Middle Power LED Series 3030

LM302B CRI80









Features & Benefits

- Superior mid power LED with wide over-drive range up to 1.5W
- Mold resin for high reliability
- Standard form factor for design flexibility (3.0 \times 3.0 mm)



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1. Characteristics

a) Absolute Maximum Rating

ltem	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	Ta	-40 ~ +85	°C	-
Storage Temperature	T_{stg}	-40 ~ +100	°C	-
LED Junction Temperature	T_{i}	125	°C	-
Forward Current	I_{F}	250	mA	-
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	5	kV	-



b) Electro-optical Characteristics (I_F = 150 mA, T_s = 85 °C)

ltem	Unit	Rank	Bin	Min.	Тур.	Max.
			AY	5.4	-	5.6
			AZ	5.6	-	5.8
Forward Voltage (V _F)	V	YB	A1	5.8	-	6.0
			A2	6.0	-	6.2
			A3	6.2	-	6.4
Reverse Voltage (@ 5 mA)	V			0.7	-	1.2
Color Rendering Index (Ra)	-			80	-	-
Special CRI (R9)	-			0	-	-
Thermal Resistance (junction to solder point)	°C/W			-	8	-
Beam Angle	o			-	115	-

Note:

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



b) Electro-optical Characteristics $(T_s = 85 \text{ }^{\circ}\text{C})$

		CRI Nominal CCT (K)	S	С	SD		S	Ε	5	SF .	S	G	Commont
Item	CRI		Min.	Max.	Current								
			97	106	106	115	115	124	124	133	133	142	150mA
		2700											
		3000											
		3500											
Luminous Flux (Φ _v)	80	4000											
Παλ (Φγ)		5000											
		5700											
		6500											

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	Р	М	w	н	т	3	2	9	F	D	5	Υ	В	R	0	S	0

Digit	PKG Information	Code	Specification					
1 2 3	Samsung Package Middle Power	SPM						
4 5	Color	WH	White					
6	Product Version	Т						
7 8 9	Form Factor	329	3.0 x 3.0 x 0.7 mm; 2 pads; 1chip;					
10	Sorting Current (mA)	F	150 mA					
11	Chromaticity Coordinates	D	ANSI Standard					
12	CRI	5	Min. 80					
13 14	Forward Voltage (V)	ΥВ	5.4~6.4V					
15 16	CCT (K)	W☆ V☆ U☆ T☆ R★ Q★	2700 W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG 3000 Bin Code: U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG 4000 T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG ★: Warm white: "0" (Whole bin) "M" (Quarter bin) or "K" (Kitting bin) 5000 R1, R2, R3, R4, R5, R6, R7, R8, R9, RA, RB, RC, RD, RE, RF, RG 5700 Bin Code: Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA, QB, QC, QD, QE, QF, QG 6500 P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG ★: Cool white: "0" (Whole bin) or "K" (Kitting bin)					
17 18	Luminous Flux	S0	Bin Code: SC, SD, SE, SF					



a) Luminous Flux Bins($I_F = 150 \text{ mA}$, $T_s = 85^{\circ}\text{C}$)

CRI (R₃) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ _v , lm)
	2700	SPMWHT329FD5YBW☆S0	SC	97 ~ 106
	2700	SHMMU13534D21BMM200	SD	106 ~ 115
	3000	SPMWHT329FD5YBV☆S0	SC	97 ~ 106
	3000	SHMMM1353LD31D4%20	SD	106 ~ 115
	3500	SPMWHT329FD5YBU☆S0	SD	106 ~ 115
	3300	3FWW1113291 D31 D0 R30	SE	115 ~ 124
80	4000	SPMWHT329FD5YBT☆S0	SE	115 ~ 124
80		SHMMM1353LD31D1%20	SF	124 ~ 133
	5000	SPMWHT329FD5YBR★S0	SE	115 ~ 124
	3000	SFWWIII329I DSTBN #SU	SF	124 ~ 133
	5700	SPMWHT329FD5YBQ★S0	SE	115 ~ 124
	3700	01-101401113231 D31DQ ₹30	SF	124 ~ 133
	6500	SPMWHT329FD5YBP★S0	SE	115 ~ 124
		OI-MINNTITISES DOT DE #OU	SF	124 ~ 133

Note:



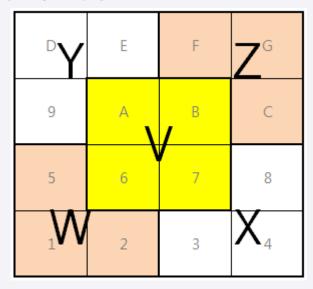
[&]quot; \star " can be "0" (Whole bin) or "K" (Kitting bin) of the color binning

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 (AY+AY), (AZ+AZ), (A1+A1), (A2+A2) or (A3+A3).
- 3. A Chromaticity Coordinates of kitting bin is mixed by kitting procedure.(below kitting simulation)

[Kitting example]



[Binning Information]

Item	Bin #1	Bin #2
	AY	AY
	AZ	AZ
VF	A1	A1
	A2	A2
	АЗ	АЗ
	W (1, 2, 5 bin)	Z (C, F, G bin)
CIE	V (6, 7, A, B bin)	V (6, 7, A, B bin)
	X (3, 4, 8 bin)	Y (9, D, E bin)
	SC	SC
	SD	SD
IV	SE	SE
	SF	SF

 $\ensuremath{\mathbb{X}}$ Each of V,W,X,Y and Z can be one bin without details division.



c) Color Bins ($I_F = 150$ mA, $T_s = 85$ °C)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
		SPMWHT329FD5YBW0S0	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
	2700	SPMWHT329FD5YBWMS0	WM (Quarter bin)	W6, W7, WA, WB
		SPMWHT329FD5YBWKS0	WK (Kitting bin)	WV, WW, WX, WY, WZ
		SPMWHT329FD5YBV0S0	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3000	SPMWHT329FD5YBVMS0	VM (Quarter bin)	V6, V7, VA, VB
		SPMWHT329FD5YBVKS0	VK (Kitting bin)	VV, VW, VX, VY, VZ
	3500	SPMWHT329FD5YBU0S0	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		SPMWHT329FD5YBUMS0	UM (Quarter bin)	U6, U7, UA, UB
80		SPMWHT329FD5YBUKS0	UK (Kitting bin)	UV, UW, UX, UY, UZ
		SPMWHT329FD5YBT0S0	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	4000	SPMWHT329FD5YBTMS0	TM (Quarter bin)	T6, T7, TA, TB
		SPMWHT329FD5YBTKS0	TK (Kitting bin)	TV, TW, TX, TY, TZ
	5000	SPMWHT329FD5YBR0S0	R0 (Whole bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9 RA,RB,RC,RD,RE,RF,RG
		SPMWHT329FD5YBRKS0	RK (Kitting bin)	RV, RW, RX, RY, RZ
	5700	SPMWHT329FD5YBQ0S0	Q0 (Whole bin)	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9 QA,QB,QC,QD,QE,QF,QG
	3700	SPMWHT329FD5YBQKS0	QK (Kitting bin)	QV, QW, QX, QY, QZ
	6500	SPMWHT329FD5YBP0S0	P0 (Whole bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9 PA,PB,PC,PD,PE,PF,PG
	0300	SPMWHT329FD5YBPKS0	PK (Kitting bin)	PV, PW, PX, PY, PZ

