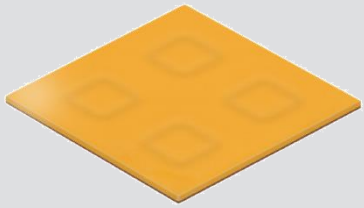
THE DATASHEET OF

SCA9VT78HAL4V06A1F

High Power LED Series
Chip Scale Package Array

LH204A



Making use of CSP, Samsung's fundamental "building block", provide with greater design flexibility and better light quality

Features & Benefits

- Utilizes Samsung TF chip and Flexible substrate platform technology
- Suitable for use in indoor and outdoor directional lighting
- 80 CRI makes it well suited for most applications
- Compact footprint (3.5 x 3.5 mm)

Applications

- Indoor Lighting: Spotlight, Downlight, MR, PAR
- Industrial Lighting: High Bay Light, Low Bay Light
- Consumer Lighting: Torch Light

Table of Contents

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +105	ºC	Note 1)
Storage Temperature	T_{stg}	-40 ~ +120	ºC	-
LED Junction Temperature	T_j	130	ºC	-
Forward Current	I_F	350	mA	-
Assembly Process Temperature	-	260 <10	ºC s	-
ESD (HBM)	-	±2	kV	-

Note:

1) Refer to the derating curve, '3. Typical Characteristics Graph', for proper driving current that maintained below maximum junction temperature.

b) Electro-optical Characteristics (IF = 150 mA)

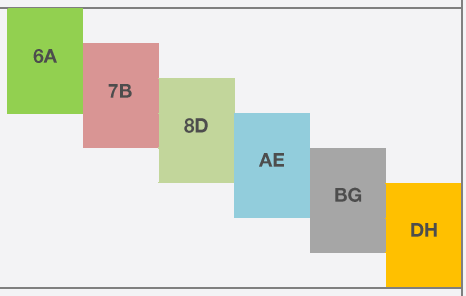
Item	Unit	Nominal CCT (K)	Condition		Value Typ.
			I_F (mA)	T_s (°C)	
Luminous Flux (Φ_v)	lm	2700 (80 CRI)	150	25	235
			150	85	215
			200	85	278
			250	85	338
Forward Voltage (V_F)	V		150	25	12.2
			150	85	11.6.
			200	85	11.9
			250	85	12.1
Reverse Voltage (@ -10 μA)	V				(min) -10.0
Thermal Resistance (junction to solder point)	°C/W				2.5
Beam Angle	°				120

Note:

Samsung maintains measurement tolerance of: luminous flux = ±7%, forward voltage = ±0.1 V

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	C	A	8	W	T	7	8	H	A	L	4	W	0	A	E	1	F

Digit	PKG Information	Code	Specification
1 2 3	Samsung Chip Scale Package Array	SCA	
4	CRI	7	Min. 70
		8	Min. 80
		9	Min. 90
5	CCT	W	2700K
		V	3000K
		U	3500K
		T	4000K
		R	5000K
		Q	5700K
		P	6500K
6	Chip Shape	T	Square type
7 8 9	Product	78H	Chip version
10 11 12	Product Purpose	AL4	4 chips in 1 array
13 14	CCT (K)	W 0	2700 — Bin Code: W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
		V 0	3000 — V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
		U 0	3500 — U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
		T 0	4000 — T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
		R T	5000 — R1, R2, R3, R4
		Q T	5700 — Q1, Q2, Q3, Q4
		P T	6500 — P1, P2, P3, P4
15 16	Luminous Flux	6 A	165 ~ 200 — 67 165 ~ 175
		7 B	175 ~ 215 — 78 175 ~ 185
		8 D	185 ~ 230 — 8A 185 ~ 200
		A E	200 ~ 245 — AB 200 ~ 215
		B G	215 ~ 260 — BD 215 ~ 230
		D H	230 ~ 280 — DE 230 ~ 245; EG 245 ~ 260; GH 260 ~ 280
			
			Digit 15: Min. spec Digit 18: Max. spec e.g.: BD = 215~230 lm, BG = BD + DE + EG = 215~260 lm
17 18	Forward Voltage (Vf)	1 F	10.6 ~ 12.9 V

a) Luminous Flux Bins and Characteristics (I_F = 150 mA, T_s= 85ºC)

CRI (R_a) Min.[1]	Nominal CCT (K)	Product Code	Sorting @ 150 mA (lm)		Calculated Minimum Flux[2] (lm)			
			Flux Rank	Flux Range[1]	@ 150 mA (25℃)	@ 200 mA	@ 250 mA	@ 350 mA
70	3000	*SCA7VT78HAL4V0BG1F*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
	3500	*SCA7UT78HAL4U0BG1F*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
	4000	*SCA7TT78HAL9T0AJEP*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
	5000	*SCA7RT78HAL9RTAJEP*	GH	260 ~ 280	281	335	408	537
			EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
	5700	*SCA7QT78HAL4QTDH1F*	GH	260 ~ 280	281	335	408	537
			EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
	6500	*SCA7PT78HAL4PTBG1F*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444

Notes:

1) Samsung maintains measurement tolerance of: luminous flux = ±7 %, CRI = ±3
2) Calculated minimum and maximum flux values are for reference only

a) Luminous Flux Bins and Characteristics (I_F = 150 mA, T_s= 85ºC)

CRI (R_a) Min.[1]	Nominal CCT (K)	Product Code	Sorting @ 150 mA (lm)		Calculated Minimum Flux[2] (lm)			
			Flux Rank	Flux Range[1]	@ 150 mA (25℃)	@ 200 mA	@ 250 mA	@ 350 mA
80	2700	*SCA8WT78HAL4W0AE1F*	DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
			AB	200 ~ 215	216	258	314	413
	3000	*SCA8VT78HAL4V0AE1F*	DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
			AB	200 ~ 215	216	258	314	413
	3500	*SCA8UT78HAL4U0AE1F*	DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
			AB	200 ~ 215	216	258	314	413
	4000	*SCA8TT78HAL4T0BG1F*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444
	5000	*SCA8RT78HAL4RTBG1F*	EG	245 ~ 260	265	316	384	506
			DE	230 ~ 245	249	297	361	475
			BD	215 ~ 230	232	277	337	444

