Middle Power LED Series Flip Chip Package





## New technology provides high performance and energy conservation



### **Features & Benefits**

- Greater freedom of design with compact package size
- High degree of reliability with plastic-free structure
- Low thermal resistance
- High efficiency providing optimized solution

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### 1. Characteristics

### a) Absolute Maximum Rating

ltem	Symbol	Rating	Unit	Condition
Operating Temperature	Ta	-40 ~ +105	٥C	-
Storage Temperature	T <sub>stg</sub>	-40 ~ +120	٥C	-
LED Junction Temperature	Tj	125	٥C	-
Forward Current	IF	350	mA	-
Assembly Process Temperature	-	260 <10	ິດ s	-
ESD (HBM)	-	±2	kV	-

### b) Electro-optical Characteristics (IF = 150 mA, $T_s = 85$ °C)

ltem	Unit	Rank	Bin	Min.	Тур.	Max.
Forward Voltage (V <sub>F</sub> )	V	6E	6A	2.7	-	2.9
Forward Voltage (VF)	v	0E "	AE	2.9	-	3.1
Reverse Voltage (@ -10 μA)	V			-10.0	-	-
Color Rendering Index (Ra)	-	8		80	-	-
Special CRI (R9)	-			0	-	-
Thermal Resistance (junction to chip point)	K/W			-	2	-
Beam Angle	0			-	120	-

Note: Samsung maintains measurement tolerance of : Forward voltage =  $\pm 0.1$  V, Luminous flux =  $\pm 5$  %, CRI =  $\pm 3$ , R9 =  $\pm 6.5$ 

### c) Luminous Flux Characteristics (I<sub>F</sub> = 150 mA, T<sub>s</sub> = 85 °C)

		Nominal	S	A	S	В	S	C	S	D	S	SE	S	SF	S	G	S	н
Item	CRI	CCT (K)	Min.	Max.														
			43	47	47	51	51	55	55	59	59	63	63	67	67	71	71	75
		2700																
		3000																
		3500																
	70	4000																
		5000																
		5700																
		6500																
		2700																
		3000																
Luminous Flux		3500																
(Φv)	80	4000																
		5000																
		5700																
		6500																
		2700																
		3000																
	90	3500																
		4000																
		5000																

### Note:

1) The LM101B is tested in pulsed condition at rated test current (10 ms pulse width)

- 2) Calculated flux values are for reference only
- 3) Samsung maintains measurement tolerance of: luminous flux =  $\pm 5$  %

## 2. Product Code Information (IF = 150 mA, Ts = 85 °C)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S																	

Digit	PKG Information	Code	Specification
123	Samsung Chip	SCP	
		7	Min. 70
4	CRI	8	Min. 80
		9	Min. 90
		w	2700
		v	3000
		U	3500
5	CCT (K)	т	4000
		R	5000
		Q	5700
		Р	6500
6	Chip Shape	т	Square
789	Chip Code	78H	
10 11 12	Product Purpose	EL1	FeC for Lighting
		w	2700K
		v	3000K
		U	3500K
13	CCT (K)	т	4000K
		R	5000K
		Q	5700K
		Р	6500K
14	MacAdam Step	L	Single Bin for MacAdam 5-step L(MacAdam 5-step Bin)
		U	Single Bin for MacAdam 3-step U(MacAdam 3-step Bin)
15 16	Luminous Flux (Im)	S0	Code: 5Y, 5Z, 5A, 5B, SC, SD, SE, 5F, 5G, 5H
17 18	Forward Voltage (V)	6E	6A 2.7~2.9 2.7~3.1 Bin Code: AE 2.9~3.1

CRI (R₃) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ <sub>v</sub> , Im)
			SE	59 ~ 63
	2700	SCP7WT78HEL1W☆S06E	SF	63 ~ 67
			SF	63 ~ 67
	3000	SCP7VT78HEL1V☆S06E	SG	67 ~ 71
	3500	SCP7UT78HEL1U☆S06E	SF	63 ~ 67
	3300	SCFTUTTORELIUXSUGE	SG	67 ~ 71
	4000	SCP7TT78HEL1T☆S06E	SG	67 ~ 71
70	4000	SCPTITIONELITESUGE	SH	71 ~ 75
	5000		SG	67 ~ 71
	5000	SCP7RT78HEL1R☆S06E	SH	71 ~ 75
	5700		SF	63 ~ 67
	5700	SCP7QT78HEL1Q☆S06E	SG	67 ~ 71
	6500		SF	63 ~ 67
	6500	SCP7PT78HEL1P☆S06E	SG	67 ~ 71

### a) Luminous Flux Bins (IF = 150 mA, Ts = 85 °C)

CRI (R₃) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ <sub>v</sub> , lm)
	0700		SD	55 ~ 59
	2700	SCP8WT78HEL1W☆S06E	SE	59 ~ 63
	2000		SE	59 ~ 63
	3000	SCP8VT78HEL1V☆S06E	SF	63 ~ 67
	2500		SE	59 ~ 63
	3500	SCP8UT78HEL1U☆S06E	SF	63 ~ 67
80	4000		SF	63 ~ 67
80	4000	SCP8TT78HEL1T☆S06E	SG	67 ~ 71
	5000	SCP8RT78HEL1R☆S06E	SF	63 ~ 67
	3000	SUPORTIONELIKXSUGE	SG	67 ~ 71
	5700		SE	59 ~ 63
	5700	SCP8QT78HEL1Q☆S06E	SF	63 ~ 67
	6500		SE	59 ~ 63
	6500	SCP8PT78HEL1P☆S06E	SF	63 ~ 67

### a) Luminous Flux Bins (IF = 150 mA, Ts = 85 °C)

Note: "☆" can be "L" (Single bin for MacAdam 5-step) "U" (Single bin for MacAdam 3-step)