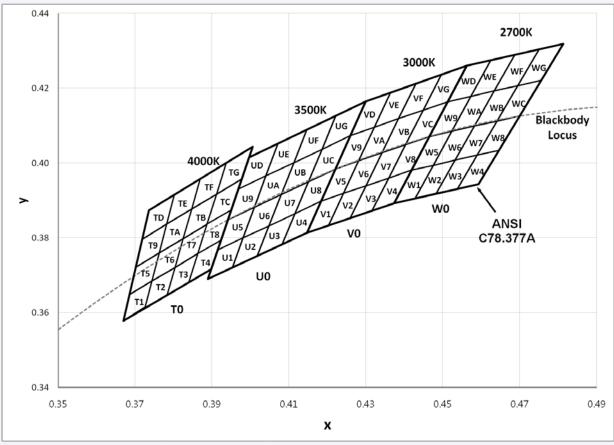


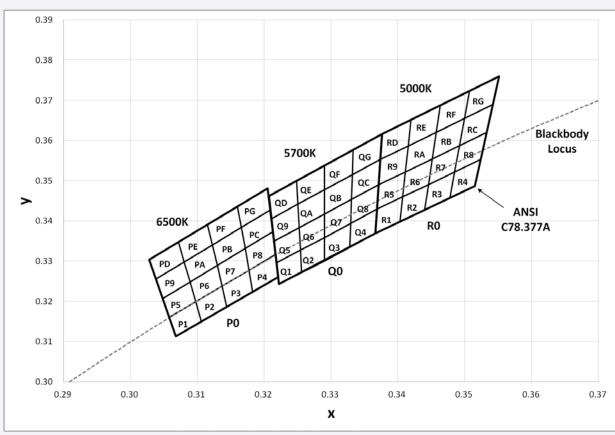
d) Voltage Bins ($I_F = 150$ mA, $T_s = 85$ °C)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
				AY	5.4 ~ 5.6
			•	AZ	5.6 ~ 5.8
-	-	-	ΥВ	A1	5.8 ~ 6.0
				A2	6.0 ~ 6.2
				АЗ	6.2 ~ 6.4



e) Chromaticity Region & Coordinates ($I_F = 150$ mA, $T_s = 85$ °C)







Region	CIEx	CIE y	Region	CIE x	CIE y
		W rank	(2700 K)		
	0.4373	0.3893		0.4465	0.4071
W1	0.4418	0.3981	W9	0.4513	0.4164
VVI	0.4475	0.3994	VV9	0.4573	0.4178
	0.4428	0.3906		0.4523	0.4085
	0.4428	0.3906		0.4523	0.4085
W2	0.4475	0.3994	WA	0.4573	0.4178
VV2	0.4532	0.4008		0.4634	0.4193
	0.4483	0.3919		0.4582	0.4099
	0.4483	0.3919		0.4582	0.4099
W3	0.4532	0.4008	W/D	0.4634	0.4193
vvs	0.4589	0.4021	- WB	0.4695	0.4207
	0.4538	0.3931		0.4641	0.4112
	0.4538	0.3931	WC	0.4641	0.4112
W4	0.4589	0.4021		0.4695	0.4207
VV4	0.4646	0.4034		0.4756	0.4221
	0.4593	0.3944		0.4700	0.4126
	0.4418	0.3981	WD	0.4513	0.4164
W5	0.4465	0.4071		0.4562	0.4260
VVO	0.4523	0.4085		0.4624	0.4274
	0.4475	0.3994		0.4573	0.4178
	0.4475	0.3994		0.4573	0.4178
W6	0.4523	0.4085	WE	0.4624	0.4274
VVO	0.4582	0.4099	VVE	0.4687	0.4289
	0.4532	0.4008	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.4634	0.4193
	0.4532	0.4008		0.4634	0.4193
W7	0.4582	0.4099	WF	0.4687	0.4289
V V /	0.4641	0.4112	VVF	0.4750	0.4304
	0.4589	0.4021		0.4695	0.4207
	0.4589	0.4021		0.4695	0.4207
1410	0.4641	0.4112	WG	0.4750	0.4304
W8	0.4700	0.4126		0.4813	0.4319
	0.4646	0.4034		0.4756	0.4221

Region	CIEx	CIE y	Region	CIE x	CIE y
		V rank	(3000 K)		•
	0.4147	0.3814		0.4221	0.3984
V1	0.4183	0.3898	V0	0.4259	0.4073
VI	0.4242	0.3919	V9	0.4322	0.4096
	0.4203	0.3833		0.4281	0.4006
	0.4203	0.3833		0.4281	0.4006
1/0	0.4242	0.3919		0.4322	0.4096
V2	0.4300	0.3939	VA	0.4385	0.4119
	0.4259	0.3853		0.4342	0.4028
	0.4259	0.3853		0.4342	0.4028
	0.4300	0.3939		0.4385	0.4119
V3	0.4359	0.3960	VB	0.4449	0.4141
	0.4316	0.3873		0.4403	0.4049
	0.4316	0.3873		0.4403	0.4049
	0.4359	0.3960	VO.	0.4449	0.4141
V4	0.4418	0.3981	VC	0.4513	0.4164
	0.4373	0.3893		0.4465	0.4071
	0.4183	0.3898		0.4259	0.4073
	0.4221	0.3984		0.4299	0.4165
V5	0.4281	0.4006	VD	0.4364	0.4188
	0.4242	0.3919		0.4322	0.4096
	0.4242	0.3919		0.4322	0.4096
1/0	0.4281	0.4006		0.4364	0.4188
V6	0.4342	0.4028	VE	0.4430	0.4212
	0.4300	0.3939		0.4385	0.4119
	0.4300	0.3939		0.4385	0.4119
\/7	0.4342	0.4028	\/ <u></u>	0.4430	0.4212
V7	0.4403	0.4049	VF	0.4496	0.4236
	0.4359	0.3960		0.4449	0.4141
	0.4359	0.3960		0.4449	0.4141
1/0	0.4403	0.4049		0.4496	0.4236
V8	0.4465	0.4071	VG	0.4562	0.4260
	0.4418	0.3981		0.4513	0.4164



