

Middle Power LED Series Flip Chip Package

LM131A



Samsung flip chip opens up a new world of lighting design
with its high output and small form factors



Features & Benefits

- High efficiency providing optimized solution
- Greater freedom of design with a high degree of reliability
- Superior color consistency
- Phosphor film directly attached to flip chip surface
- Plastic-free structure delivers low thermal resistance
- Compact footprint (1.42 x 1.42 mm)

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1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Operating Temperature	T_a	-40 ~ +85	°C	-
Storage Temperature	T_{stg}	-40 ~ +120	°C	-
LED Junction Temperature	T_j	125	°C	-
Forward Current	I_F	350	mA	-
Peak Pulsed Forward Current	I_{Fp}	700	mA	Duty 1/10, pulse width 10 ms
Assembly Process Temperature	-	260 <10	°C s	-
ESD (HBM)	-	±2	kV	-

b) Electro-optical Characteristics ($I_F = 300 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

Item	Unit	Nominal CCT (K)	Rank	Bin	Min.	Typ.	Max.
Forward Voltage (V_F)	V		CK	CG	3.0	-	3.2
				GK	3.2	-	3.4
			8E	8A	82.0	-	90.0
				AC	90.0	-	98.0
				CE	98.0	-	106.0
				9B	86.0	-	94.0
Luminous Flux (Φ_v)	lm	2700	8E	BD	94.0	-	102.0
				DF	102.0	-	110.0
				FH	110.0	-	118.0
		3000	9F	CE	98.0	-	106.0
				EG	106.0	-	114.0
				GI	114.0	-	122.0
		4000	BH	BD	94.0	-	102.0
				DF	102.0	-	110.0
				FH	110.0	-	118.0
			CI	CE	98.0	-	106.0
				EG	106.0	-	114.0
				GI	114.0	-	122.0
Reverse Voltage (@ $-10 \text{ } \mu\text{A}$)	V			BD	94.0	-	102.0
				DF	102.0	-	110.0
				FH	110.0	-	118.0
Color Rendering Index (R_a)	-				80	-	-
Special CRI (R9)	-				0	-	-
Thermal Resistance (junction to chip point)	$^\circ\text{C/W}$				-	2	-
Beam Angle	$^\circ$				-	120	-

Note:

Samsung maintains measurement tolerance of: forward voltage = $\pm 0.1 \text{ V}$, luminous flux = $\pm 5 \%$, 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	C	S	8	W	T	7	8	E	F	L	1	W	0	8	E	C	K

Digit	PKG Information	Code	Specification
1 2 3	Samsung Chip	SCS	
4	CRI	8	Min. 80
5	CCT (K)	W 2700 V 3000 T 4000 R 5000 P 6500	
6	Chip Shape	T	FCOM Square
7 8 9	Chip Size (μm)	78E	780 x 780 x 170 μm
10 11 12	Product Purpose	FL1	FCOM for Lighting
13 14	Color Rank	W0 W Rank W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG V0 V Rank V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG T0 T Rank Bin Code: T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG R0 R Rank R1, R2, R3, R4, R5, R6, R7, R8, R9, RA P0 P Rank P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG	
15 16	Luminous Flux (lm)	8E 82~106 9F 86~110 BH 94~118 CI 98~122 Bin Code:	8A 82~ 90 9B 86~ 94 BD 94~102 CE 98~106 FH 110~118 GI 114~122
17 18	Forward Voltage (V)	CK 3.0~3.4 Bin Code:	CG 3.0~3.2 GK 3.2~3.4

a) Luminous Flux Bins ($I_f = 300 \text{ mA}$, $T_s = 25 \text{ }^\circ\text{C}$)

