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Middle Power LED Series  
5630

# LM561B Plus



Improved efficacy and performance of LM561B to provide better solution



## Features & Benefits

- 0.3 W class middle power LED
- Mold resin for high reliability
- Standard form factor for design flexibility (5.6 × 3.0 mm)

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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 ~ +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 10 ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	±5	kV	-

**b) Electro-optical Characteristics (I<sub>F</sub> = 65 mA, T<sub>s</sub> = 25 °C)**

Item	Unit	CRI (R <sub>a</sub> ) Min.	Nominal CCT (K)	Rank	Bin	Min.	Typ.	Max.				
Forward Voltage (V <sub>F</sub> )	V			WA (WK)	AZ	2.7	-	2.8				
					A1	2.8	-	2.9				
					A2	2.9	-	3.0				
					A3	3.0	-	3.1				
					A4	3.1	-	3.2				
					2700	S4	30.0	-	32.0			
						S5	32.0	-	34.0			
					3000	S4	30.5	-	32.5			
						S5	32.5	-	34.5			
					3500	S4	31.0	-	33.0			
S5	33.0	-	35.0									
Luminous Flux (Φ <sub>v</sub> )	lm	80	4000		S4	32.0	-	34.0				
					S5	34.0	-	36.0				
			5000		S4	33.0	-	35.0				
					S5	35.0	-	37.0				
			5700		S4	32.5	-	34.5				
					S5	34.5	-	36.5				
			6500		S4	32.0	-	34.0				
					S5	34.0	-	36.0				
			Reverse Voltage (@ 5 mA)		V					0.7	-	1.2
			Color Rendering Index (R <sub>a</sub> )		-			5		80	-	-
Special CRI (R9)	-					0	-	-				
Thermal Resistance (junction to solder point)	°C/W					-	14	20				
Beam Angle	°					-	120	-				

**Note:**

Samsung maintains measurement tolerance of: forward voltage = ±0.1 V, 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	T	5	4	1	M	P	5	W	K	R	K	S	4

Digit	PKG Information	Code	Specification
1 2 3	Samsung Package Middle Power	<b>SPM</b>	
4 5	Color	<b>WH</b>	White
6	Product Version	<b>T</b>	
7 8 9	Form Factor	<b>541</b>	5.6 x 3.0 x 0.7 mm; 4 pads;
10	Sorting Current (mA)	<b>M</b>	65 mA
11	Chromaticity Coordinates	<b>P</b>	
12	CRI	<b>5</b> <b>7</b>	Min. 80 Min. 90
13 14	Forward Voltage (V)	<b>WA</b> <b>WK</b>	2.7~3.2V (2,500 pcs/Reel) 2.7~3.2V (10,000 pcs/Reel)
15 16	CCT (K)	<b>W</b> ★ <b>V</b> ★ <b>U</b> ★ <b>T</b> ★ <b>R</b> ★ <b>Q</b> ★ <b>P</b> ★	2700 3000 3500 4000 5000 5700 6500 Bin Code: W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG ★ : "0" (Whole bin) "M" (Quarter bin) "R"(Outer bin), "N"(N Kitting) or "K" (K Kitting)
17 18	Luminous Flux	<b>S4</b> <b>S5</b>	Bin Code: S4 S5

a) Luminous Flux Bins( $I_F = 65 \text{ mA}$ ,  $T_s = 25^\circ\text{C}$ )

CRI ( $R_a$ ) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range ( $\Phi_v$ , lm)
80	2700	SPMWHT541MP5W◆W☆S4	S4	30.0 ~ 32.0
		SPMWHT541MP5W◆W☆S5	S5	32.0 ~ 34.0
	3000	SPMWHT541MP5W◆V☆S4	S4	30.5 ~ 32.5
		SPMWHT541MP5W◆V☆S5	S5	32.5 ~ 34.5
	3500	SPMWHT541MP5W◆U☆S4	S4	31.0 ~ 33.0
		SPMWHT541MP5W◆U☆S5	S5	33.0 ~ 35.0
	4000	SPMWHT541MP5W◆T☆S4	S4	32.0 ~ 34.0
		SPMWHT541MP5W◆T☆S5	S5	34.0 ~ 36.0
	5000	SPMWHT541MP5W◆R☆S4	S4	33.0 ~ 35.0
		SPMWHT541MP5W◆R☆S5	S5	35.0 ~ 37.0
	5700	SPMWHT541MP5W◆Q☆S4	S4	32.5 ~ 34.5
		SPMWHT541MP5W◆Q☆S5	S5	34.5 ~ 36.5
	6500	SPMWHT541MP5W◆P☆S4	S4	32.0 ~ 34.0
		SPMWHT541MP5W◆P☆S5	S5	34.0 ~ 36.0

**Note:**

"◆" can be "A" (2,500pcs) or "K" (10,000pcs) of reel taping

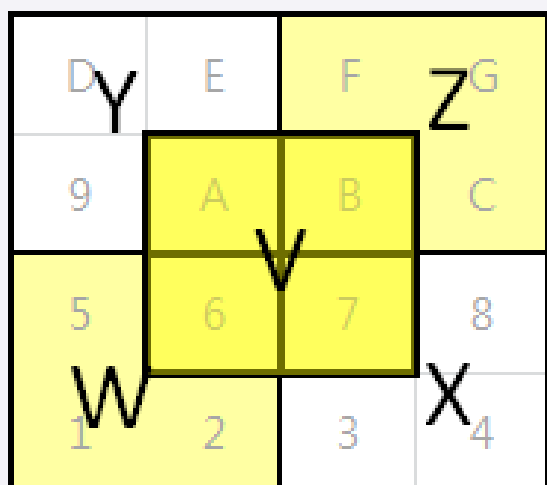
"☆" can be "0" (Whole bin), "M" (Quarter bin), "R"(Outer bin), "N"(N Kitting) or "K" (K Kitting) of the color binning

## b) Kitting rule

### 1) K Kitting 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 (A1+A1), (A2+A2), (A3+A3), (A4+A4) or (AZ+AZ).
3. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure.(below kitting simulation)

#### [Kitting example]



#### [Binning Information]

	Bin #1	Bin #2
VF	AZ	AZ
	A1	A1
	A2	A2
	A3	A3
	A4	A4
CIE	W	Z
	V	V
	X	Y
IV	S4	S4
	S5	S5

※ Each of V,W,X,Y and Z can be one bin without details division.



