High Power LED Series
Chip Scale Package

LH171H

For Horticulture Lighting

Features & Benefits

- Chip scale package with compact design (1.7 x 1.7 mm)
- Maximum current up to 0.7A with low thermal resistance

SAMSUNG

Table of Contents

SAMSUNG

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Ambient / Operating Temperature	T_a	-40 ~ +100	ºC	Note 1)
Storage Temperature	T_{stg}	-40 ~ +125	ºC	-
LED Junction Temperature	T_j	135	ºC	-
Forward Current	I_F	700	mA	Note 1)
Peak Pulse Forward Current	I_{FP}	1000	mA	Duty 1/10 pulse width 10ms
Assembly Process Temperature	-	255 <20	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

Item	Unit	Nominal CCT (K)	Condition		Value Typ.
			I_F (mA)	T_j (°C)	
Luminous Flux (Φ_v)	lm	4000 (70 CRI)	150	85	75
			350	25	175
			350	85	160
			500	85	215
			700	85	277
Forward Voltage (V_F)	V		150	25	2.68
			350	25	2.96
			350	85	2.84
			500	85	2.94
			700	85	3.05
Thermal Resistance (junction to solder point)	K/W				2
Beam Angle	°				120

Note:

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

c) Luminous Flux Characteristics (T_s = 85 °C)

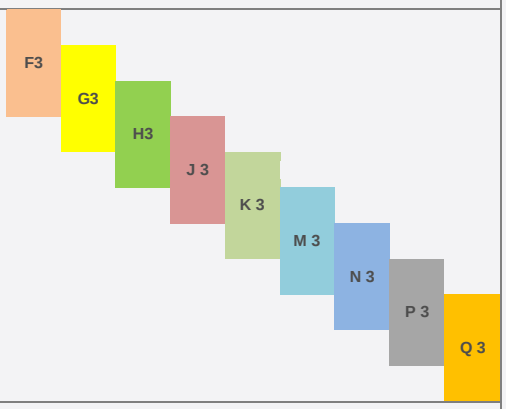
Sorting @ 350 mA (lm)			Calculated Minimum Flux[2] (lm)			
Flux Rank	Flux Range[1]	Sub Rank	@ 150 mA	@ 350 mA	@ 500 mA	@ 700 mA
E3	80 ~ 110	E1, F1, G1	37	80	108	139
F3	90 ~ 120	F1, G1, H1	42	90	121	156
G3	100 ~ 130	G1, H1, J1	47	100	135	173
H3	110 ~ 140	H1, J1, K1	51	110	148	191
J3	120 ~ 150	J1, K1, M1	56	120	161	208
K3	130 ~ 160	K1, M1, N1	61	130	175	225
M3	140 ~ 170	M1, N1, P1	65	140	188	242
N3	150 ~ 180	N1, P1, Q1	70	150	202	260
P3	160 ~ 190	P1, Q1, R1	75	160	215	277
Q3	170 ~ 200	Q1, R1, S1	79	170	229	294
R3	180 ~ 210	R1, S1, T1	84	180	242	312
S3	190 ~ 220	S1, T1, U1	89	190	256	329
T3	200 ~ 230	T1, U1, V1	93	200	269	346
U3	210 ~ 240	U1, V1, W1	98	210	282	364
V3	220 ~ 250	V1, W1, X1	103	220	296	381
W3	230 ~ 260	W1, X1, Y1	107	230	309	398
X3	240 ~ 270	X1, Y1, Z1	112	240	323	416
Y3	250 ~ 280	Y1, Z1, 11	117	250	336	433
Z3	260 ~ 290	Z1, 11, 21	121	260	350	450

Notes:

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

2. Product Code Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	C	P	7	T	T	9	3	K	E	H	1	T	L	N	3	6	E

Digit	PKG Information	Code	Specification
1 2 3	Samsung Chip Scale Package	SCP	
4	CRI	7	CRI 70
		8	CRI 80
		9	CRI 90
5	CCT(K)	W	2700K
		V	3000K
		U	3500K
		T	4000K
		R	5000K
		Q	5700K
		P	6500K
6	Chip Shape	T	Square type
7 8 9	Product	93K	Chip version
10 11 12	Product Purpose	EH1	FEC for Horticulture
13	CCT (K)	W	2700K
		V	3000K
		U	3500K
		T	4000K
		R	5000K
		Q	5700K
		P	6500K
14	MacAdam Step	U	MacAdam 3-Step
		L	MacAdam 5-Step
15 16	Luminous Flux	F 3	90- 120 (F1 90-100)
		G 3	100- 130 (G1 100-110)
		H 3	110- 140 (H1 110- 120)
		J 3	120- 150 (J1 120- 130)
		K 3	130~160 (K1 130~140)
		M 3	140~170 (M1 140~150)
		N 3	150~180 (N1 150~160)
		P 3	160~190 (P1 160~170)
		Q 3	170~200 (Q1 170~180)
			
			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)	6 E	6A 2.7~2.9 AE 2.9~3.1

a) Luminous Flux Bins (I_F = 350 mA, T_s = 85 °C)

CRI/ Nominal CCT (K)		Flux rank										
		E1	F1	G1	H1	J1	K1	M1	N1	P1	Q1	R1
	(min. flux)	80	90	100	110	120	130	140	150	160	170	180
70	3000						SCP7VT93KEH1V◇K36E					
	4000								SCP7TT93KEH1T◇N36E			
	5000								SCP7RT93KEH1R◇N36E			