Region	CIEx	CIE y	Region	CIE x	CIE y
		U rank	(3500 K)		
	0.3889	0.3690		0.3941	0.3848
114	0.3915	0.3768	110	0.3968	0.3930
U1	0.3981	0.3800	U9	0.4040	0.3966
	0.3953	0.3720	-	0.3941 0.3968	0.3882
	0.3953	0.3720		0.4010	0.3882
	0.3981	0.3800		0.4040	0.3966
U2	0.4048	0.3832	UA	0.4113	0.4001
	0.4017	0.3751		0.3941 0.3968 0.4040 0.4010 0.4010 0.4010 0.4010 0.4040 0.4113 0.4080 0.4150 0.4150 0.4150 0.4150 0.4150 0.4166 0.4259 0.4221 0.3968 0.3996 0.4071 0.4040 0.4071 0.4146 0.4113 0.4113 0.4146 0.4122 0.4186 0.4222 0.4299	0.3916
	0.4017	0.3751		0.4080	0.3916
	0.4048	0.3832		0.4113	0.4001
U3	0.4116	0.3865	UB	0.4186	0.4037
	0.4082	0.3782	UB	0.4150	0.3950
	0.4082	0.3782		0.4150	0.3950
	0.4116	0.3865	UC	0.4186	0.4037
U4	0.4183	0.3898		0.4259	0.4073
	0.4147	0.3814	8 mg	0.4150 0.4150 0.4186 0.4259 0.4221 0.3968 0.3996 0.4071	0.3984
	0.3915	0.3768		0.3968	0.3930
	0.3941	0.3848		0.3996	0.4015
U5	0.4010	0.3882	UD	0.4071	0.4052
	0.3981	0.3800		0.3941 0.3968 0.4040 0.4010 0.4010 0.4010 0.4010 0.4040 0.4113 0.4080 0.4113 0.4186 0.4150 0.4150 0.4150 0.4150 0.4166 0.4259 0.4221 0.3968 0.3996 0.4071 0.4040 0.4071 0.4146 0.4113 0.4113 0.4146 0.4122 0.4186 0.4222 0.4299	0.3966
	0.3981	0.3800		0.4150 0.4186 0.4259 0.4221 0.3968 0.3996 0.4071 0.4040 0.4040 0.4113 0.4113 0.4146 0.4222	0.3966
	0.4010	0.3882		0.4071	0.4052
U6	0.4080	0.3916	UE	0.4146	0.4089
	0.4048	0.3832		0.4113	0.4001
	0.4048	0.3832		0.4113	0.4001
	0.4080	0.3916		0.4146	0.4089
U7	0.4150	0.3950	UF	0.4222	0.4127
	0.4116	0.3865		0.3968 0.4040 0.4010 0.4010 0.4010 0.4010 0.4040 0.4113 0.4080 0.4113 0.4186 0.4150 0.4150 0.4150 0.4150 0.4150 0.4166 0.4259 0.4221 0.3968 0.3996 0.4071 0.4040 0.4041 0.4040 0.4041 0.4040 0.4041 0.4146 0.4113 0.4146 0.4122 0.4186 0.4222 0.4299	0.4037
	0.4116	0.3865		0.4186	0.4037
	0.4150	0.3950		0.4222	0.4127
U8	0.4221	0.3984	UG	0.4299	0.4165
	0.4183	0.3898		0.4259	0.4073

Region	CIEx	CIE y	Region	CIE x	CIE y
		T rank	(4000 K)		·
	0.3670	0.3578		0.3702	0.3722
T-4	0.3726	0.3612	то	0.3763	0.3760
T1	0.3744	0.3685	T9	0.3763 0.3763 0.3782 0.3719 0.3763 0.3825 0.3847 0.3825 0.3887 0.3912 0.3847 0.3950 0.3978 0.3912 0.3719 0.3782 0.3802 0.3736 0.3782 0.3847 0.3869 0.3802 0.3847 0.3869	0.3837
	0.3686	0.3649		0.3719	0.3797
	0.3726	0.3612		0.3763	0.3760
TO	0.3783	0.3646		0.3825	0.3798
T2	0.3804	0.3721	TA	0.3847	0.3877
	0.3744	0.3685		0.3763 0.3782 0.3719 0.3763 0.3763 0.3825 0.3847 0.3825 0.3887 0.3912 0.3847 0.3950 0.3978 0.3912 0.3719 0.3782 0.3782 0.3802 0.3736 0.3782 0.3847 0.3869 0.3802 0.3847	0.3837
	0.3783	0.3646		0.3782 0.3825 0.3887 0.3912 0.3847 0.3887 0.3950 0.3978	0.3798
то.	0.3840	0.3681		0.3887	0.3836
T3	0.3863	0.3758	TB	0.3912	0.3917
	0.3804	0.3721		0.3702 0.3763 0.3782 0.3719 0.3763 0.3825 0.3847 0.3825 0.3887 0.3912 0.3847 0.3950 0.3978 0.3912 0.3719 0.3782 0.3802 0.3736 0.3782 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802 0.3802	0.3877
	0.3840	0.3681		0.3887	0.3837
Τ4	0.3898	0.3716		0.3950	0.3875
T4	0.3924	0.3794	TC	0.3978	0.3958
	0.3863	0.3758		0.3912	0.3917
	0.3686	0.3649		0.3719	0.3797
	0.3744	0.3685	T-0	0.3782	0.3837
T5	0.3763	0.3760	TD	0.3802	0.3916
	0.3702	0.3722		0.3736	0.3874
	0.3744	0.3685		0.3763 0.3782 0.3719 0.3763 0.3825 0.3847 0.3825 0.3887 0.3912 0.3847 0.3950 0.3978 0.3912 0.3719 0.3782 0.3802 0.3736 0.3869 0.3802 0.3847 0.3869 0.3802 0.3937 0.3869 0.3912 0.3978	0.3837
то.	0.3804	0.3721		0.3847	0.3877
T6	0.3825	0.3798	TE	0.3869	0.3958
	0.3763	0.376		0.3702 0.3763 0.3782 0.3719 0.3763 0.3825 0.3847 0.3825 0.3887 0.3912 0.3847 0.3950 0.3978 0.3912 0.3719 0.3782 0.3736 0.3782 0.3802 0.3736 0.3802 0.3847 0.3869 0.3802 0.3847 0.3912 0.3802	0.3916
	0.3804	0.3721		0.3847	0.3877
	0.3863	0.3758		0.3912	0.3917
T7	0.3887	0.3836	TF	0.3937	0.4001
	0.3825	0.3798		0.3869	0.3958
	0.3863	0.3758		0.3912	0.3917
	0.3924	0.3794	T-0		0.3958
T8	0.3950	0.3875	TG		0.4044
	0.3887	0.3836		0.3937	0.4001