## b) Kitting rule

### 2) N Kitting 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 (A1+A1), (A2+A2), (A3+A3), (A4+A4) or (AZ+AZ).
3. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure.(below kitting simulation)

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

### [Binning Information]

	Bin #1	Bin #2
VF	AZ	AZ
	A1	A1
	A2	A2
	A3	A3
	A4	A4
CIE	6 bin	B bin
	7 bin	A bin
IV	S4	S4
	S5	S5

c) Color Bins ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

CRI ( $R_a$ ) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
80	2700	SPMWHT541MP5W◆W0S☆	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		SPMWHT541MP5W◆WMS☆	WM (Quarter bin)	W6, W7, WA, WB
		SPMWHT541MP5W◆WKS☆	WK (K Kitting)	WV, WW, WX, WY, WZ
		SPMWHT541MP5W◆WNS☆	WN (N Kitting)	W6, W7, WA, WB
		SPMWHT541MP5W◆WRS☆	WR (Outer bin)	W1, W2, W3, W4, W5, W8, W9, WC, WD, WE, WF, WG
	3000	SPMWHT541MP5W◆V0S☆	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
		SPMWHT541MP5W◆VMS☆	VM (Quarter bin)	V6, V7, VA, VB
		SPMWHT541MP5W◆VKS☆	VK (K Kitting)	VV, VW, VX, VY, VZ
		SPMWHT541MP5W◆VNS☆	VN (N Kitting)	V6, V7, VA, VB
		SPMWHT541MP5W◆VRS☆	VR (Outer bin)	V1, V2, V3, V4, V5, V8, V9, VC, VD, VE, VF, VG
3500	SPMWHT541MP5W◆U0S☆	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG	
	SPMWHT541MP5W◆UMS☆	UM (Quarter bin)	U6, U7, UA, UB	
	SPMWHT541MP5W◆UKS☆	UK (K Kitting)	UV, UW, UX, UY, UZ	
	SPMWHT541MP5W◆UNS☆	UN (N Kitting)	U6, U7, UA, UB	
	SPMWHT541MP5W◆URS☆	UR (Outer bin)	U1, U2, U3, U4, U5, U8 U9, UC, UD, UE, UF, UG	
4000	SPMWHT541MP5W◆T0S☆	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG	
	SPMWHT541MP5W◆TMS☆	TM (Quarter bin)	T6, T7, TA, TB	
	SPMWHT541MP5W◆TKS☆	TK (K Kitting)	TV, TW, TX, TY, TZ	
	SPMWHT541MP5W◆TNS☆	TN (N Kitting)	T6, T7, TA, TB	
	SPMWHT541MP5W◆TRS☆	TR (Outer bin)	T1, T2, T3, T4, T5, T8, T9, TC, TD, TE, TF, TG	
5000	SPMWHT541MP5W◆R0S☆	R0 (Whole bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG	
	SPMWHT541MP5W◆RMS☆	RM (Quarter bin)	R6, R7, RA, RB	

	SPMWHT541MP5W◆RK <sup>☆</sup>	RK (K Kitting)	RV, RW, RX, RY, RZ
	SPMWHT541MP5W◆RNS <sup>☆</sup>	RN (N Kitting)	R6, R7, RA, RB
	SPMWHT541MP5W◆RRS <sup>☆</sup>	RR (Outer bin)	R1, R2, R3, R4, R5, R8, R9, RC, RD, RE, RF, RG
	SPMWHT541MP5W◆Q0S <sup>☆</sup>	Q0 (Whole bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG
	SPMWHT541MP5W◆QMS <sup>☆</sup>	QM (Quarter bin)	Q6, Q7, QA, QB
5700	SPMWHT541MP5W◆QKS <sup>☆</sup>	QK (Kitting bin)	QV, QW, QX, QY, QZ
	SPMWHT541MP5W◆QNS <sup>☆</sup>	QN (Quarter cross kitting bin)	Q6, Q7, QA, QB
	SPMWHT541MP5W◆QRS <sup>☆</sup>	QR (Outer bin)	Q1, Q2, Q3, Q4, Q5, Q8, Q9, QC, QD, QE, QF, QG
	SPMWHT541MP5W◆P0S <sup>☆</sup>	P0 (Whole bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG
	SPMWHT541MP5W◆PMS <sup>☆</sup>	PM (Quarter bin)	P6, P7, PA, PB
6500	SPMWHT541MP5W◆PKS <sup>☆</sup>	PK (Kitting bin)	PV, PW, PX, PY, PZ
	SPMWHT541MP5W◆PNS <sup>☆</sup>	PN (Quarter cross kitting bin)	P6, P7, PA, PB
	SPMWHT541MP5W◆PRS <sup>☆</sup>	PR (Outer bin)	P1, P2, P3, P4, P5, P8, P9, PC, PD, PE, PF, PG