Notes:

1) ◇ : MacAdam step code, L(MacAdam 5-step) / U(MacAdam 3-step)

b) Color Bins (I_F = 350 mA, T_S= 85 °C)

Nominal CCT (K)	CRI (R_a)	Color Rank	Chromaticity Bins
3000, 4000, 5000	70	L (Full Bin for MacAdam 5-step)	☆L
		U (Full Bin for MacAdam 3-step)	☆U

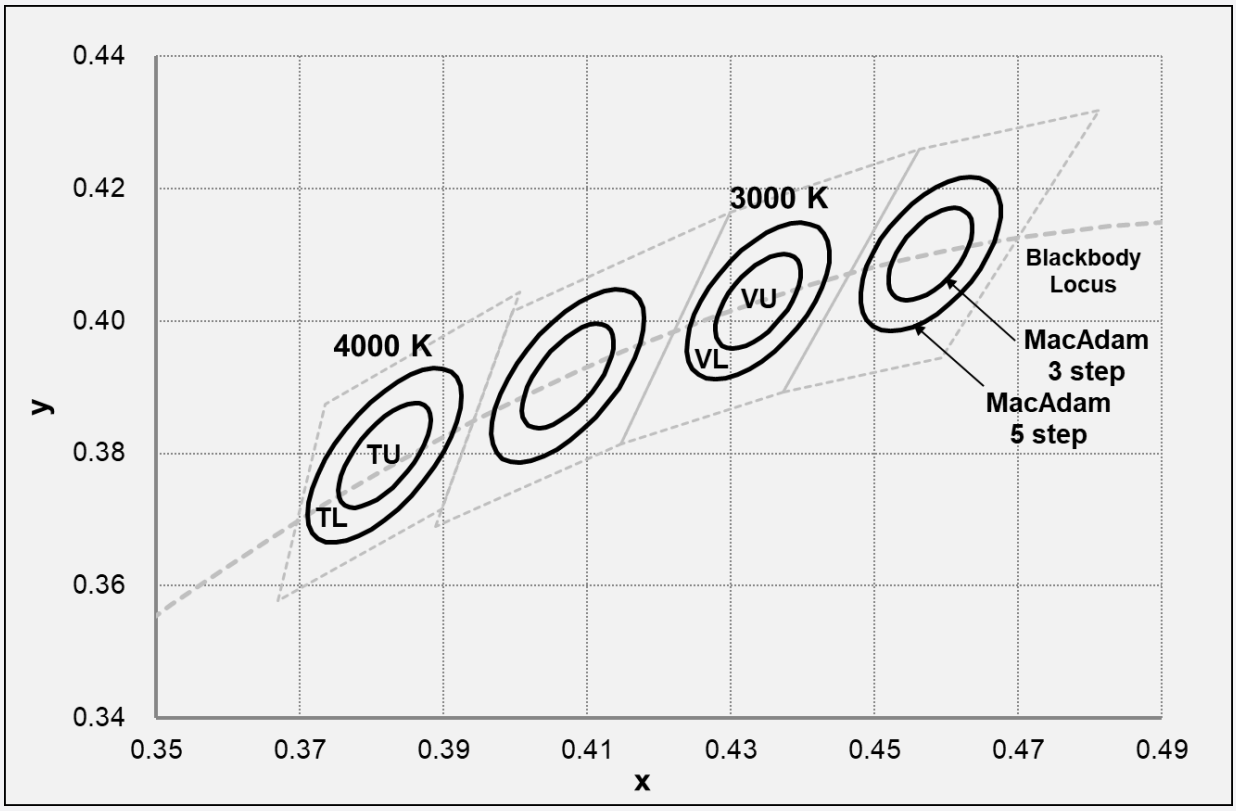
Notes:

