

High Power LED Series Chip Scale Package

LH181A



Use of Samsung's Chip Scale Package technology
provide high performance and energy conserving

Features & Benefits

- Utilizes Samsung TF chip technology
- Suitable for use in indoor and outdoor lighting
- Compact footprint (1.91 x 1.91 mm)

Applications

- Indoor Lighting: Spotlight, Downlight, MR, PAR
- Outdoor Lighting: Street Light, Tunnel Light, Security Light, Parking Lot Light
- Industrial Lighting: High Bay Light, Low Bay Light
- Consumer Lighting: Torch Light



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1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +105	°C	Note 1)
Storage Temperature	T_{stg}	-40 ~ +125	°C	-
LED Junction Temperature	T_j	150	°C	-
Forward Current	I_F	1500	mA	-
Peak Pulse Forward Current	I_{FP}	2000	mA	Duty 1/10 pulse width 10ms
Assembly Process Temperature	-	260 <10	°C 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

Item	Unit	Nominal CCT (K)	Condition		Value Typ.
			I _F (mA)	T _J (°C)	
Luminous Flux (Φ _v)	lm	5000 (70 CRI)	350	25	172
			350	85	160
			700	85	290
			1000	85	383
			1500	85	489
Forward Voltage (V _F)	V		350	25	2.92
			350	85	2.82
			700	85	2.97
			1000	85	3.08
			1500	85	3.15
Thermal Resistance (junction to solder point)	°C/W				3
Beam Angle	°				140

Note:

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

2. Product Code Information

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>	<u>18</u>
S	C	P	7	R	T	F	1	H	P	L	A	R	T	M	3	4	E

Digit	PKG Information	Code	Specification					
1 2 3	Samsung Chip Scale Package	SCP						
4	CRI	7 8 9	Min. 70 Min. 80 Min. 90					
5	CCT	W V U T S R Q P	2700K 3000K 3500K 4000K 4500K 5000K 5700K 6500K					
6	Chip Shape	T	Square type					
7 8 9	Product	F1H	Chip version					
10 11	CSP type	PL	PoC for lighting					
12	Product Purpose	A	PKG single product					
13 14	CCT (K)	W0 V0 U0 T0 S0 RT QT PT	2700 3000 3500 4000 4500 5000 5700 6500	Bin Co de:	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 S1, S2, S3, S4, S5, S6, S7, S8, S9, SA, SB, SC, SD, SE, SF, SG R1, R2, R3, R4 Q1, Q2, Q3, Q4 P1, P2, P3, P4			
15 16	Luminous Flux	F3 G3 H3 J3 K3 M3 N3 P3	90~120 100~130 110~140 120~150 130~160 140~170 150~180 160~190	F1 G1 H1 J1 K1 M1 N1 P1	90~100 100~110 110~120 120~130 130~140 140~150 150~160 160~170			
			Digit 15: Min. spec Digit 16: The number of higher bin(s) from min. spec. e.g.: K1 = 130~140 lm, K3 = 130~160 lm					
17 18	Forward Voltage (Vf)	4E	2.7 ~ 3.1 V	Bin Cdoe	49 9E	2.7~2.91 2.91~3.1		

a) Luminous Flux Bins and Characteristics ($I_F = 350 \text{ mA}$, $T_s = 85^\circ\text{C}$)

CRI (R_a) Min. ¹⁾	Nominal CCT (K)	Product Code	Sorting @ 350 mA (lm)		Calculated Minimum Flux ²⁾ (lm)	
			Flux Rank	Flux Range ¹⁾	@ 700 mA	@ 1000 mA
70	2700	SCP7WTF1HPLAW0J34E	M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
			J1	120 ~ 130	220	291
	3000	SCP7VTF1HPLAV0K34E	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	3500	SCP7UTF1HPLAU0K34E	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	4000	SCP7TTF1HPLAT0M34E	P1	160 ~ 170	293	388
			N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
	5000	SCP7RTF1HPLARTM34E	P1	160 ~ 170	293	388
			N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
	5700	SCP7QTF1HPLAQTM34E	P1	160 ~ 170	293	388
			N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
6500	SCP7PTF1HPLAPTM34E	P1	160 ~ 170	293	388	
		N1	150 ~ 160	275	363	
		M1	140 ~ 150	257	339	

Notes:

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

a) Luminous Flux Bins and Characteristics ($I_F = 350 \text{ mA}$, $T_s = 85^\circ\text{C}$)