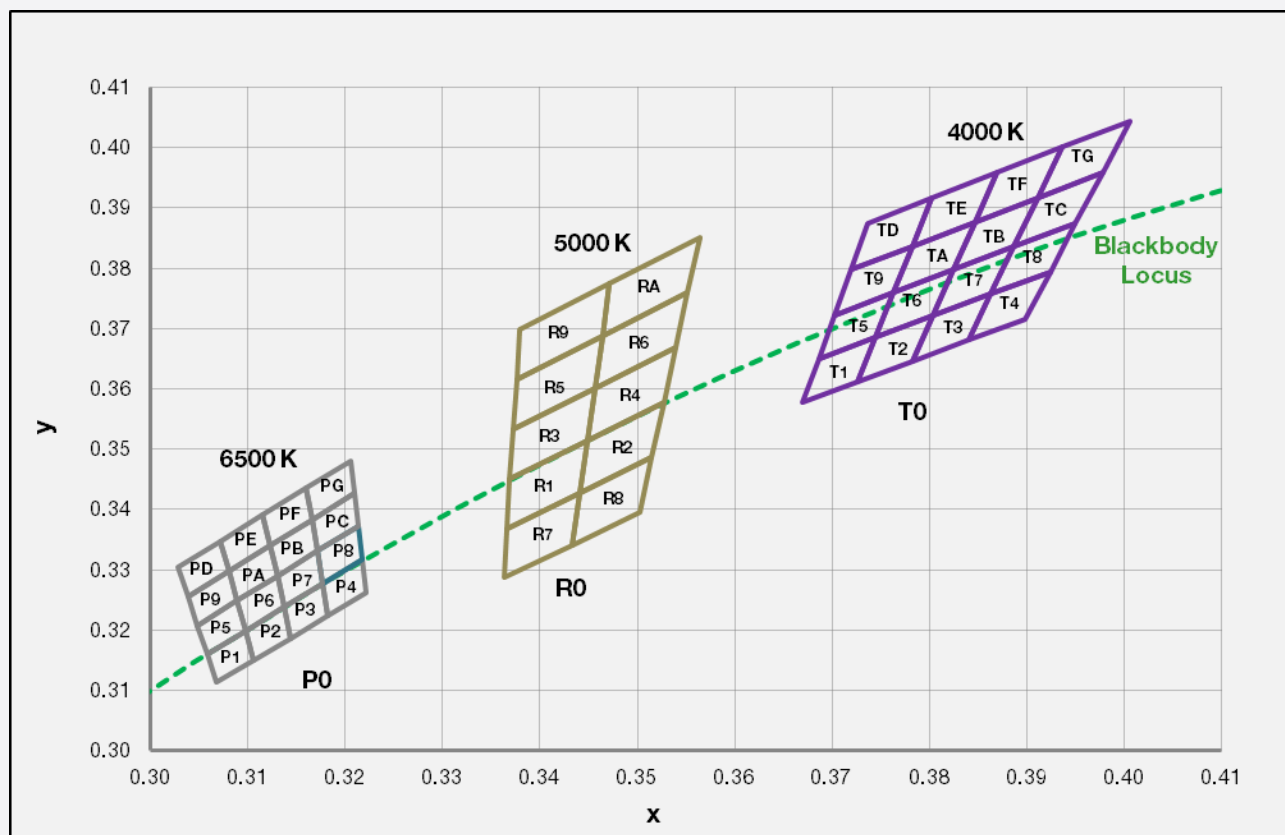
Nominal CCT (K)	CRI Min.	Product Code	Flux Rank	Flux Bin	Flux Range (Φ_v , lm)
2700	80	SCS8WT78EFL1W08ECK	8E	8A	82 ~ 90
				AC	90 ~ 98
				CE	98 ~ 106
3000	80	SCS8VT78EFL1V09FCK	9F	9B	86 ~ 94
				BD	94 ~ 102
				DF	102 ~ 110
4000	80	SCS8TT78EFL1T0BHCK	BH	BD	94 ~ 102
				DF	102 ~ 110
				FH	110 ~ 118
5000	80	SCS8RT78EFL1R0CICK	CI	CE	98 ~ 106
				EG	106 ~ 114
				GI	114 ~ 122
6500	80	SCS8PT78EFL1P0BHCK	BH	BD	94 ~ 102
				DF	102 ~ 110
				FH	110 ~ 118

b) Color Bins ($I_f = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Nominal CCT (K)	CRI Min.	Product Code	Color Rank	Chromaticity Bins
2700	80	SCS8WT78EFL1W08ECK	W0 (Whole bin)	W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG
3000	80	SCS8VT78EFL1V09FCK	V0 (Whole bin)	V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG
4000	80	SCS8TT78EFL1T0BHCK	T0 (Whole bin)	T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG
5000	80	SCS8RT78EFL1R0CICK	R0 (Whole bin)	R1, R2, R3, R4, R5, R6, R7, R8, R9, RA
6500	80	SCS8PT78EFL1P0BHCK	P0 (Whole bin)	P1, P2, P3, P4, P5, P6, P7, P8, P9, PA, PB, PC, PD, PE, PF, PG

c) Voltage Bins ($I_f = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

Nominal CCT (K)	CRI Min.	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
			CK	CG	3.0 ~ 3.2
				GK	3.2 ~ 3.4



d) Chromaticity Region & Coordinates ($I_F = 300 \text{ mA}$, $T_s = 25 \text{ °C}$)

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
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	0.376		0.3802	0.3916
	0.3702	0.3722		0.3736	0.3874
T6	0.3744	0.3685	TE	0.3782	0.3837
	0.3804	0.3721		0.3847	0.3877
	0.3825	0.3798		0.3869	0.3958
	0.3763	0.376		0.3802	0.3916
T7	0.3804	0.3721	TF	0.3847	0.3877
	0.3863	0.3758		0.3912	0.3917
	0.3887	0.3836		0.3937	0.4001
	0.3825	0.3798		0.3869	0.3958
T8	0.3863	0.3758	TG	0.3912	0.3917
	0.3924	0.3794		0.3978	0.3958
	0.3950	0.3875		0.4006	0.4044
	0.3887	0.3836		0.3937	0.4001