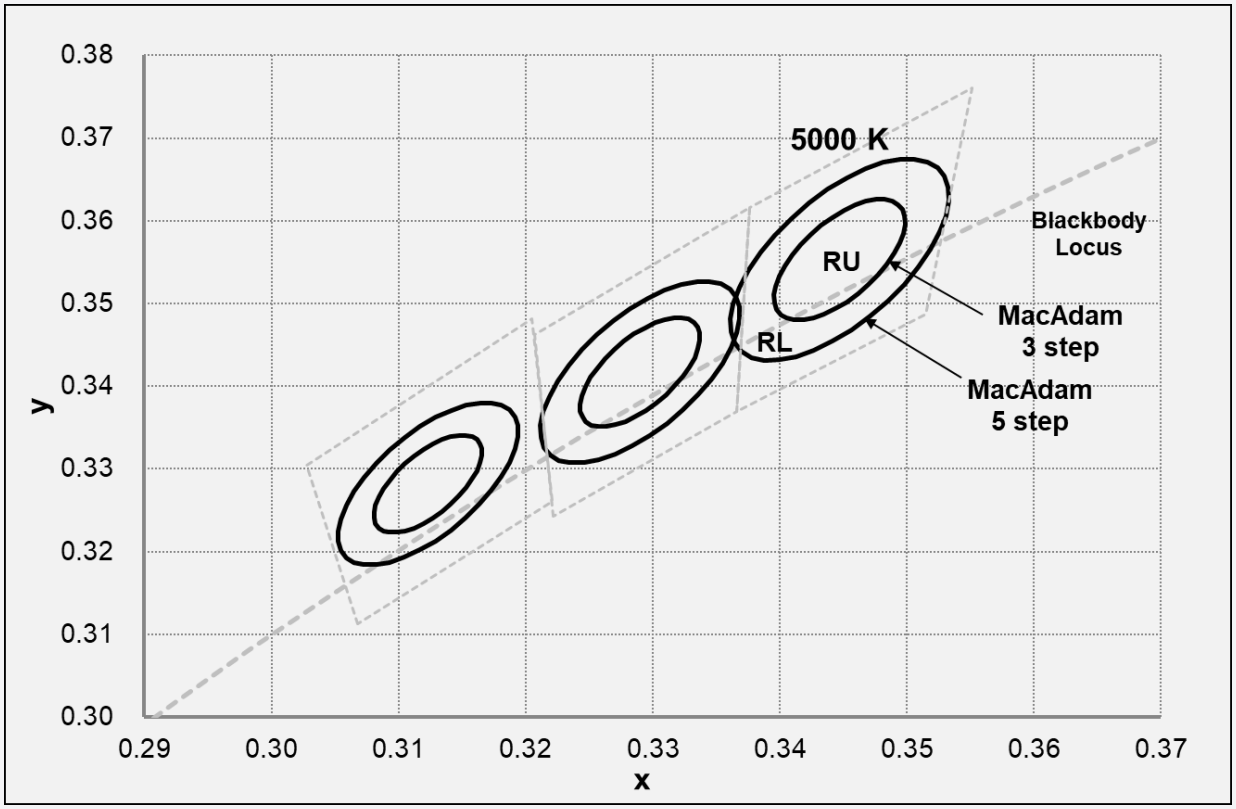
1) ☆ : Nominal CCT code, V(3000K)/T(4000K)/R(5000K)

c) Voltage Bins (I_F = 350 mA, T_S = 85 °C)

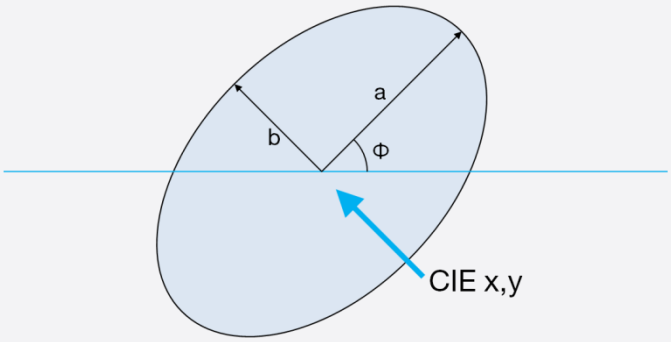
CRI (R_a)	Nominal CCT (K)	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
			6E	6A	2.7 ~ 2.9
				AE	2.9 ~ 3.1

d) Chromaticity Region & Coordinates (I_F = 350 mA, T_s = 85 °C)





e) Chromaticity Region & Coordinates (I_F = 350 mA, T_s = 85 °C)



	CCT (K)	Center point		Major-axis	Minor-axis	Rotation
		CIE x	CIE y	a	b	Φ
3 step	3000	0.4338	0.4030	0.0083	0.0041	53.22
	4000	0.3818	0.3797	0.0094	0.0040	53.72
	5000	0.3447	0.3553	0.0082	0.0035	59.62
5 step	3000	0.4338	0.4030	0.0138	0.0068	53.22
	4000	0.3818	0.3797	0.0157	0.0067	53.72
	5000	0.3447	0.3553	0.0137	0.0058	59.62

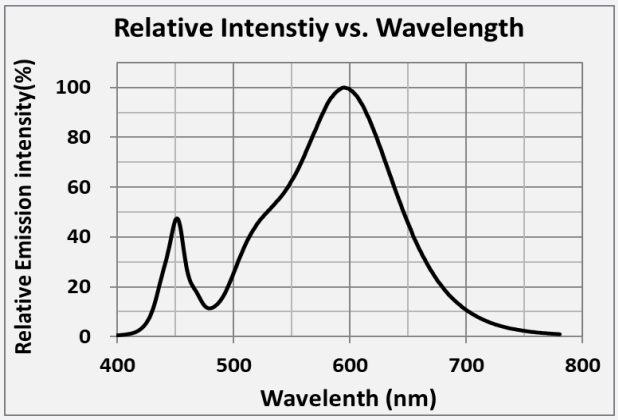
Note:

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

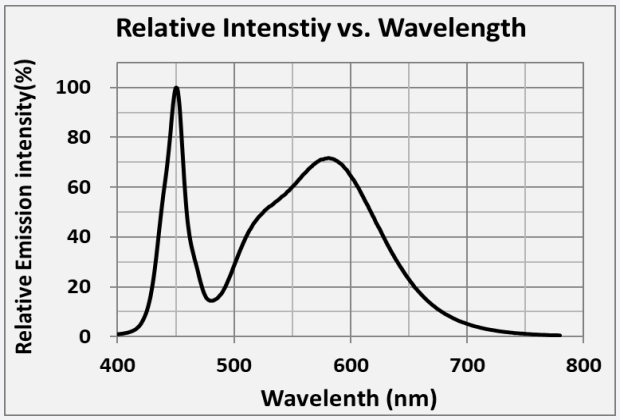
3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F = 350 mA, T_S = 85 ºC)

