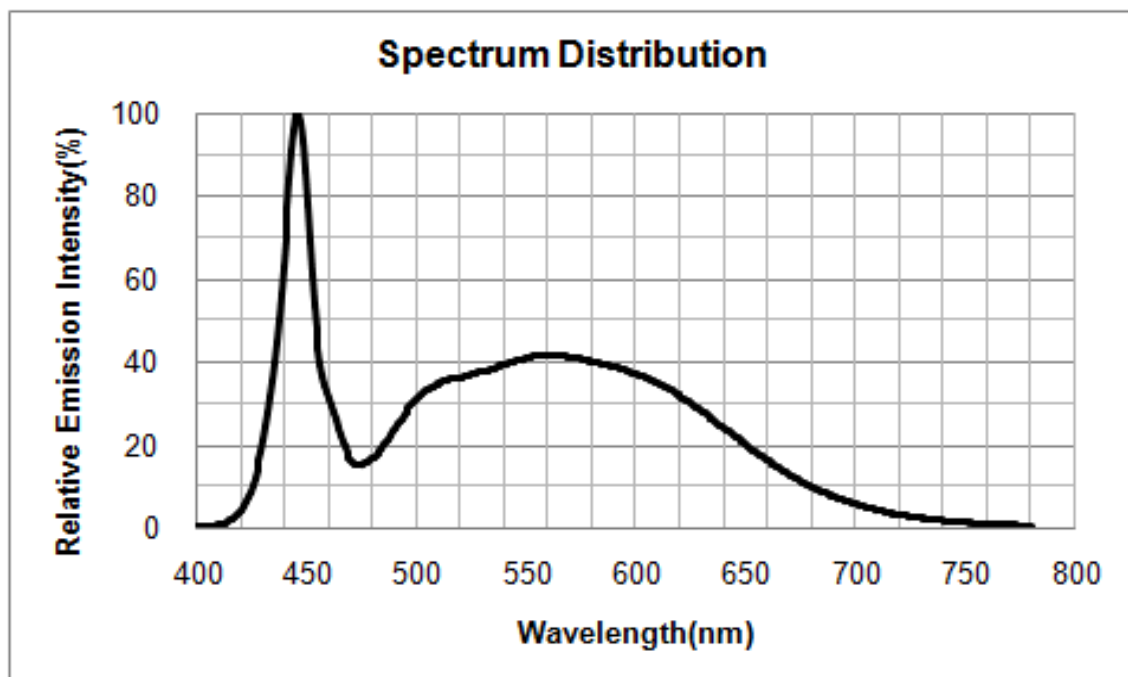
[CCT : 3500K & 4000K]



[CCT : 5000K & 5700K]



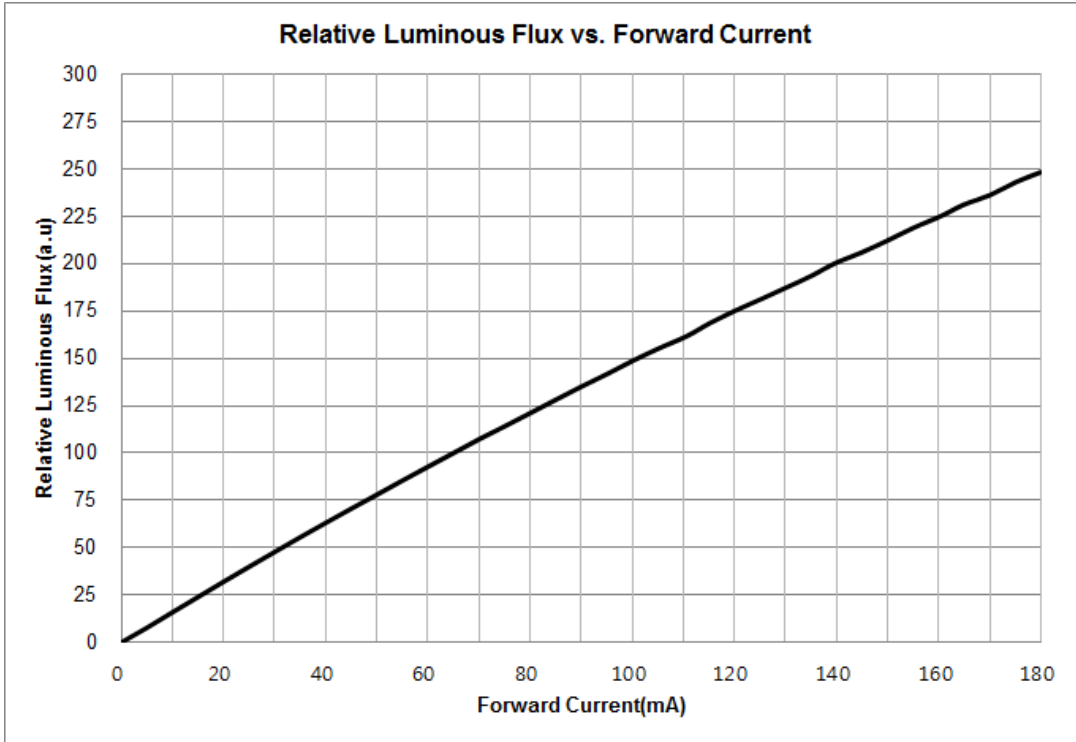
[CCT : 6500K]