Region	CIE x	CIE y	Region	CIE x	CIE y
R rank (5000 K)					
R1	0.3366	0.3369	R6	0.3456	0.3601
	0.3441	0.3428		0.3539	0.3669
	0.3449	0.3515		0.3551	0.3760
	0.3369	0.3451		0.3464	0.3688
R2	0.3441	0.3428	R7	0.3363	0.3287
	0.3515	0.3487		0.3433	0.3341
	0.3527	0.3578		0.3441	0.3428
	0.3449	0.3515		0.3366	0.3369
R3	0.3369	0.3451	R8	0.3433	0.3341
	0.3449	0.3515		0.3503	0.3396
	0.3456	0.3601		0.3515	0.3487
	0.3373	0.3534		0.3441	0.3428
R4	0.3449	0.3515	R9	0.3376	0.3616
	0.3527	0.3578		0.3464	0.3688
	0.3539	0.3669		0.3471	0.3775
	0.3456	0.3601		0.3379	0.3698
R5	0.3373	0.3534	RA	0.3464	0.3688
	0.3456	0.3601		0.3551	0.3760
	0.3464	0.3688		0.3564	0.3851
	0.3376	0.3616		0.3471	0.3775

d) Chromaticity Region & Coordinates

Region	CIE x	CIE y	Region	CIE x	CIE y
P rank (6500 K)					
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		0.3213	0.3373
	0.3217	0.3317		0.3209	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
	0.3217	0.3317		0.3209	0.3427
	0.3213	0.3373		0.3205	0.3481
	0.3172	0.3332		0.3160	0.3436

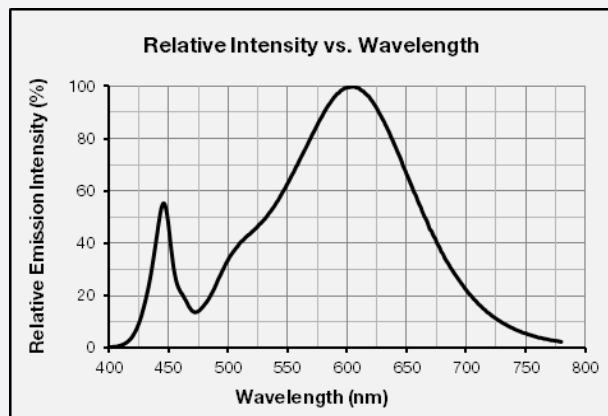
Note:

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

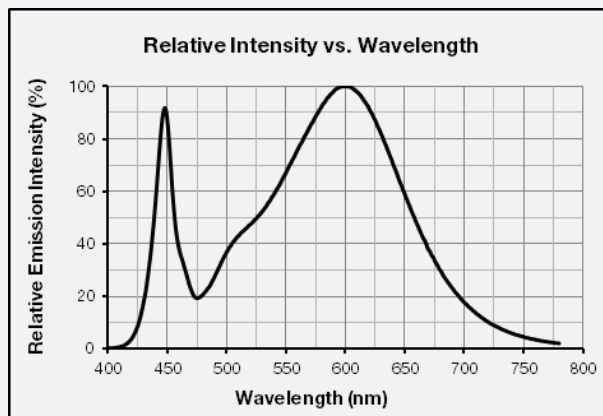
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_f = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