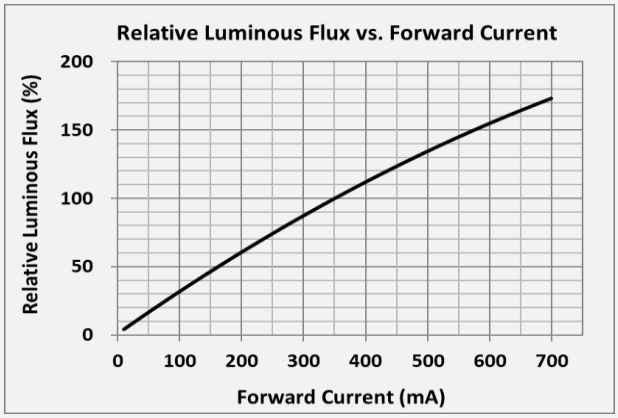
3000K/CRI70

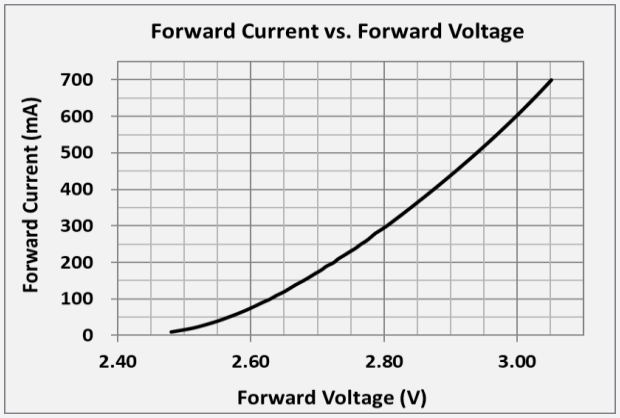


5000K/CRI70

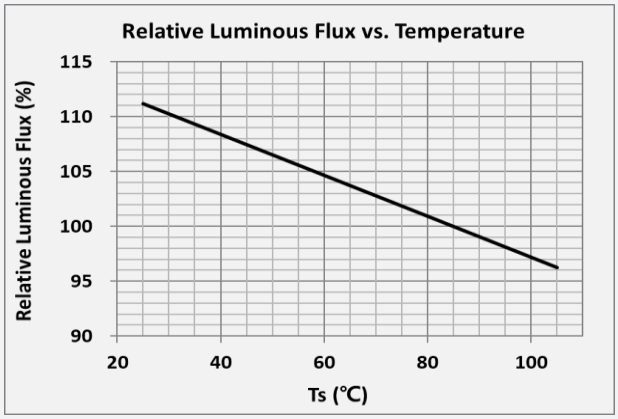


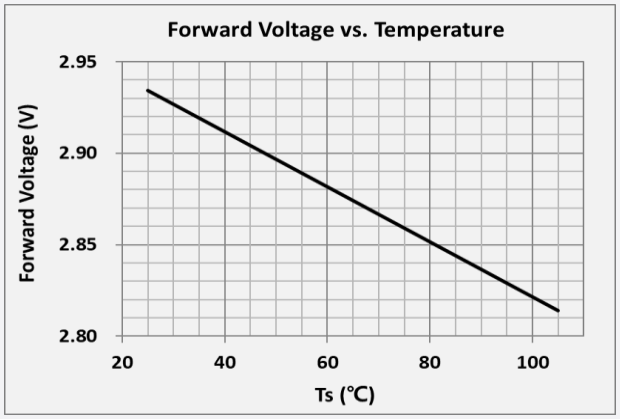
b) Forward Current Characteristics (T_S = 85 ºC)



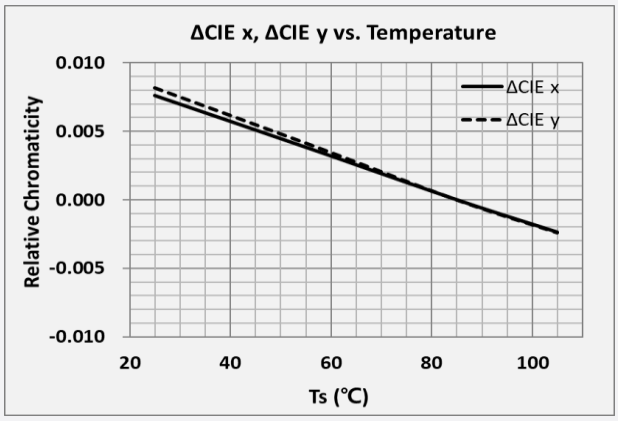


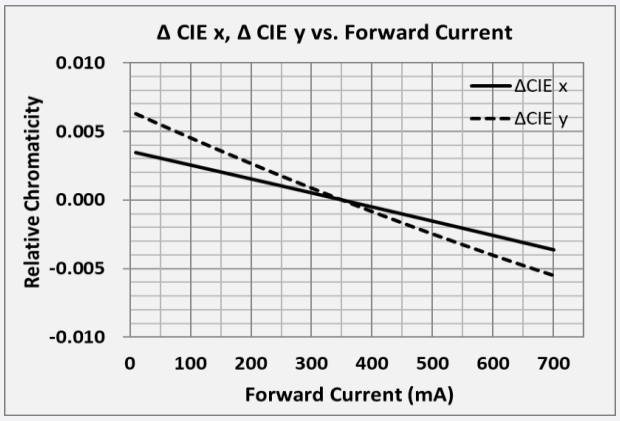
c) Temperature Characteristics (I_F = 350 mA)