CRI (R₄) Min.	Nominal CCT (K)	Product Code	Flux Bin	Flux Range (Φ <sub>v</sub> , lm)
	2700		SA	43 ~ 47
	2700	SCP9WT78HEL1W☆S06E	SB	47 ~ 51
	2000		SA	43 ~ 47
	3000	SCP9VT78HEL1V☆S06E	SB	47 ~ 51
90	3500		SB	47 ~ 51
90	3000	SCP9UT78HEL1U☆S06E	SC	51 ~ 55
	4000		SB	47 ~ 51
	4000	SCP9TT78HEL1T☆S06E	SC	51 ~ 55
	5000		SB	47 ~ 51
	2000	SCP9RT78HEL1R☆S06E	SC	51 ~ 55

### a) Luminous Flux Bins (IF = 150 mA, Ts = 85 °C)

Note: "☆" can be "L" (Single bin for MacAdam 5-step), "U" (Single bin for MacAdam 3-step)

2700      SCP7WT78HELIW :: SORE      WL      WL      WL        3000      SCP7WT78HELIW :: SORE      VL	CRI Min.	Nominal CCT (K)	Product Code	Color Rank	Chromaticity Bins
WU      WU        3000      SCP7V178HELIV/S0PE      VL      VL        3500      SCP7UT78HELIV/S0PE      UU      UU        3500      SCP7TT78HELIV/S0PE      TL      TL        70      4000      SCP7TT78HELIX/S0PE      TU      TU        5000      SCP7TT78HELIX/S0PE      RU      RU        5000      SCP7TT78HELIX/S0PE      RU      RU        6000      SCP7TT78HELIX/S0PE      RU      RU        6000      SCP7TT78HELIX/S0PE      PL      PL        700      SCP8VT78HELIX/S0PE      WL      WL        700      SCP8VT78HELIX/S0PE      WL      WL        700      SCP8VT78HELIX/S0PE      WL      VL        700      SCP8VT78HELIX/S0PE      WL      VL        700      SCP8VT78HELIX/S0PE      TL      TL        700      SCP8VT78HELIX/S0PE      UL      UL        700      SCP8VT78HELIX/S0PE      RL      RL        700      SCP8VT78HELIX/S0PE      RL      RL        700      SCP8VT78HELIX/S0PE      RU      UL<		2700		WL	WL
3000      SCPPUT78HEL1V > SOBE      VU      VU      VU        3600      SCPPUT78HEL1V > SOBE      UL      UL      UL        70      4000      SCPPTT78HEL1T > SOBE      TL      TL      TL        70      4000      SCPPTT78HEL1T > SOBE      RL      RL      RL        70      800      SCPPTT78HEL1R > SOBE      RL      RL      RL        700      SCPPTT78HEL1P > SOBE      OL      OL      OL        700      SCPPTT78HEL1P > SOBE      PL      PL      PL        6600      SCPPTT78HEL1P > SOBE      PL      WL      WL        700      SCP8VT78HEL1V > SOBE      WL      WL      WL        700      SCP8VT78HEL1V > SOBE      WL      WL      WL        700      SCP8VT78HEL1V > SOBE      UL      UL      UL        700      SCP8VT78HEL1V > SOBE      UL      UL      UL        700      SCP8VT78HEL1V > SOBE      UL      UL      UL        700      SCP8VT78HEL1V > SOBE      RL      RL      RL        700      SCP8V		2700	SCF7W170HELIW # SUCE	WU	WU
NU      VU      VU        3500      SCP7UT78HE11% SOGE      UU      UU        70      4000      SCP7TT78HE11% SOGE      TL      TL        70      4000      SCP7TT78HE11% SOGE      RL      RL        70      3000      SCP7RT78HE11% SOGE      RU      RU        70      3000      SCP7RT78HE11% SOGE      RU      RU        70      3000      SCP7PT78HE11% SOGE      PL      PL        70      SCP8VT78HE11% SOGE      PL      PU      PU        70      SCP8VT78HE11% SOGE      WU      WU      WU        70      SCP8VT78HE11% SOGE      WL      WL      WU        70      SCP8VT78HE11% SOGE      WU      WU      WU        700      SCP8VT78HE11% SOGE      WU      WU      WU        700      SCP8T78HE11% SOGE      RL      RL      RL        700      SCP8T78HE11% SOGE      RU      QU      QU        700      SCP8T78HE11% SOGE      RU      QU      QU        700      SCP8T78HE11% SOGE      RU <td></td> <td>2000</td> <td></td> <td>VL</td> <td>VL</td>		2000		VL	VL
3000      SCP7UT78HE1L1::SOBE      UU      UU        70      4000      SCP7UT78HE1L1::SOBE      TL      TL        70      4000      SCP7TT78HE1L1::SOBE      RL      RL        70      3000      SCP7RT78HE1.IR::SOBE      RL      RL        70      3000      SCP7RT78HE1.IR::SOBE      RL      RL        70      3000      SCP70T78HE1.IP::SOBE      RU      QL        70      3000      SCP70T78HE1.IP::SOBE      PL      PL        70      3000      SCP8VT78HE1.IV::SOBE      WL      WL        70      3000      SCP8VT78HE1.IV::SOBE      VL      VL        70      3000      SCP8VT78HE1.IV::SOBE      UL      UL        70      3000      SCP8T78HE1.IT::SOBE      TL      TL        70      SCP8T78HE1.IT::SOBE      TL      TL      TL        700      SCP8T78HE1.IT::SOBE      RL      RL      RL        700      SCP8T78HE1.IR::SOBE      RL      RL      RL        700      SCP8T78HE1.IR::SOBE      RL      RL      RL		3000	SCFTVITORELIV × SUDE	VU	VU
70      4000      SCP7TT78HEL1T \$\$06E      TL      TL        70      4000      SCP7TT78HEL1R \$\$06E      RL      RL      RL        800      SCP7RT79HEL1R \$\$06E      RU      RU      RU        800      SCP7RT79HEL1R \$\$06E      RU      RU      RU        800      SCP7PT79HEL1P \$\$06E      RU      RU      RU        800      SCP7PT79HEL1P \$\$06E      PU      PU      PU        80      3000      SCP8VT79HEL1V \$\$06E      WU      WU      WU        80      3000      SCP8VT79HEL1V \$\$06E      WL      VL      VL        80      4000      SCP8VT79HEL1V \$\$06E      UL      UL      UL        80      4000      SCP8TT78HEL1T \$\$06E      TL      TL      TL        80      4000      SCP8TT78HEL1R \$\$06E      RU      RU      RU        80      4000      SCP8TT78HEL1R \$\$06E      RU      RU      RU        80      3000      SCP8T78HEL1R \$\$06E      RU      RU      RU        90      SCP8VT78HEL1N \$\$06E      RU      <		2500		UL	UL