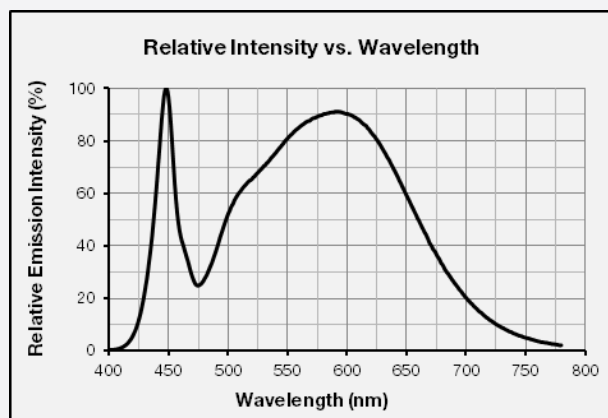
CCT: 2700 K



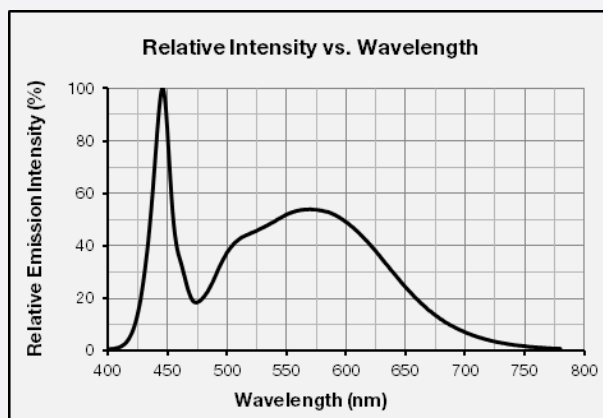
CCT: 3000 K



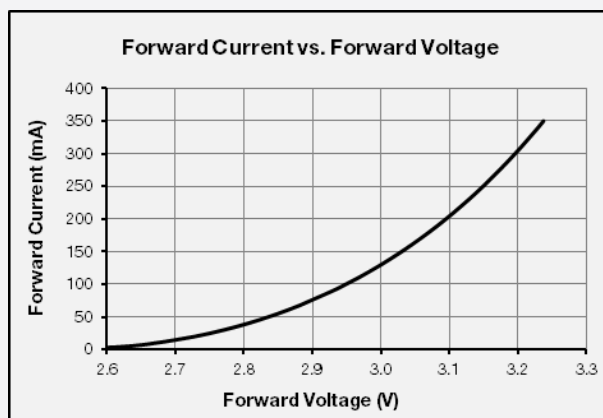
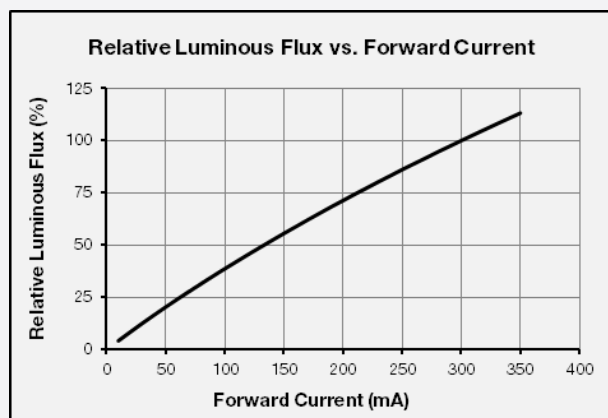
CCT: 4000 K



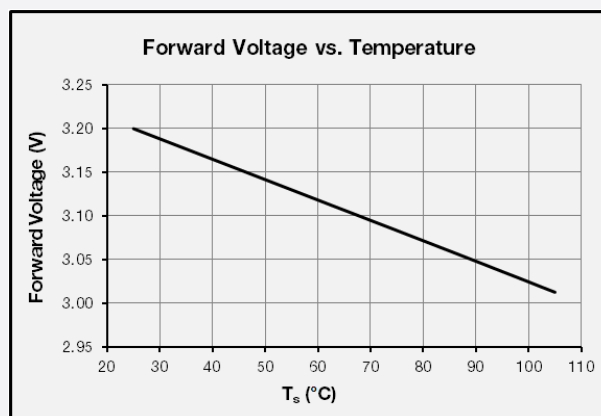
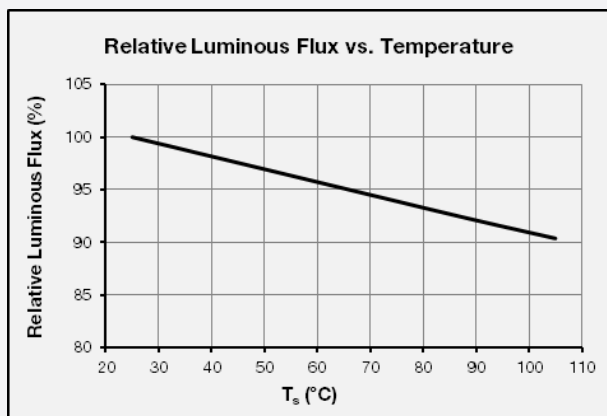
CCT: 5000 K



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

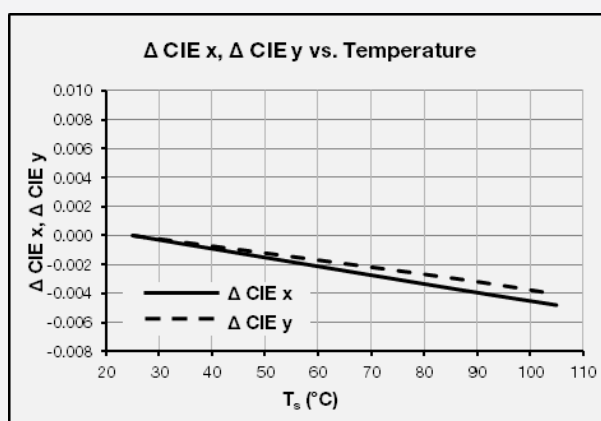
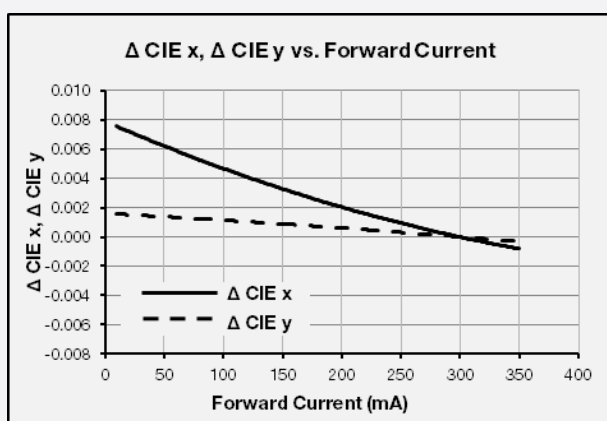