CRI (R_a) Min. ¹⁾	Nominal CCT (K)	Product Code	Sorting @ 350 mA (lm)		Calculated Minimum Flux ²⁾ (lm)	
			Flux Rank	Flux Range ¹⁾	@ 700 mA	@ 1000 mA
80	2700	<i>SCP8WTF1HPLAW0J34E</i>	M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
			J1	120 ~ 130	220	291
	3000	<i>SCP8VTF1HPLAV0K34E</i>	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	3500	<i>SCP8UTF1HPLAU0K34E</i>	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	4000	<i>SCP8TTF1HPLAT0K34E</i>	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	5000	<i>SCP8RTF1HPLARTK34E</i>	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
	5700	<i>SCP8QTF1HPLAQTk34E</i>	N1	150 ~ 160	275	363
			M1	140 ~ 150	257	339
			K1	130 ~ 140	238	315
6500	<i>SCP8PTF1HPLAPTk34E</i>	N1	150 ~ 160	275	363	
		M1	140 ~ 150	257	339	
		K1	130 ~ 140	238	315	
90	3000	<i>SCP9VTF1HPLAV0G34E</i>	J1	120 ~ 130	220	291
			H1	110 ~ 120	201	266
			G1	100 ~ 110	184	243
	4000	<i>SCP9TTF1HPLAT0G34E</i>	J1	120 ~ 130	220	291
			H1	110 ~ 120	201	266
			G1	100 ~ 110	184	243

Notes:

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

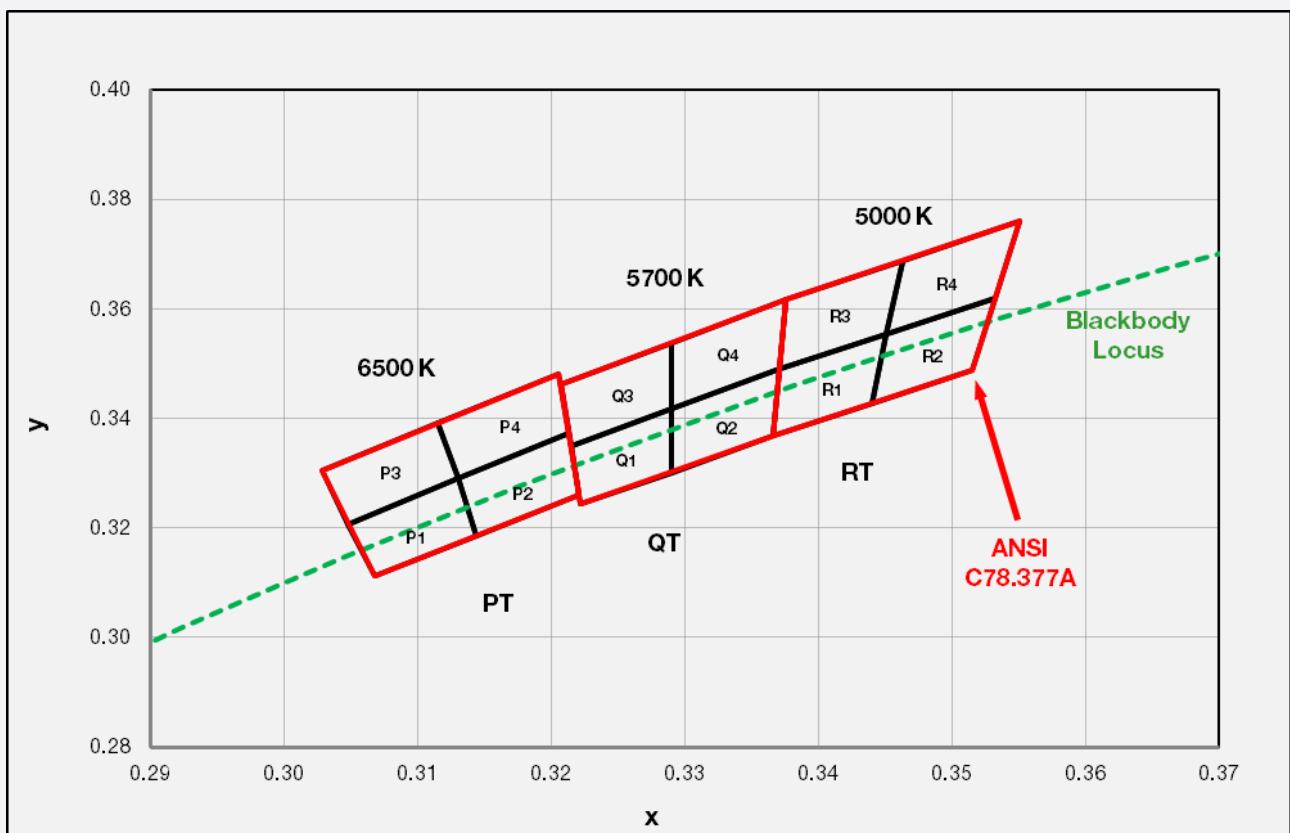
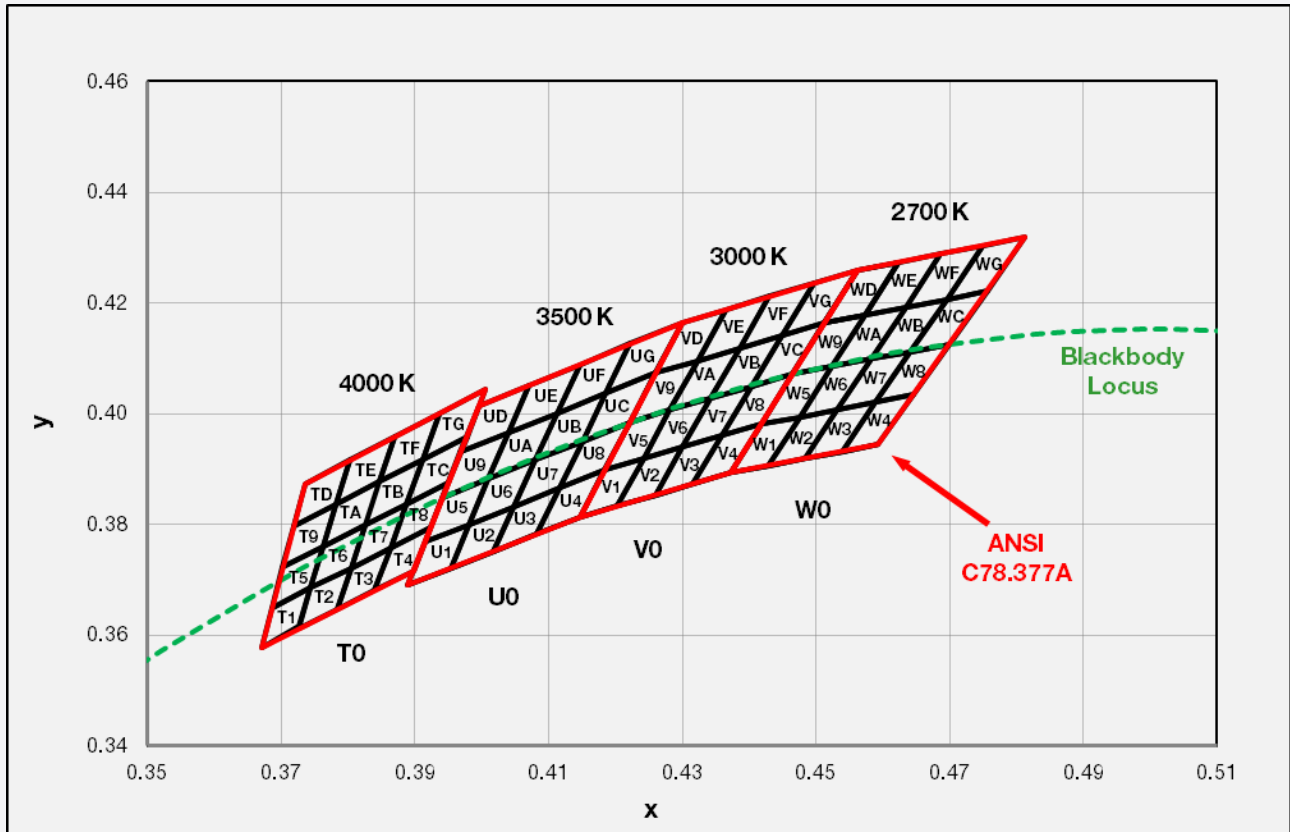
b) Color Bins ($I_F = 350 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