## 2) Forward Current Characteristics

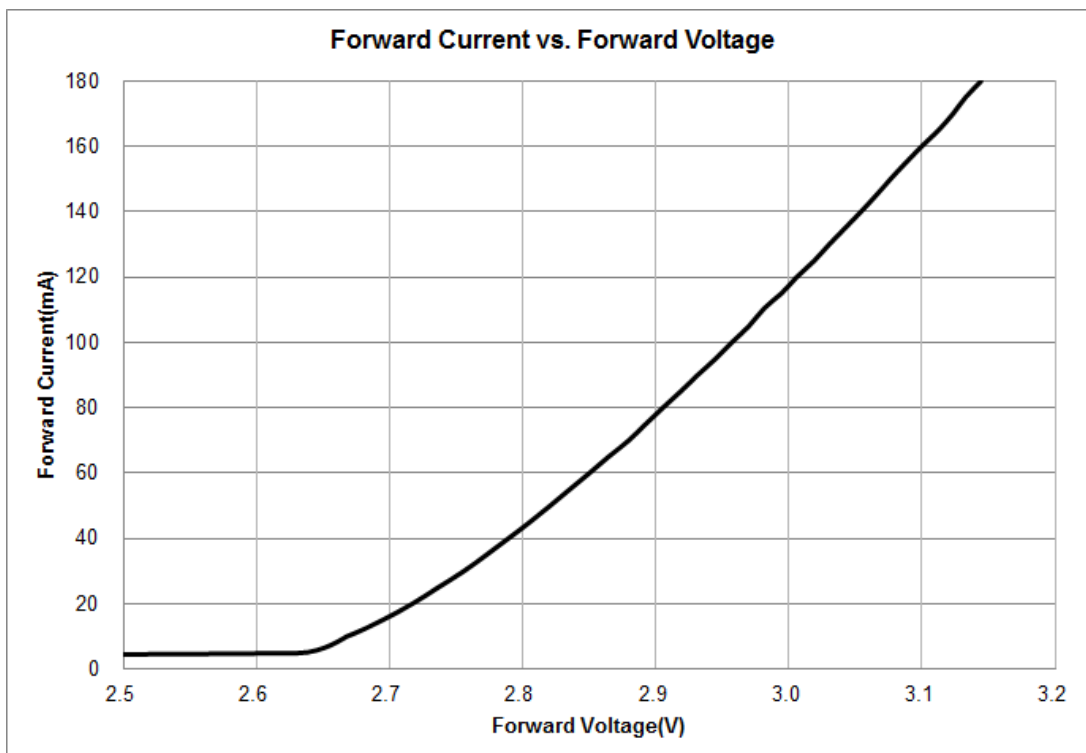
[Relative Luminous Flux vs. Forward Current]

( $T_s = 25^\circ\text{C}$ )



## [Forward Current vs. Forward Voltage]

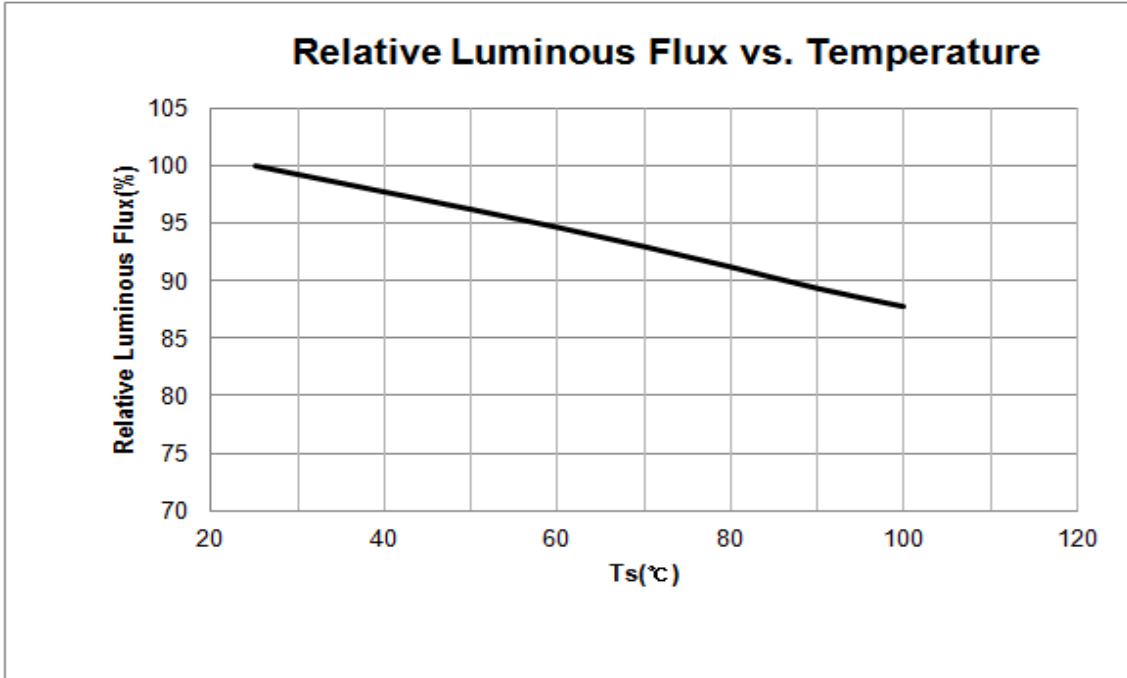
( $T_s = 25^\circ\text{C}$ )



### 3) Temperature Characteristics

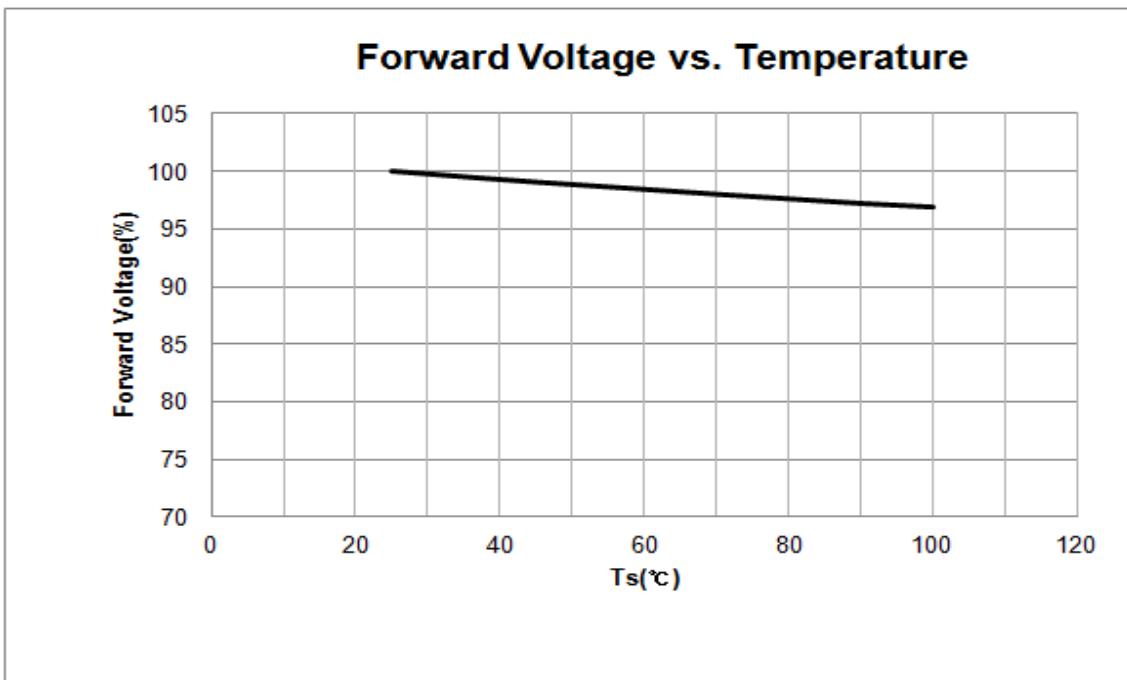
[Relative Luminous Flux vs.  $T_s$ ]