**Note:**

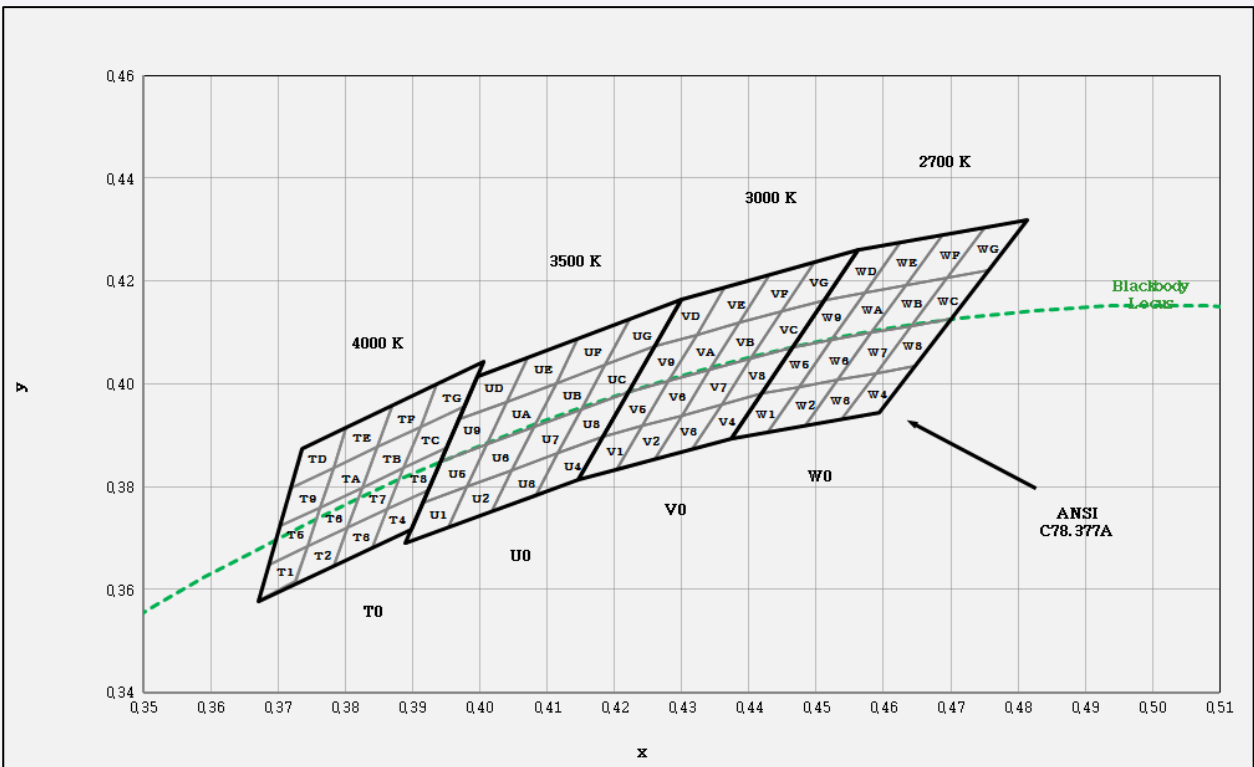
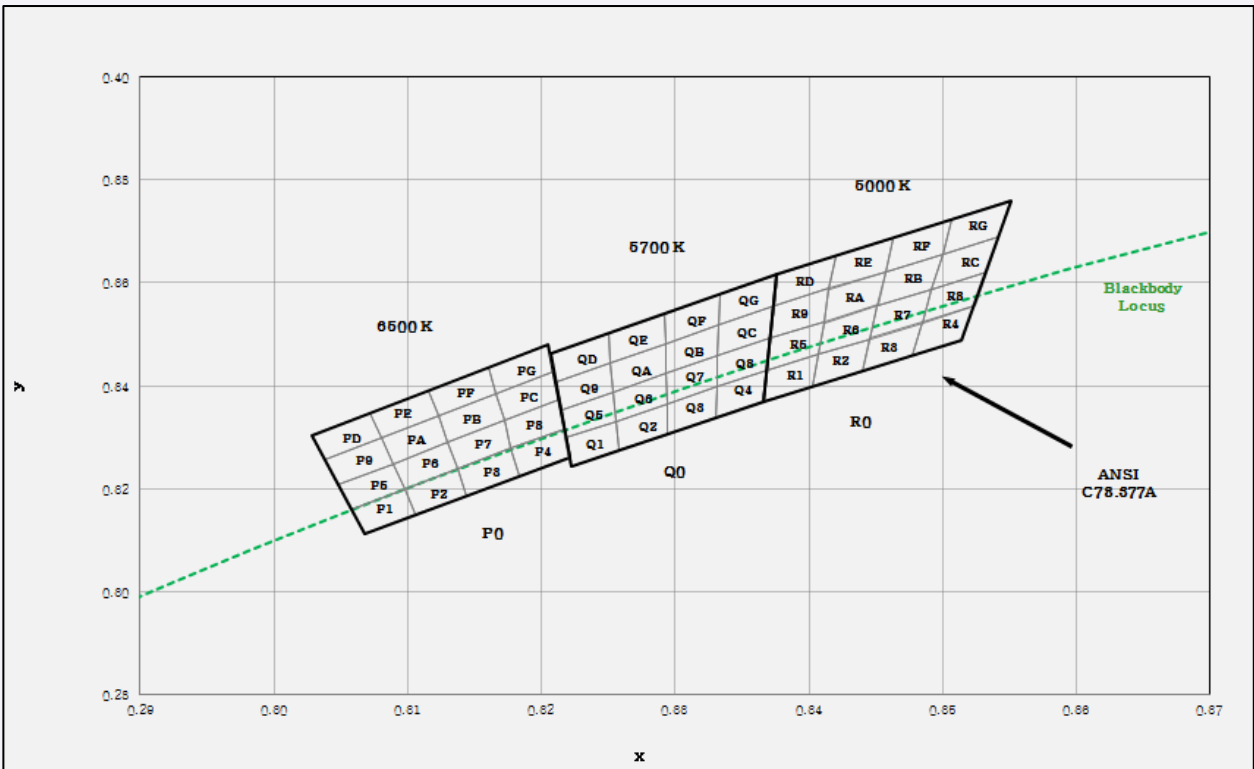
"◆" can be "A" (2,500pcs) or "K" (10,000pcs) of reel taping

"☆" can be "S4" or "S5" of luminous flux bin

**d) Voltage Bins ( $I_f = 65 \text{ mA}$ ,  $T_s = 25 \text{ °C}$ )**

CRI (R <sub>a</sub> ) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-	-	AZ	2.7 ~ 2.8
-	-	-	-	A1	2.8 ~ 2.9
-	-	-	WA (WK)	A2	2.9 ~ 3.0
-	-	-	-	A3	3.0 ~ 3.1
-	-	-	-	A4	3.1 ~ 3.2

e) Chromaticity Region & Coordinates ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )



**e) Chromaticity Region & Coordinates ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )**

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>W rank (2700 K)</b>					
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
<b>V rank (3000 K)</b>					
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

## e) Chromaticity Region &amp; Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>U rank (3500 K)</b>					
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
<b>T rank (4000 K)</b>					
T1	0.3670	0.3578	T9	0.3702	0.3722
	0.3726	0.3612		0.3763	0.3760
	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	0.3840	0.3681	TC	0.3887	0.3836
	0.3898	0.3716		0.3950	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	0.3760		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	0.3760		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
	0.3950	0.3875		0.4006	0.4044
	0.3887	0.3836		0.3937	0.4001

## e) Chromaticity Region &amp; Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>R rank (5000 K)</b>					
R1	0.3366	0.3369	R9	0.3374	0.3554
	0.3369	0.3431		0.3371	0.3493
	0.3407	0.3460		0.3411	0.3522
	0.3403	0.3398		0.3415	0.3587
R2	0.3403	0.3398	RA	0.3415	0.3587
	0.3407	0.3460		0.3411	0.3522
	0.3446	0.3491		0.3451	0.3554
	0.3440	0.3427		0.3457	0.3621
R3	0.3446	0.3491	RB	0.3451	0.3554
	0.3440	0.3427		0.3457	0.3621
	0.3477	0.3458		0.3500	0.3655
	0.3485	0.3522		0.3492	0.3587
R4	0.3485	0.3522	RC	0.3492	0.3587
	0.3477	0.3458		0.3500	0.3655
	0.3514	0.3487		0.3542	0.3690
	0.3524	0.3554		0.3533	0.3620
R5	0.3371	0.3493	RD	0.3376	0.3616
	0.3369	0.3431		0.3374	0.3554
	0.3407	0.3460		0.3415	0.3587
	0.3411	0.3522		0.3420	0.3652
R6	0.3407	0.3460	RE	0.3415	0.3587
	0.3411	0.3522		0.3420	0.3652
	0.3451	0.3554		0.3463	0.3687
	0.3446	0.3491		0.3457	0.3621
R7	0.3446	0.3491	RF	0.3457	0.3621
	0.3451	0.3554		0.3463	0.3687
	0.3492	0.3587		0.3507	0.3724
	0.3485	0.3522		0.3500	0.3655
R8	0.3485	0.3522	RG	0.3500	0.3655
	0.3492	0.3587		0.3507	0.3724
	0.3533	0.3620		0.3551	0.3760
	0.3524	0.3554		0.3542	0.3690