CRI (R _a) Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
70	2700	SCP7WTF1HPLAW0J34E	W0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3000	SCP7VTF1HPLAV0K34E	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3500	SCP7UTF1HPLAU0K34E	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	4000	SCP7TTF1HPLAT0M34E	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	5000	SCP7RTF1HPLARTM34E	RT (ANSI bin)	R1, R2, R3, R4
	5700	SCP7QTF1HPLAQTM34E	QT (ANSI bin)	Q1, Q2, Q3, Q4
	6500	SCP7PTF1HPLAPTM34E	PT (ANSI bin)	P1, P2, P3, P4
80	2700	SCP8WTF1HPLAW0J34E	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
	3000	SCP8VTF1HPLAV0K34E	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	3500	SCP8UTF1HPLAU0K34E	U0 (Whole bin)	U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG
	4000	SCP8TTF1HPLAT0K34E	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
	5000	SCP8RTF1HPLARTK34E	RT (ANSI bin)	R1, R2, R3, R4
	5700	SCP8QTF1HPLAQTK34E	QT (ANSI bin)	Q1, Q2, Q3, Q4
	6500	SCP8PTF1HPLAPTK34E	PT (ANSI bin)	P1, P2, P3, P4
90	3000	SCP9VTF1HPLAV0G34E	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
	4000	SCP9TTF1HPLAV0G34E	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG

c) Voltage Bins ($I_f = 350 \text{ mA}$, $T_s = 85 \text{ °C}$)

CRI (R_a) Min.	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
			4E	49	2.7 ~ 2.91
				9E	2.91 ~ 3.1

d) Chromaticity Region & Coordinates ($I_f = 350 \text{ mA}$, $T_s = 85^\circ \text{C}$)



d) Chromaticity Region & Coordinates ($I_F = 350 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