( $I_F = 65\text{mA}$ )



[Forward Voltage vs.  $T_s$ ]

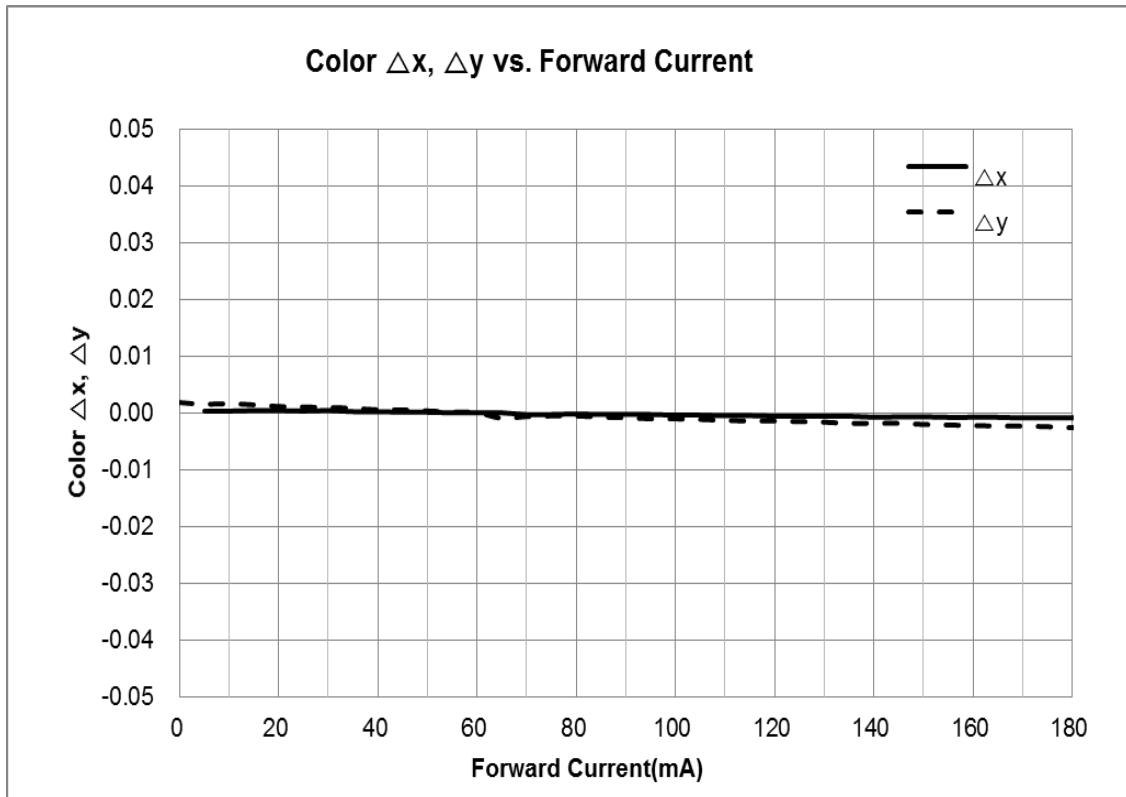
( $I_F = 65\text{mA}$ )



#### 4) Color shift Characteristics

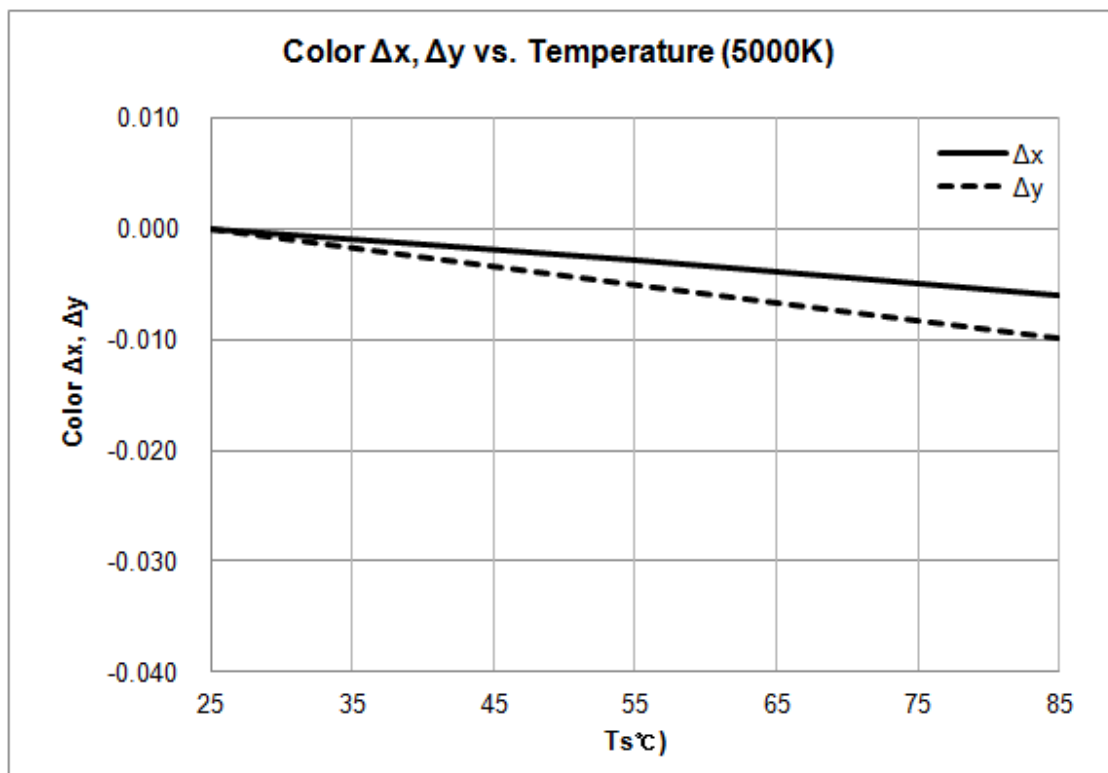
[Color  $\Delta x$ ,  $\Delta y$  vs. Forward Current]