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>Q rank (5700 K)</b>					
Q1	0.3218	0.3298	Q9	0.3211	0.3407
	0.3222	0.3243		0.3215	0.3353
	0.3258	0.3275		0.3254	0.3388
	0.3256	0.3331		0.3252	0.3444
Q2	0.3256	0.3331	QA	0.3252	0.3444
	0.3258	0.3275		0.3254	0.3388
	0.3294	0.3306		0.3293	0.3423
	0.3294	0.3364		0.3293	0.3481
Q3	0.3294	0.3364	QB	0.3293	0.3481
	0.3294	0.3306		0.3293	0.3423
	0.3330	0.3338		0.3332	0.3458
	0.3331	0.3398		0.3333	0.3518
Q4	0.3331	0.3398	QC	0.3333	0.3518
	0.3330	0.3338		0.3332	0.3458
	0.3366	0.3369		0.3371	0.3493
	0.3369	0.3431		0.3374	0.3554
Q5	0.3215	0.3353	QD	0.3207	0.3462
	0.3218	0.3298		0.3211	0.3407
	0.3256	0.3331		0.3252	0.3444
	0.3254	0.3388		0.3250	0.3501
Q6	0.3254	0.3388	QE	0.3250	0.3501
	0.3256	0.3331		0.3252	0.3444
	0.3294	0.3364		0.3293	0.3481
	0.3293	0.3423		0.3292	0.3539
Q7	0.3293	0.3423	QF	0.3292	0.3539
	0.3294	0.3364		0.3293	0.3481
	0.3331	0.3398		0.3333	0.3518
	0.3332	0.3458		0.3334	0.3578
Q8	0.3332	0.3458	QG	0.3334	0.3578
	0.3331	0.3398		0.3333	0.3518
	0.3369	0.3431		0.3374	0.3554
	0.3371	0.3493		0.3376	0.3616

## e) Chromaticity Region &amp; Coordinates

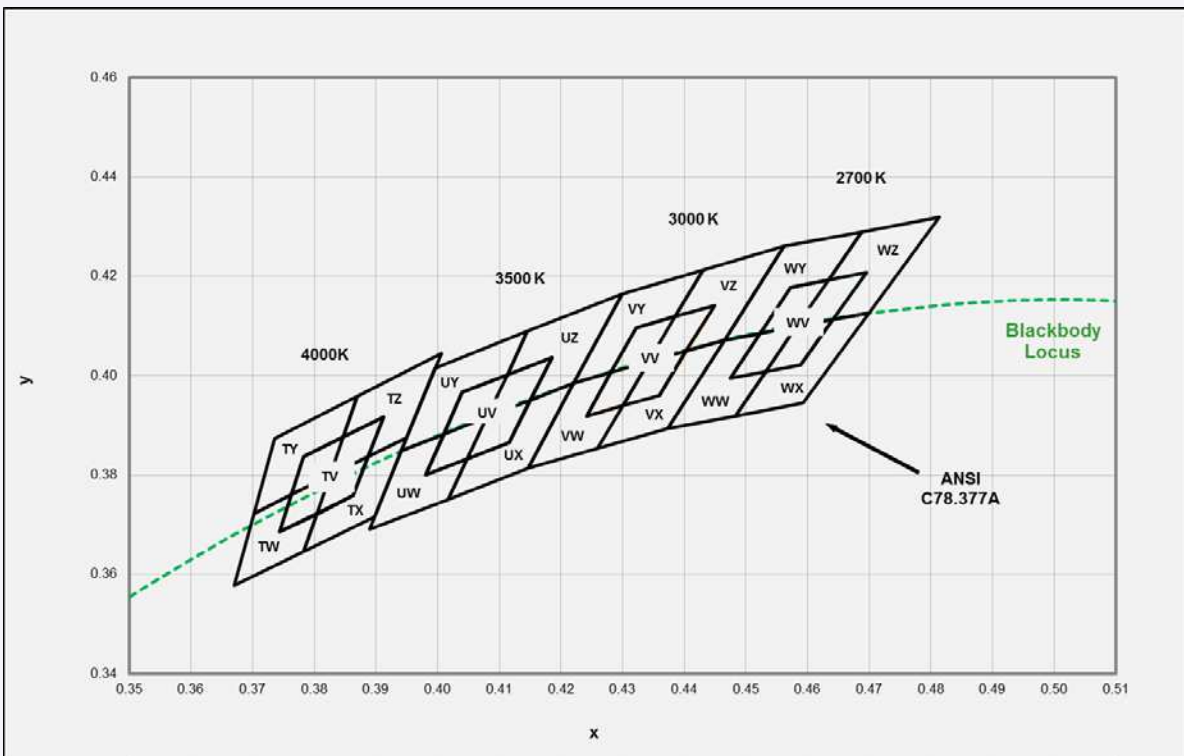
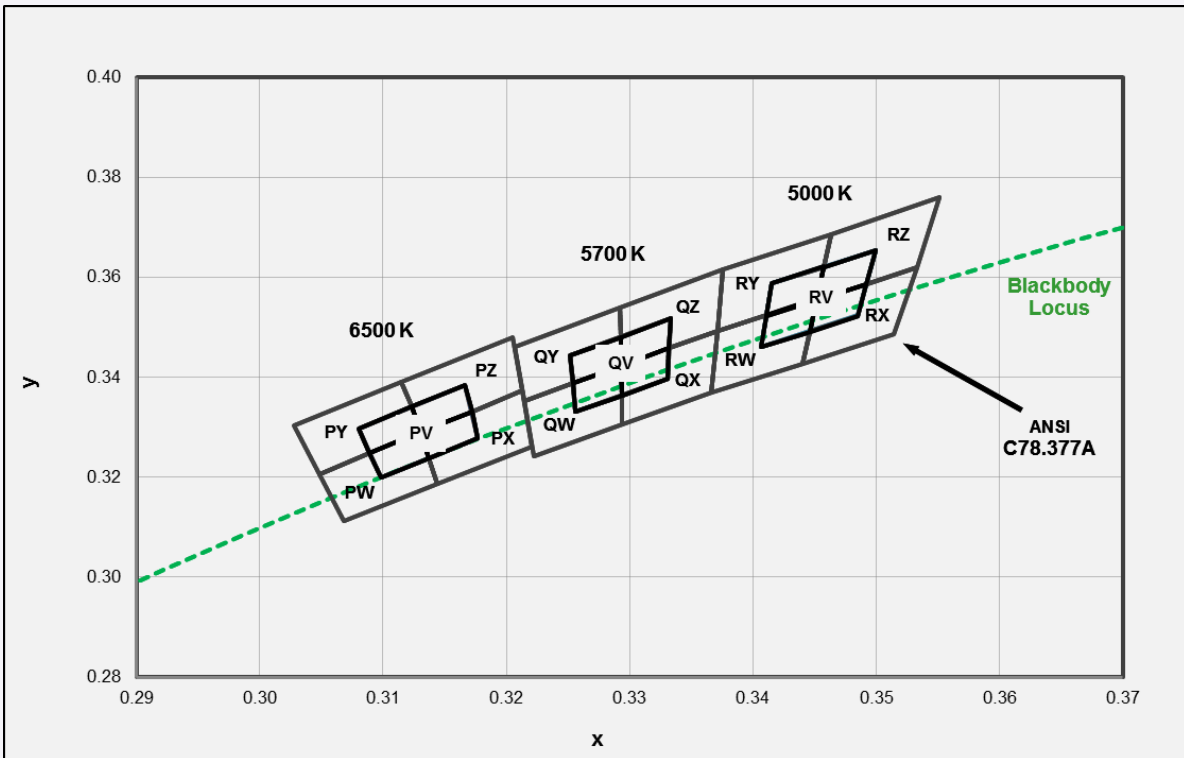
Region	CIE x	CIE y	Region	CIE x	CIE y
<b>P rank (6500 K)</b>					
P1	0.3068	0.3113	P9	0.3048	0.3207
	0.3106	0.3150		0.3089	0.3249
	0.3098	0.3199		0.3080	0.3298
	0.3058	0.3160		0.3038	0.3256
P2	0.3106	0.3150	PA	0.3089	0.3249
	0.3144	0.3186		0.3130	0.3290
	0.3137	0.3238		0.3123	0.3341
	0.3098	0.3199		0.3080	0.3298
P3	0.3144	0.3186	PB	0.3130	0.3290
	0.3183	0.3224		0.3172	0.3332
	0.3177	0.3278		0.3166	0.3384
	0.3137	0.3238		0.3123	0.3341
P4	0.3183	0.3224	PC	0.3172	0.3332
	0.3221	0.3261		0.3214	0.3373
	0.3218	0.3317		0.3210	0.3427
	0.3177	0.3278		0.3166	0.3384
P5	0.3058	0.3160	PD	0.3038	0.3256
	0.3098	0.3199		0.3080	0.3298
	0.3089	0.3249		0.3072	0.3348
	0.3048	0.3207		0.3028	0.3304
P6	0.3098	0.3199	PE	0.3080	0.3298
	0.3137	0.3238		0.3123	0.3341
	0.3130	0.3290		0.3115	0.3391
	0.3089	0.3249		0.3072	0.3348
P7	0.3137	0.3238	PF	0.3123	0.3341
	0.3177	0.3278		0.3166	0.3384
	0.3172	0.3332		0.3160	0.3436
	0.3130	0.3290		0.3115	0.3391
P8	0.3177	0.3278	PG	0.3166	0.3384
	0.3218	0.3317		0.3210	0.3427
	0.3214	0.3373		0.3206	0.3481
	0.3172	0.3332		0.3160	0.3436