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

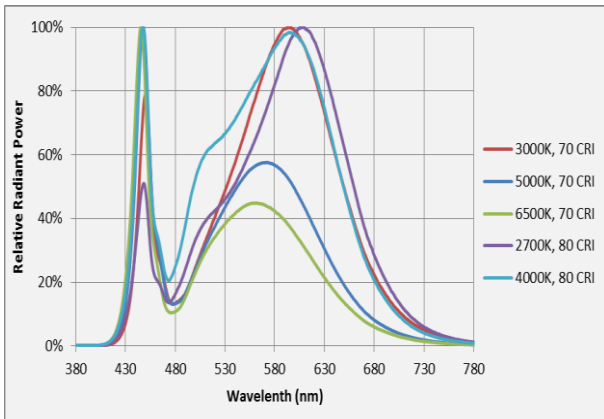
Region	CIE x	CIE y
P rank (6500 K)		
P1	0.3068	0.3113
	0.3144	0.3186
	0.3130	0.3290
	0.3048	0.3207
P2	0.3144	0.3186
	0.3221	0.3261
	0.3213	0.3373
	0.3130	0.3290
P3	0.3048	0.3207
	0.3130	0.3290
	0.3115	0.3391
	0.3028	0.3304
P4	0.3130	0.3290
	0.3213	0.3373
	0.3205	0.3481
	0.3115	0.3391

Note:

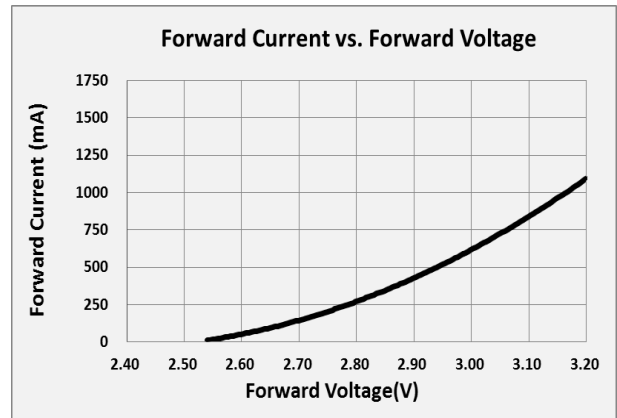
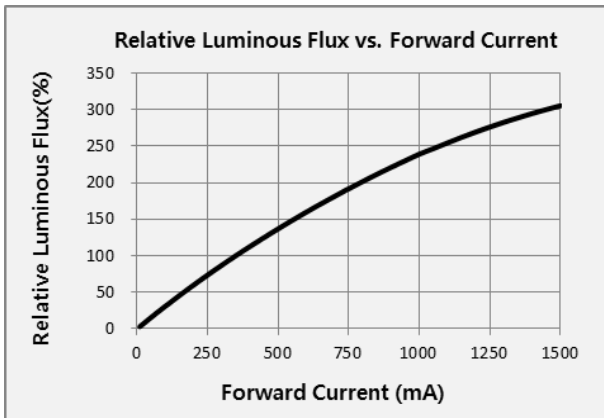
Samsung maintains measurement tolerance of: $C_x, C_y = \pm 0.005$

3. Typical Characteristics Graphs

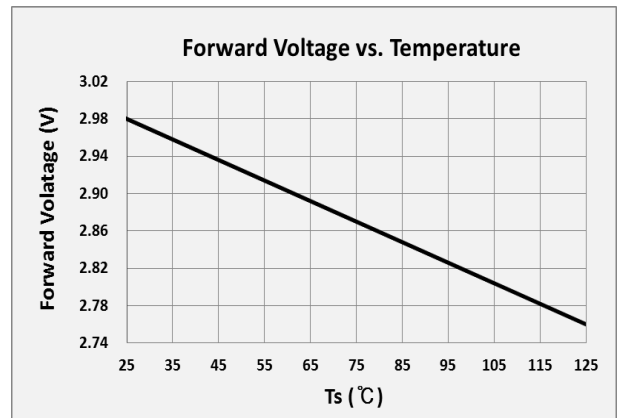
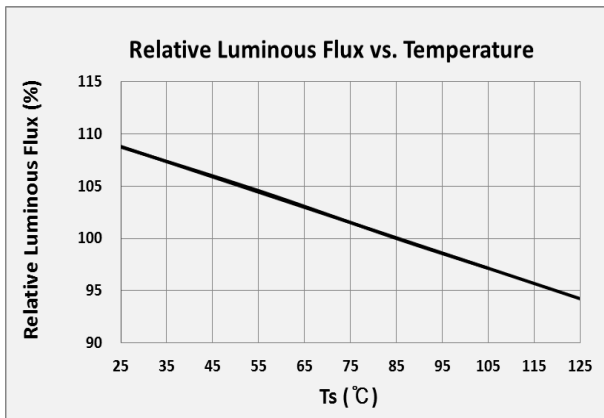
a) Spectrum Distribution ($I_f = 350 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)