( $T_s = 25^\circ\text{C}$ )



[Color  $\Delta x$ ,  $\Delta y$  vs.  $T_s$ ]

( $I_F = 65\text{mA}$ )

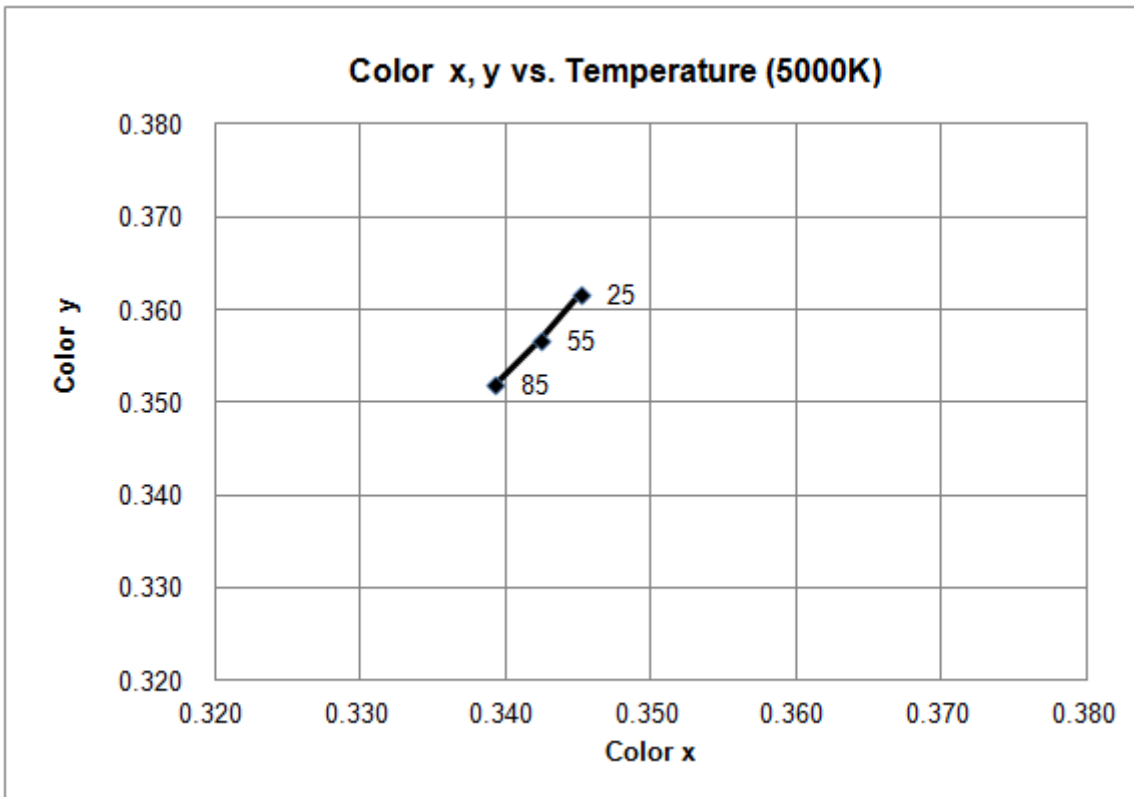




#### 4) Color shift Characteristics

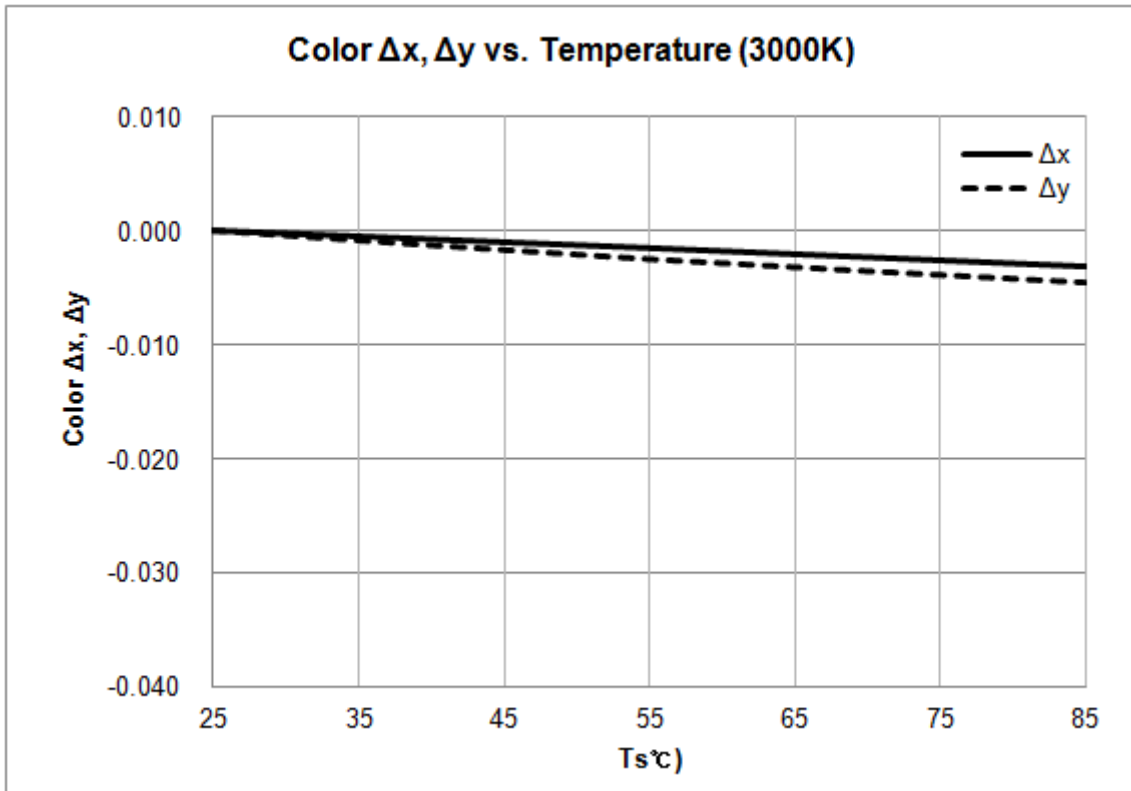
[Color x, y vs. Ts]