Notes:

1) Samsung maintains measurement tolerance of: luminous flux = ±7 %, CRI = ±3
2) Calculated minimum and maximum flux values are for reference only

a) Luminous Flux Bins and Characteristics (I_F = 150 mA, T_s= 85ºC)

CRI (R_a) Min.[1]	Nominal CCT (K)	Product Code	Sorting @ 150 mA (lm)		Calculated Minimum Flux[2] (lm)			
			Flux Rank	Flux Range[1]	@ 150 mA (25℃)	@ 200 mA	@ 250 mA	@ 350 mA
90	2700	*SCA9WT78HAL4W06A1F*	8A	185 ~ 200	200	239	290	382
			78	175 ~ 185	189	226	275	362
			67	165 ~ 175	178	213	259	341
	3000	*SCA9VT78HAL4V06A1F*	8A	185 ~ 200	200	239	290	382
			78	175 ~ 185	189	226	275	362
			67	165 ~ 175	178	213	259	341
	3500	*SCA9UT78HAL4U07B1F*	AB	200 ~ 215	216	258	314	413
			8A	185 ~ 200	200	239	290	382
			78	175 ~ 185	189	226	275	362
	4000	*SCA9TT78HAL4T07B1F*	AB	200 ~ 215	216	258	314	413
			8A	185 ~ 200	200	239	290	382
			78	175 ~ 185	189	226	275	362

Notes:

1) Samsung maintains measurement tolerance of: luminous flux = ±7 %, CRI = ±3
2) Calculated minimum and maximum flux values are for reference only

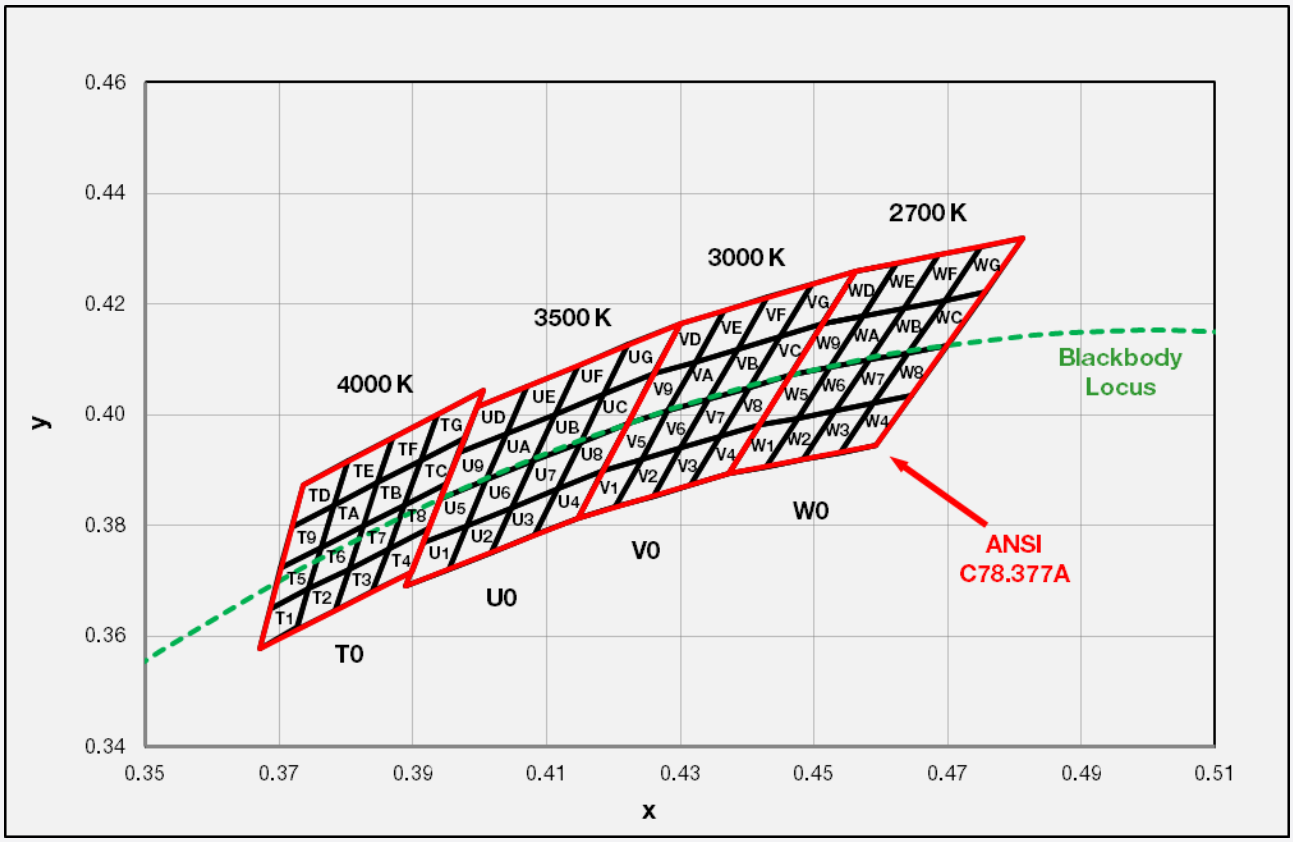
b) Color Bins (I_F = 150 mA, T_s= 85 °C)

