

\*Customer:

# SPECIFICATION

<b>ITEM</b>	<b>TOP LED DEVICE</b>
<b>MODEL</b>	<b>SSC-HBMGFRT825</b>

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## 1. Features

- Pb-free Reflow Soldering application
- RoHS Compliant
- Material : InGaN(Blue) / InGaN(Green) / AlInGaP(Red)
- 6-Pin (R,G,B separate) type
- Suitable for all SMT assembly methods ; Suitable for all soldering methods
- Encapsulating Resin : Epoxy Resin
- White colored SMT package and colorless clear window

## 2. Application

- Full Color Display
- Indoor and outdoor displays
- LCD Backlights etc.
- Indicator

## 3. Absolute Maximum Ratings <sup>\*1</sup>

( $T_a=25^{\circ}\text{C}$ )

Parameter	Symbol	Value			Unit
		Red	Green	Blue	
Forward Current	$I_F$	30	30	30	mA
Forward Peak Surge Current <sup>*2</sup>	$I_{FM}$	100	100	100	mA
Reverse Voltage (per die)	$V_R$	5			V
Power Dissipation	$P_d$	81 <sup>*3</sup>	120 <sup>*3</sup>	120 <sup>*3</sup>	mW
		263 <sup>*4</sup>			
Operating Temperature	$T_{opr}$	-40 ~ +100			$^{\circ}\text{C}$
Storage Temperature	$T_{stg}$	-40 ~ +100			$^{\circ}\text{C}$

\*1 Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.

\*2  $I_{FM}$  was measured at  $T_w \leq 1\text{msec}$  of pulse width and  $D \leq 1/10$  of duty ratio.

\*3 The value for one LED device.(Single color)

\*4 The value for total power dissipation when two and more devices are lit simultaneously.

#### 4. Electro-Optical Characteristics

( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Forward Voltage	Red	$V_F$	$I_F=20\text{mA}$	1.8	2.25	2.7	V
	Green		$I_F=20\text{mA}$	2.8	3.3	4.0	
	Blue		$I_F=20\text{mA}$	2.8	3.3	3.8	
Reverse Current	Red	$I_R$	$V_R=5\text{V}$ (per die)	-	-	10	$\mu\text{A}$
	Green			-	-	10	
	Blue			-	-	10	
Luminance Intensity *1	Red	$I_V$	$I_F=20\text{mA}$	120	275	430	mcd
	Green		$I_F=20\text{mA}$	270	578	880	
	Blue		$I_F=20\text{mA}$	85	188	290	
Peak Wavelength	Red	$\lambda_p$	$I_F=20\text{mA}$	-	640	-	nm
	Green		$I_F=20\text{mA}$	-	521	-	
	Blue		$I_F=20\text{mA}$	-	464	-	
Dominant Wavelength	Red	$\lambda_d$	$I_F=20\text{mA}$	623	630	636	nm
	Green		$I_F=20\text{mA}$	520	528	537	
	Blue		$I_F=20\text{mA}$	465	470	477	
Spectral Bandwidth	Red	$\Delta\lambda$	$I_F=20\text{mA}$	-	20	-	nm
	Green		$I_F=20\text{mA}$	-	35	-	
	Blue		$I_F=20\text{mA}$	-	26	-	
Viewing Angle *2	R, G, B	$2\theta_{1/2}$	$I_F=20\text{mA}$ (per die)	-	120	-	deg.

\*1 The luminous intensity  $I_V$  was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package.  
Luminous Intensity Measurement allowance is  $\pm 10\%$

\*2  $2\theta_{1/2}$  is the off-axis where the luminous intensity is 1/2 of the peak intensity.

[Note] All measurements were made under the standardized environment of SSC.

## 5. Rank of HBMGFRT825

### 1) Special binning (White balance)

X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>
VF	Iv	Iv	λd	W-Color Rank

### 2) General binning (RGB balance binning)

X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>
VF	Iv	Iv	λd

### ▣ Luminous Intensity [Iv]

Rank Name	R		Rank Name	G		Rank Name	B		Rank Name	Total Iv	
	MIN	MAX		MIN	MAX		MIN	MAX		MIN	MAX
N	120	185	N	270	400	N	85	125	TN	475	710
O	185	280	O	400	600	O	125	190	TO	710	1070
P	280	430	P	600	880	P	190	290	TP	1070	1600