( $I_F = 65\text{mA}$ )



[Color  $\Delta x$ ,  $\Delta y$  vs. Ts]

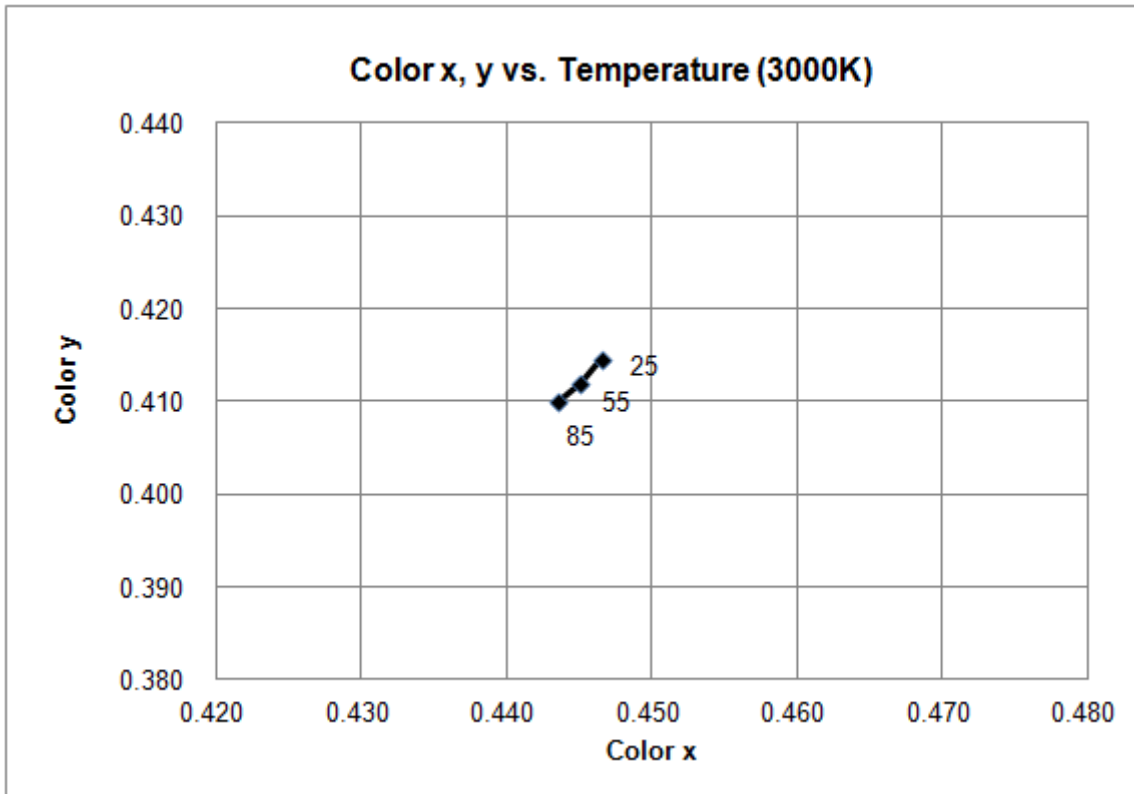
( $I_F = 65\text{mA}$ )



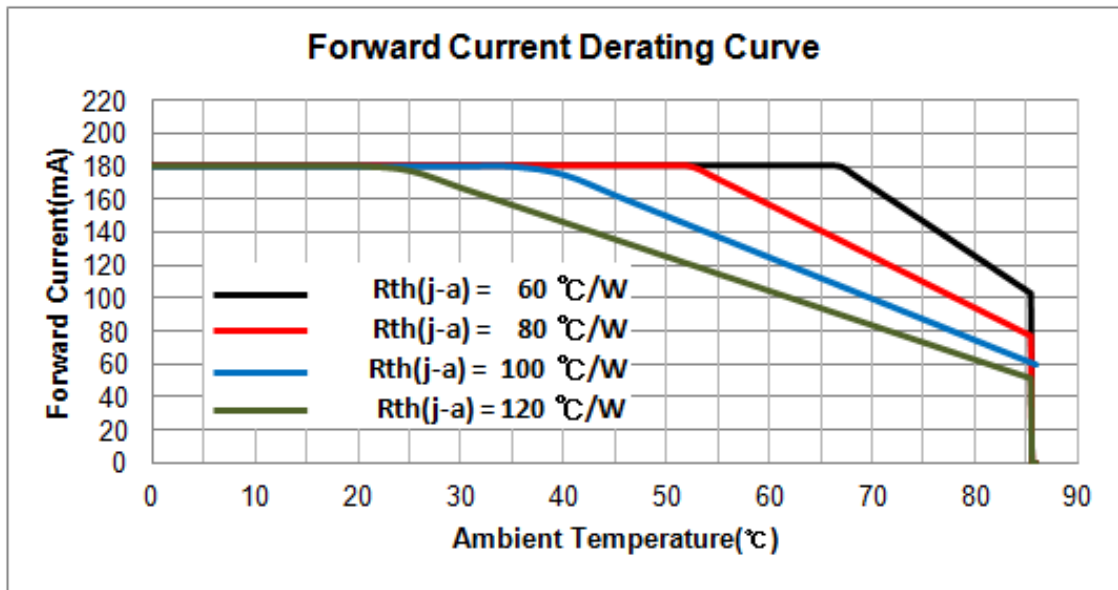
#### 4) Color shift Characteristics

[Color x, y vs.  $T_s$ ]

( $T_s = 25^\circ\text{C}$ )