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		3500	3CF70176HE10 × 306E	UU	UU
NU      TU      TU        S000      SCP7RT78HELIR      RL      RL        700      SCP7OT78HELIO      SOB      QL      QL        6500      SCP7OT78HELIO      SOB      QU      QU        6500      SCP7PT78HELIP      PL      PL      PL        700      SCP8WT78HELIP      SOBE      WL      WL        700      SCP8WT78HELIV      SOBE      WU      WU        700      SCP8WT78HELIV      SOBE      WU      WU        700      SCP8WT78HELIV      SOBE      WU      WU        700      SCP8WT78HELIV      SOBE      WU      UU      UU        700      SCP8WT78HELIV      SOBE      UU      UU      UU        700      SCP8WT78HELIV      SOBE      UU      UU      UU      QU        700      SCP8WT78HELIT      SOBE      RU      RL      RL      RL      RL      RL      RL      RL      QU	70	4000		TL	TL
$ \left( \begin{array}{cccccccccccccccccccccccccccccccccccc$	70	4000	SCF71170HELITX SUDE	TU	TU
RU      RU        5700      SCP70T78HEL10xS06E      GL      GL        6500      SCP70T78HEL1PxS06E      PL      PL        6500      SCP70T78HEL1PxS06E      PU      PU        700      SCP80T78HEL1PxS06E      WL      WL        700      SCP80T78HEL1VxS06E      WU      WU        700      SCP80T78HEL1VxS06E      VL      VL        700      SCP80T78HEL1VxS06E      UL      UL        700      SCP80T78HEL1VxS06E      UU      UU        700      SCP80T78HEL1TxS06E      TL      TL        700      SCP80T78HEL1TxS06E      TU      TU      TU        700      SCP80T78HEL1TxS06E      RU      RU      RU        700      SCP80T78HEL1PxS06E      RU      RU      RU        700      SCP80T78HEL1PxS06E      PU      PU      PU        700      SCP80T78HEL1PxS06E      PU      PU      PU        700      SCP80T78HEL1PxS06E      VL      VL      VL        700      SCP80T78HEL1PxS06E      VL      VL      VL </td <td></td> <td>5000</td> <td></td> <td>RL</td> <td>RL</td>		5000		RL	RL
5700      SCP70T78HEL10 & SOBE      OU      QU        6600      SCP7PT78HEL19 & SOBE      PL      PL        700      SCP8WT78HEL19 & SOBE      PU      PU        700      SCP8WT78HEL1W & SOBE      WL      WL        700      SCP8WT78HEL1W & SOBE      WL      VL        700      SCP8UT78HEL1V & SOBE      VL      VL        700      SCP8UT78HEL1V & SOBE      VL      VL        700      SCP8UT78HEL1V & SOBE      UL      UL        700      SCP8UT78HEL1T & SOBE      TL      TL        700      SCP8UT78HEL1T & SOBE      RU      RU        700      SCP8UT78HEL1R & SOBE      RU      RU        700      SCP8UT78HEL1R & SOBE      QU      QU        700      SCP8UT78HEL1P & SOBE      PL      PL        700      SCP8PT78HEL1P & SOBE      PU      PU        700      SCP8PT78HEL1P & SOBE      VL      VL        700      SCP8PT78HEL1W & SOBE      VL      VL        700      SCP8PT78HEL1W & SOBE      VL      VL        700		5000	SCP/RI/8HELIRXSUGE	RU	RU
QU      QU      QU        6500      SCP7PT78HEL1P:SOGE      PL      PL        PU      PU      PU        2700      SCP8WT78HEL1W:SOGE      WU      WU        3000      SCP8VT78HEL1V:SOGE      WU      VL        3000      SCP8VT78HEL1V:SOGE      VL      VL        3000      SCP8VT78HEL1V:SOGE      VU      VU        3500      SCP8VT78HEL1V:SOGE      UL      UL        3500      SCP8T78HEL1T:SOGE      TL      TL        700      SCP8T78HEL1R:SOGE      RL      RL        5000      SCP8T78HEL1R:SOGE      RU      QU        5000      SCP8T78HEL1R:SOGE      QL      QL        600      SCP8T78HEL1P:SOGE      QL      QL        600      SCP8T78HEL1P:SOGE      PL      PL        600      SCP8T78HEL1P:SOGE      WL      WL        700      SCP8T78HEL1P:SOGE      VL      VL        700      SCP8T78HEL1P:SOGE      WL      WL        700      SCP8T78HEL1P:SOGE      VL      VL        700		5700		QL	QL
6500      SCP7PT78HELIP      PU      PU        2700      SCP8WT78HELIW      WL      WL      WL        3000      SCP8WT78HELIW      SOE      WU      WU      WU        3000      SCP8VT78HELIV      SOE      VU      VU      VU      VU        3500      SCP8UT78HELIV      SOE      UL      UL <td< td=""><td></td><td>5700</td><td>SCP/QI/8HELIQ×SUBE</td><td>QU</td><td>QU</td></td<>		5700	SCP/QI/8HELIQ×SUBE	QU	QU
PU      PU        80      8CP8WT78HEL1W±S06E      WL      WL        3000      8CP8VT78HEL1V±S06E      VL      VL        3000      8CP8VT78HEL1V±S06E      VU      VU        3000      8CP8VT78HEL1V±S06E      UL      UL        3000      8CP8VT78HEL1V±S06E      UU      UU        3000      8CP8VT78HEL1T±S06E      TL      TL        3000      8CP8VT78HEL1T±S06E      TU      TU        5000      8CP8VT78HEL1A±S06E      RU      RU        5000      8CP8VT78HEL1A±S06E      RU      RU        6600      8CP8VT78HEL1A±S06E      PU      PU        6500      8CP8VT78HEL1A±S06E      PU      PU        90      8CP9VT78HEL1A±S06E      WL      WL        90      3500      8CP9VT78HEL1V±S06E      VL      VL        90      3500      8CP9VT78HEL1V±S06E      UL      UL        90      3500      8CP9T78HEL10±S06E      UL      UL        90      3500      8CP9T78HEL10±S06E      UL      UL        900      <		0500		PL	PL