Mix Rank Name	R	G	B
NN	N	N	N
OO	O	O	O
PP	P	P	P
NO	O	N	N
	N	O	N
	N	N	O
ON	N	O	O
	O	N	O
	O	O	N
OP	P	O	O
	O	P	O
	O	O	P
PO	O	P	P
	P	O	P
	P	P	O

Mix Rank Name	R	G	B
NP	P	N	N
	N	P	N
	N	N	P
PN	N	P	P
	P	N	P
	P	P	N
XX	N	O	P
	P	N	O
	O	P	N

### ▣ Dominant Wavelength [λd]

Rank Name	R		G		B	
	MIN	MAX	MIN	MAX	MIN	MAX
A	620	635	520	527	467.5	472
B	620	635	530	537	472.5	477
C	620	635	520	537	465	477

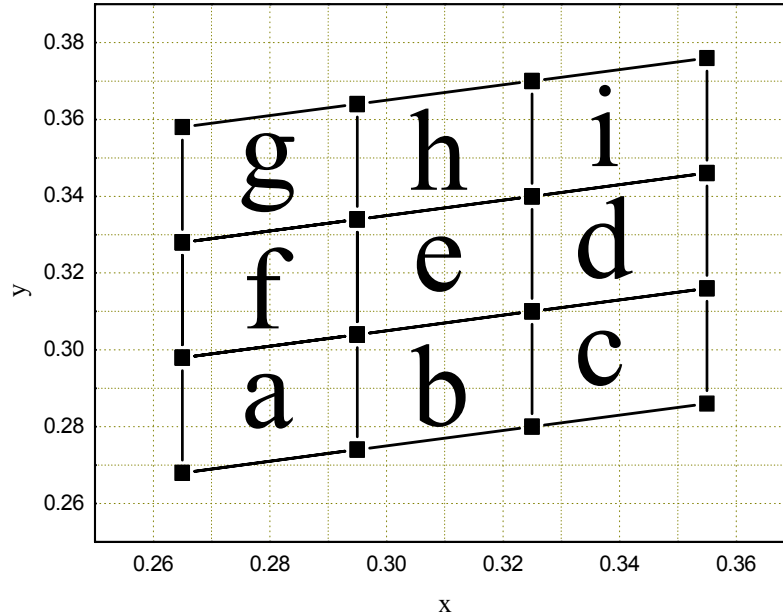
### ▣ Forward Voltage

Rank Name	R		G		B	
	MIN	MAX	MIN	MAX	MIN	MAX
1	2.0	2.5	3.1	3.6	3.1	3.5
2	1.8	2.7	2.8	4.0	2.8	3.8