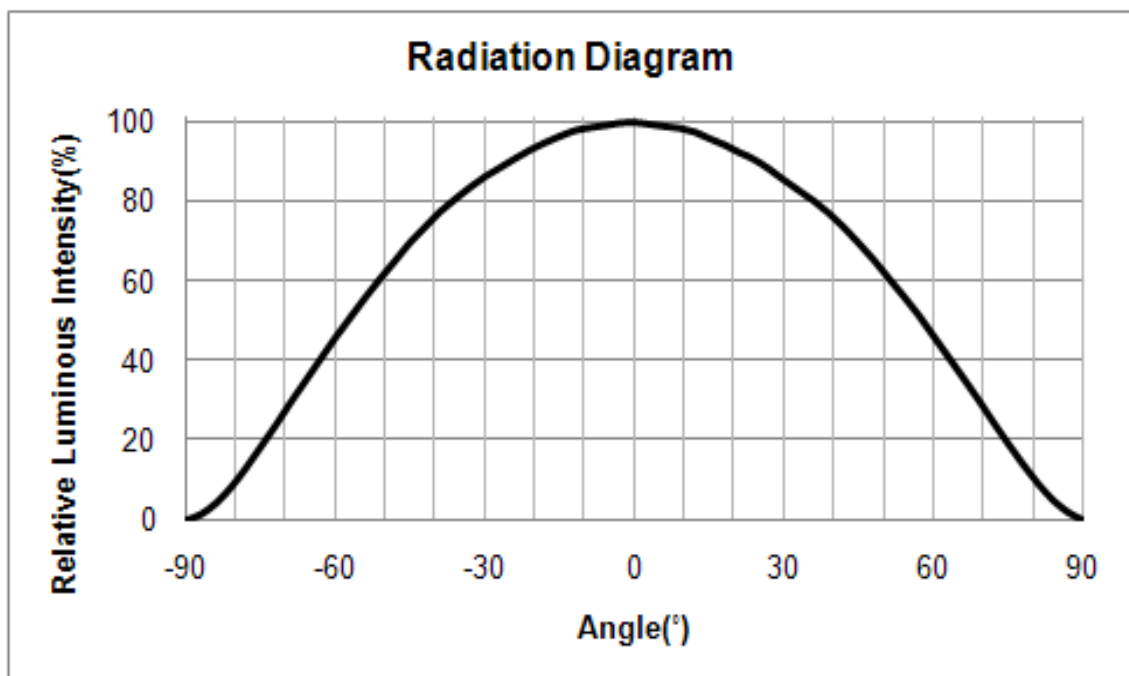


### 5) Derating Curve



### 6) Beam Angle Characteristics

( $I_F = 65\text{mA}$  &  $T_a = 25^\circ\text{C}$ )



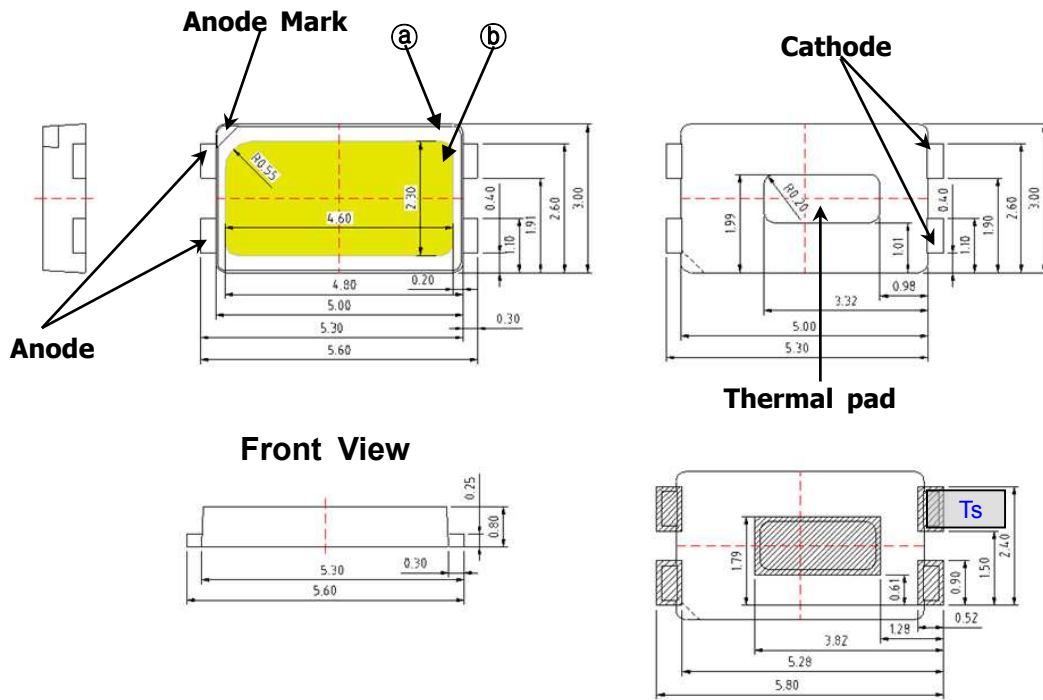
## 4. Outline Drawing & Dimension

1. Tolerance is  $\pm 0.10$  mm
2. The maximum compressing force is 15N on the body <sup>Ⓐ</sup>
3. Do not place pressure on the encapsulation resin <sup>Ⓑ</sup>

**Left Side View**

**Top View**

**Bottom View**



**Recommended Land Pattern**

**Notes:**

- 1) This LED has built-in ESD protection device(s) connected in parallel to LED Chip(s).
- 2) Ts point & measurement method
  - ① Measure the nearest point to the thermal pad. If necessary, remove PSR of PCB to reach Ts point.
  - ② Thermal pad must be soldered to the PCB to dissipate heat properly. Otherwise, LED can be damaged.
- 3) The thermal pad is electrically connected to the cathode contact pads
- 4) Precautions
  - ① The pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid the 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 and Conditions

### 1) Test Items

Test Item	Test Conditions	Test Hours/Cycles	Sample No	
MSL Test	125 °C 24hrs drying → 60 °C, 60 %RH 120hrs → 260 °C 10sec 3 cycles	1 cycle	11	
Room Temperature life test	25 °C ±3 °C, DC180 mA	1,000 hrs	22	
High Temperature life test	85 °C ±3 °C, DC180 mA	1,000 hrs	22	
High Temperature humidity life test	60 °C ±3 °C, 90 % ±2 %RH, DC180 mA	1,000 hrs	22	
Low Temperature life test	-40 °C ±3 °C, DC180 mA	1,000 hrs	22	
Powered Temperature Cycle test	-45 °C/20 min ↔ 85 °C/20 min, Sweep 100min cycle on/off: each 5 min, DC 180 mA	100 cycle	22	
Thermal Shock	-45 °C/15 min ↔ 125 °C/15 min → Hot plate 180 °C	500 cycle	100	
High Temperature Storage	Ta=120 °C ±3 °C	1000 hrs	11	
Low Temperature Storage	Ta=-40 °C ±3 °C	1000 hrs	11	
ESD(HBM)		R1:10 MΩ, R2:1.5 kΩ, C:100 pF, V = ±5 kV	5 times	5
ESD(MM)		R1:10 MΩ, R2: 0, C:200 pF, V = ±0.5 kV	5 times	5
Vibration Test	20~2000~20 Hz 200 m/s <sup>2</sup> , Sweep 4 min X, Y, Z 3 direction, each 1 cycle	4 cycles	11	
Mechanical Shock Test	1500G, 0.5 ms,	5 cycles	11	