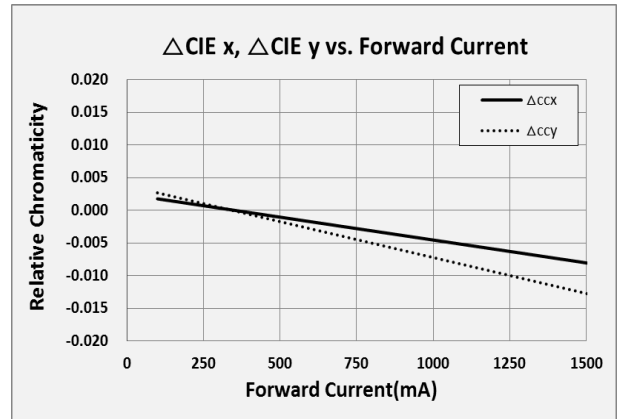
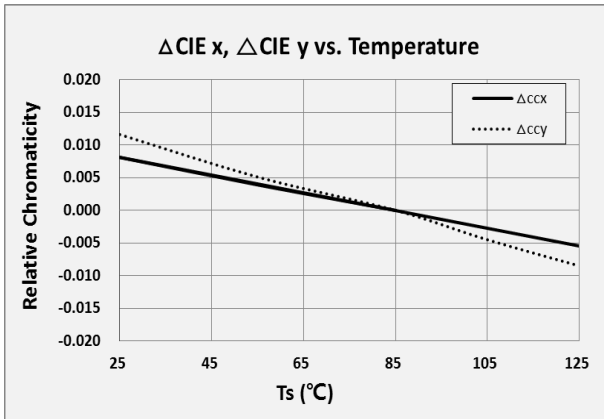
b) Forward Current Characteristics ($T_s = 85 \text{ }^\circ\text{C}$)



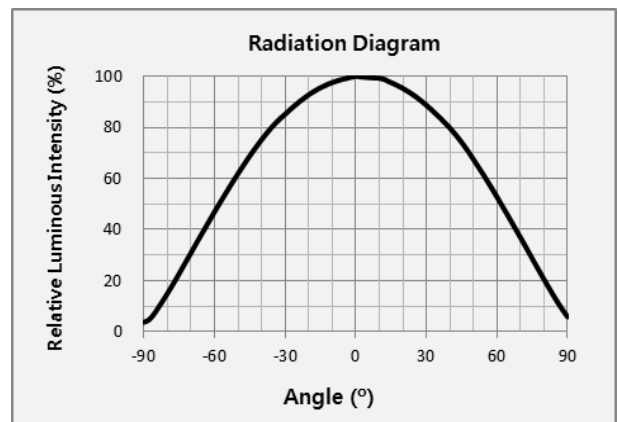
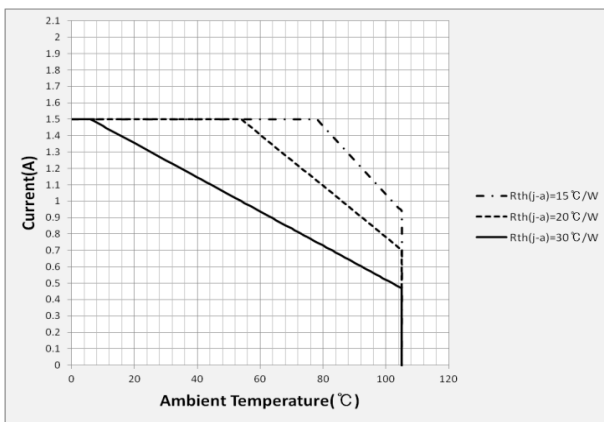
c) Temperature Characteristics ($I_f = 350 \text{ mA}$)



d) Color Shift Characteristics ($I_f = 350 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

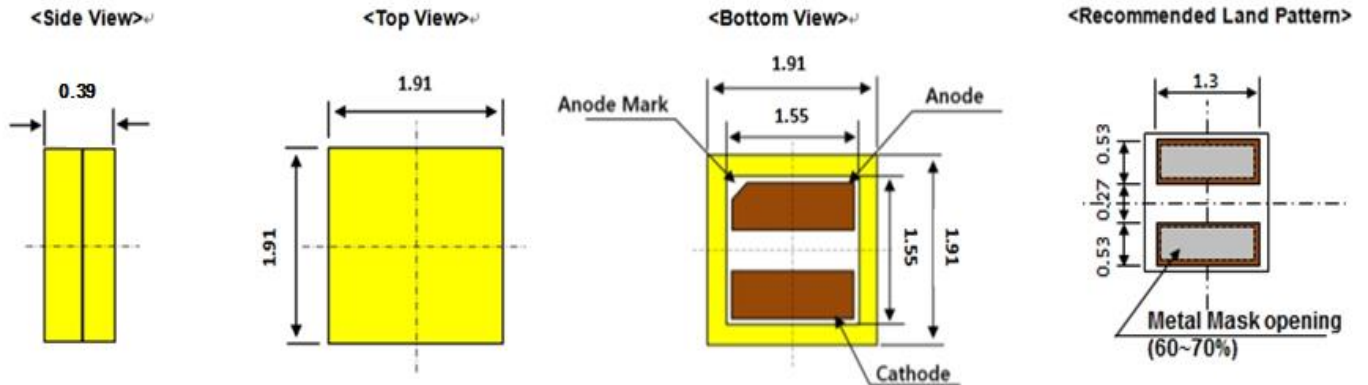


e) Derating Curve and Beam Angle Characteristics ($I_f = 350 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)