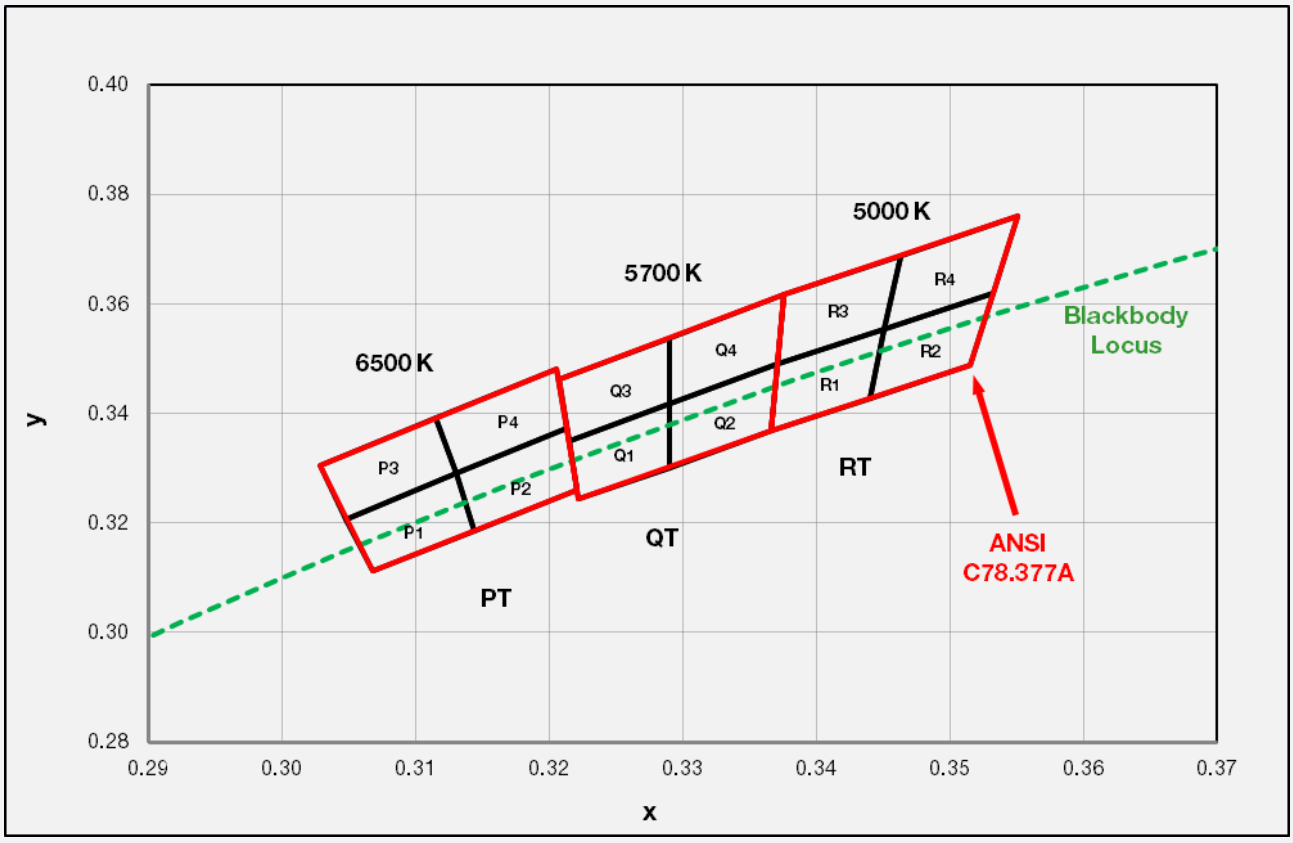
CRI (R_a) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
70	3000	***SCA7VT78HAL4V0BG1F***	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3500	***SCA7UT78HAL4U0BG1F***	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	4000	***SCA7TT78HAL4T0BG1F***	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	5000	***SCA7RT78HAL4RTDH1F***	RT (ANSI bin)	R1, R2, R3, R4
	5700	***SCA7QT78HAL9QTAJEP***	QT (ANSI bin)	Q1, Q2, Q3, Q4
	6500	***SCA7PT78HAL9PTAJEP***	PT (ANSI bin)	P1, P2, P3, P4
80	2700	***SCA8WT78HAL4W0AE1F***	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
	3000	***SCA8VT78HAL4V0AE1F***	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3500	***SCA8UT78HAL4U0AE1F***	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	4000	***SCA8TT78HAL4T0BG1F***	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	5000	***SCA8RT78HAL4RTBG1F***	RT (ANSI bin)	R1, R2, R3, R4
90	2700	***SCA9WT78HAL4W06A1F***	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
	3000	***SCA9VT78HAL4V06A1F***	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3500	***SCA9UT78HAL4U07B1F***	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	4000	*SCA9TT78HAL4T07B1F*	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG

c) 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)
			1F		10.6 ~ 12.9V

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





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

Region	CIE x	CIE y	Region	CIE x	CIE y
W rank (2700 K)					
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 (3000 K)					
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

d) Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
U rank (3500 K)					
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 (4000 K)					
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	0.3837
	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	0.376		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
	0.3950	0.3875		0.4006	0.4044
	0.3887	0.3836		0.3937	0.4001

d) Chromaticity Region & Coordinates

Region	CIE x	CIE y
R rank (5000 K)		
R1	0.3371	0.3490
	0.3451	0.3554
	0.3440	0.3427
	0.3366	0.3369
R2	0.3451	0.3554
	0.3533	0.3620
	0.3515	0.3487
	0.3440	0.3427
R3	0.3376	0.3616
	0.3463	0.3687
	0.3451	0.3554
	0.3371	0.3490
R4	0.3463	0.3687
	0.3551	0.3760
	0.3533	0.3620
	0.3451	0.3554

Region	CIE x	CIE y
Q rank (5700 K)		
Q1	0.3215	0.3350
	0.3290	0.3417
	0.3290	0.3300
	0.3222	0.3243
Q2	0.3290	0.3417
	0.3371	0.3490
	0.3366	0.3369
	0.3290	0.3300
Q3	0.3207	0.3462
	0.3290	0.3538
	0.3290	0.3417
	0.3215	0.3350
Q4	0.3290	0.3538
	0.3376	0.3616
	0.3371	0.3490
	0.3290	0.3417

Region	CIE x	CIE y
P rank (6500 K)		
P1	0.3068	0.3113
	0.3144	0.3186
	0.3130	0.3290
	0.3048	0.3207
P2	0.3144	0.3186
	0.3221	0.3261
	0.3213	0.3373
	0.3130	0.3290
P3	0.3048	0.3207
	0.3130	0.3290
	0.3115	0.3391
	0.3028	0.3304
P4	0.3130	0.3290
	0.3213	0.3373
	0.3205	0.3481
	0.3115	0.3391

