

Customer :

SPECIFICATION

ITEM	5450 1.6T TOP VIEW LED DEVICE
MODEL	MRGBHT114
PART NO.	

Customer		
Approved by	Approved by	Approved by
/	/	/

Supplier		
Drawn by	Checked by	Approved by
/	/	/



CONTENTS

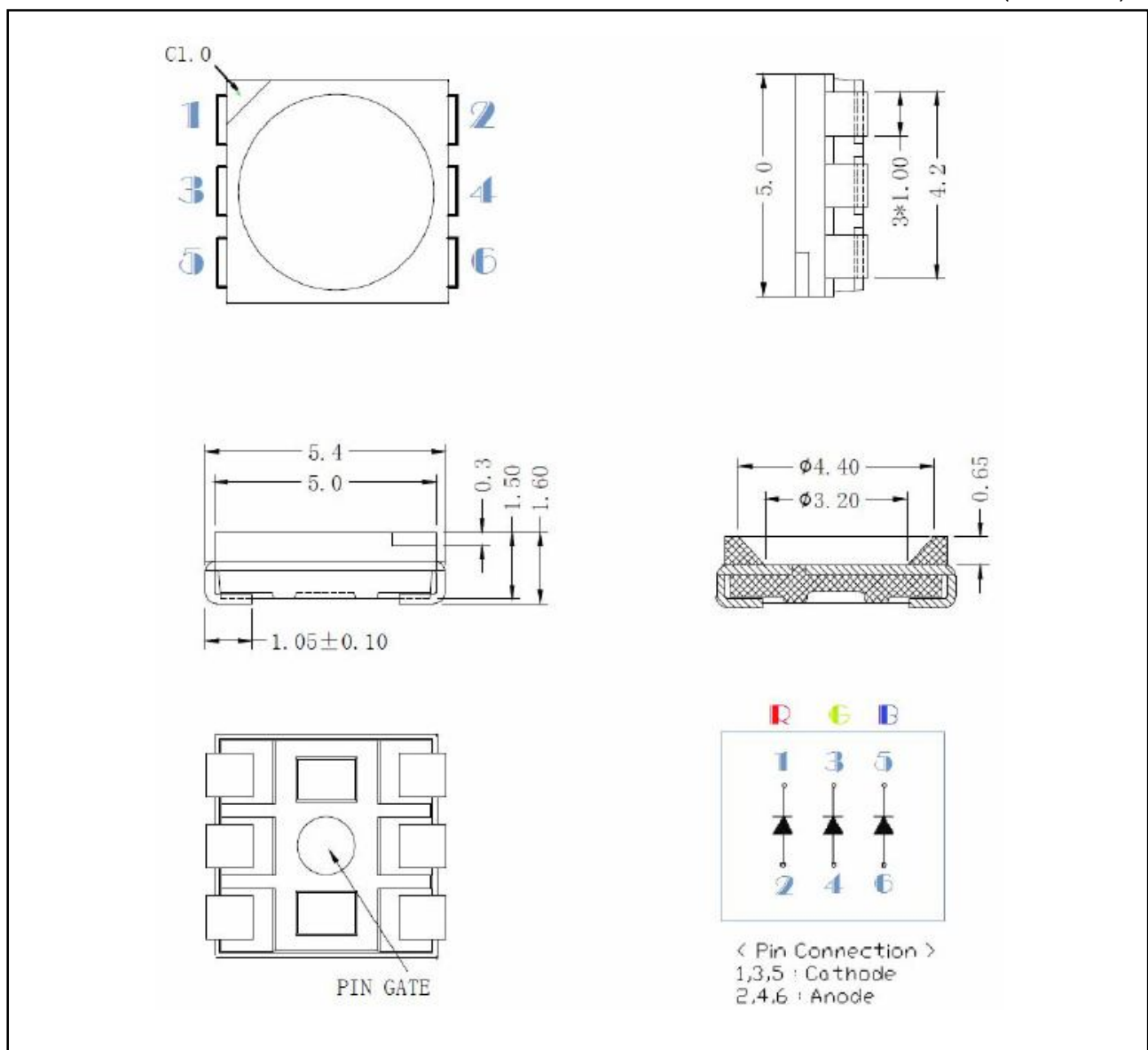
1. Feature	..... 3 / 14
2. Outline Dimension	..... 3 / 14
3. Specifications	..... 4~5 / 14
4. Reliability	..... 6 / 14
5. Typical Characteristic Curves	..... 7 / 14
6. Packing Dimensions	..... 8~9 / 14
7. Packing	..... 10 / 14
8. Cautions on use	..... 11~13 / 14
9. Others	..... 13 / 14
10. Revision History	..... 14 / 14