### 2) Criteria for Judging the Damage

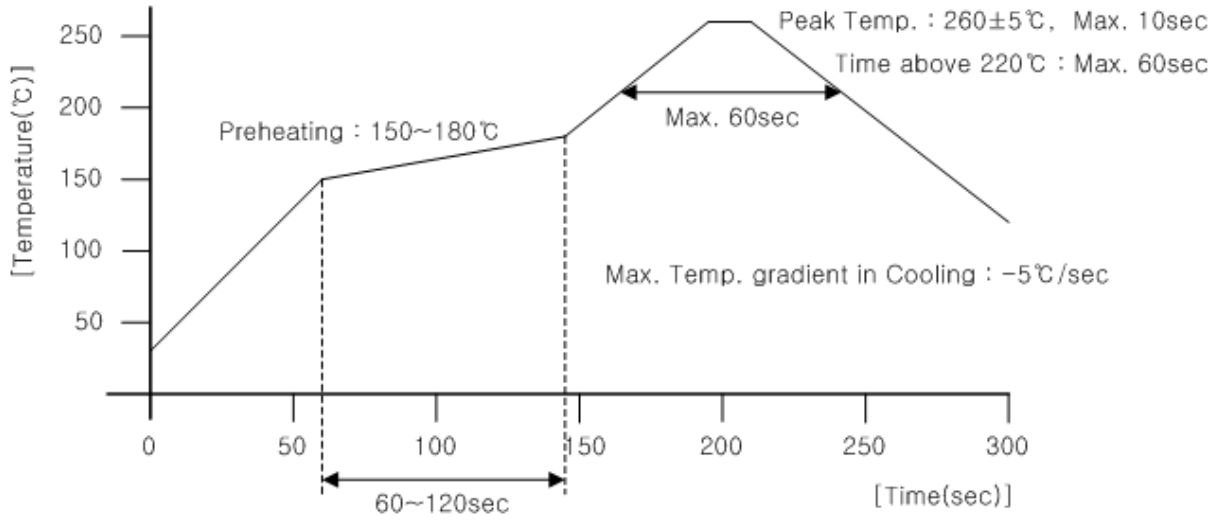
Item	Symbol	Test Condition	Limit	
			Min	Max
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 65 mA	Init. Value*0.9	Init. Value*1.1
Luminous Flux	Φ <sub>v</sub>	I <sub>F</sub> = 65 mA	Init. Value*0.7	Init. Value*1.2



## 6. Solder Conditions

### 1) Reflow Conditions ( Pb Free )

Reflow Frequency : 2 times max.



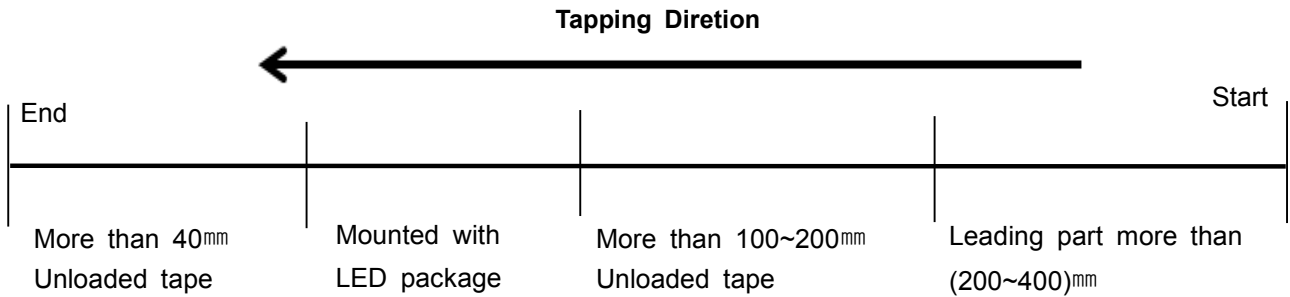
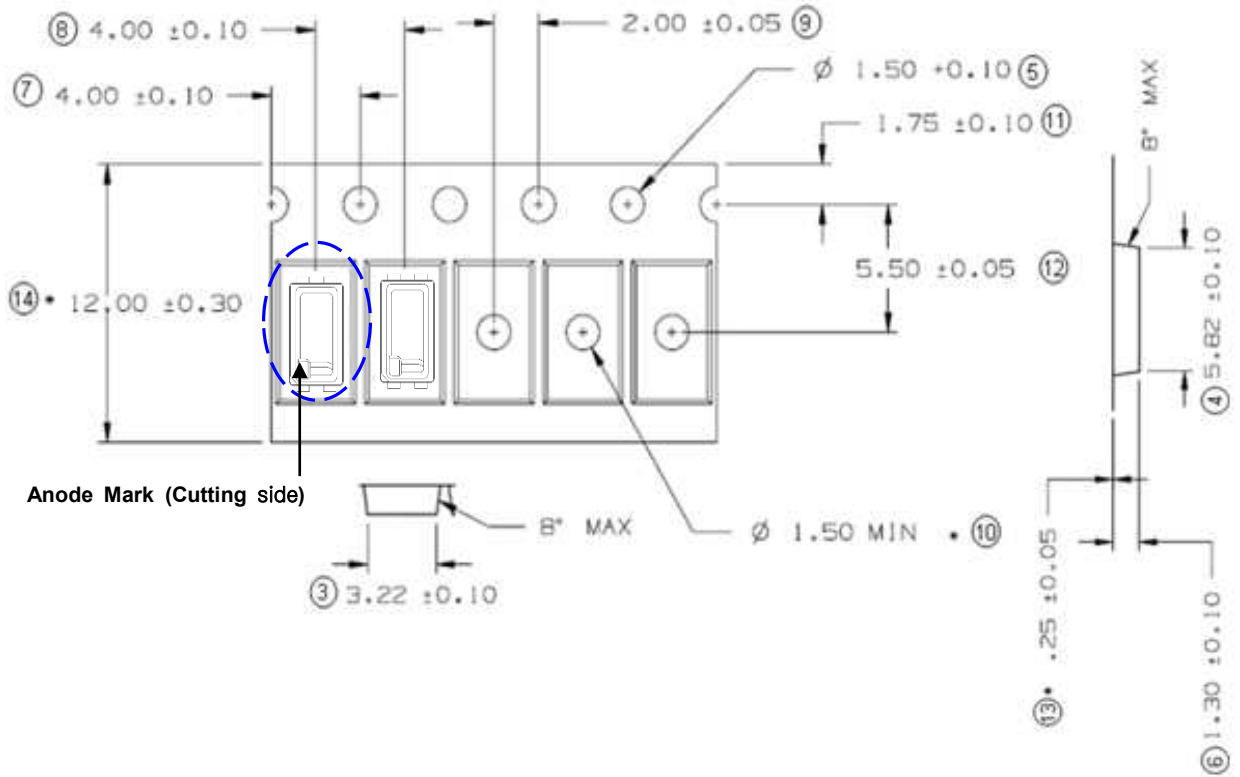
### 2) For Manual Soldering