Region	CIEx	CIE y	Region	CIE x	CIE y
		R rank	(5000 K)		
	0.3366	0.3369	1 1 1 1 1 1 1 1 1 1 1 1 1	0.3371	0.3490
	0.3369	0.3430	500	0.3374	0.3553
R1	0.3407	0.3460	R9 0.3415	0.3587	
	0.3403	0.3398	-	0.3411	0.3522
	0.3403	0.3398		0.3411	0.3522
-	0.3407	0.3460		0.3415	0.3587
R2	0.3446	0.3491	RA	0.3457	0.3621
	0.3440	0.3427		0.3371 0.3374 0.3415 0.3411 0.3411 0.3415	0.3554
	0.3440	0.3427		0.3451	0.3554
	0.3446	0.3491		0.3457	0.3621
R3	0.3485	0.3522	RB	0.3500	0.3655
	0.3478	0.3457		0.3492	0.3587
	0.3478	0.3457		0.3492	0.3587
	0.3485	0.3522	RC	0.3500	0.3655
R4	0.3524	0.3554		0.3542	0.3690
	0.3515	0.3487		0.3415 0.3457 0.3451 0.3451 0.3457 0.3500 0.3492 0.3500 0.3542 0.3533 0.3374 0.3376 0.3420 0.3415 0.3420 0.3463 0.3457	0.3620
	0.3369	0.3430		0.3374	0.3553
	0.3371	0.3490		0.3376	0.3616
R5	0.3411	0.3522	RD	0.3420	0.3652
	0.3407	0.3460		0.3371 0.3374 0.3415 0.3411 0.3411 0.3415 0.3457 0.3451 0.3457 0.3500 0.3492 0.3500 0.3542 0.3533 0.3374 0.3376 0.3420 0.3415 0.3420 0.3415 0.3420 0.3457 0.3463 0.3457 0.3463 0.3507 0.3500 0.3500 0.3507	0.3587
	0.3407	0.3460		0.3415	0.3587
	0.3411	0.3522		0.3420	0.3652
R6	0.3451	0.3554	RE	0.3463	0.3687
	0.3446	0.3491		0.3371 0.3374 0.3415 0.3411 0.3411 0.3415 0.3451 0.3451 0.3451 0.3457 0.3500 0.3492 0.3500 0.3542 0.3533 0.3374 0.3376 0.3420 0.3415 0.3415 0.3457 0.3463 0.3457 0.3463 0.3507 0.3500 0.3500 0.3500	0.3621
	0.3446	0.3491		0.3457	0.3621
	0.3451	0.3554		0.3463	0.3687
R7	0.3492	0.3587	RF	0.3507	0.3724
	0.3485	0.3522		0.3374 0.3415 0.3411 0.3411 0.3415 0.3457 0.3457 0.3451 0.3457 0.3500 0.3492 0.3500 0.3542 0.3533 0.3374 0.3376 0.3420 0.3415 0.3415 0.3420 0.3463 0.3457 0.3463 0.3507 0.3500 0.3500	0.3655
	0.3485	0.3522		0.3500	0.3655
	0.3492	0.3587		0.3507	0.3724
R8	0.3533	0.3620	RG	0.3551	0.3760
	0.3524	0.3554		0.3542	0.3690

Region	CIEx	CIE y	Region	CIEx	CIE y
		Q rank	(5700 K)		
	0.3222	0.3243		0.3215	0.3350
	0.3219	0.3297		0.3211	0.3406
Q1	0.3254	0.3328	Q9	0.3251	0.3442
	0.3256	0.3272		0.3253	0.3384
	0.3256	0.3272		0.3253	0.3384
	0.3254	0.3328		0.3251	0.3442
Q2	0.3290	0.3359	QA	0.3290	0.3478
	0.3290	0.3300		0.3215 0.3211 0.3251 0.3253 0.3253 0.3253	0.3417
	0.3290	0.3300		0.3290 0.3290 0.3290 0.3332 0.3331 0.3331 0.3332	0.3417
	0.3290	0.3359		0.3290	0.3478
Q3	0.3329	0.3394	QB	0.3332	0.3515
	0.3328	0.3335	Q9 0.3215 Q9 0.3251 QA 0.3253 QA 0.3251 QA 0.3290 QB 0.3290 QB 0.3331 QC 0.3374 QC 0.3374 QD 0.3249 QD 0.3251 QD 0.3251 QC 0.3249 QD 0.3251 QC 0.3249 QC 0.3290 QC 0.3290 QC 0.3290 QC 0.3333 QC 0.3332 QC 0.3333	0.3331	0.3454
	0.3328	0.3335		0.3331	0.3454
	0.3329	0.3394	QC	0.3332	0.3515
Q4	0.3369	0.3430		0.3374	0.3553
	0.3366	0.3369		0.3211 0.3251 0.3253 0.3253 0.3251 0.3290 0.3290 0.3290 0.3332 0.3331 0.3332 0.3374 0.3371 0.3211 0.3207 0.3249 0.3251 0.3251 0.3251 0.3290 0.3290 0.3290 0.3290 0.3290 0.3333 0.3332 0.3333	0.3490
	0.3219	0.3297		0.3211	0.3406
	0.3215	0.3350		0.3207	0.3462
Q5	0.3253	0.3384	QD	0.3249	0.3500
	0.3254	0.3328		0.3251	0.3442
	0.3254	0.3328		0.3290 0.3290 0.3290 0.3290 0.3332 0.3331 0.3331 0.3332 0.3374 0.3371 0.3211 0.3207 0.3249 0.3251 0.3251 0.3249 0.3290 0.3290 0.3290 0.3290 0.3333 0.3332 0.3332	0.3442
	0.3253	0.3384		0.3249	0.3500
Q6	0.3290	0.3417	QE	0.3290	0.3538
	0.3290	0.3359		0.3215 0.3211 0.3251 0.3253 0.3253 0.3253 0.3251 0.3290 0.3290 0.3290 0.3332 0.3331 0.3331 0.3332 0.3374 0.3211 0.3207 0.3249 0.3251 0.3251 0.3251 0.3251 0.3251 0.3290 0.3290 0.3290 0.3290 0.3333 0.3332 0.3333 0.3332	0.3478
	0.3290	0.3359		0.3290	0.3478
6-	0.3290	0.3417	6-	0.3290	0.3538
Q7	0.3331	0.3454	QF	0.3333	0.3577
	0.3329	0.3394	-	0.3332	0.3515
	0.3329	0.3394		0.3332	0.3515
	0.3331	0.3454		0.3333	0.3577
Q8	0.3371	0.3490	QG	0.3376	0.3616
	0.3369	0.3430		0.3374	0.3553