## 6. White balance Color Rank

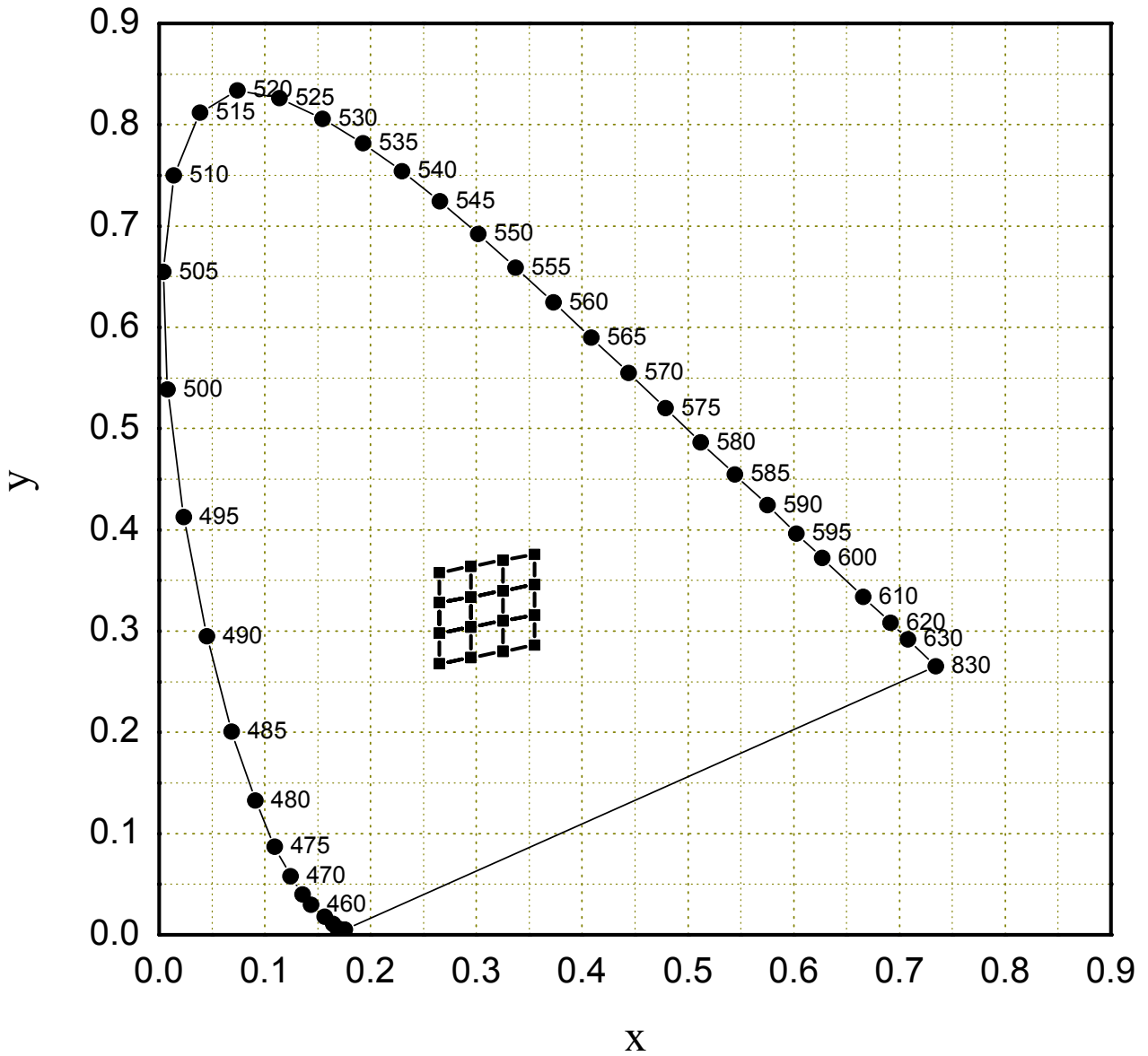
### ◆ Color Group : Natural White

- Color Coordinates (typ.): x 0.31 , y 0.32
- IF Condition = 15mA for Red / 20mA for Green / 8mA for Blue
- Color Rank : a, b, c, d, e, f, g, h, i (9 BIN)
  - \*1Bin Cell Size : x0.03, y0.036
  - \*9Bin Total Cell Size : x0.09, y0.108



a		b		c		d		e	
x	y	x	y	x	y	x	y	x	y
0.265	0.268	0.295	0.274	0.325	0.280	0.325	0.310	0.295	0.304
0.295	0.274	0.325	0.280	0.355	0.286	0.355	0.316	0.325	0.310
0.295	0.304	0.325	0.310	0.355	0.316	0.355	0.346	0.325	0.340
0.265	0.298	0.295	0.304	0.325	0.310	0.325	0.340	0.295	0.334

f		g		h		i	
x	y	x	y	x	y	x	y
0.265	0.298	0.265	0.328	0.295	0.334	0.325	0.340
0.295	0.304	0.295	0.334	0.325	0.340	0.355	0.346
0.295	0.334	0.295	0.364	0.325	0.370	0.355	0.376
0.265	0.328	0.265	0.358	0.295	0.364	0.325	0.370



## 7. Rank Name Table

### 1) Special binning (White balance)

$X_1$	$X_2$	$X_3$	$X_4$	$X_5$
Mix VF	Mix Iv	Mix Iv	Mix $\lambda$ d	W-Color Rank

Label Name	Rank Name	Label Name	Rank Name	Label Name	Rank Name
1	1TNCa	10	1TOCa	19	1TPCa
2	1TNCb	11	1TOCb	20	1TPCb
3	1TNCc	12	1TOCc	21	1TPCc
4	1TNCd	13	1TOCd	22	1TPCd
5	1TNCE	14	1TOCe	23	1TPCe
6	1TNCf	15	1TOCf	24	1TPCf
7	1TNCg	16	1TOCg	25	1TPCg
8	1TNCh	17	1TOCh	26	1TPCh
9	1TNCi	18	1TOCi	27	1TPCi