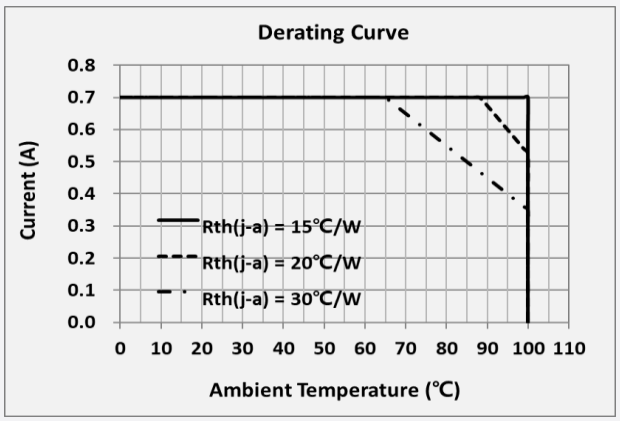


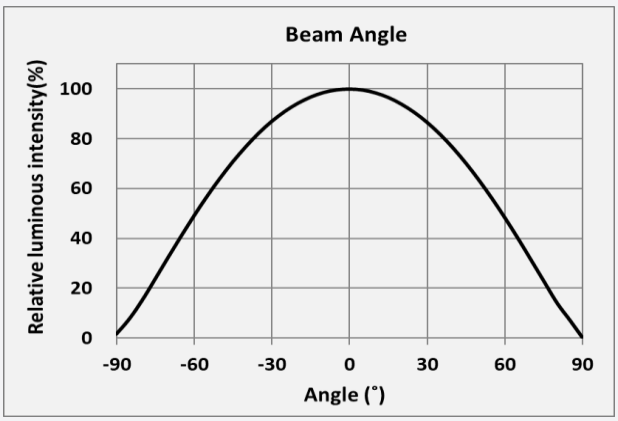
d) Color Shift Characteristics (I_F = 350 mA, T_s = 85 ºC)





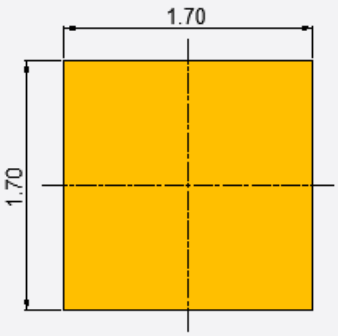
e) Derating Curve and Beam Angle Characteristics (I_F = 350 mA, T_s = 25 ºC)





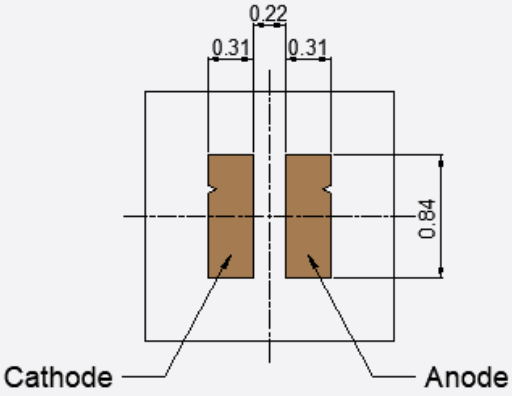
4. Outline Drawing & Dimension

<Top View>



<Side View>

<Bottom View>



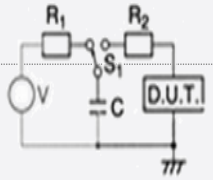
- Measurement unit: mm
- Tolerance: ±0.13 mm

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
Room Temperature Life Test	25 ºC, Derated maximum current	1000 h
High Temperature Life Test	85 ºC, Derating maximum current	1000 h
High Temperature Humidity Life Test	60 ºC, 90% RH, Derating maximum current	1000 h
Low Temperature Life Test	-40 ºC, Derating maximum current	1000 h
Temperature Humidity Cycle Test	-10 ºC ↔25 ºC /Dry, 25 ºC ↔ 65 ºC /95% R.H. Derating maximum current	10 cycles
Thermal Shock	-40 ºC ↔ 125 ºC, each 15 min Transfer time within 5 min	500 cycles
High Temperature Storage	120 ºC	1000 h
Low Temperature Storage	-40 ºC	1000 h
ESD (HBM)	 R_1: 10 MΩ R_2: 1.5 kΩ	5 times
ESD (MM)	R_1: 10 MΩ R_2: 0 C: 200 pF V: ±0.2 kV	5 times
Vibration Test	20~2000~20 Hz, 200 m/s^2, sweep 4 min X, Y, Z 3 direction, each 1 cycle	4 cycles
Mechanical Shock Test	1500 g, 0.5 ms 3 shocks each X-Y-Z axis	5 cycles

b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_s = 25 ºC)	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