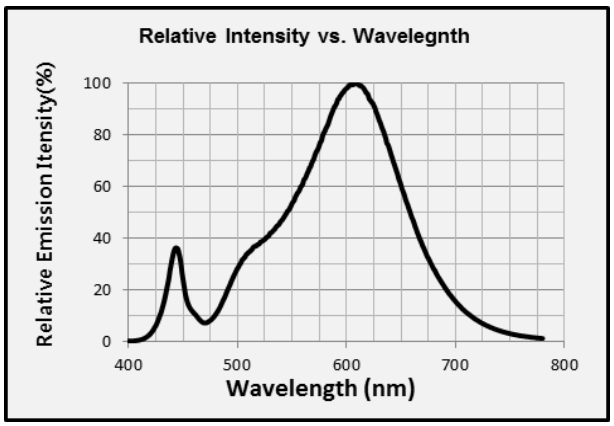
Note:

Samsung maintains measurement tolerance of: Cx, Cy = ±0.005

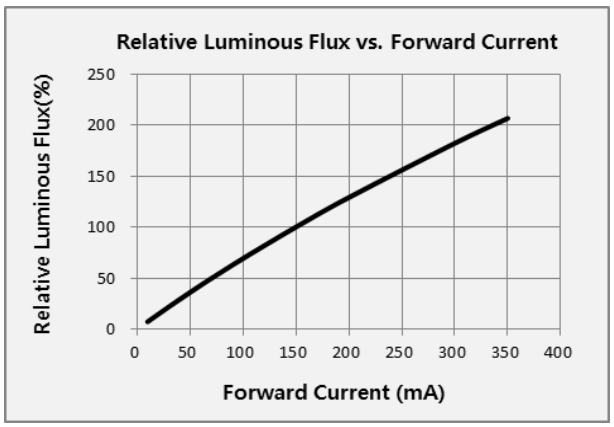
3. Typical Characteristics Graphs

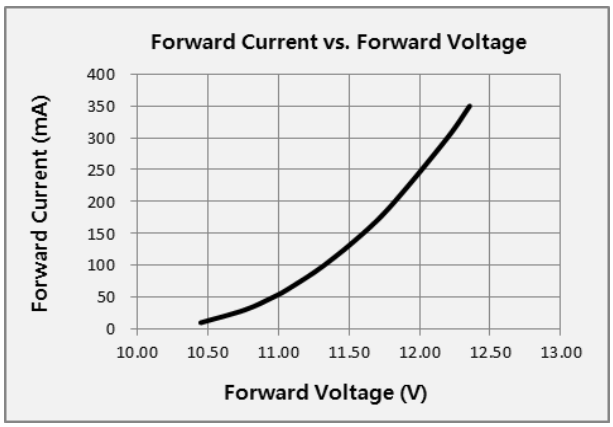
a) Spectrum Distribution (I_F = 150 mA, T_S = 85 °C)

Warm White

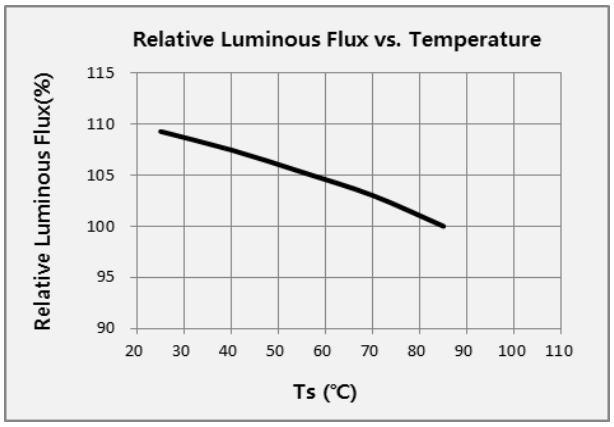


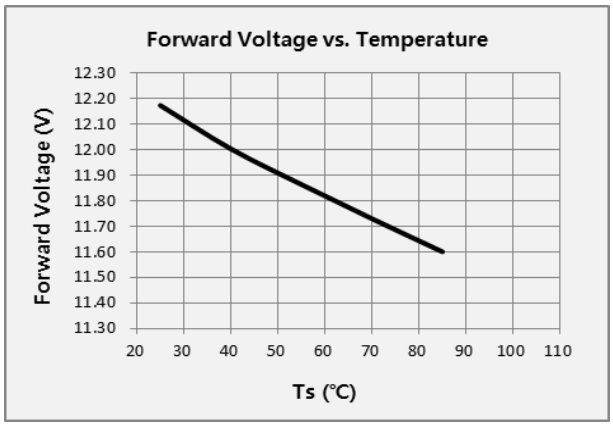
b) Forward Current Characteristics (T_S = 85 °C)



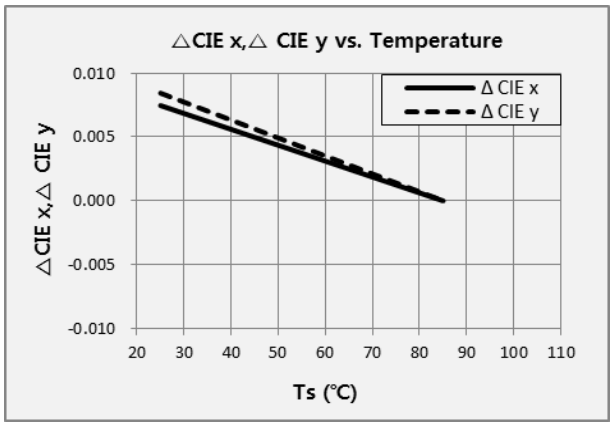


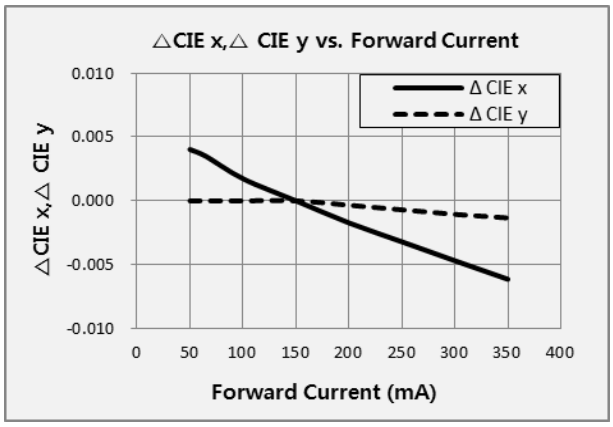
c) Temperature Characteristics (I_F = 150 mA)