**Note:**

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



f) Kitting Chromaticity Region & Coordinates ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )



**f) Kitting Chromaticity Region & Coordinates ( $I_F = 65 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )**

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>W rank (2700 K)</b>					
WW	0.4475	0.3994			
	0.4589	0.4021			
	0.4695	0.4207			
	0.4573	0.4178			
WW	0.4373	0.3893	WY	0.4465	0.4071
	0.4483	0.3919		0.4582	0.4099
	0.4582	0.4099		0.4687	0.4289
	0.4465	0.4071		0.4562	0.4260
WX	0.4483	0.3919	WZ	0.4582	0.4099
	0.4593	0.3944		0.4700	0.4126
	0.4700	0.4126		0.4813	0.4319
	0.4582	0.4099		0.4687	0.4289

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>V rank (3000 K)</b>					
VV	0.4242	0.3919			
	0.4359	0.3960			
	0.4449	0.4141			
	0.4322	0.4096			
VV	0.4147	0.3814	VY	0.4342	0.4028
	0.4259	0.3853		0.4465	0.4071
	0.4342	0.4028		0.4562	0.4260
	0.4221	0.3984		0.4430	0.4212
VX	0.4259	0.3853	VZ	0.4221	0.3984
	0.4373	0.3893		0.4342	0.4028
	0.4465	0.4071		0.4430	0.4212
	0.4342	0.4028		0.4299	0.4165

## f) Kitting Chromaticity Region &amp; Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>U rank (3500 K)</b>					
UV	0.3981	0.3800			
	0.4116	0.3865			
	0.4186	0.4037			
	0.4040	0.3966			
UW	0.3889	0.3690	UY	0.3941	0.3848
	0.4017	0.3751		0.4080	0.3916
	0.4080	0.3916		0.4146	0.4089
	0.3941	0.3848		0.3996	0.4015
UX	0.4017	0.3751	UZ	0.4080	0.3916
	0.4147	0.3814		0.4221	0.3984
	0.4221	0.3984		0.4299	0.4165
	0.4080	0.3916		0.4146	0.4089

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>T rank (4000 K)</b>					
TV	0.3744	0.3685			
	0.3863	0.3758			
	0.3912	0.3917			
	0.3782	0.3837			
TW	0.3670	0.3578	TY	0.3702	0.3722
	0.3783	0.3646		0.3825	0.3798
	0.3825	0.3798		0.3869	0.3958
	0.3702	0.3722		0.3736	0.3874
TX	0.3783	0.3646	TZ	0.3825	0.3798
	0.3898	0.3716		0.3950	0.3875
	0.3950	0.3875		0.4006	0.4044
	0.3825	0.3798		0.3869	0.3958

## f) Kitting Chromaticity Region &amp; Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>R rank (5000 K)</b>					
RV	0.3407	0.3460			
	0.3485	0.3524			
	0.3500	0.3655			
	0.3415	0.3588			
RW	0.3366	0.3369	RY	0.3371	0.3493
	0.3440	0.3427		0.3411	0.3525
	0.3446	0.3491		0.3415	0.3588
	0.3407	0.3460		0.3457	0.3621
RX	0.3440	0.3428	RZ	0.3457	0.3621
	0.3514	0.3487		0.3500	0.3655
	0.3533	0.3620		0.3492	0.3587
	0.3492	0.3587		0.3533	0.3620