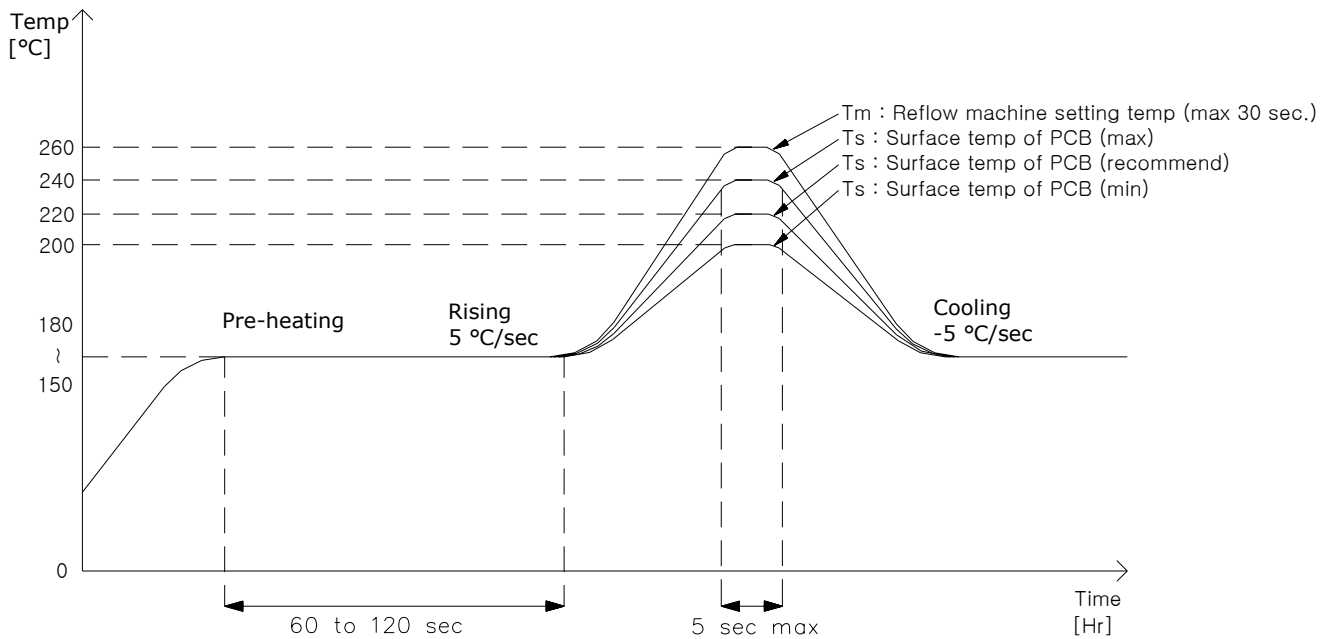
### 2) General binning (RGB balance binning)

$X_1$	$X_2$	$X_3$	$X_4$
Mix VF	Mix Iv	Mix Iv	Mix $\lambda$ d

Label Name	Rank Name	Label Name	Rank Name	Label Name	Rank Name
28	2NNA	38	2NNB	48	2NNC
29	2OOA	39	2OOB	49	2OOC
30	2PPA	40	2PPB	50	2PPC
31	2NOA	41	2NOB	51	2NOC
32	2ONA	42	2ONB	52	2ONC
33	2OPA	43	2OPB	53	2OPC
34	2POA	44	2POB	54	2POC
35	2NPA	45	2NPB	55	2NPC
36	2PNA	46	2PNB	56	2PNC
37	2XXA	47	2XXB	57	2XXC