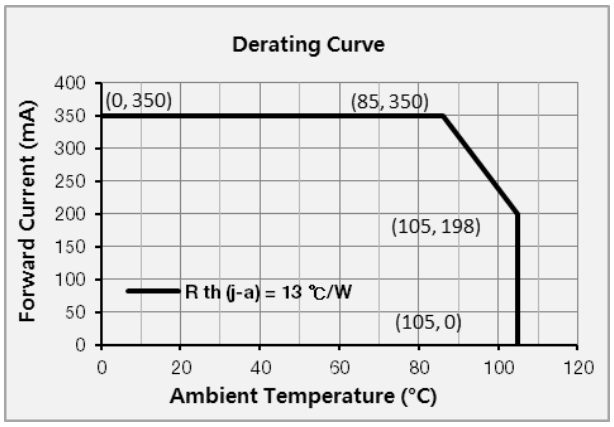


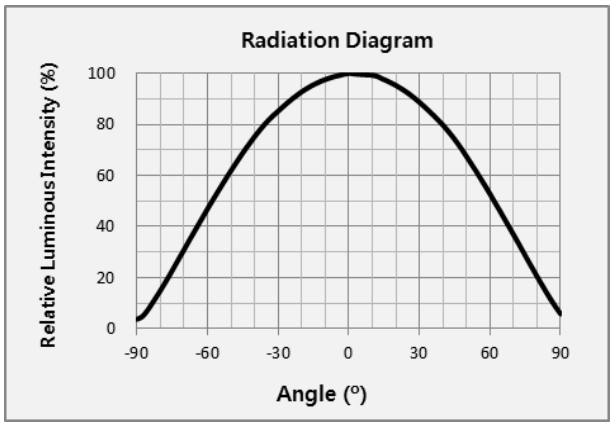
d) Color Shift Characteristics (I_F = 150 mA, T_s = 85 °C)



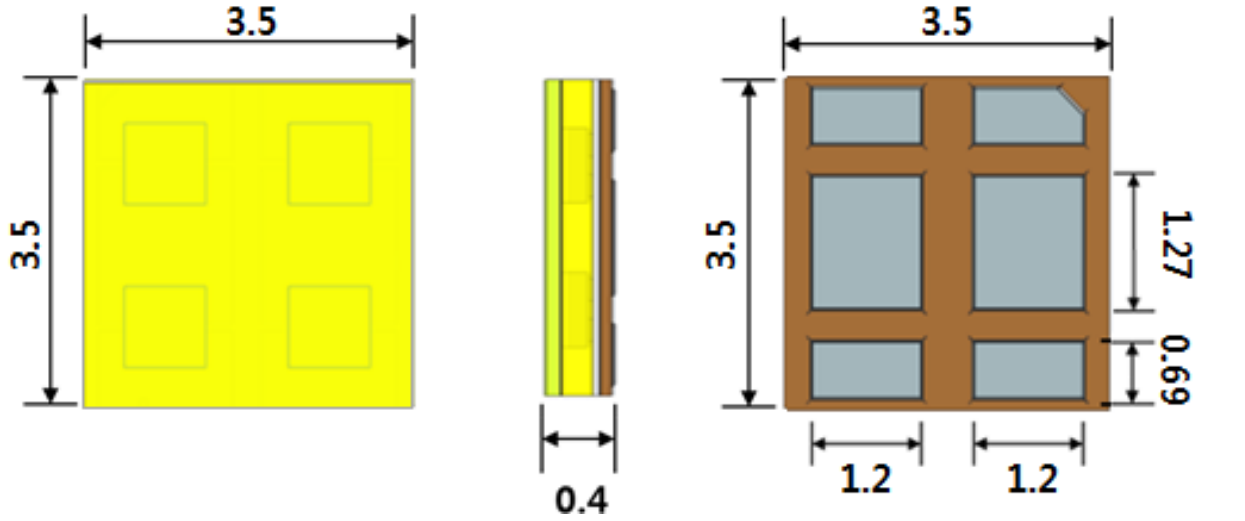


e) Derating Curve and Beam Angle Characteristics (I_F = 150 mA, T_s = 25 °C)





4. Outline Drawing & Dimension



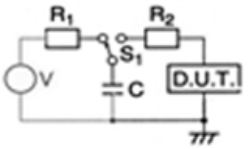
- Measurement unit: mm
- Maximum compressing force is 15 N on the body ⓐ
- Do not place pressure on the encapsulation resin ⓑ

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, Derating max current	1000 h	22
High Temperature Life Test	85 °C, Derating max current	1000 h	22
High Temperature Humidity Life Test	85 °C, 85 % RH, Derating max current	1000 h	22
Low Temperature Life Test	-40 °C, Derating max current	1000 h	22
Powered Temperature Cycle Test	-45 °C / 20 min ↔ 85 °C / 20 min, sweep 100 min cycle on/off: each 5 min, Derating max current	100 cycles	22
Thermal Shock	-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_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ±2 kV	5 times	30
ESD (MM)	R_1: 10 MΩ R_2: 0 C: 200 pF V: ±0.2 kV	5 times	30
Vibration Test	20~2000~20 Hz, 200 m/s^2, 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