c) Temperature Characteristics ($I_F = 300 \text{ mA}$)

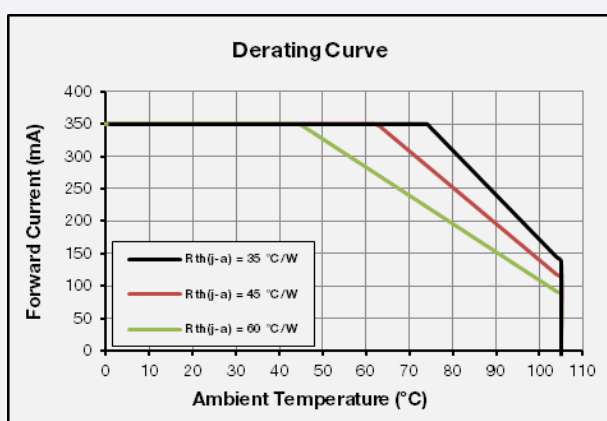


d) Color Shift Characteristics $T_s = 25^\circ\text{C}$

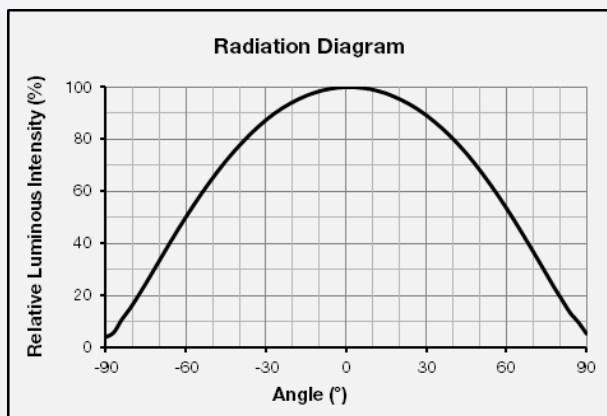
$I_F = 300 \text{ mA}$



e) Derating Curve

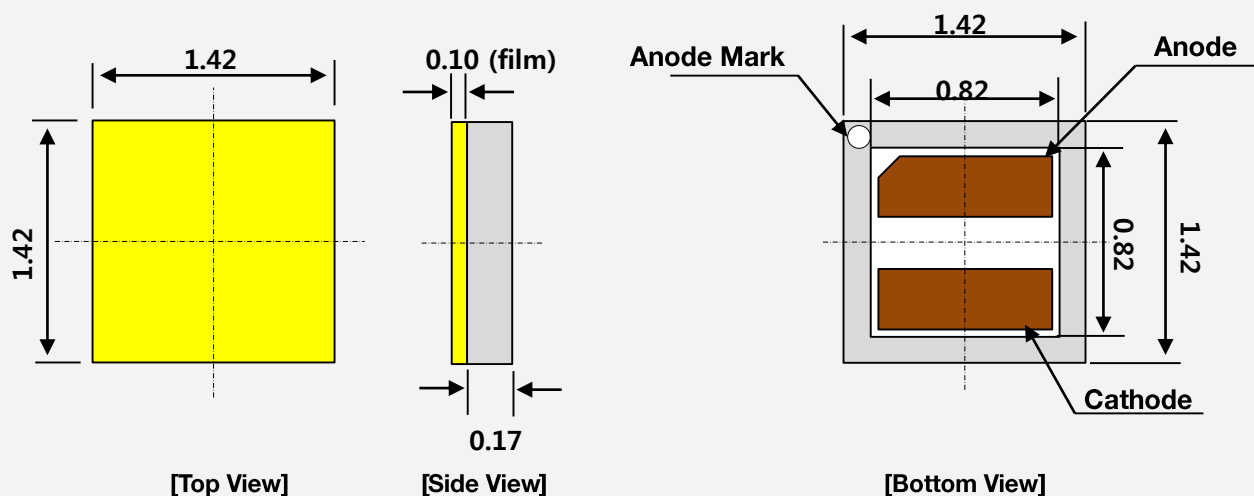


f) Beam Angle Characteristics ($I_F = 300 \text{ mA}$, $T_s = 25^\circ\text{C}$)