80      SCP8WT78HEL1W ± S06E      WU      WU        3000      SCP8VT78HEL1V ± S06E      VL      VL        3000      SCP8VT78HEL1V ± S06E      UL      UL        3600      SCP8UT78HEL1V ± S06E      UL      UL        3600      SCP8UT78HEL1V ± S06E      UL      UL        4000      SCP8T78HEL1T ± S06E      TL      TL        5000      SCP8T78HEL1R ± S06E      RU      RU        5000      SCP8T78HEL1R ± S06E      RU      RU        6500      SCP8T78HEL1R ± S06E      RU      RU        6500      SCP8T78HEL1P ± S06E      PL      PL        6500      SCP8T78HEL1P ± S06E      PU      PU        90      SCP8T78HEL1P ± S06E      WL      WL        90      SCP9VT78HEL1V ± S06E      VL      VL        90      3500      SCP9UT78HEL1V ± S06E      UL      UL        90      3500      SCP9UT78HEL1V ± S06E      UL      UL        90      3500      SCP9UT78HEL1V ± S06E      UL      UL        90      3500      SCP9UT78HEL1X ± S06E		6500	SCP7P178HEL1P☆S06E	PU	PU
NU      WU        3000      SCP8VT78HEL1V \$\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		0700		WL	WL
3000SCP8VT78HELIV::SOGEVUVU3500SCP8UT78HELIV::SOGEULUL3500SCP8UT78HELIT::SOGEUUUU4000SCP8T78HELIT::SOGETLTL5000SCP8T78HELIR::SOGERLRL5000SCP8T78HELIR::SOGEQLQL5700SCP80T78HELIQ::SOGEQLQL6500SCP80T78HELIQ::SOGEQLQL6500SCP80T78HELIP::SOGEPLPL6500SCP80T78HELIP::SOGEPUPU700SCP80T78HELIV::SOGEWLWL3000SCP90T78HELIV::SOGEVLVL903500SCP90T78HELIV::SOGEULUL4000SCP90T78HELIV::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000SCP90T78HELIT::SOGEULUL4000 <td></td> <td>2700</td> <td>SCP8W178HEL1W ☆ S06E</td> <td>WU</td> <td>WU</td>		2700	SCP8W178HEL1W ☆ S06E	WU	WU
VUVU3500SCP8UT78HEL1U:::SOGEULUL4000SCP8TT78HEL1T:::SOGETLTL4000SCP8TT78HEL1T:::SOGETUTU5000SCP8TT78HEL1R::SOGERLRL5000SCP8TT78HEL1R::SOGERURU6500SCP8OT78HEL1Q::SOGEQLQL6500SCP8OT78HEL1Q::SOGEQLQU6500SCP8OT78HEL1P::SOGEPLPL6500SCP8OT78HEL1P::SOGEPUPU700SCP8OT78HEL1P::SOGEWLWL3000SCP9VT78HEL1V::SOGEWUWU903500SCP9UT78HEL1V::SOGEULUL4000SCP9UT78HEL1U::SOGEULUL4000SCP9TT8HEL1T::SOGEULUL4000SCP9TT8HEL1T::SOGEULUL5000SCP9TT8HEL1T::SOGEULUL4000SCP9TT8HEL1T::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL5000SCP9TT8HEL1R::SOGEULUL <td></td> <td>0000</td> <td></td> <td>VL</td> <td>VL</td>		0000		VL	VL
$\begin{array}{ c c c c c } & & & & & & & & & & & & & & & & & & &$		3000	SCP8V178HEL1V☆S06E	VU	VU
8040003CP8TT78HELIT\$:\$S06ETLTLTUTUTUTU5000SCP8RT78HELIT\$:\$S06ERLRL5000SCP8RT78HELIT\$:\$S06EQLQL5700SCP8QT78HELIQ\$:\$S06EQLQL6500SCP8PT78HELIP\$:\$S06EPLPL6500SCP8PT78HELIP\$:\$S06EPUPU6500SCP8PT78HELIP\$:\$S06EWLWL700SCP9VT78HELIV\$:\$S06EWLWL903000SCP9VT78HELIV\$:\$S06EVLVL903500SCP9VT78HELIV\$:\$S06EULUL4000SCP9T78HELIV\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL4000SCP9T78HELIT\$:\$S06EULUL <td></td> <td>0500</td> <td></td> <td>UL</td> <td>UL</td>		0500		UL	UL
804000SCP8TT78HEL1T \(\xispacesside)TUTU100SCP8TT78HEL1R \(\xispacesside)RLRL100SCP8TT78HEL1R \(\xispacesside)QLQL100SCP8QT78HEL1Q \(\xispacesside)QLQL100SCP8QT78HEL1Q \(\xispacesside)QLQL100SCP8PT78HEL1P \(\xispacesside)PLPL100SCP8PT78HEL1P \(\xispacesside)PUPU100SCP9VT78HEL1V \(\xispacesside)WLWL100SCP9VT78HEL1V \(\xispacesside)VLVL100SCP9VT78HEL1V \(\xispacesside)VLVL100SCP9VT78HEL1V \(\xispacesside)ULUL100SCP9T78HEL1V \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1T \(\xispacesside)ULUL100SCP9T78HEL1R \(\xispacesside)ULUL100SCP9T78HEL1R \(\xispacesside)SCP9T78HEL1R \(\xispacesside)SCP9T78HEL1R \(\xispacesside)100SCP9T78HEL1T \(\xispacesside)SCP9T78HEL1R \(\xispacesside)SC		3500	SCP8UT78HEL1U☆S06E	UU	UU
$\begin{array}{c c c c c c } & & & & & & & & & & & & & & & & & & &$		1000		TL	TL
$ \frac{5000}{5000} \frac{SCP8RT78HEL1R \pm S06E}{RU} \frac{RU}{RU} \\ \frac{RU}{RU} \frac{RU}{RU} \\ \frac{RU}{RU}$	80	4000	SCP81178HEL11☆S06E	TU	TU
$\frac{\mbox{RU}}{\mbox{RU}} \\ \begin{tabular}{ c c c c } \hline \mbox{RU}}{\mbox{Figure}} & \end{tabular}{\mbox{RU}} & \end{tabular}{\mb$				RL	RL
$\frac{1}{1000} \frac{1}{1000} \frac{1}{1000$		5000	SCP8R178HEL1R☆S06E	RU	RU
$\begin{array}{c c c c c c } & & & & & & & & & & & & & & & & & & &$				QL	QL
6500      SCP8PT78HEL1P☆S06E      PU      PU        PU      PU      WL      WL      WL      WL      WL      WL      WU      WU <td></td> <td>5700</td> <td>SCP8QT78HEL1Q☆ S06E</td> <td>QU</td> <td>QU</td>		5700	SCP8QT78HEL1Q☆ S06E	QU	QU
$\begin{array}{c c c c c c c } & & & & & & & & & & & & & & & & & & &$				PL	PL
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		6500	SCP8PT78HEL1P☆S06E	PU	PU
				WL	WL
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		2700	SCP9WT78HEL1W ☆ S06E	WU	WU
$\begin{array}{c c} & & & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ & & & \\ & & & \\ & & & & \\$				VL	VL
90 3500 SCP9UT78HEL1U\$\$06E UU UU 4000 SCP9TT78HEL1T\$\$06E UL UL 5000 SCP9RT78HEL1R\$\$06E UL UL		3000	SCP9VT78HEL1V☆S06E	VU	VU
UU      UU        4000      SCP9TT78HEL1T☆S06E      UL      UL        5000      SCP9RT78HEL1R☆S06E      UL      UU				UL	UL
4000 SCP9TT78HEL1T☆S06E UU UU 5000 SCP9RT78HEL1R☆S06E UL UL	90	3500	SCP9UT78HEL1U☆S06E	UU	UU
UU      UU        5000      SCP9RT78HEL1R☆S06E				UL	UL
5000 SCP9RT78HEL1R☆S06E		4000	SCP9TT78HEL1T☆S06E	UU	UU
5000 SCP9RT78HEL1R☆S06E UU UU				UL	UL
		5000	SCP9RT78HEL1R☆S06E	UU	UU