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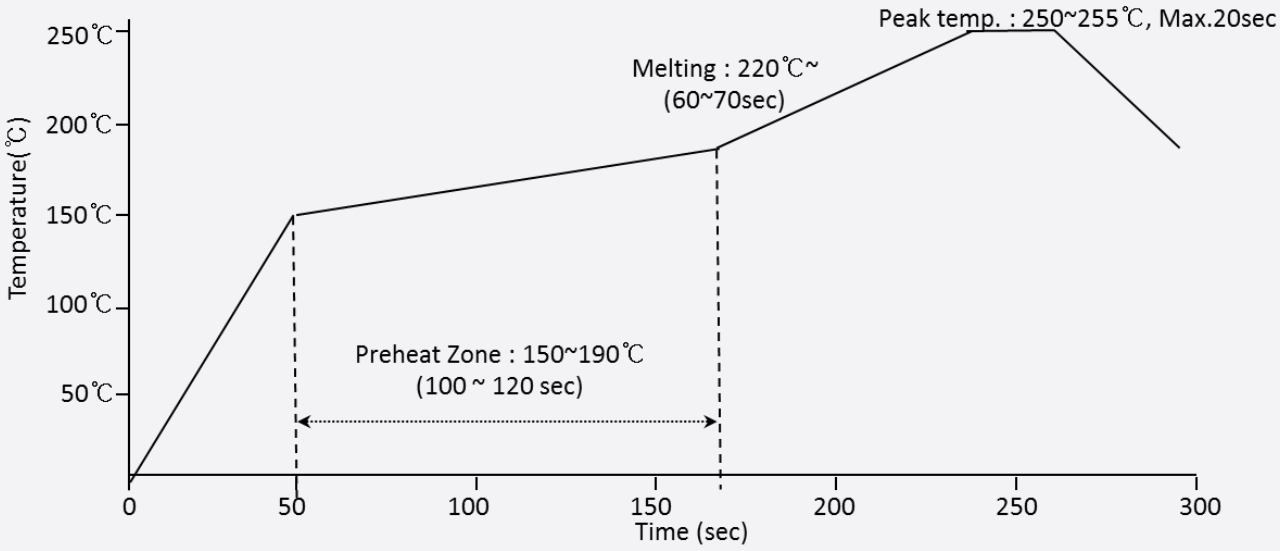
6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