1. Features

- ☐ Package : SMD Top View Type
- ☐ 5.4 X 5.0 X 1.6mm(L X W X H) small size surface mount type
- ☐ Viewing angle : extremely wide(120°)
- ☐ Taping : 12mm conductive black carrier tape & antistatic clear cover tape 1,000pcs/reel

2. Outline Dimensions

(Unit : mm)



3. Specifications

3-1. Absolute Maximum Ratings

(Ta=25℃)

Item	Symbol	Absolute Maximum Rating			Unit
		Blue	Green	Red	
Forward Current	I_F	30	30	30	mA
*1)Pulse Forward Current	I_{FP}	90	90	90	mA
Reverse Voltage	V_R	5			V
Power Dissipation	P_D	66	96	96	mW
Operating Temperature	T_{opr}	-30~+85			℃
Storage Temperature	T_{stg}	-40~+100			℃

*1) I_{FP} conditions : Pulse with $t_w \leq 0.1\text{ms}$, Duty ratio $\leq 1/10$

※ Care is to be taken that Power Dissipation dose not exceed the Absolute Maximum Rating of the product.

3-2. Electro-Optical Characteristics

(Ta=25℃)

Parameter	Color	Symbol	Test Condition	Min	Max	Units
Forward Voltage* ¹	Red	V _F	I _F =20mA	2.0	2.2	V
	Green			3.0	3.2	
	Blue			3.0	3.2	
Luminous Intensity* ²	Red	I _V		700	900	Mcd
	Green			1500	1700	
	Blue			250	350	
Dominant Wavelength* ³	Red	W _D		620	625	nm
	Green			522	527	
	Blue			450	455	

*1) Voltage are tested at a current pulse duration of 1ms and an accuracy of $\pm 0.05\text{V}$

*2) Luminous Intensity is tested at a current pulse duration of 10ms and an accuracy of $\pm 10\%$.

*3) The measurement tolerance of the dominant wavelength is 2nm

3-3. Dominant Wavelength

(Ta=25℃)

W_D Rank	Test Condition	Blue	Green	Red	Unit
FC	$I_F=20\text{mA}$	450~455	522~527	620~625	nm

3-4. Luminous Intensity Ranks

(Ta=25℃)

I_V Rank	Test Condition	Blue	Green	Blue	Unit
A	$I_F=20\text{mA}$	250~350	1500~1700	700~900	mcd

3-5. Forward Voltage Ranks

(Ta=25℃)

V_F Rank	Test Condition	Blue	Green	Red	Unit
1	$I_F=20\text{mA}$	3.0~3.2	3.0~3.2	2.0~2.2	V

4. Reliability

4-1. Test items and results

Test Item	Standard Test Method	Test Condition	Time / Cycle
Thermal Shock Test (TST)	EIAJ ED-4701 300 301	Ta=-40℃ (1min.) ~ 110℃ (1min.) Transfer ≤ 10sec.	100 Cycles
Solderability	EIAJ ED-4701 300 303	Tsld=215±5℃, 3sec.	1 Time
Temperature Cycle (TC)	EIAJ ED-4701 100 105	Ta=-40℃ (30min.) ~ 25℃ (5min.) ~ 110℃ (30min.) ~ 25℃ (5min.) Transfer ≤ 5min.	100 Cycles
High Temperature Storage (HTS)	EIAJ ED-4701 200 201	Ta=110℃	1000 Hours
Temperature Humidity Storage (THS)	EIAJ ED-4701 100 103	Ta=85℃, RH=85%	1000 Hours
Low Temperature Storage (LTS)	EIAJ ED-4701 200 202	Ta=-40℃	1000 Hours
Pressure Cooker Test (PCT)	JEDEC JESD22-A110	121℃, 100%, 2atm.	48 Hours
Room Temperature Operating Life (RTOL)	Internal Reference	Ta=25℃, I _F =20mA	1000 Hours
High Temp. & High Humi. Operating Life (H3TOL)	Internal Reference	Ta=60℃, RH=90%, I _F =15mA	1000 Hours
High Temperature Operating Life (HTOL)	Internal Reference	Ta=85℃, I _F =15mA	1000 Hours
Low Temperature Operating Life (LTOL)	Internal Reference	Ta=-40℃, I _F =15mA	1000 Hours
Electrostatic Discharge (HBM/ESD)	MIL-STD-883D	1kV at 1.5kΩ, 100pF	3 Times