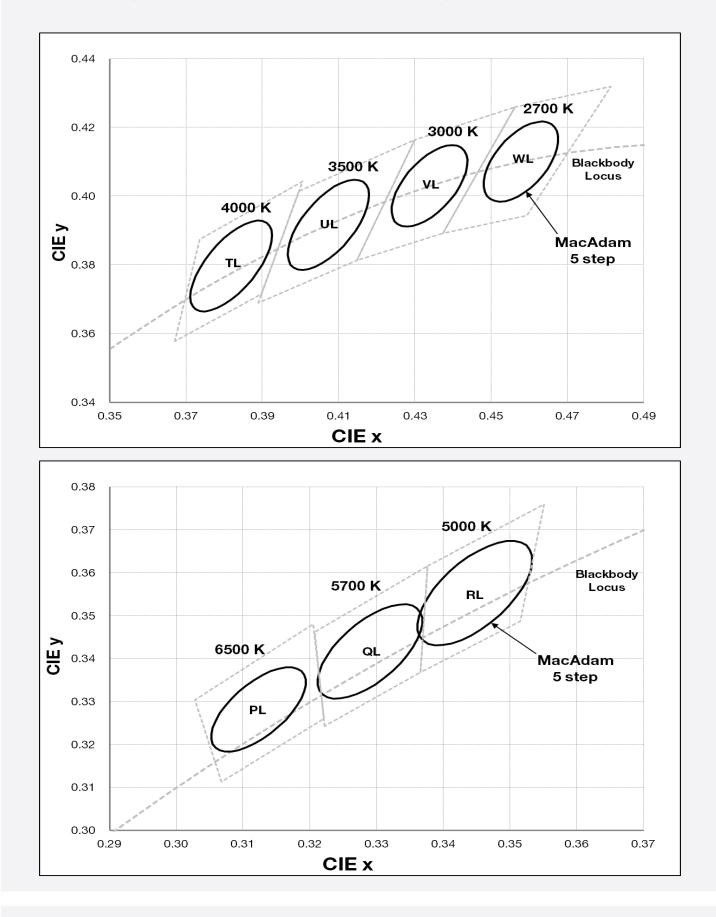
Note: "☆" can be "L" (Single bin for MacAdam 5-step), "U" (Single bin for MacAdam 3-step)