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>Q rank (5700 K)</b>					
QV	0.3256	0.3331			
	0.3331	0.3398			
	0.3333	0.3518			
	0.3252	0.3444			
QW	0.3222	0.3243	QY	0.3215	0.3353
	0.3294	0.3306		0.3293	0.3423
	0.3293	0.3423		0.3292	0.3539
	0.3215	0.3353		0.3207	0.3462
	0.3294	0.3306		0.3293	0.3423
QX	0.3366	0.3369	QZ	0.3371	0.3493
	0.3371	0.3493		0.3376	0.3616
	0.3293	0.3423		0.3292	0.3539

## f) Kitting Chromaticity Region &amp; Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
<b>P rank (6500 K)</b>					
PV	0.3098	0.3199			
	0.3177	0.3278			
	0.3166	0.3384			
	0.3080	0.3298			
PW	0.3068	0.3113	PY	0.3048	0.3207
	0.3144	0.3186		0.3130	0.3290
	0.3130	0.3290		0.3115	0.3391
	0.3089	0.3249		0.3028	0.3304
PX	0.3144	0.3186	PZ	0.3130	0.3290
	0.3221	0.3261		0.3213	0.3373
	0.3213	0.3373		0.3205	0.3481
	0.3130	0.3290		0.3115	0.3391

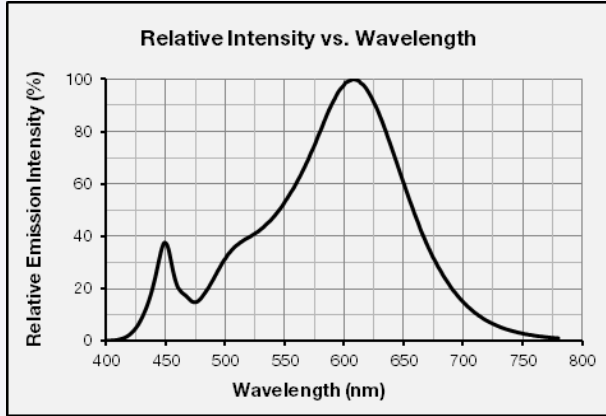
**Note:**

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

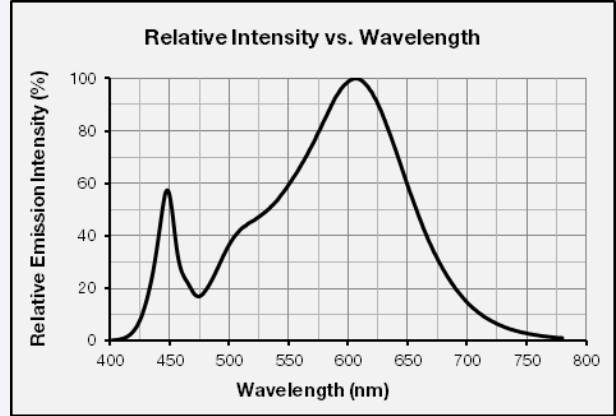
### 3. Typical Characteristics Graphs

#### a) Spectrum Distribution ( $I_f = 65 \text{ mA}$ , $T_s = 25 \text{ }^\circ\text{C}$ )

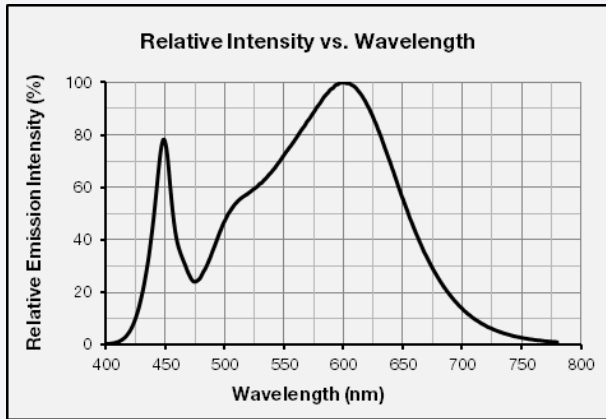
CCT: 2700 K (80 CRI)



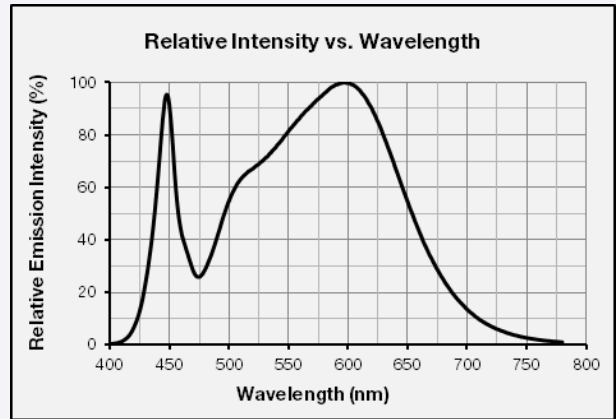
CCT: 3000 K (80 CRI)



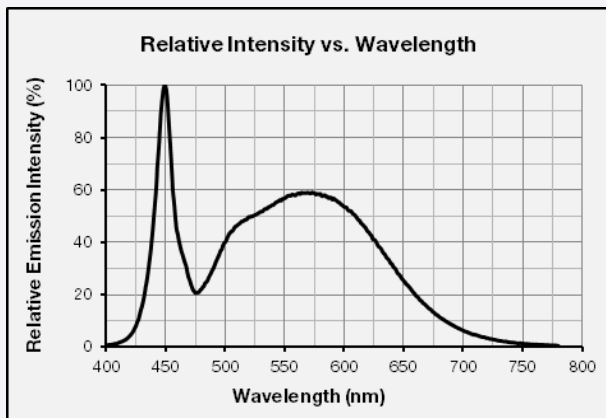
CCT: 3500 K (80 CRI)



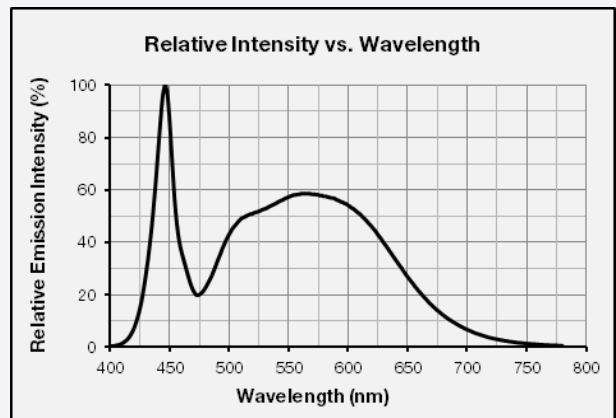
CCT: 4000 K (80 CRI)