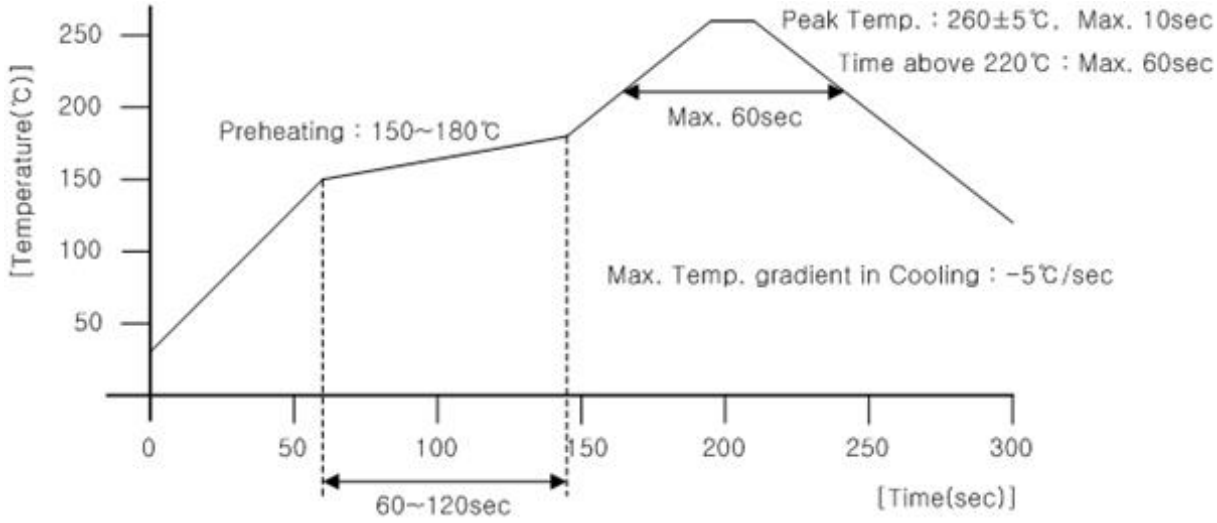
b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_s = 25 °C)	Limit	
			Min	Max
Forward Voltage	V_F	I_F = 150 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ_v	I_F = 150 mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

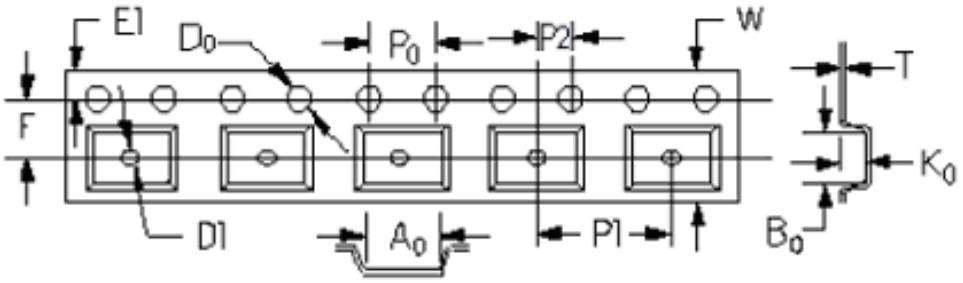


b) Manual Soldering Conditions

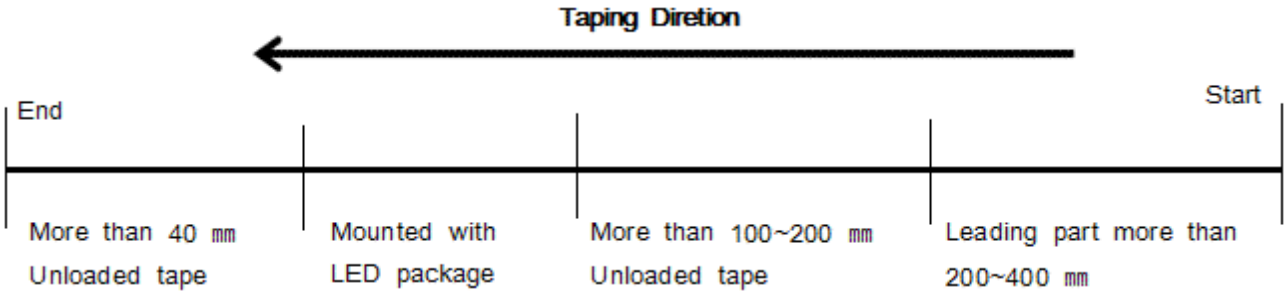
Not more than 5 seconds @ max. 300 °C, under soldering iron.