## 8. Soldering Profile

### (1) Reflow Soldering Conditions / Profile (Lead Free Solder)



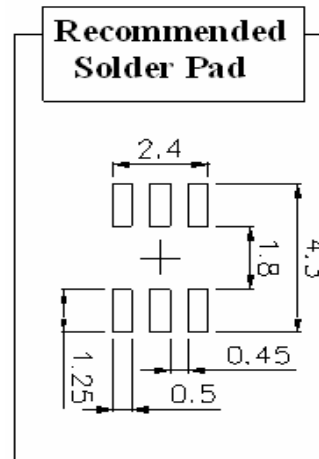
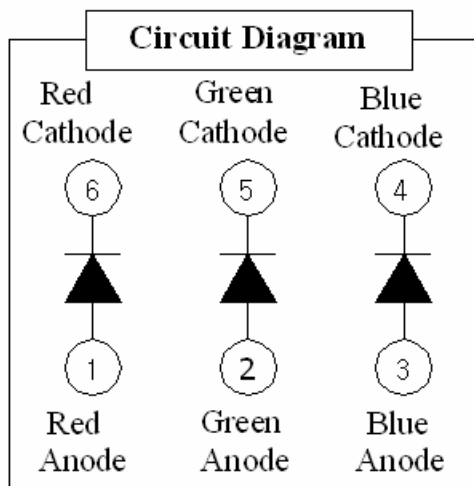
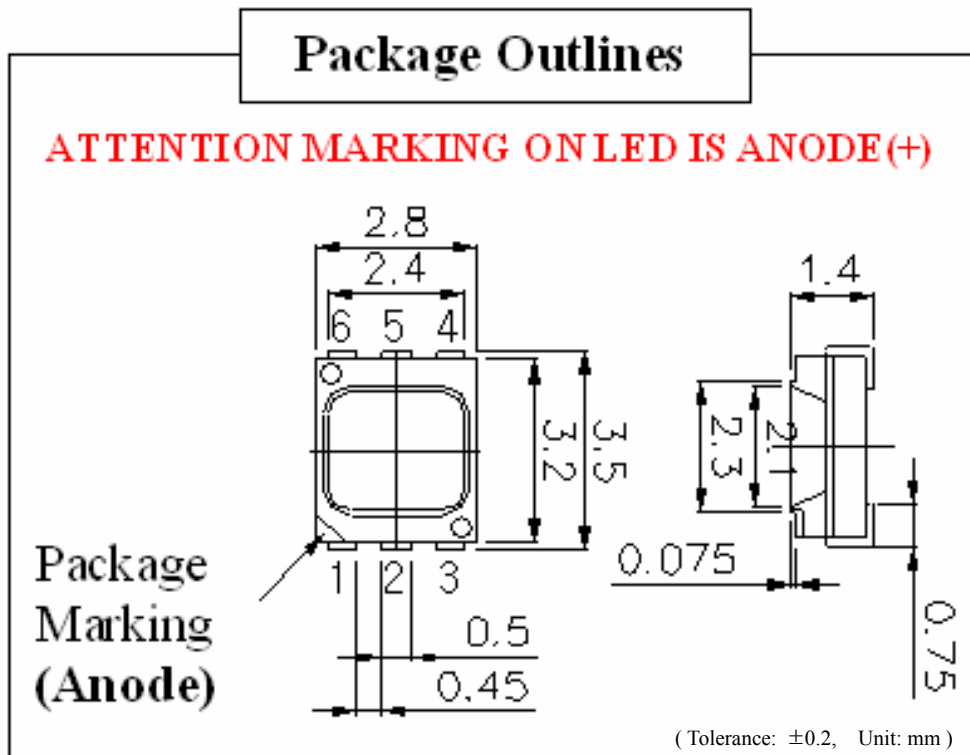
### (2) Hand Soldering conditions

Do not exceed 4 seconds at maximum 315°C under soldering iron.

Note : In case that the soldered products are reused in soldering process, we don't guarantee the products.