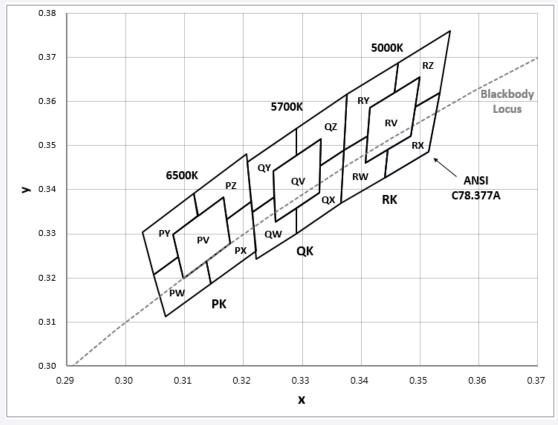


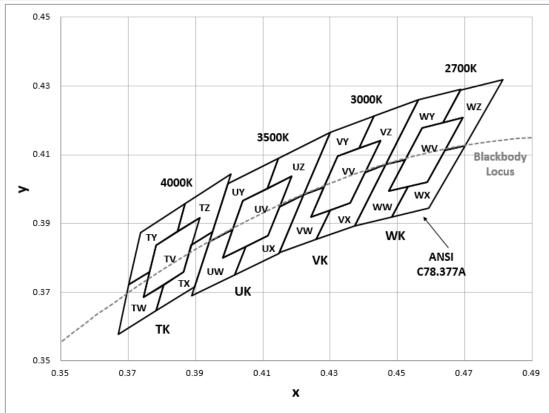
		P rank	(6500 K)		
	0.3068	0.3113		0.3048	0.3207
D1	0.3106	0.3150	DO.	0.3089	0.3249
P1	0.3098	0.3199	P9	0.3080	0.3298
	0.3058	0.3160		0.3038	0.3256
	0.3106	0.3150		0.3089	0.3249
D0	0.3144	0.3186	D.4	0.3130	0.3290
P2	0.3137	0.3238	PA	0.3123	0.3341
	0.3098	0.3199		0.3080	0.3298
	0.3144	0.3186		0.3130	0.3290
	0.3183	0.3224	55	0.3172	0.3332
P3	0.3177	0.3278	PB	0.3166	0.3384
	0.3137	0.3238		0.3089 0.3080 0.3038 0.3089 0.3130 0.3123 0.3080 0.3130 0.3172	0.3341
	0.3183	0.3224		0.3172	0.3332
-	0.3221	0.3261	PC	0.3213	0.3373
P4	0.3217	0.3317		0.3209	0.3427
	0.3177	0.3278		0.3048 0.3089 0.3080 0.3038 0.3089 0.3130 0.3123 0.3080 0.3132 0.3172 0.3166 0.3123 0.3209 0.3166 0.3038 0.3080 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3123 0.315 0.3072	0.3384
	0.3058	0.3160		0.3038	0.3256
D	0.3098	0.3199	55	0.3080	0.3298
P5	0.3089	0.3249	PD	0.3048 0.3089 0.3080 0.3088 0.3089 0.3130 0.3123 0.3080 0.3172 0.3166 0.3123 0.3209 0.3166 0.3038 0.3080 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3072 0.3028 0.3080 0.3123	0.3348
	0.3048	0.3207			0.3304
	0.3098	0.3199		0.3089 0.3130 0.3123 0.3080 0.3130 0.3172 0.3166 0.3123 0.3172 0.3213 0.3209 0.3166 0.3038 0.3080 0.3072 0.3028 0.3080 0.3123 0.3115 0.3072 0.3123 0.3166 0.3166 0.3166 0.309 0.3123	0.3298
D0	0.3137	0.3238	5-	0.3123	0.3341
P6	0.3130	0.3290	PE	0.3115	0.3391
*****	0.3089	0.3249		0.3072	0.3348
	0.3137	0.3238		0.3123	0.3341
D.7	0.3177	0.3278	D-	0.3166	0.3384
P7	0.3172	0.3332	PF	0.3160	0.3436
	0.3130	0.3290		0.3048 0.3089 0.3080 0.3038 0.3089 0.3130 0.3123 0.3080 0.3172 0.3166 0.3123 0.3209 0.3166 0.3038 0.3080 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3123 0.315 0.3072 0.3028 0.3080 0.3072 0.3028 0.3080 0.3123	0.3391
	0.3177	0.3278		0.3166	0.3384
	0.3217	0.3317		0.3209	0.3427
P8	0.3213	0.3373	PG	0.3205	0.3481
	0.3172	0.3332	P9 0.304 0.308 0.308 0.308 0.308 0.313 0.312 0.316 0.316 0.316 0.308 PD 0.308 0.316 0.316 0.316 0.308 0.308 0.316 0.316 0.308 0.308 0.308 0.308 0.308 0.308 0.308 0.308 0.308 0.316 0.316 0.312	0.3160	0.3436

Note: Samsung maintains measurement tolerance of: Cx, $Cy = \pm 0.005$



f) Kitting Chromaticity Region & Coordinates (I_F = 150 mA, T_s = 85 °C)







f) Kitting Chromaticity Region & Coordinates ($I_F = 150$ mA, $T_s = 85$ °C)

Region	CIEx	CIE y	Region	CIEx	CIE y
		W rank	(2700 K)		
	0.4475	0.3994			
WV	0.4589	0.4021			
VVV	0.4695	0.4207			
	0.4573	0.4178			
	0.4373	0.3893		0.4465	0.4071
	0.4483	0.3919		0.4523	0.4085
WW	0.4532	0.4008	1407	0.4573	0.4178
VVVV	0.4475	0.3994	WY	0.4634	0.4193
	0.4523	0.4085		0.4687	0.4289
	0.4465	0.4071		0.4523 0.4573 0.4634 0.4687 0.4562 0.4641 0.4700 0.4813 0.4687 0.4634	0.4260
	0.4483	0.3919		0.4641	0.4112
	0.4593	0.3944		0.4700	0.4126
WX	0.4700	0.4126	WZ	0.4813	0.4319
VVA	0.4641	0.4112	VVZ	0.4687	0.4289
	0.4589	0.4021		0.4634	0.4193
	0.4532	0.4008		0.4695	0.4207

Region	CIEx	CIE y	Region	CIEx	CIE y
		V rank	(3000 K)		
	0.4242	0.3919			
107	0.4359	0.3960			
W	0.4449	0.4141			
	0.4322	0.4096	-		
	0.4147	0.3814		0.4221	0.3984
	0.4259	0.3853	-	0.4281	0.4006
VW	0.4300	0.3939	100	0.4322	0.4096
VVV	0.4242	0.3919	· VY	0.4385	0.4119
	0.4281	0.4006		0.4430	0.4212
	0.4221	0.3984		0.4221 0.4281 0.4322 0.4385	0.4165
	0.4259	0.3853		0.4403	0.4049
	0.4373	0.3893		0.4465	0.4071
V	0.4465	0.4071	VZ	0.4562	0.4260
VX	0.4403	0.4049	· VZ	0.4430	0.4212
	0.4359	0.3960		0.4385	0.4119
	0.4300	0.3939		0.4449	0.4141



f) Kitting Chromaticity Region & Coordinates

Region	CIEx	CIE y	Region	CIE x	CIE y
		U rank	(3500 K)		
	0.3981	0.3800			
1.07	0.4116	0.3865			
UV	0.4186	0.4037			
	0.4040	0.3966			
	0.3889	0.3690		0.3941	0.3848
	0.4017	0.3751	UY	0.4010	0.3882
UW	0.4048	0.3832		0.4040	0.3966
UVV	0.3981	0.3800		0.4113	0.4001
	0.4010	0.3882		0.4146	0.4089
	0.3941	0.3848		0.4010 0.4040 0.4113	0.4015
	0.4017	0.3751		0.4150	0.3950
	0.4147	0.3814		0.4221	0.3984
UX	0.4221	0.3984	UZ	0.4299	0.4165
UX	0.4150	0.3950	UZ	0.4146	0.4089
	0.4116	0.3865		0.4113	0.4001
	0.4048	0.3832		0.4186	0.4037