7. Tape & Reel

a) Taping Dimension

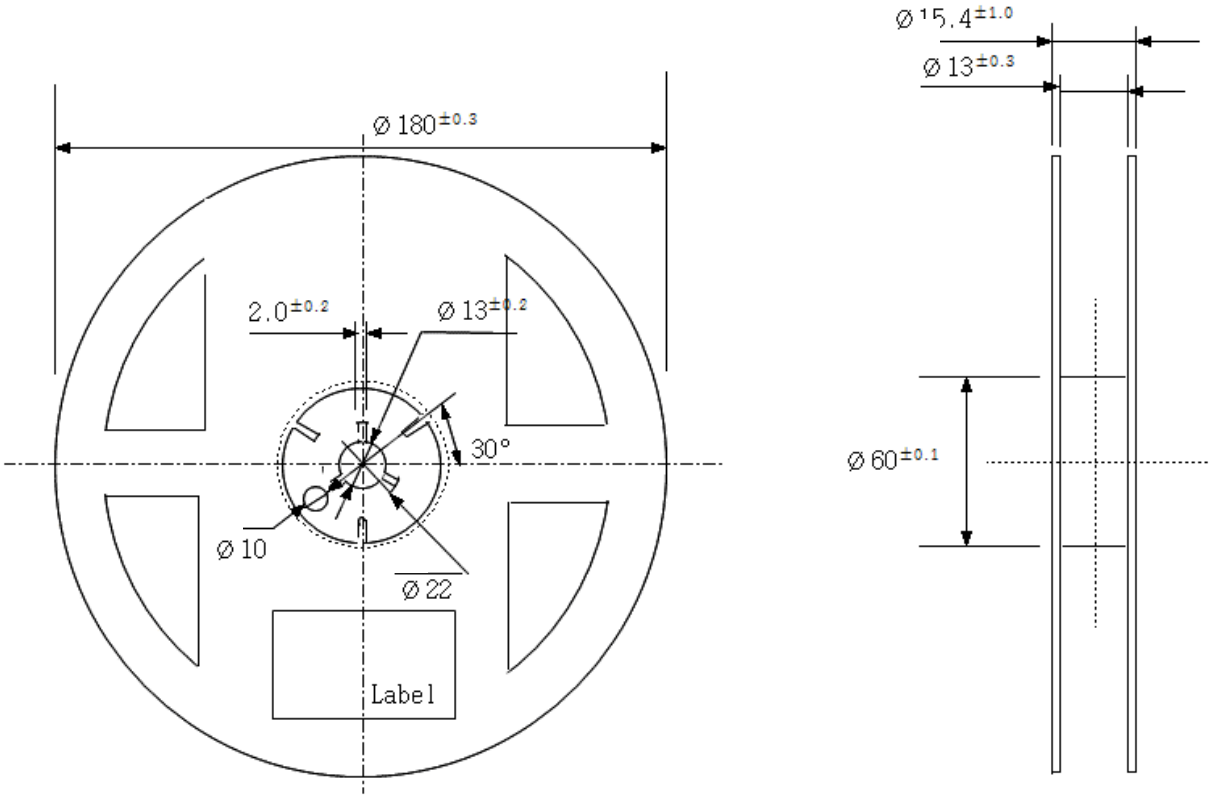


Ao	Bo	Ko	T	W	P1	E1	F	D0	D1	P2	Po	Po10
3.800	3.800	1.000	0.250	12.000	8.000	1.750	5.500	1.500	1.500	2.000	4.000	40.000



b) Reel Dimension

(unit: mm)

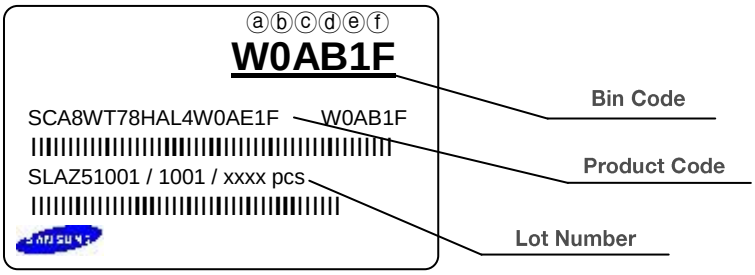


Notes:

1) Quantity: The quantity/reel is 1,000 pcs
2) Cumulative tolerance: Cumulative tolerance / 10 pitches is ±0.2 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



Note: Denoted bin code and product code above is only an example (see description on page 7)

Bin Code:

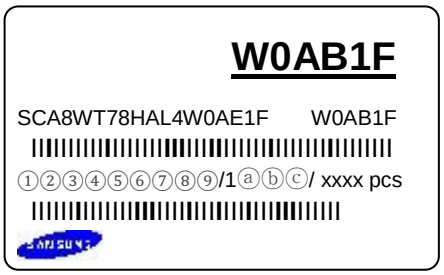
ⓐⓑ: Forward Voltage bin (refer to page 10)

ⓒⓓ: Chromaticity bin (refer to page 9)

ⓔⓕ: Luminous Flux bin (refer to page 6-8)

b) Lot Number

The lot number is composed of the following characters:



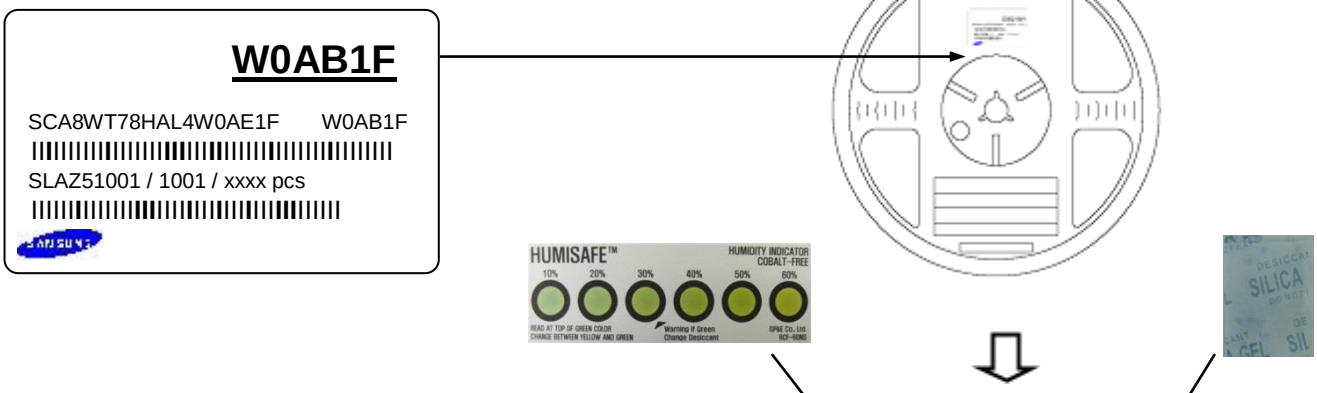
①②③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / xxxx pcs

①	:	Production site (S: Giheung, Korea)
②	:	L (LED)
③	:	Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	:	Year (A: 2016, B:2017, C:2018…)
⑤	:	Month (1~9, A, B, C)
⑥	:	Day (1~9, A, B~V)
⑦⑧⑨	:	Product serial number (001 ~ 999)
ⓐⓑⓒ	:	Reel number (001 ~ 999)