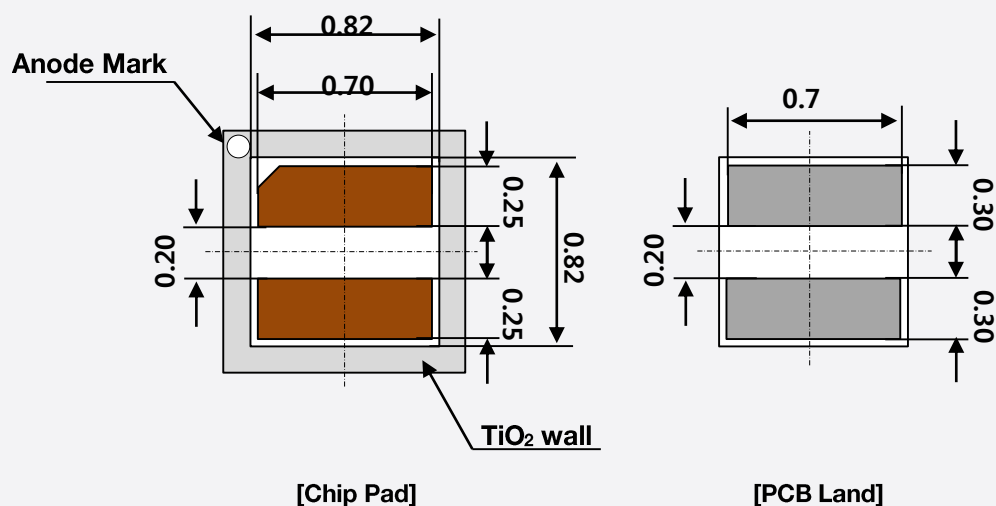


4. Outline Drawing & Dimension

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



RECOMMENDED PCB SOLDER PAD

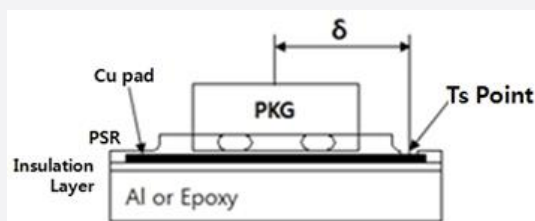


T_s Point & Measurement Method:

Measure nearest point from the center of LED chip (δ) as shown below.

Distance between chip center and T_s point (δ) = 3.5 mm

$T_j = T_s + \text{Power} \times \text{Thermal resistance at } T_s (R_{j-s})$

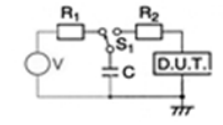


Precautions:

- 1) This LED chip PKG does not contain built-in ESD protection device.
- 2) 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.
- 3) 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.
- 4) 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
MSL Test	125 °C 24 h drying → 60 °C, 60 % RH 120 h → 260 °C 10 s 3 cycles	1 cycle	11
Room Temperature Life Test	25 °C, DC 350 mA	1000 h	22
High Temperature Life Test	85 °C, DC 350 mA	1000 h	22
High Temperature Humidity Life Test	85 °C, 85 % RH, DC 350 mA	1000 h	22
Low Temperature Life Test	-40 °C, DC 350 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 350 mA	100 cycles	22
Thermal Shock	-45 °C / 15 min ↔ 125 °C / 15 min → hot plate 180 °C	800 cycles	100
High Temperature Storage	120 °C	1000 h	11
Low Temperature Storage	-40 °C	1000 h	11
ESD (HBM)	 R₁: 10 MΩ R₂: 1.5 kΩ C: 100 pF V: ±2 kV	5 times	5
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	5 cycles	11