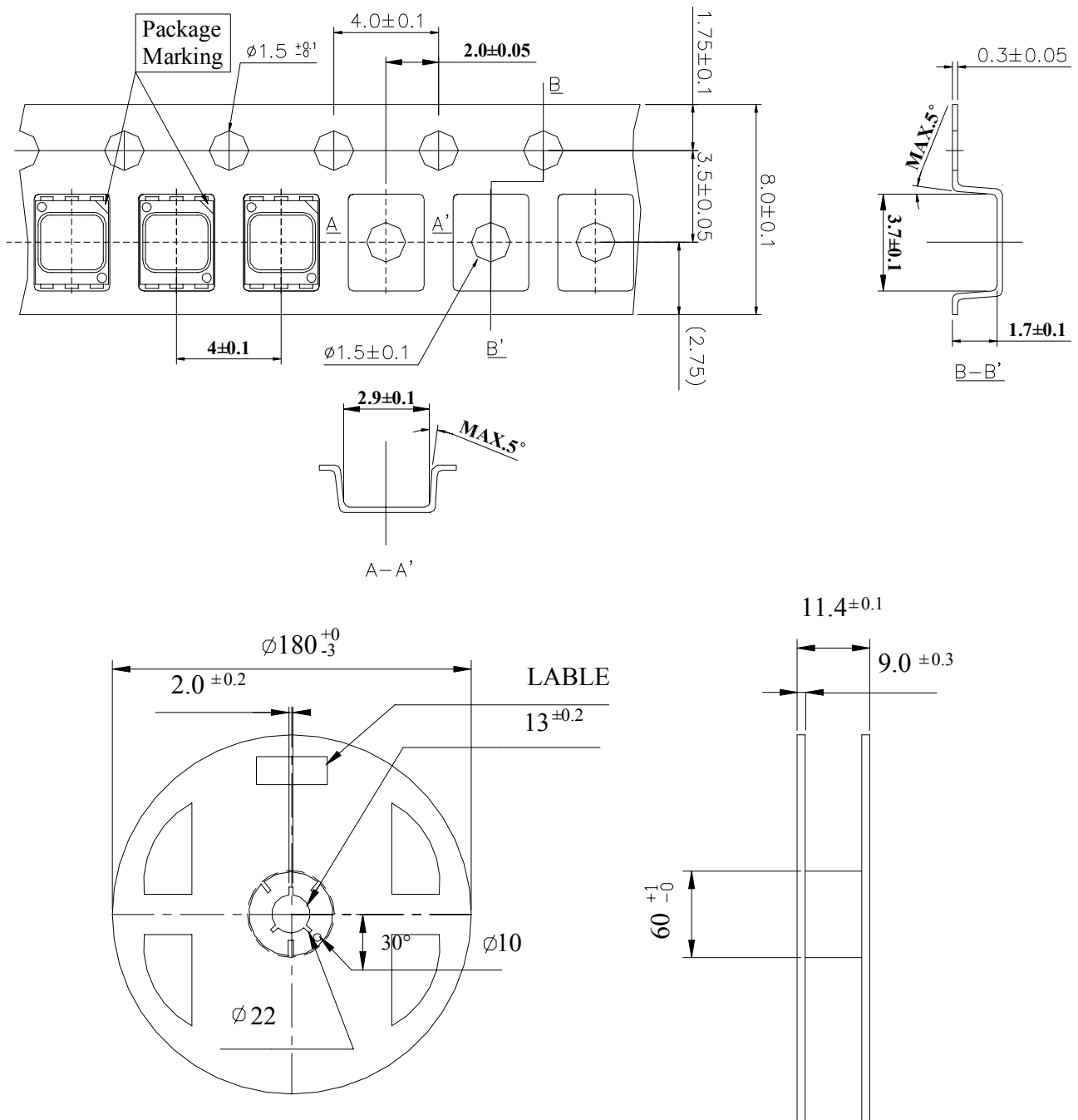
## 9. Outline Dimension And Material



### \* MATERIALS

PARTS	MATERIALS
Package	Heat-Resistant Polymer
Encapsulating Resin	Epoxy Resin
Electrodes	Ag Plating Copper Alloy