Region	CIEx	CIE y	Region	CIEx	CIE y				
	T rank (4000 K)								
	0.3744	0.3685							
T) /	0.3863	0.3758							
TV	0.3912	0.3917							
	0.3782	0.3837							
	0.3670	0.3578		0.3702	0.3722				
	0.3783	0.3646		0.3763	0.3760				
TW	0.3804	0.3721	TY	0.3782	0.3837				
100	0.3744	0.3685		0.3847	0.3877				
	0.3763	0.3760		0.3869	0.3958				
	0.3702	0.3722		0.3736	0.3874				
	0.3783	0.3646		0.3887	0.3837				
	0.3898	0.3716		0.3950	0.3875				
TX	0.3950	0.3875	TZ	0.4006	0.4044				
17	0.3887	0.3837	12	0.3869	0.3958				
	0.3863	0.3758		0.3847	0.3877				
	0.3804	0.3721		0.3912	0.3917				



f) Kitting Chromaticity Region & Coordinates

Region	CIEx	CIE y	Region	CIE x	CIE y			
	R rank (5000 K)							
	0.3407	0.3460						
RV	0.3485	0.3524						
ΗV	0.3500	0.3655						
	0.3415	0.3588						
	0.3366	0.3369		0.3371	0.3493			
	0.3440	0.3427	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.3411	0.3525			
DIA	0.3446	0.3491	DV	0.3415	0.3588			
RW	0.3407	0.3460	RY	0.3457	0.3621			
	0.3411	0.3525		0.3371 0.3411 0.3415	0.3687			
	0.3371	0.3493	10 10 10 10 10 10 10 10 10 10 10 10 10 1		0.3616			
	0.3440	0.3428		0.3492	0.3587			
	0.3514	0.3487		0.3553	0.3620			
DV	0.3533	0.3620	D.7	0.3551	0.3760			
RX	0.3492	0.3587	RZ	0.3463	0.3687			
	0.3485	0.3522		0.3457	0.3621			
	0.3446	0.3493		0.3371 0.3411 0.3415 0.3457 0.3463 0.3376 0.3492 0.3553 0.3551 0.3463	0.3655			

Region	CIEx	CIE y	Region	CIE x	CIE y
	•	Q rank	(5700 K)		
	0.3254	0.3328			
QV	0.3329	0.3394			
QV	0.3332	0.3515			
	0.3251	0.3442			
	0.3222	0.3243		0.3215	0.3350
	0.3290	0.3300		0.3253	0.3384
QW	0.3290	0.3359	QY	0.3251	0.3442
QVV	0.3254	0.3328	Qĭ	0.3290	0.3478
	0.3253	0.3384		0.3290	0.3538
	0.3215	0.3350		0.3215 0.3253 0.3251 0.3290	0.3462
	0.3290	0.3300		0.3331	0.3454
	0.3366	0.3369		0.3371	0.3490
OX	0.3371	0.3490	ΟZ	0.3376	0.3616
QA	0.3331	0.3454	QΖ	0.3290	0.3538
	0.3329	0.3394		0.3290	0.3478
	0.3290	0.3359		0.3332	0.3515



f) Kitting Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y			
	P rank (6500 K)							
	0.3098	0.3199		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
PV	0.3177	0.3278						
PV	0.3166	0.3384						
	0.3080	0.3298						
	0.3068	0.3113		0.3048	0.3207			
	0.3144	0.3186		0.3089	0.3249			
PW	0.3137	0.3238	PY	0.3080	0.3298			
FVV	0.3098	0.3199		0.3123	0.3341			
	0.3089	0.3249		0.3115	0.3391			
	0.3048	0.3207		0.3048 0.3089 0.3080 0.3123	0.3304			
	0.3144	0.3186		0.3172	0.3332			
	0.3221	0.3261		0.3213	0.3373			
PX	0.3213	0.3373	PZ	0.3205	0.3481			
1 /	0.3172	0.3332	1 2	0.3115	0.3391			
	0.3177	0.3278		0.3123	0.3341			
	0.3137	0.3238		0.3166	0.3384			

Note:

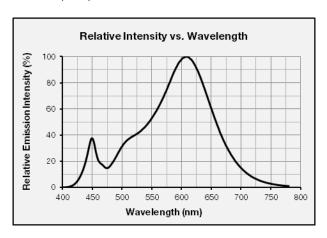
Samsung maintains measurement tolerance of: Cx, $Cy = \pm 0.005$



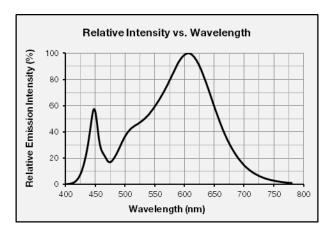
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_F = 150 \text{ mA}, T_s = 85 ^{\circ}\text{C}$)

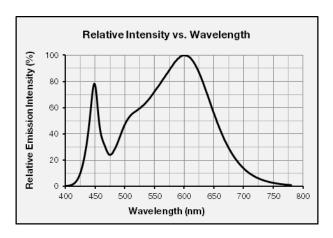
CCT: 2700 K (80 CRI)



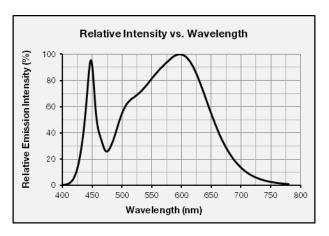
CCT: 3000 K (80 CRI)



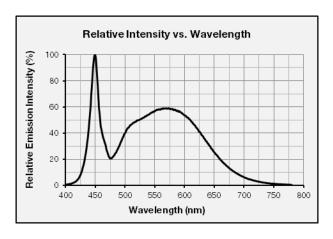
CCT: 3500 K (80 CRI)



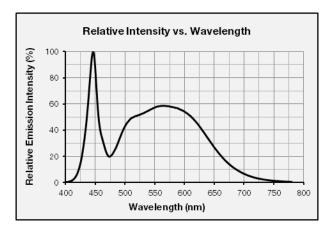
CCT: 4000 K (80 CRI)



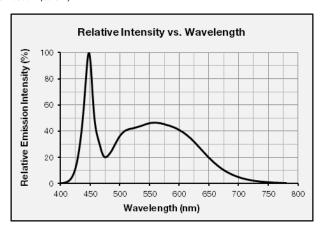
CCT: 5000 K (80 CRI)



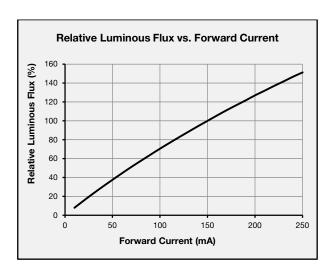
CCT: 5700 K (80 CRI)