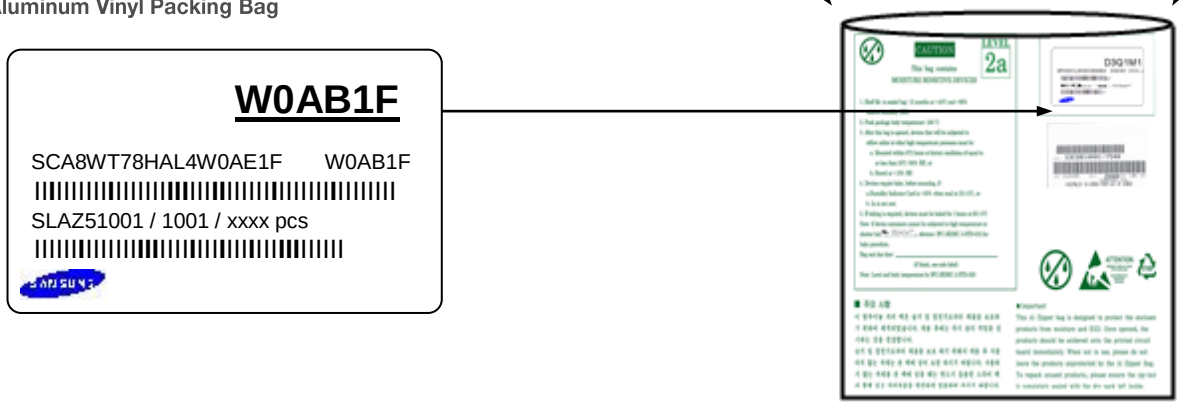
9. Packing Structure

a) Packing Process

Reel



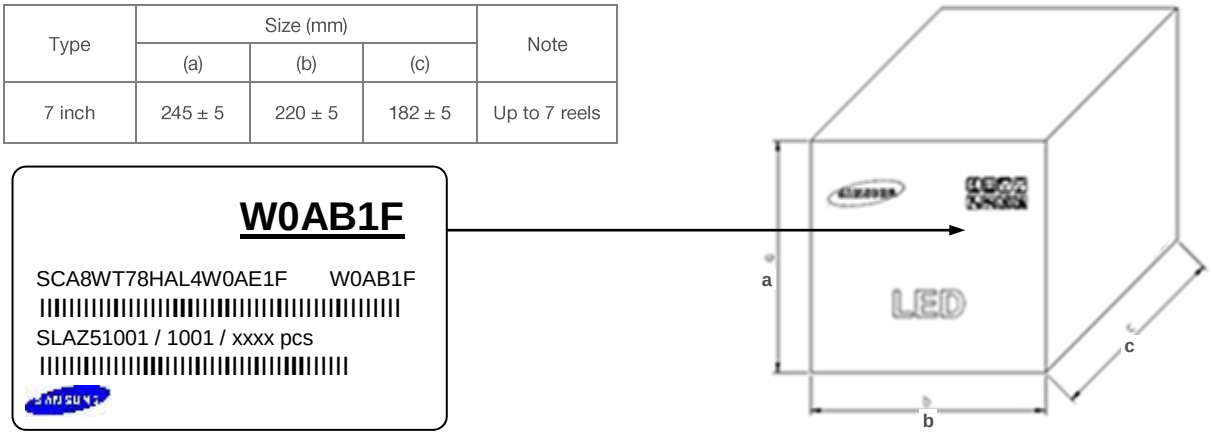
Aluminum Vinyl Packing Bag



Outer Box

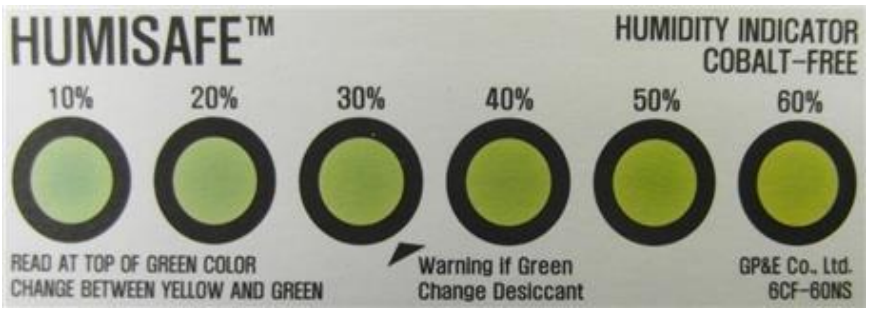
Material: Paper SW(B)

Type	Size (mm)			Note
	(a)	(b)	(c)	
7 inch	245 ± 5	220 ± 5	182 ± 5	Up to 7 reels



b) Aluminum Vinyl Packing Bag

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



10. Precautions in Handling & Use

1) For over-current protection, users are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of forward voltage.
2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When cleaning is required, IPA is recommended as the cleaning agent. Some solvent-based cleaning agent may damage the silicone resins used in the device.
3) When the device is in operation, the forward current should be carefully determined considering the maximum ambient temperature and corresponding junction temperature.
4) LEDs must be stored in a clean environment. 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 ºC, 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 ºC / 60 % RH, or
   b. Stored at <10 % RH
6) Repack unused devices with anti-moisture packing, fold to close any opening and then store in a dry place.
7) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 ºC.
8) Devices must be baked for 1 hour at 60 ± 5 ºC, if baking is required.
9) The LEDs are sensitive to the static electricity and surge current. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs. If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices. Damaged LEDs may show some unusual characteristics such as increase in leakage current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.
10) VOCs (Volatile Organic Compounds) can be generated from adhesives, flux, hardener or organic additives used in luminaires (fixtures). Transparent LED silicone encapsulant is permeable to those chemicals and they may lead to a discoloration of encapsulant when they exposed to heat or light. This phenomenon can cause a significant loss of light emitted (output) from the luminaires. In order to prevent these problems, we recommend users to know the physical properties of materials used in luminaires and they must be carefully selected.
11) Risk of sulfurization (or tarnishing)
    The LED from Samsung uses a silver-plated lead frame and its surface color may change to black (or dark colored) when it is exposed to sulfur (S), chlorine (Cl) or other halogen compound. Sulfurization of lead frame may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of lead frame, LED should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.

Legal and additional information.

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Samsung Electronics Co., Ltd. is a global leader in technology, opening new possibilities for people everywhere. Through relentless innovation and discovery, we are transforming the worlds of TVs, smartphones, tablets, PCs, cameras, home appliances, printers, LTE systems, medical devices, semiconductors and LED solutions. We employ 286,000 people across 80 countries with annual sales of US$216.7 billion. To discover more, please visit www.samsungled.com.

Samsung Electronics Co., Ltd.
1, Samsung-ro
Giheung-gu, Yongin-si
Gyeonggi-do, 17113
KOREA

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