# SAMSUNG

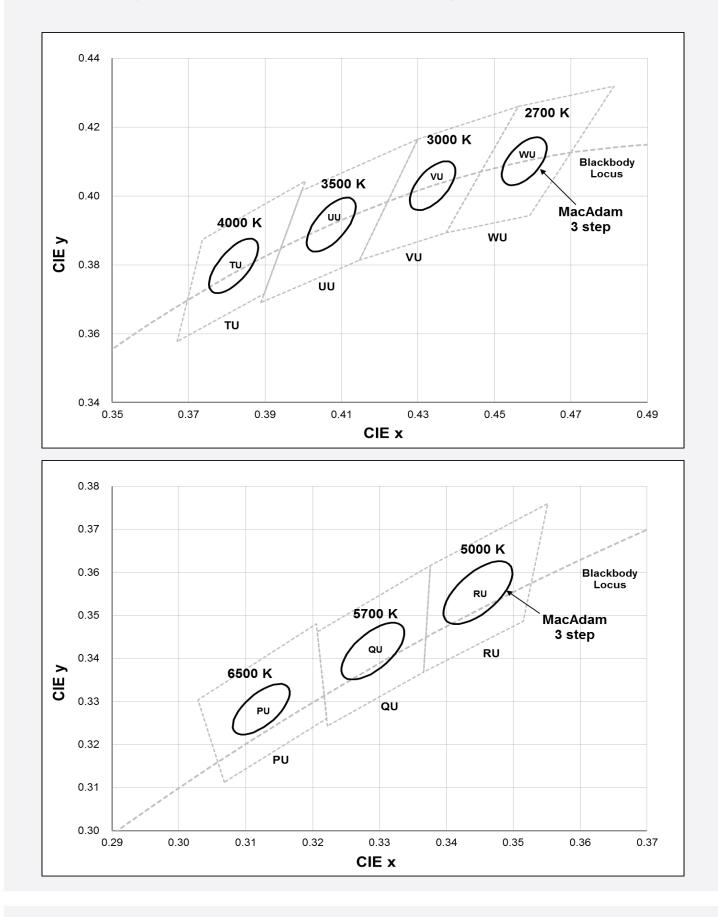
b) Color Bins (I<sub>F</sub> = 150 mA,  $T_s = 85 \ ^{\circ}C$ )

### c) Voltage Bins (I<sub>F</sub> = 150 mA, $T_s = 85 \ ^{\circ}C$ )

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

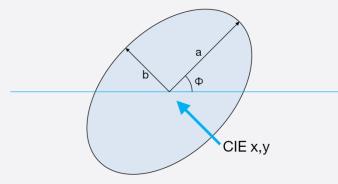


### d) Chromaticity Region & Coordinates (I<sub>F</sub> = 150 mA, T<sub>s</sub> = 85 °C) : "L" (Single bin for MacAdam 5-step)



### d) Chromaticity Region & Coordinates (I<sub>F</sub> = 150 mA, T<sub>s</sub> = 85 °C) : "U" (Single bin for MacAdam 3-step)

### d) Chromaticity Region & Coordinates (IF = 150 mA, Ts = 85 °C)

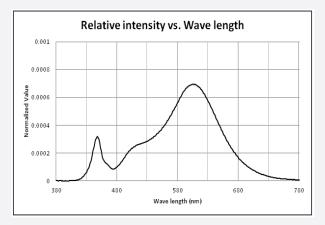


	ССТ	Cer	nter point	Major-axis	Minor-axis	Rotation
	(K)	CIE x	CIE y		b	Φ
	2700	0.4578	0.4101	0.0081	0.0042	53.70
	3000	0.4338	0.4030	0.0083	0.0041	53.22
	3500	0.4073	0.3917	0.0093	0.0041	54.00
3 step (U code)	4000	0.3818	0.3797	0.0094	0.0040	53.72
	5000	0.3447	0.3553	0.0082	0.0035	59.62
	5700	0.3287	0.3417	0.0075	0.0032	59.10
	6500	0.3123	0.3282	0.0067	0.0029	58.57
	2700	0.4578	0.4101	0.0135	0.0070	53.70
	3000	0.4338	0.4030	0.0138	0.0068	53.22
	3500	0.4073	0.3917	0.0155	0.0068	54.00
5 step (L code)	4000	0.3818	0.3797	0.0157	0.0067	53.72
	5000	0.3447	0.3553	0.0137	0.0058	59.62
	5700	0.3287	0.3417	0.0125	0.0053	59.10
	6500	0.3123	0.3282	0.0112	0.0048	58.57

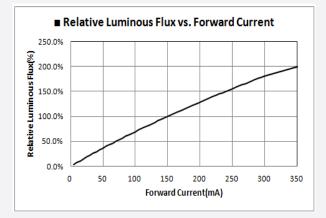
### 3. Typical Characteristics Graphs

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

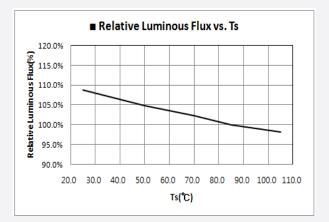
CCT: 2700 K, CRI80



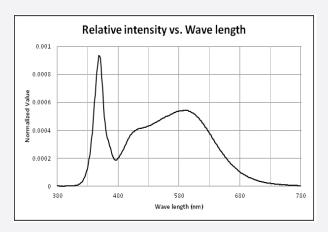
### b) Forward Current Characteristics (T<sub>s</sub> = 85 °C)

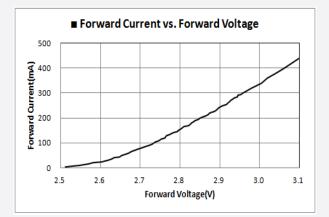


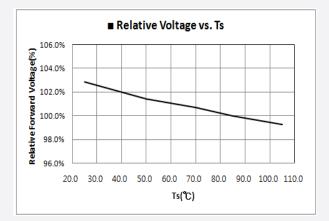
### c) Temperature Characteristics (I<sub>F</sub> = 150 mA)