4. Outline Drawing & Dimension

1. Tolerance is ± 0.10 mm
2. Do not place LEDs with pressure



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 Size
Room Temperature Life Test	25 °C, Derating maximum current	1000 h	22
High Temperature Life Test	85 °C, Derating maximum current	1000 h	22
High Temperature Humidity Life Test	60 °C, 90% RH, Derating maximum current	1000 h	22
Low Temperature Life Test	-40 °C, Derating maximum current	1000 h	22
Temperature Humidity Cycle Test	-10 °C ↔ 25 °C 95 % RH ↔ 65 °C 95 % RH Derating maximum current	10 cycles	11
Powered Temperature Cycle Test	-40 °C / 85 °C each 20 min, 100 min transfer power on/off each 5 min, Derating maximum current	100 cycles	11
Thermal Shock	-45 °C / 15 min ↔ 125 °C / 15 min temperature change within 5 min	500 cycles	100
High Temperature Storage	120 °C	1000 h	11
Low Temperature Storage	-40 °C	1000 h	11
ESD (HBM)	<p> R_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ± 2 kV </p>	5 times	30
ESD (MM)			
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

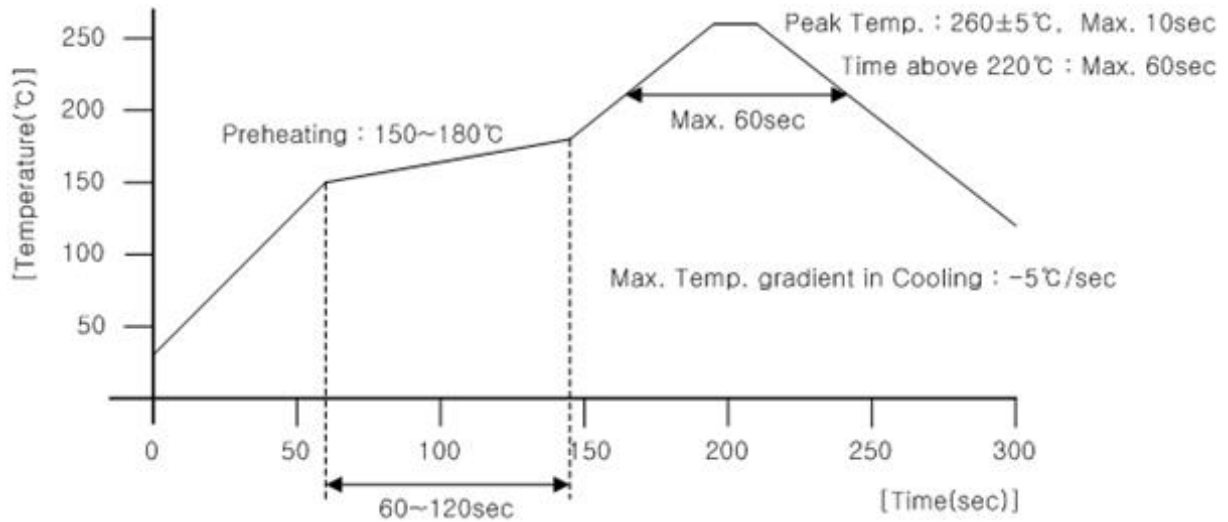
b) Criteria for Judging the Damage

Item	Symbol	Test Condition ($T_s = 25$ °C)	Limit	
			Min.	Max.
Forward Voltage	V_F	$I_F = 350$ mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ_v	$I_F = 350$ mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