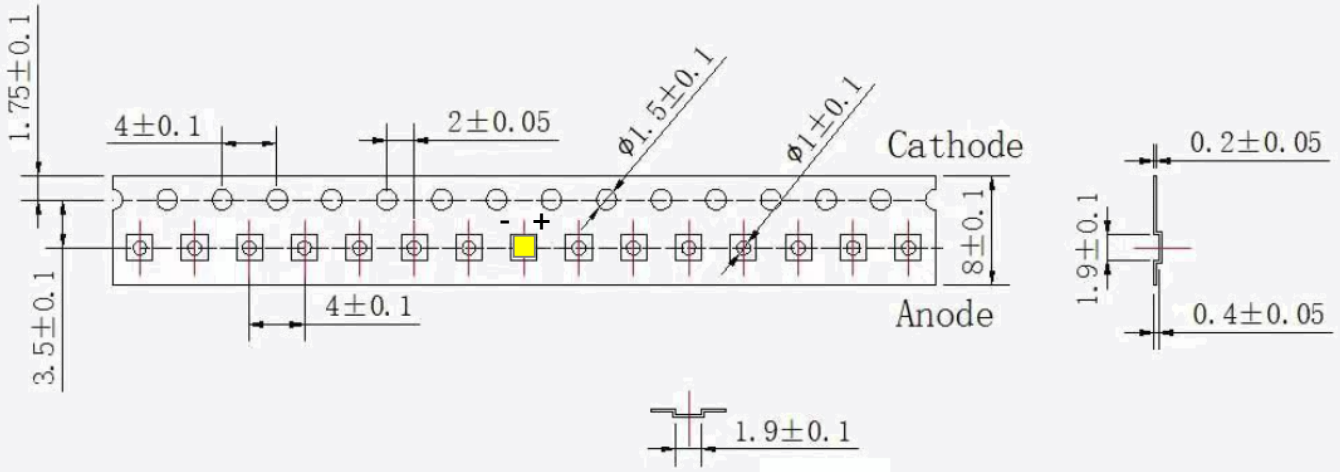


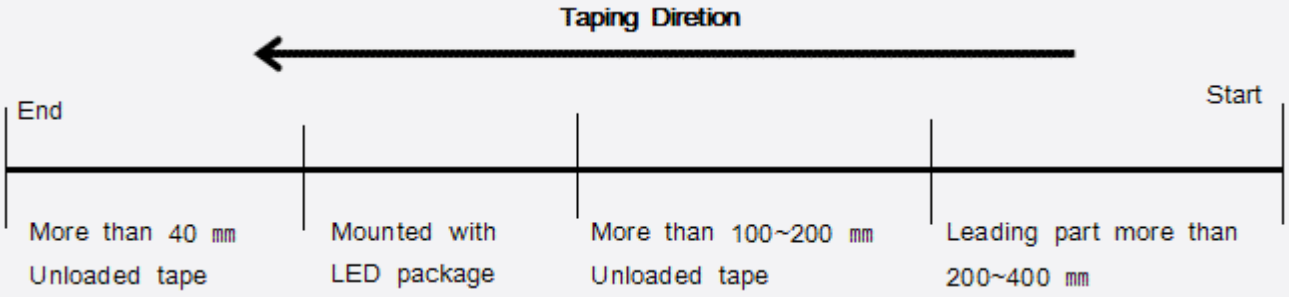
b) Manual Soldering Conditions

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

7. Tape & Reel

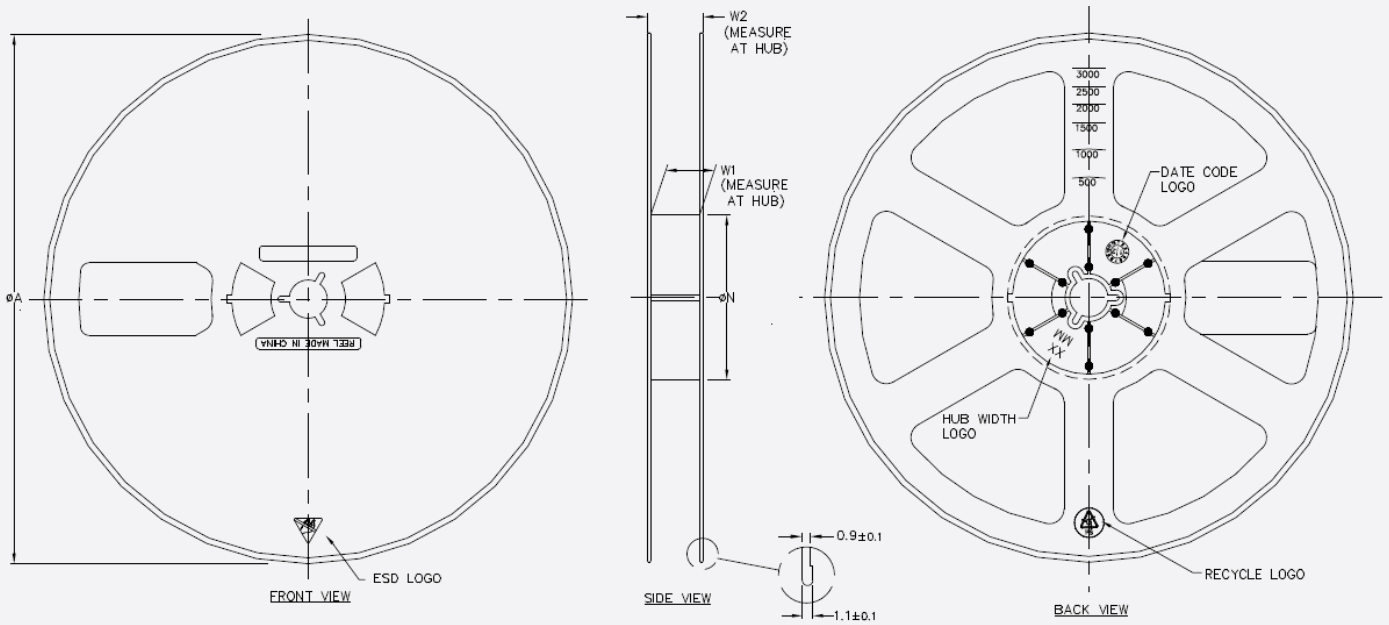
a) Taping Dimension

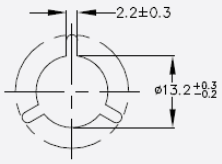




b) Reel Dimension

(unit: mm)





ARBOR HOLE
DETAIL A
SCALE 2:1

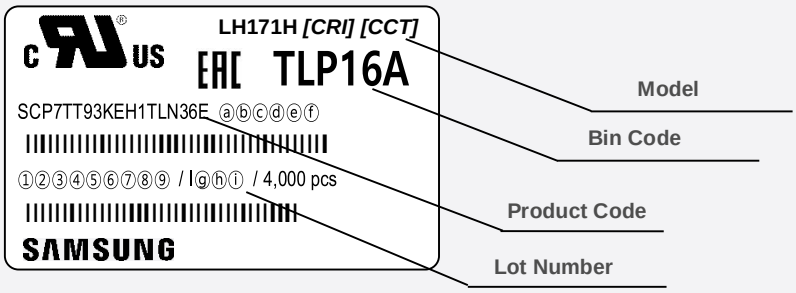
PRODUCT SPECIFICATIONS				
TAPE WIDTH	øA ±1.0	øN ±0.5	W1 ±0.5	W2 (MAX)
08MM	ø178.0	54.0	9.5	15.0
12MM	ø178.0	54.0	13.5	19.0

Notes:

1) Quantity: 4,000 Qty/reel
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

Bin Code:

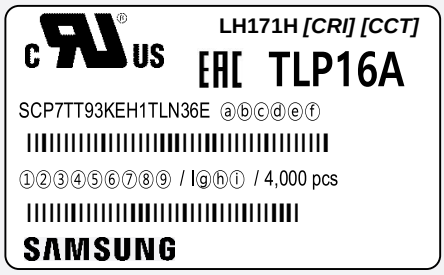
ⓐⓑ : Chromaticity bin (refer to page 9-10)

ⓒⓓ : Luminous Flux bin (refer to page 7)

ⓔⓕ : Forward Voltage bin (refer to page 8)

b) Lot Number

The lot number is composed of the following characters:



①②③④⑤⑥⑦⑧⑨ / Ⅰⓐⓑⓒ / 4,000 pcs

①② : Production site (GB: Nanchang China)

③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)

④ : Year (E: 2020, F: 2021, L:2022 …)

⑤ : Month (1~9, A, B, C)

⑥ : Day (1~9, A, B~V)