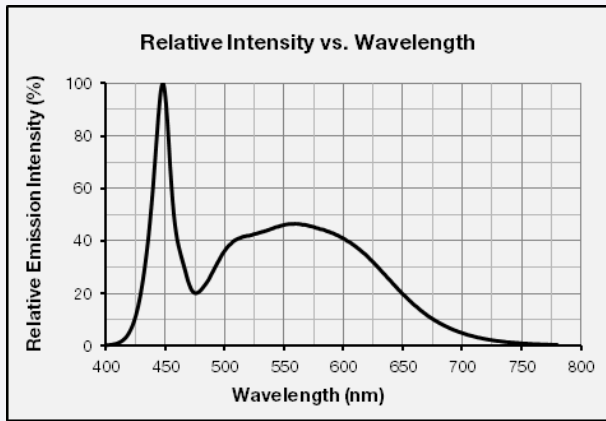
CCT: 5000 K (80 CRI)



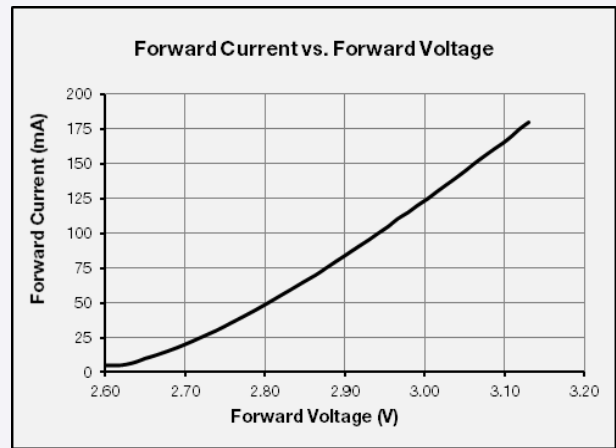
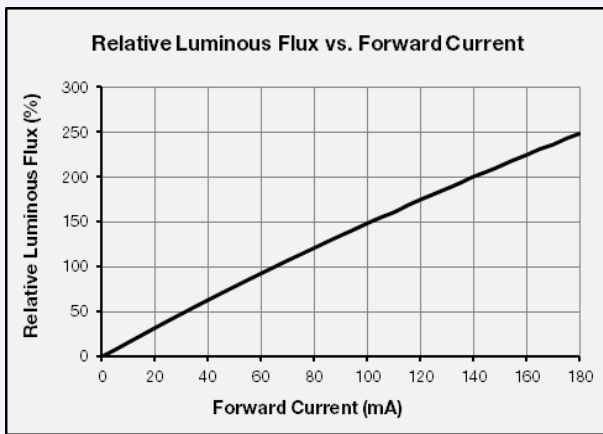
CCT: 5700 K (80 CRI)



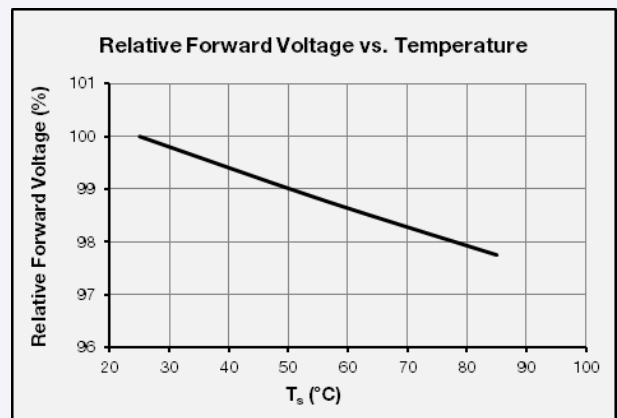
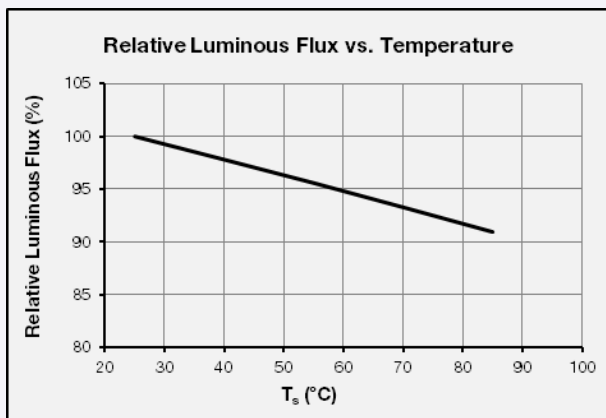
CCT: 6500 K (80 CRI)



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



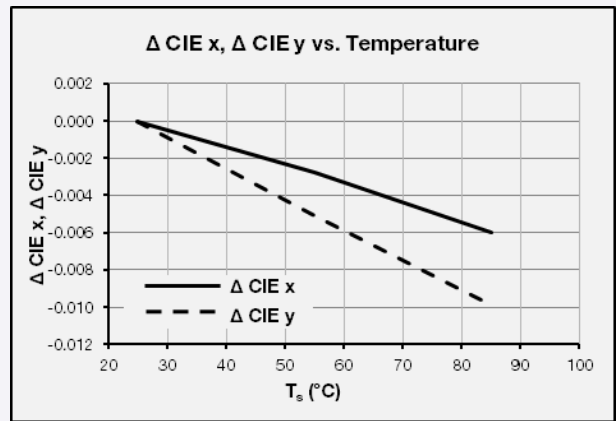
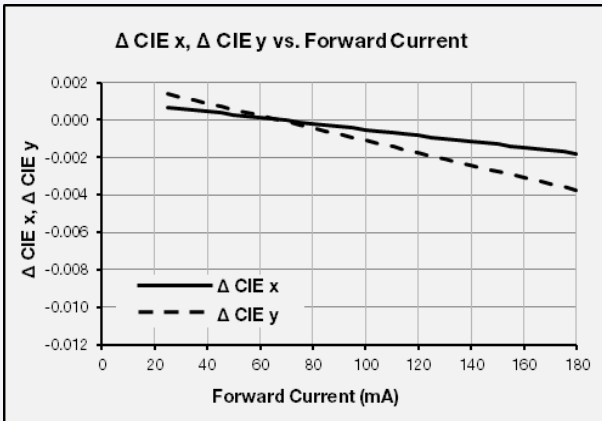
**c) Temperature Characteristics ( $I_f = 65\text{ mA}$ )**