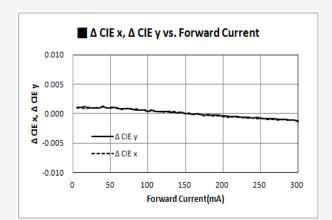
CCT: 5000 K, CRI80

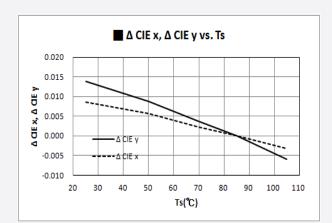




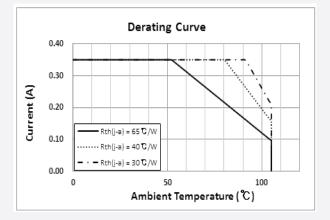






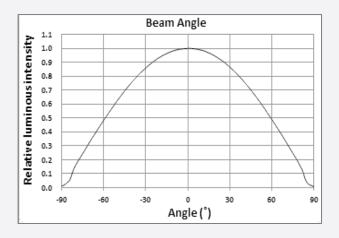


### e) Derating Curve



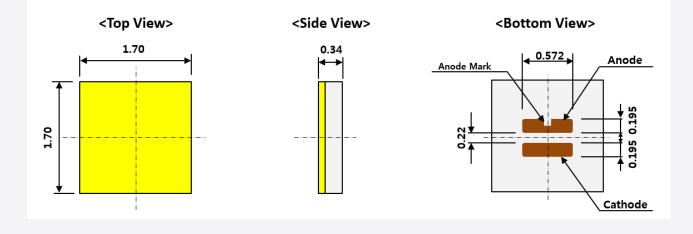
 $R_{th}$  is measured after soldering of LED chip on the metal based substrate. \*metal: aluminum (refer to page 17)

### f) Beam Angle Characteristics (I<sub>F</sub> =150 mA)



### 4. Outline Drawing & Dimension

- 1. Tolerance is ±0.1mm (only height ±0.06 mm)
- 2. Do not place LEDs with pressure



- Measurement unit: mm
- Tolerance: ±0.1mm (only height ±0.06 mm)

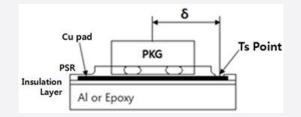
#### **Precautions:**

- 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.
- 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.

#### Ts Point & Measurement Method:

Measure nearest point from the center of LED chip  $(\delta)$  as shown below.

- Distance between chip center and  $T_s$  point ( $\delta$ ) = 3.5 mm
- $T_j = T_s + Power x$  Thermal resistance at  $T_s (R_{j-s})$



### **Precautions:**

- 4) This LED chip PKG does not contain built-in ESD protection device.
- 5) 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.
- 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.
- 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 °C, Derated max current	1000 h
High Temperature Life Test	85 °C, Derated max current	1000 h
High Temperature Humidity Life Test	85 °C, 85 % RH, Derated max current	1000 h
Low Temperature Life Test	-40 °C, DC Derated max current	1000 h
Powered Temperature Cycle Test	-45 °C / 20 min $\leftrightarrow$ 85 °C / 20 min, sweep 100 min cycle on/off: each 5 min, Derated max current	100 cycles
Temperature Cycling	-45 °C / 15 min ↔ 125 °C / 15 min → Hot plate 180 °C	500 cycles
High Temperature Storage	120 °C	1000 h
Low Temperature Storage	-40 °C	1000 h
ESD (HBM)	R1:      10 ΜΩ        R2:      1.5 kΩ        C:      100 pF        777      V:      ±2 kV	5 times
Vibration Test	20~2000~20 Hz, 200 m/s², sweep 4 min X, Y, Z 3 direction, each 1 cycle	4 cycles
Mechanical Shock Test	1500 g, 0.5 ms	5 cycles

### b) Criteria for Judging the Damage

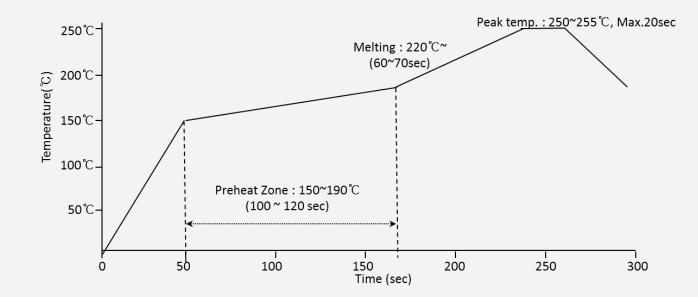
	ltom	Symbol	Test Condition	Limit	
	ltem	Зуший	(Ts = 25 °C)	Min	Max
	Forward Voltage	VF	$I_F$ = Derated max current	Init. Value * 0.9	Init. Value * 1.1
	Luminous Flux	Φν	$I_F$ = Derated max current	Init. Value * 0.7	Init. Value * 1.1