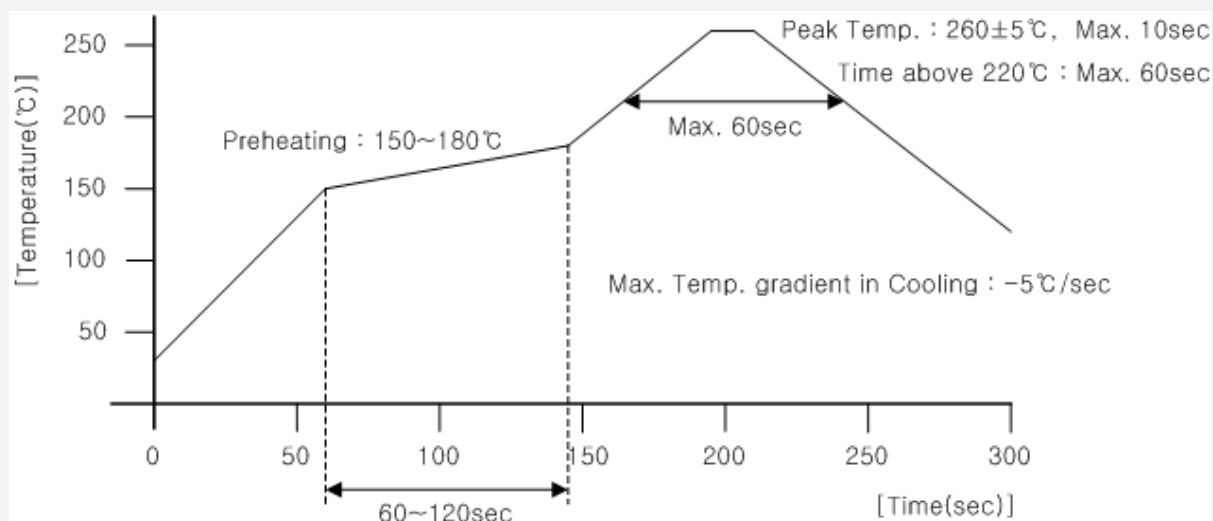
b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T _s = 25 °C)	Limit	
			Min	Max
Forward Voltage	V _F	I _F = 300 mA	Init. Value * 0.9	Init. Value * 1.1
Luminous Flux	Φ _v	I _F = 300 mA	Init. Value * 0.7	Init. Value * 1.1

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

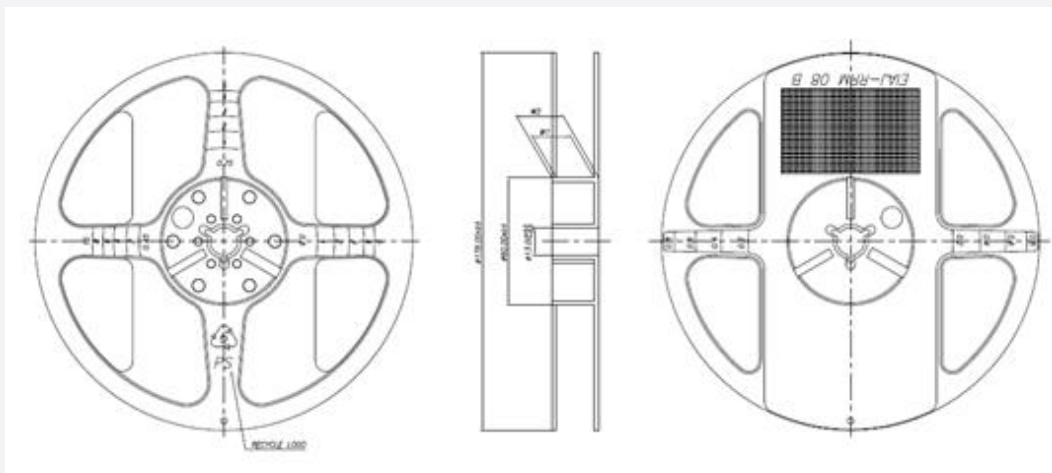


b) Manual Soldering Conditions

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

b) Reel Dimension

(unit: mm)



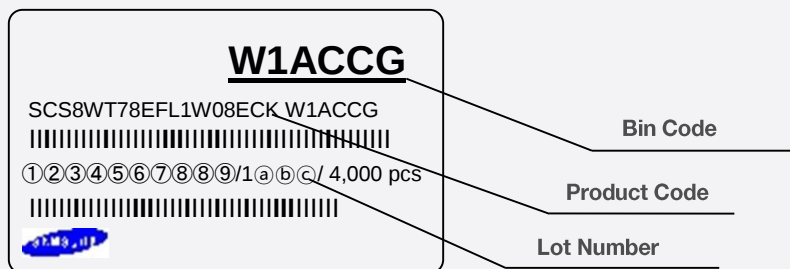
Width	W1	W2
8mm	9 ±0.3	11.9 ±1.0

Notes:

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) Cumulative Tolerance: Cumulative tolerance / 10 pitches is ± 0.2 mm
- 3) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

8. Label Structure

a) Label Structure



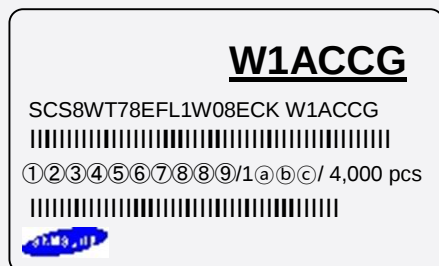
Note: Denoted product code and bin code above is only an example (see description on page 5)

Rank Code:

- ①⑥: Chromaticity bin (refer to page 9-11)
- ③④: Luminous Flux bin (refer to page 6)
- ⑤⑦: Forward Voltage bin (refer to page 7)

b) Lot Number

The lot number is composed of the following characters:



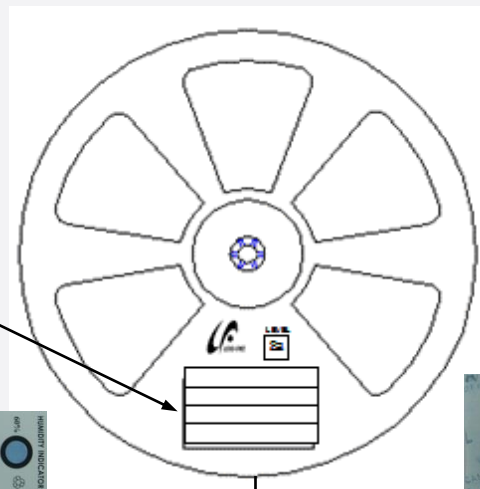
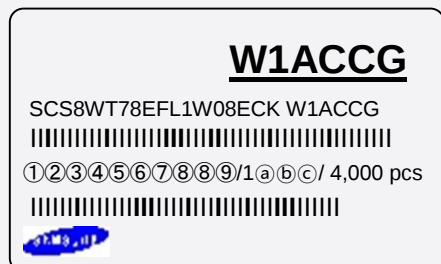
①②③④⑤⑥⑦⑧⑨ / 1a⑥c / 4,000 pcs

- ① : Product state (T: Taping)
- ② : Production site (1: KC1)
- ③ : Year (E: 2014, F: 2015, ...)
- ④ : Month (1~9, A, B, C)
- ⑤ : Day (1~9, A, B~V)
- ⑥⑦⑧⑨ : Product serial number (0001 ~ 0009, A001 ~ ZZZZ)
- ①⑥⑦ : Reel number (001 ~ 999)

9. Packing Structure

a) Packing Process

Reel



Aluminum Vinyl Bag

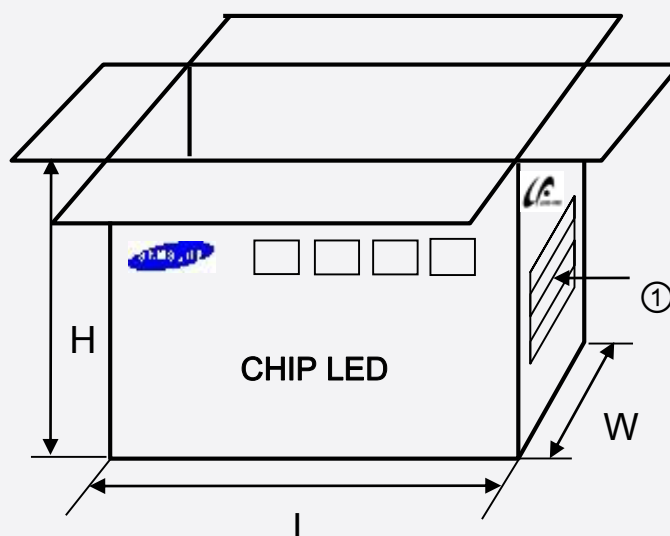
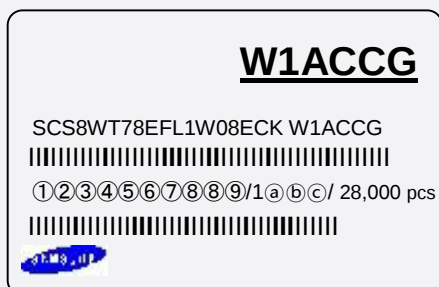


Outer Box

Material: Paper (SW3B(A))

Type	Size (mm)			Note
	L	W	H	
7 inch	295 ± 5	290 ± 5	260 ± 5	Up to 7 reels max.

① Side Label



b) Aluminum Vinyl Packing Bag



CAUTION

This bag contains
MOISTURE SENSITIVE DEVICES

LEVEL
2a

- Shelf life in sealed bag: 12 months at <40℃ and <90% relative humidity (RH)
- Peak package body temperature: 240 ℃
- After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
 - Mounted within 672 hours at factory conditions of equal to or less than 30℃ /60% RH, or
 - Stored at < 10% RH
- Devices require bake, before mounting, if:
 - Humidity Indicator Card is > 65% when read at 23±5℃, or
 - 2a is not met.
- If baking is required, devices must be baked for 1 hours at 60±5℃

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure,

Bag seal due date: _____
(If blank, see code label)

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

W1ACCG

SCS8WT78EFL1W08ECK W1ACCG
 |||||
 ①②③④⑤⑥⑦⑧⑨/a b c/ 4,000 pcs
 |||||







ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES



■ 주의 사항

이 알루미늄 지퍼 팩은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

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■ 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

- 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.

Legal and additional information.

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