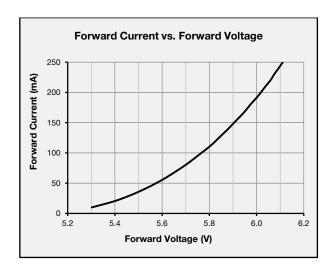


CCT: 6500 K (80 CRI)

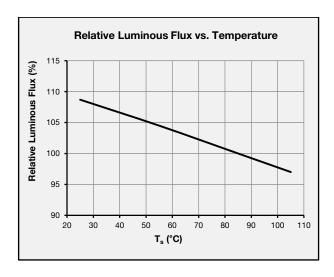


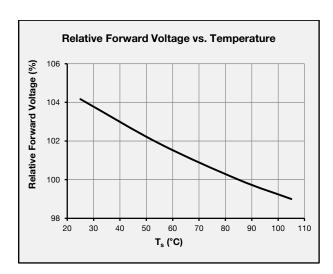
b) Forward Current Characteristics (T_s = 85 °C)





c) Temperature Characteristics (I_F = 150 mA)

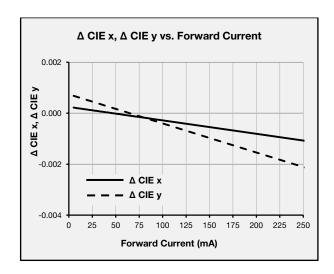


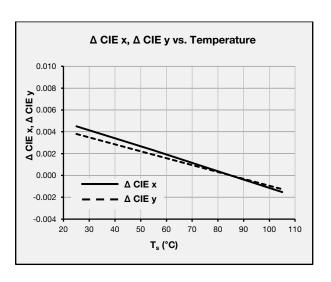


d) Color Shift Characteristics

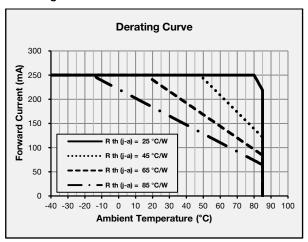
T_s = 85 °C

 $I_F = 150 \text{ mA}$

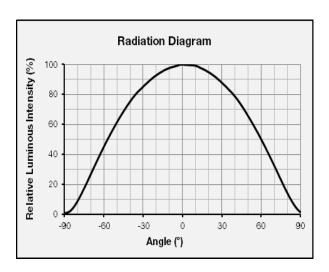




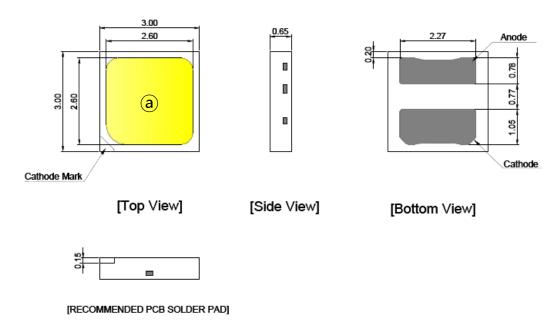
e) Derating Curve

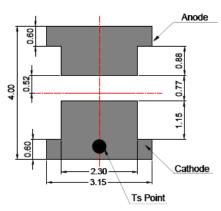


f) Beam Angle Characteristics (I_F = 150 mA, T_s = 85 °C)



4. Outline Drawing & Dimension





- Measurement unit: mm
- Tolerance: ±0.1mm
- Do not place pressure on the encapsulation resin (a)

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 250 mA		1000 h	22
High Temperature Life Test	85 °C, DC 250 mA	1000 h	22	
High Temperature Humidity Life Test	85 °C, 85 % RH, DC 250 mA	1000 h	22	
Low Temperature Life Test	-40 °C, DC 250 mA	1000 h	22	
Powered Temperature Cycle Test	-45 °C ~ 85 °C, each 20 min, on/off Temp. Change time 100min, DC 250	100 cycles	22	
Temperature Cycling	-45 °C / 15 min ↔ 125 °C / 15 mi	n	500 cycles	100
High Temperature Storage	120 °C		1000 h	11
Low Temperature Storage	-40 °C		1000 h	11
ESD (HBM)	n, n ₂	10 MΩ 1.5 kΩ	5 times	30
ESD (MM)	R₂: C:	10 MΩ 0 200 pF ±0.5 kV	5 times	30
Vibration Test	20~2000~20 Hz, 200 m/s², sweep 4 min X, Y, Z 3 direction, each 1 cycle 1500 g, 0.5 ms 3 shocks each X-Y-Z axis		4 cycles	11
Mechanical Shock Test			5 cycles	11

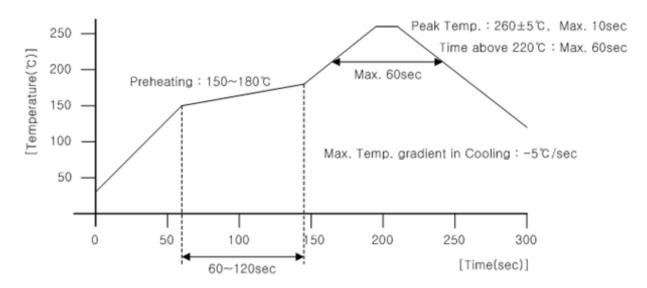
b) Criteria for Judging the Damage

la se	Complete	Test Condition	Limit			
ltem	Symbol	(T _s = 25 °C)	Min	Max		
Forward Voltage	V _F	$I_F = 250 \text{ mA}$	Init. Value * 0.9	Init. Value * 1.1		
Luminous Flux	Φ,	I _F = 250 mA	Init. Value * 0.7	Init. Value * 1.1		

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



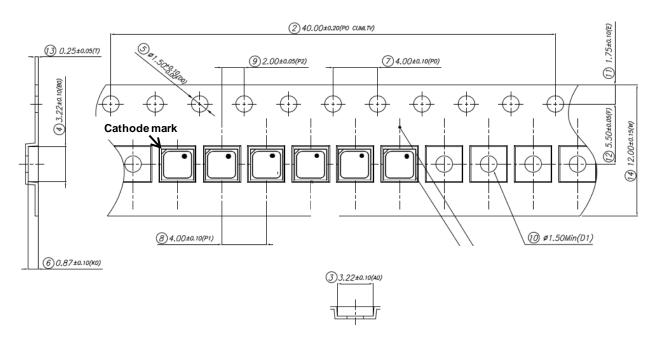
b) Manual Soldering Conditions

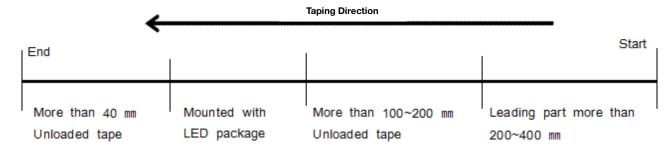
Not more than 5 seconds @ max. 300 °C, under soldering iron.