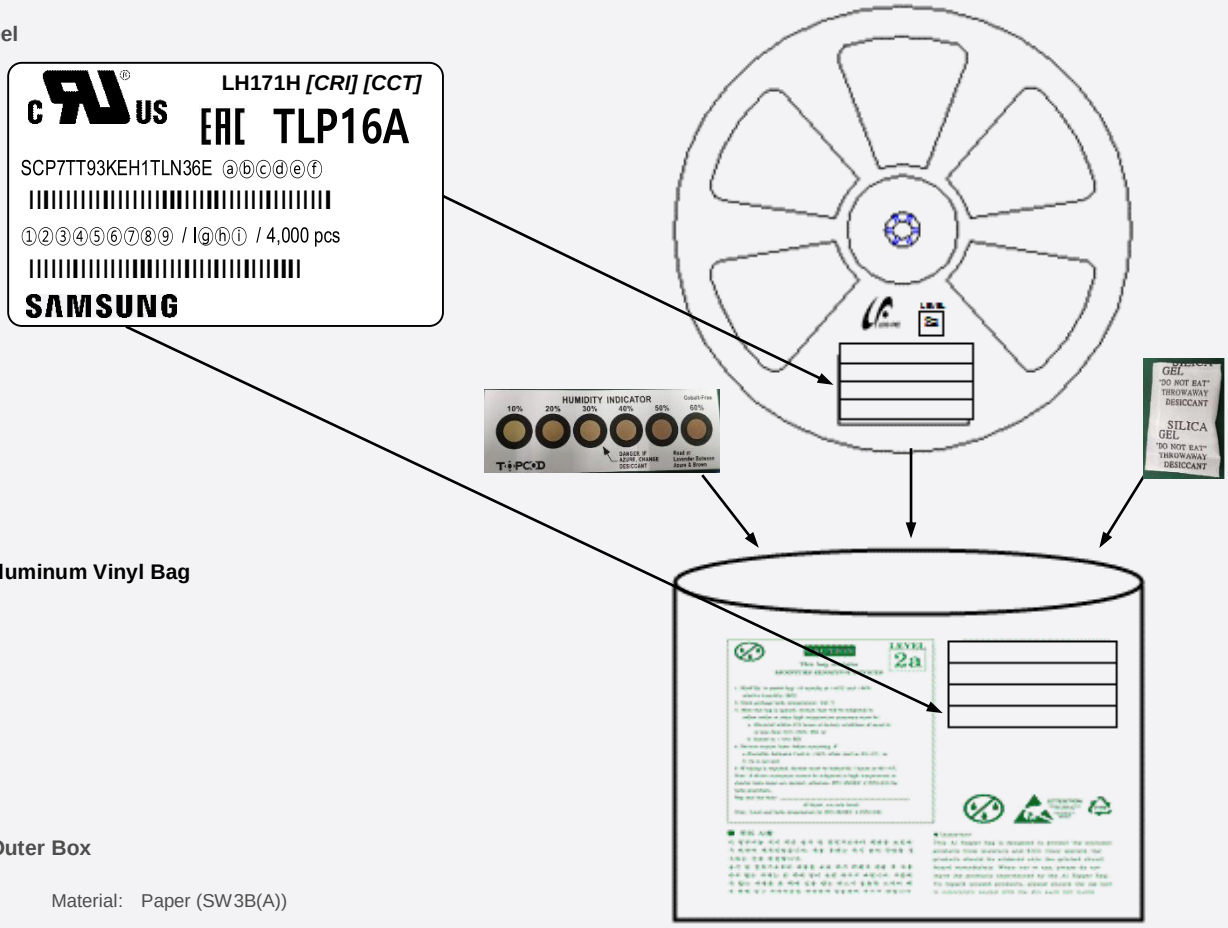
⑦⑧⑨ : Product serial number (001 ~ 999)

ⓖⓗⓘ : Reel number (001 ~ 999) or (AAA ~ ZZZ)

9. Packing Structure

a) Packing Process

Reel

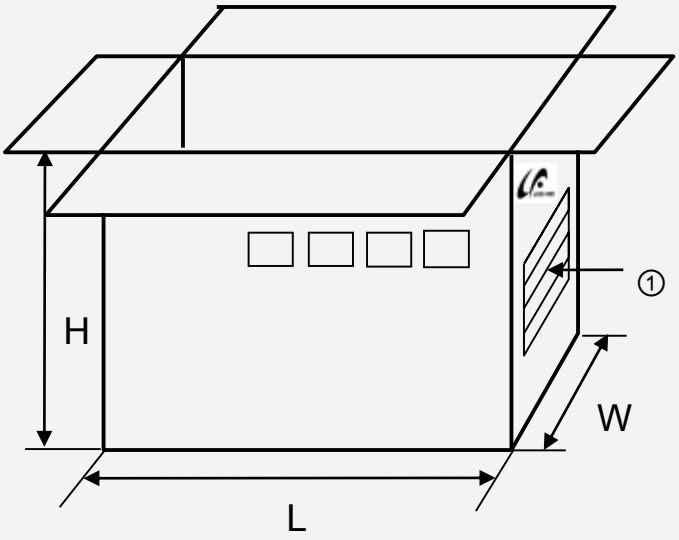


Aluminum Vinyl Bag

Outer Box

Material: Paper (SW3B(A))

Type	Size (mm)			Note
	L	W	H	
7 inch	295 ± 5	290 ± 5	260 ± 5	Max 10 reels



① **Side Label**

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.
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.

Legal and additional information.

About Samsung Electronics Co., Ltd.

Samsung Electronics Co. Ltd inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and semiconductor and LED solutions. For the latest news, please visit the Samsung Newsroom at http://news.samsung.com.

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