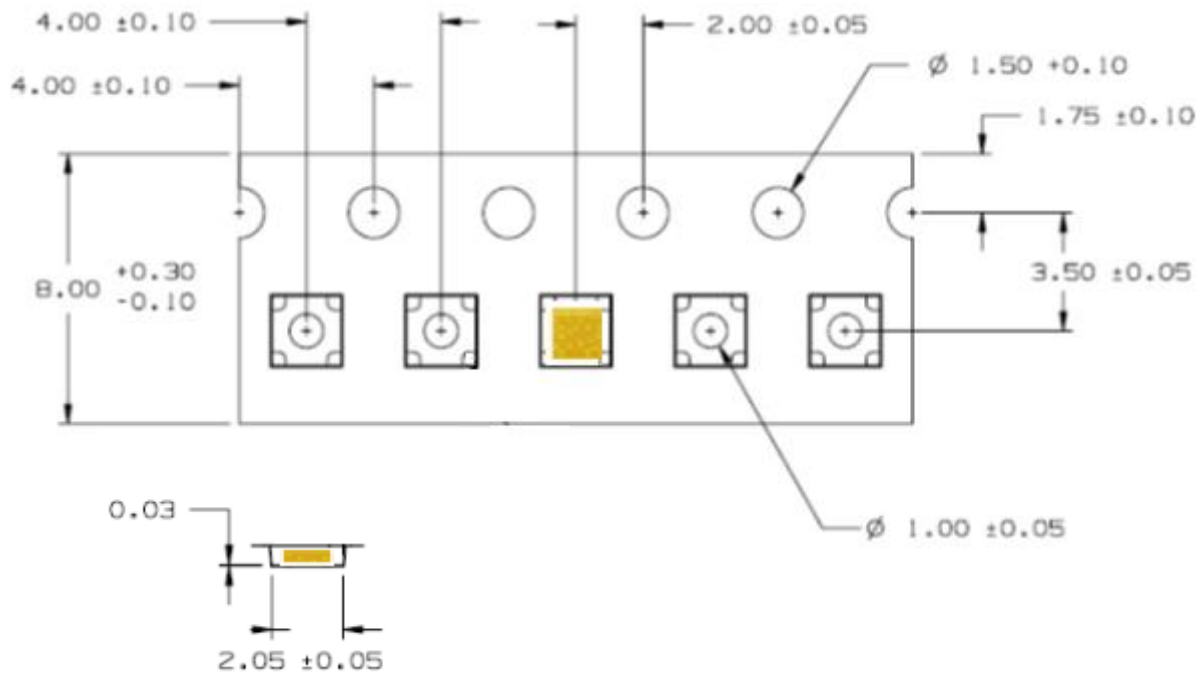


b) Manual Soldering Conditions

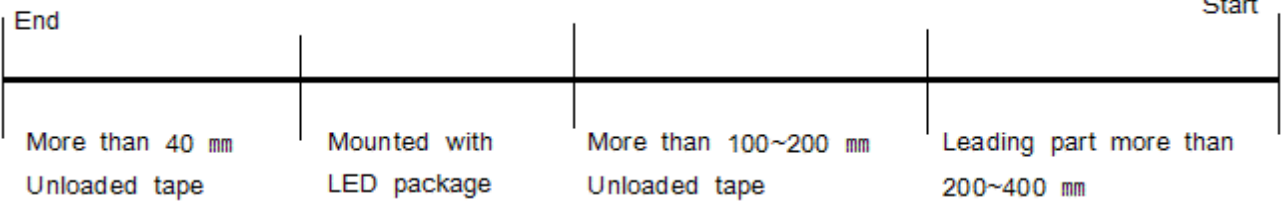
No more than 5 seconds @ max. 300 °C, under soldering iron.

7. Tape & Reel

a) Taping Dimension

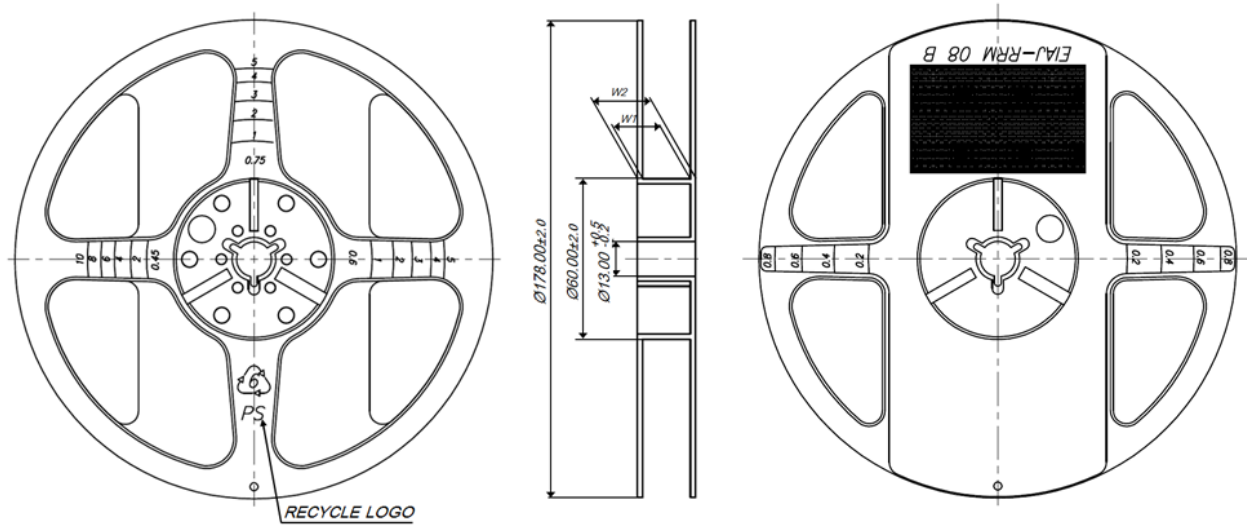


Taping Direction



b) Reel Dimension

(unit: mm)