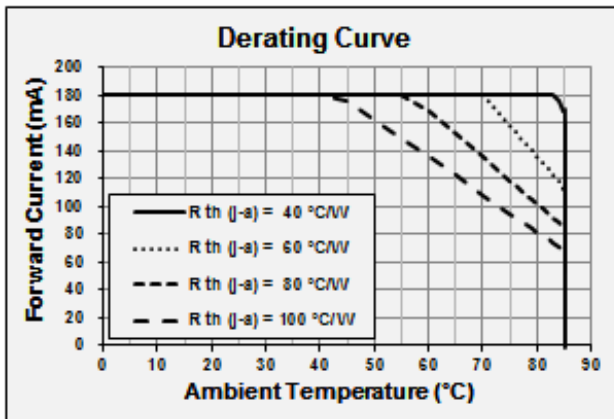
d) Color Shift Characteristics

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

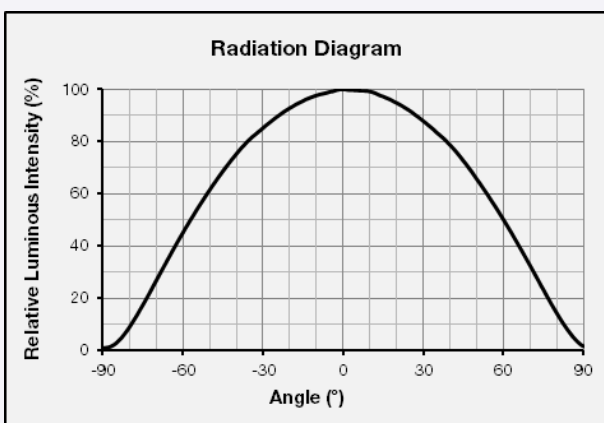
$I_F = 65\text{ mA}$



e) Derating Curve

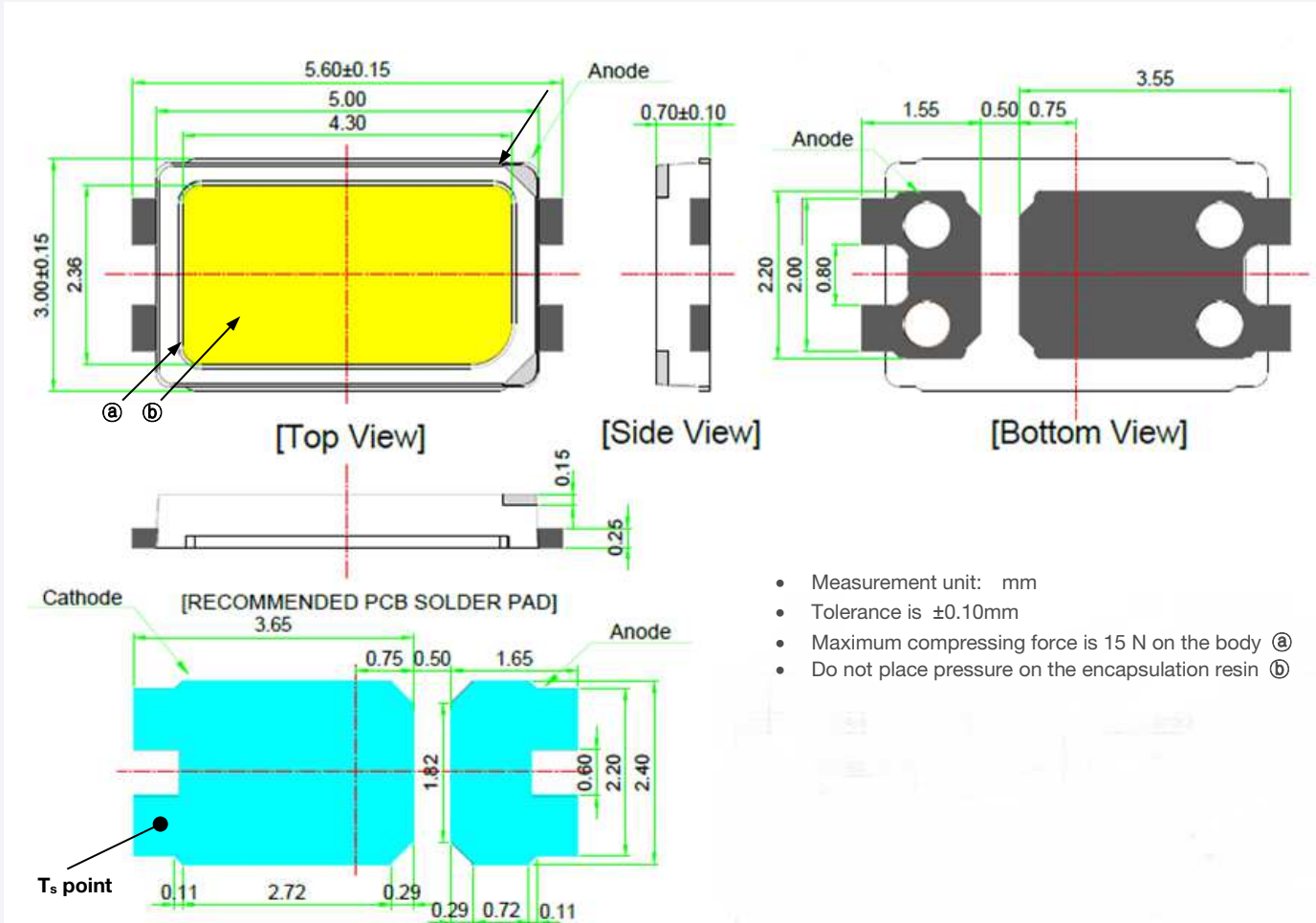


f) Beam Angle Characteristics ( $I_F = 65\text{ mA}$ ,  $T_s = 25\text{ }^\circ\text{C}$ )





#### 4. Outline Drawing & Dimension



- Measurement unit: mm
- Tolerance is  $\pm 0.10$ mm
- Maximum compressing force is 15 N on the body ③
- Do not place pressure on the encapsulation resin ⑥

#### Notes:

- 1) This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).
- 2)  $T_s$  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 180 mA	1000 h	22	
High Temperature Life Test	85 °C, DC 180 mA	1000 h	22	
High Temperature Humidity Life Test	85 °C, 85 % RH, DC 180 mA	1000 h	22	
Low Temperature Life Test	-40 °C, DC 180 mA	1000 h	22	
Powered Temperature Cycle Test	-45 °C / 20 min ↔ 85 °C / 20 min, sweep 100 min cycle on/off: each 5 min, DC 180 mA	100 cycles	22	
Thermal Cycle	-45 °C / 15 min ↔ 125 °C / 15 min → Hot plate 180 °C	500 cycles	100	
High Temperature Storage	120 °C	1000 h	11	
Low Temperature Storage	-40 °C	1000 h	11	
ESD (HBM)		R <sub>1</sub> : 10 MΩ R <sub>2</sub> : 1.5 kΩ C: 100 pF V: ±5 kV	5 times	30
ESD (MM)		R <sub>1</sub> : 10 MΩ R <sub>2</sub> : 0 C: 200 pF V: ±0.5 kV	5 times	30
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	1500 g, 0.5 ms 3 shocks each X-Y-Z axis	5 cycles	11	

### b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T <sub>s</sub> = 25 °C)	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 * 1.1