## 10. Packing



(1) Quantity : 2000 pcs/Reel

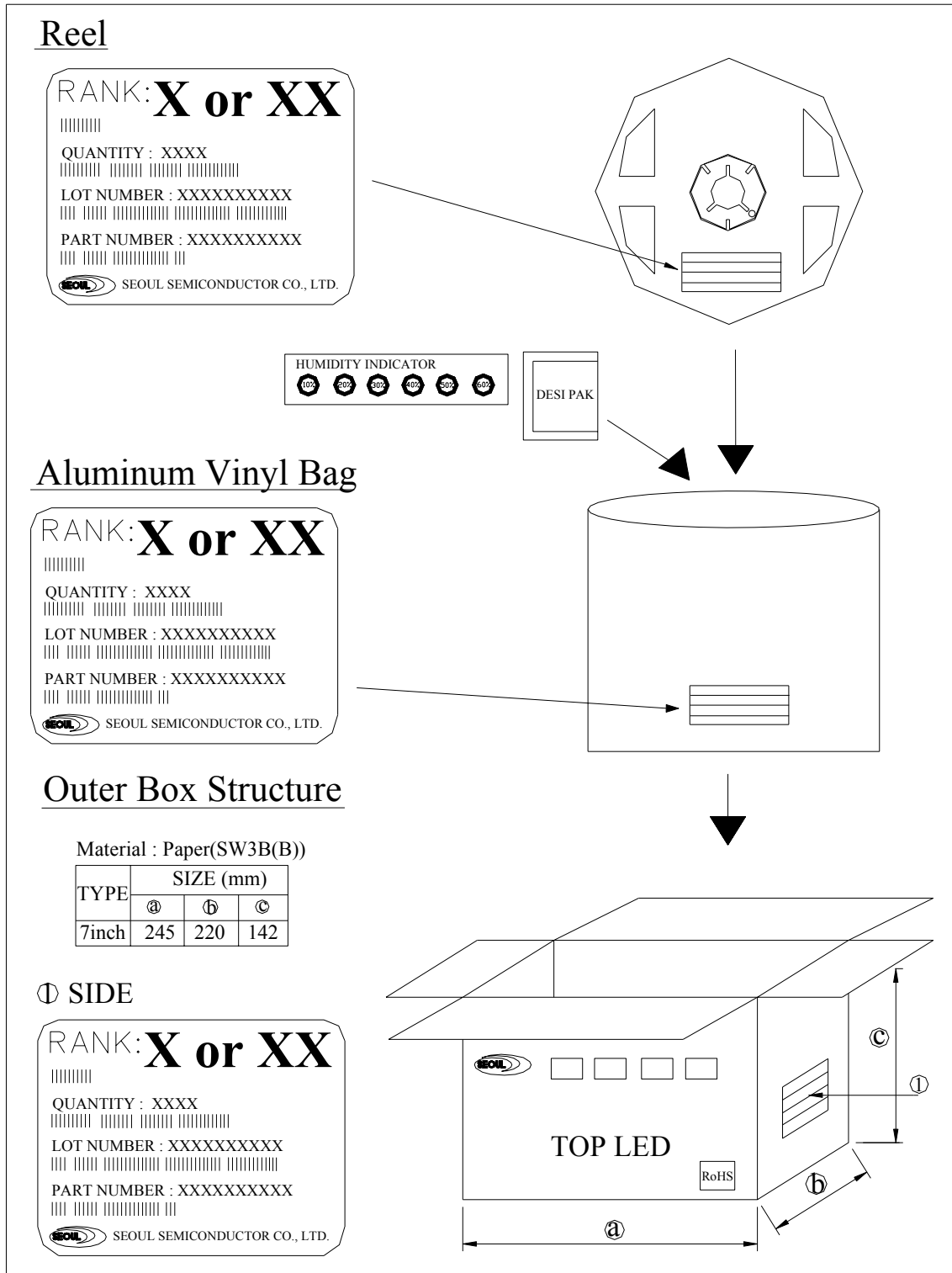
(Tolerance:  $\pm 0.2$ , Unit: mm)

(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be  $\pm 0.2$ mm

(3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of  $10^\circ$  to the carrier tape

(4) Package : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

## 11. Reel Packing Structure



**12. Lot Number**

**The lot number is composed of the following characters;**

**HBMGFRT**○□□◎◎ #~#

**HBMGFRT**    **First Part Name**

○        **Year** (6 for 2006, 7 for 2007, 8 for 2008 )

□□      **Month** ( 01 for Jan., 02 for Feb.,.....11 for Nov., 12 for Dec.)

◎◎      **Day** ( 01, 02, 03, 04, .....28, 29, 30, 31.)

#~#      **The number of the internal quality control**

RANK: **X or XX**

|||||||

QUANTITY : 2000

|||||||    |||||    |||||    |||||

LOT NUMBER : HBMGFRT70322 01 512

||||    ||||    |||||    |||||    |||||    |||||    |||||    |||||

PART NUMBER : HBMGFRT825

||||    |||||    |||||    |||||    |||||



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### 13. Precaution for use

#### (1) Storage

In order to avoid the absorption of moisture, it is recommended to store in a dry box (or a desiccator) with a desiccant. Otherwise, to store them in the following environment is recommended.

Temperature : 5°C ~30°C Humidity : maximum 70%RH

#### (2) Attention after open.

LED is correspond to SMD, when LED be soldered dip, interfacial separation may affect the light transmission efficiency, causing the light intensity to drop. Attention in followed;

Keeping of a fraction

Temperature : 5 ~ 40°C Humidity : less than 10%

(3) In the case of more than 1 week passed after opening or change color of indicator on desiccant, components shall be dried 10-12hr. at  $60\pm 5^{\circ}\text{C}$ .

(4) Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.

(5) Quick cooling shall be avoided.