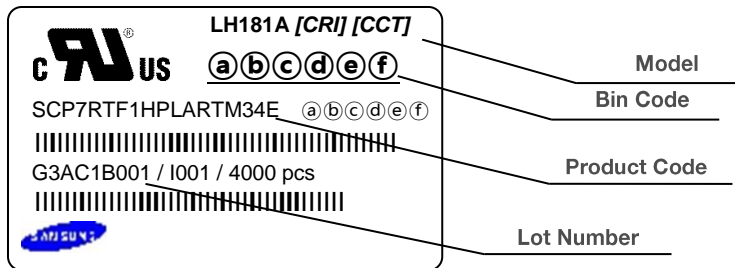
Width	W1	W2
8mm	9 ± 0.3	11.9 ± 1.0

Notes:

- 1) Quantity: The quantity/reel is 4,000 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



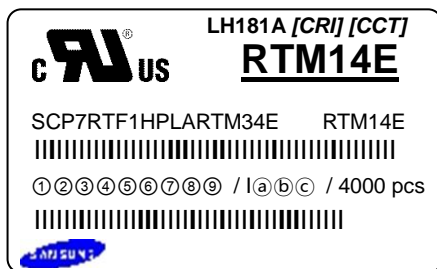
Note: Denoted bin code and product code above is only an example (see description on page -)

Bin Code:

- ⒶⒷ: Chromaticity bin (refer to page 11)
- ⒸⒹ: Luminous Flux bin (refer to page 6-7)
- ⒺⒻ: Voltage bin (refer to page 9)

b) Lot Number

The lot number is composed of the following characters:

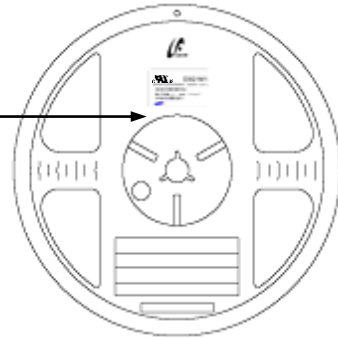
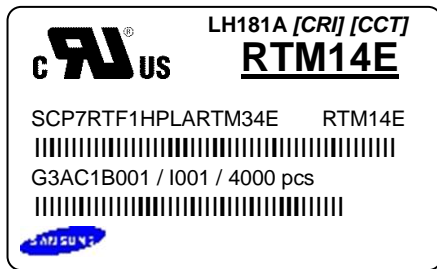


- ①② : Production site (G3 : Shenzhen, China, G4 :Guangzhou, China, GB : Nanchang, China)
- ③ : Product state (A : Normal, B : Bulk, C : First Production, R : Reproduction, S : Sample)
- ④ : Year (Y : 2014, Z : 2015, A : 2016, ...)
- ⑤ : Month (1, 2, ..., 7: July, ..., A: Oct., B: Nov., C: Dec.)
- ⑥ : Day (1~9, A: 10, ..., K: 20, ..., U: 30, V:31)
- ⑦⑧⑨ : Product serial number (001 ~ 999)
- ⒶⒷⒸ : Reel number (001~999) or (AAA~ZZZ)

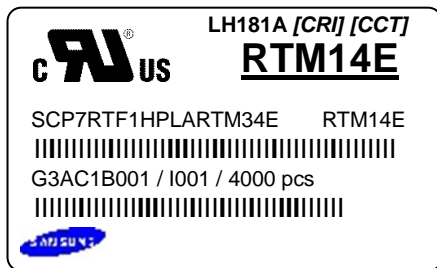
9. Packing Structure

a) Packing Process

Reel



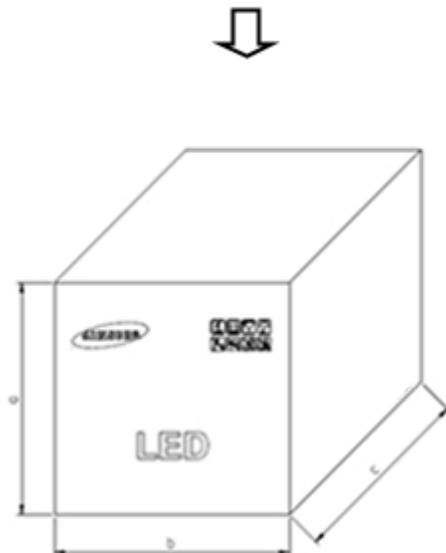
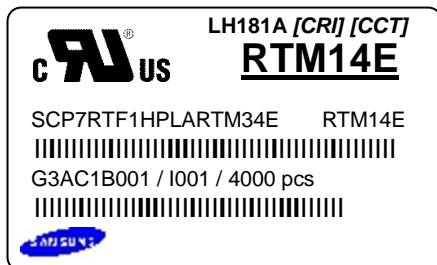
Aluminum Vinyl Packing Bag



Outer Box

Material: Paper SW(B)

Type	Size (mm)			Note
	(a)	(b)	(c)	
7 inch	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels



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 °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 °C / 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 °C.
- 8) Devices must be baked for 1 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 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 does not use a silver-plated lead frame but if the LED is attached in silver-plated substrate, the surface color of substrate may change to black (or dark colored) when it is exposed to sulfur (S), chlorine (Cl) or other halogen compound. Sulfurization of substrate may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit, It requires caution. Due to possible sulfurization of substrate, 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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