### 6. Soldering Conditions

### a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



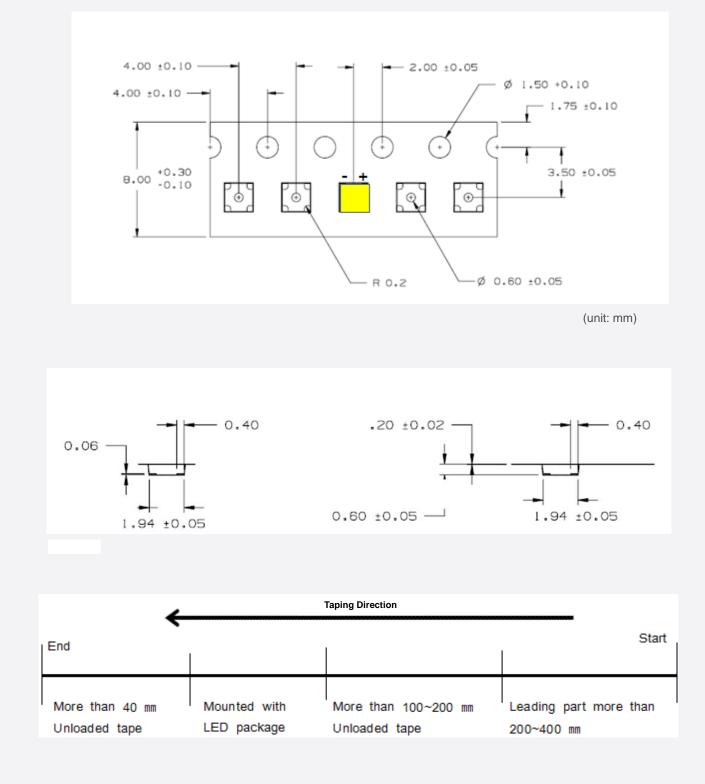
### b) Manual Soldering Conditions

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

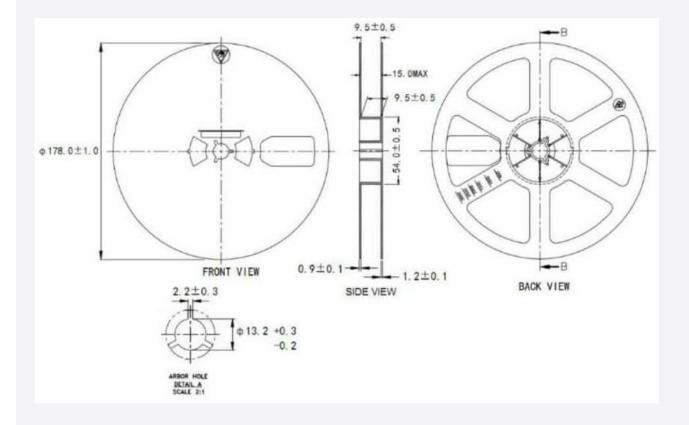
## 20

### 7. Tape & Reel

### a) Taping Dimension



### b) Reel Dimension

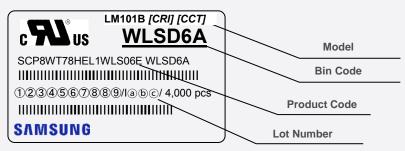


### Notes:

- 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

### Bin Code:

(a) (b): Chromaticity bin (refer to page 10-14)

©d: Luminous Flux bin (refer to page 7-9)

(e) f): Forward Voltage bin (refer to page 11)

#### b) Lot Number

The lot number is composed of the following characters:

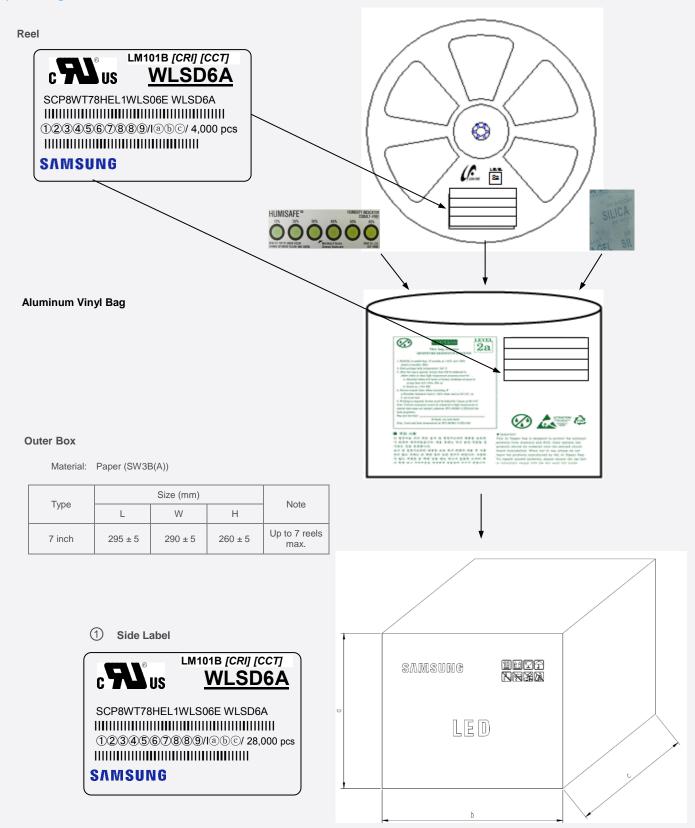


(123456789/labc /4,000 pcs

(1)(2)	:	Production site (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 (1~9, A, B, C)
6	:	Day (1~9, A, B~V)
789	:	Product serial number (001 ~ 999)
abc	:	Reel number (001 ~ 999) or (AAA ~ ZZZ)

### 9. Packing Structure

#### a) Packing Process



#### b) Aluminum Vinyl Packing Bag



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



# HUMIDITY INDICATOR COBALT-FREE 10% 20% 30% 40% 50% 60% O O O O O O O O O Marting of SPEER COOR CHARGE BITWILIN HOLDWI AND GREEN OF COMPACE AND COMPACE

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### 10. Precautions in Handling & Use

- 1) For over-current-proof function, customers are recommended to apply resistors to prevent sudden change of the current caused by slight shift of the voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use.
- 3) When the LEDs illuminate, operating current should be decided after considering the ambient maximum 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 by a sealed container with nitrogen gas injected (shelf life of sealed bags: 12 months, temperature ~40 °C, ~90 % RH).
- 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</li>
- 6) Repack unused products 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) Devices must be baked for 1 hour at  $60 \pm 5$  °C, if baking is required.
- 9) The LEDs are sensitive to the static electricity and surge. 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 leak 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). 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 (CI) 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.

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