(6) Components shall not be mounted on warped direction of PCB.

(7) Anti radioactive ray design is not considered for the products.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent etc. When washing is required, IPA should be used.

(9) When the LEDs are illuminating, operating current should be decided after considering the ambient maximum temperature.

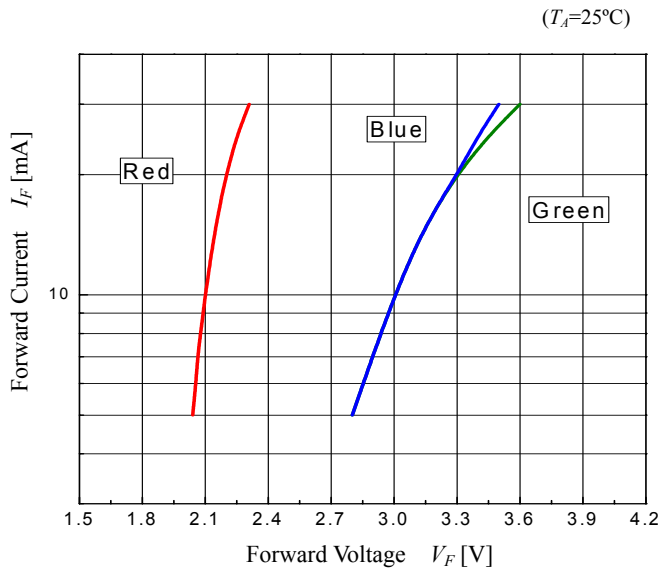
(10) The LEDs must be soldered within seven days after opening the moisture-proof packing.

(11) Repack unused products with anti-moisture packing, fold to close any opening and then store in a dry place.

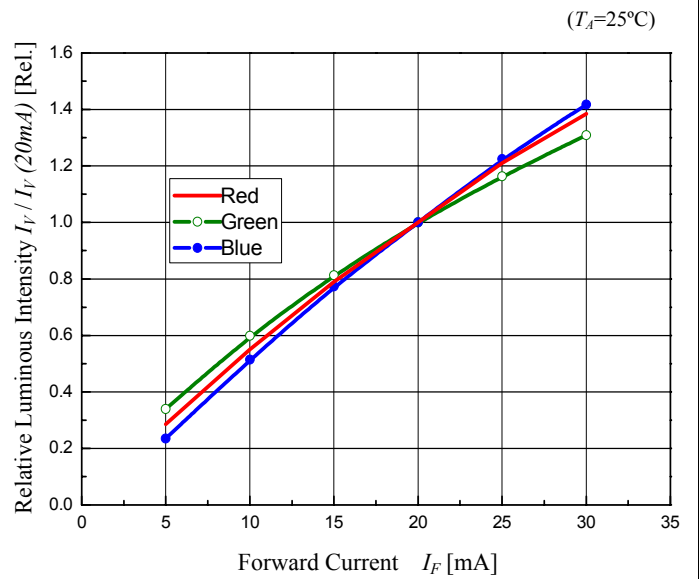
(12) The appearance and specifications of the product may be modified for improvement without notice.

## 14. Characteristic Diagram

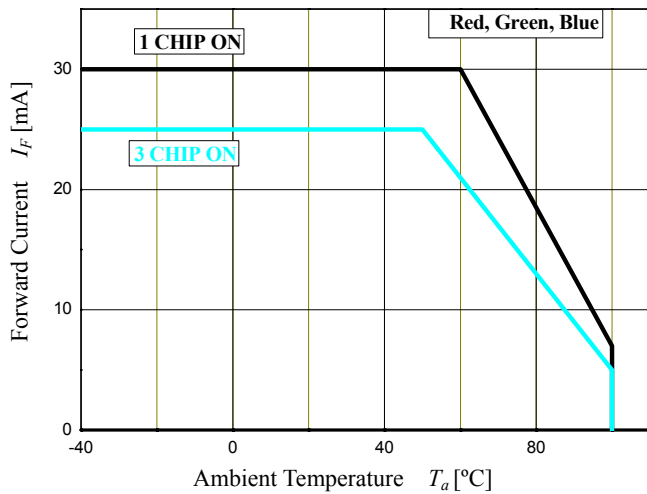
Forward Current vs. Forward Voltage



Relative Luminous Intensity vs. Forward Current



Ambient Temperature vs. Power Dissipation



Radiation Diagram