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

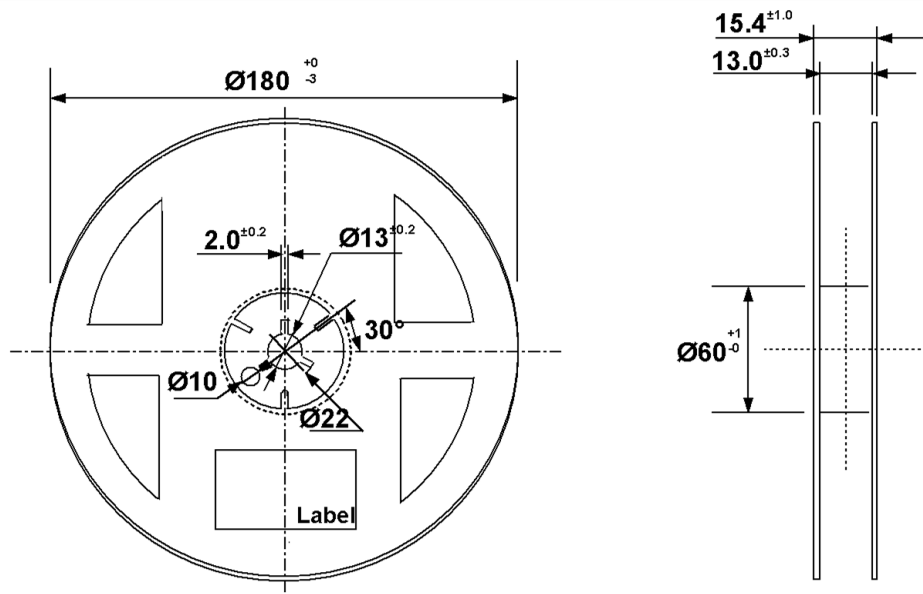
## 7. Tape & Reel

### 1) Taping Dimension

(unit : mm)

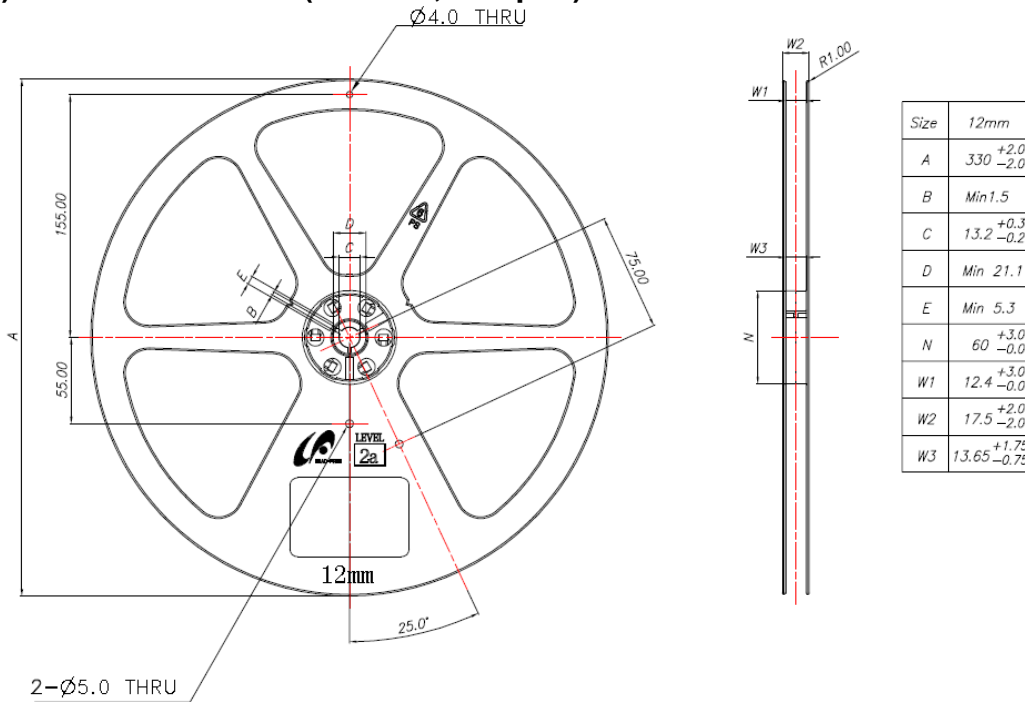


## 2-1) Reel Dimension (max 2,500 pcs)



Tolerance  $\pm 0.2$  , Unit:mm

## 2-2) Reel Dimension (max 10,000 pcs)



- (1) Quantity : The quantity/Reel to be 2,500 pcs or 10,000 pcs, .
- (2) Cumulative Tolerance : Cumulative tolerance/10 pitches to be  $\pm 0.2$ mm
- (3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at 10°C angle to be the carrier tape.
- (4) Packaging : P/N, Manufacturing data code no. and quantity to be indicated on a damp proof Package.