7. Tape & Reel

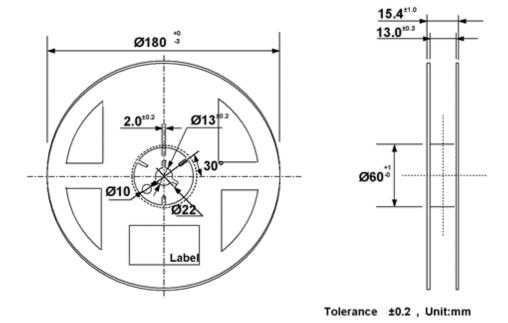
a) Taping Dimension

(unit: mm)





b) Reel Dimension



Notes:

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) Cumulative tolerance: Cumulative tolerance / 10 pitches is $\pm 0.2 \text{ mm}$
- 3) Adhesion strength of cover tape: Adhesion strength is 0.1-0.7 N when the cover tape is turned off from the carrier tape at 10° angle to the carrier tape
- 4) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

8. Label Structure

a) Label Structure



abcdef

A2R4SE

SAMERAS

Note: Denoted bin code and product code above is only an example

'★' means all kind of Chromaticity Coordinate Ranks

Bin Code:

(a) (refer to page 9)

©d: Chromaticity bin (refer to page 11~14)

(e)f): Luminous Flux bin (refer to page 7)

b) Lot Number



A2R4SE



The lot number is composed of the following characters:

(1)(2)(3)(4)(5)(6)(7)(8)(9) / 1(a)(b)(C) / 4,000 pcs

1 : Production site (S: Giheung, Korea, G: Tianjin, China)

(2) : L (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)

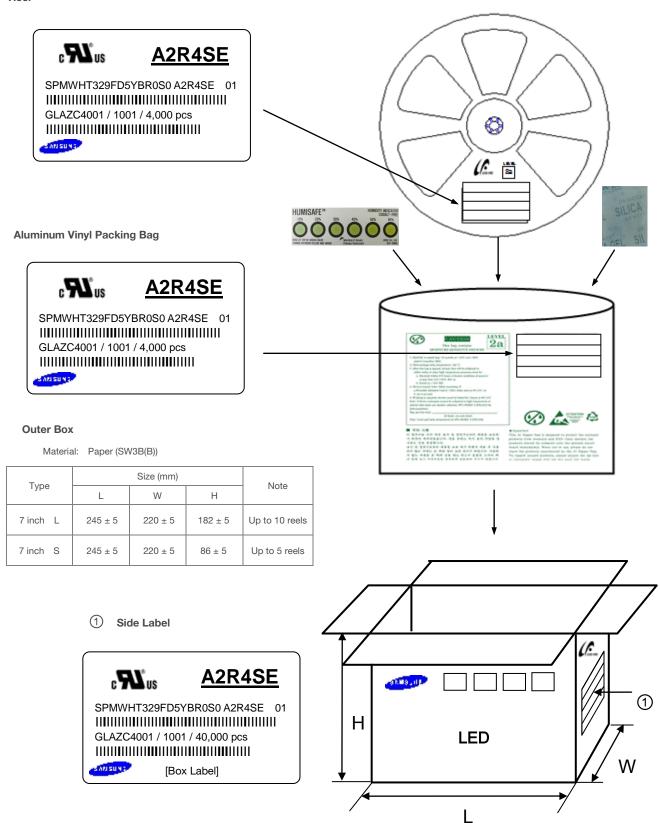
(001 ~ 999) : Product serial number

(a)(b)(c) : Reel number (001 ~ 999)

9. Packing Structure

a) Packing Process

Reel



b) Packing Process for kitting

Reel

Kitting 'A'



SPMWHT329FD5YB

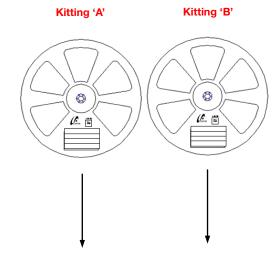
KS0 A1

WSE 01

WHITHING DESCRIPTION OF STREET OF

Kitting 'B'

Kitting 'B'



Aluminum Vinyl Packing Bag

Kitting 'A'

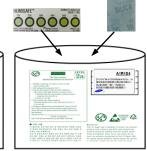
ANSUN



GLAW94001 / 1001 / 2,500 pcs





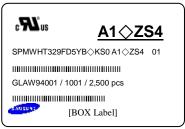


Outer Box

Kitting 'A'



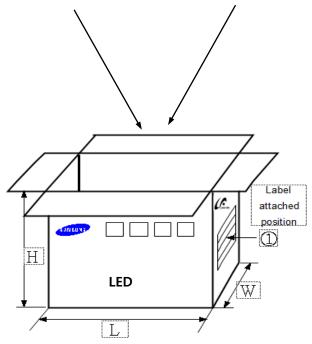
Kitting 'B'



Note: "♦" can be Nominal CCT code.

Material: Paper (SW3B(B))

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



b) Aluminum Vinyl Packing Bag



CAUTION



This bag contains MOISTURE SENSITIVE DEVICES

- Shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
- 2. Peak package body temperature: 240 °C
- After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
 - a. Mounted within 672 hours at factory conditions of equal to or less than 30°C /60% RH, or
 - b. Stored at < 10% RH
- Devices require bake, before mounting, ifa. Humidity Indicator Card is >/60% when read at 23±5°C, or b. 2a is not met.
- 5. If baking is required, devices must be baked for 10~24 hours at 60±5°C Note: if device containers cannot be subjected to high temperature or shorter hake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure.

Bag seal due date:

(I blank, see code label)

Note: Level and body temperature by IPC/JEDEC J-STD-020

c**FL**°us

A2R4SE

SAMERYS









■ 주의 사항

이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하 기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 설 시하는 것을 권장합니다.

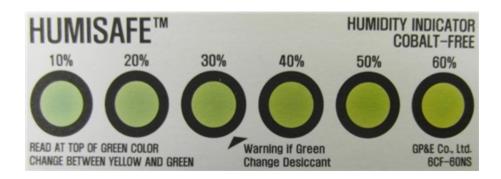
습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용 하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하 지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩 과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

■ 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.

c) Silica Gel & Humidity Indicator Card inside Aluminum Vinyl Bag





10. Precautions in Handling & Use

- 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. If the LEDs are to be stored for three months or more after being shipped from Samsung, they should be packed with a nitrogen-filled container (shelf life of sealed bags is 12 months at temperature 0~40 °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 $^{\circ}$ C / 60 $^{\circ}$ C 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	Maximum Percent Relative Humidity						Temperature
	Level	40%	50%	60%	70%	80%	90%	remperature
Dod. This lands	Level 2a	œ	œ	28	1	1	1	30℃
Body Thickness <2.1mm		∞	00	00	2	1	1	25℃
		®	o o	o o	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 \pm 5 °C.
- 8) It is recommended to be baked for 12 hour 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 antielectrostatic 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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Samsung Electronics Co., Ltd. 95, Samsung 2-ro Giheung-gu Yongin-si, Gyeonggi-do, 446-711 KOREA

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