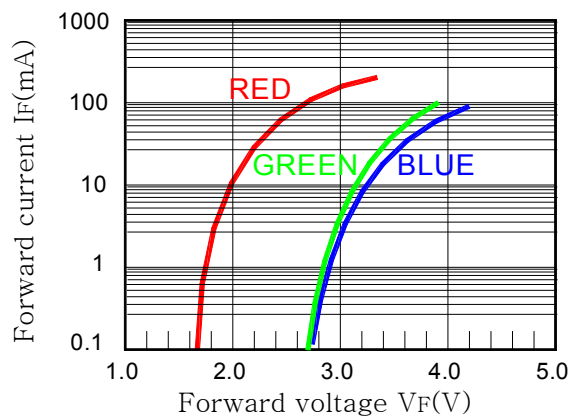
4-2. Criteria for judging the damage

Item	Symbol	Test Condition	Criteria for Judgement	
Forward Voltage	V _F	R,G,B I _F =20mA	-	U.S.L.* × 1.2
Luminous Intensity Condition 1	I _V	R,G,B I _F =20mA	L.S.L.** × 0.7	-
Luminous Intensity Condition 2 (Internal Reference)	I _V	R,G,B I _F =20mA	L.S.L.** × 0.5	-

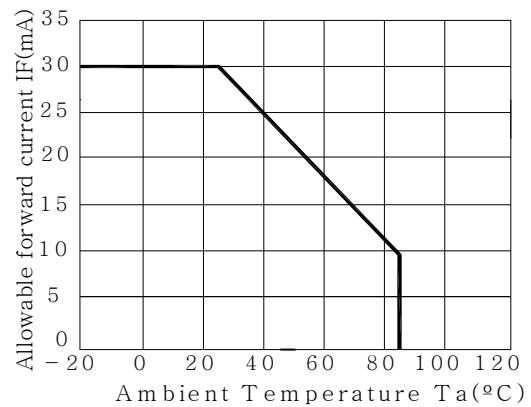
*2) U.S.L. : Upper Standard Level / L.S.L. : Lower Standard Level

5. Typical Characteristic Curves

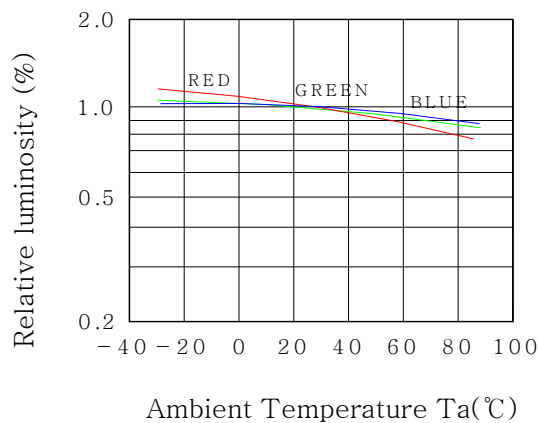
Forward Current vs Forward Voltage



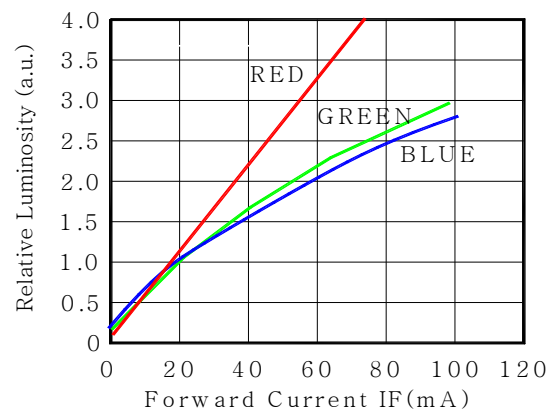
Allowable Forward current vs Ambient Temp.



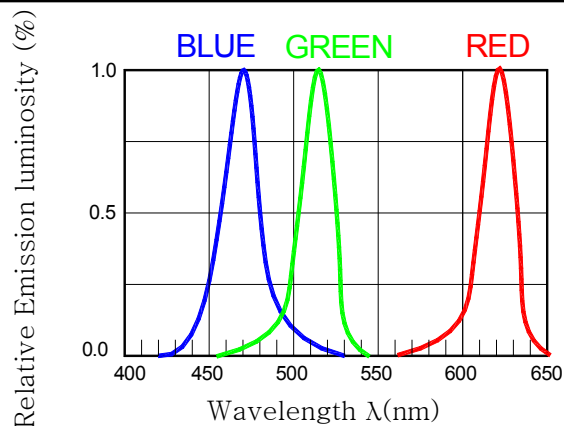
Relative luminosity vs Ambient Temp.



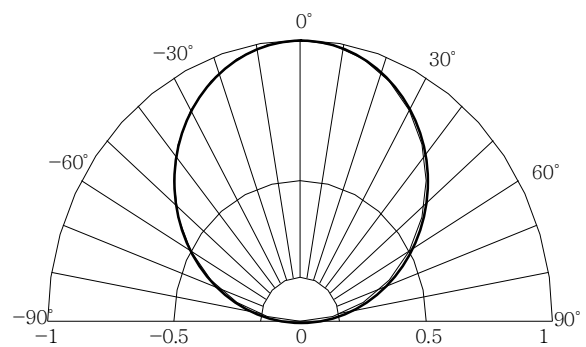
Relative luminosity vs Forward current



Relative luminosity vs Wavelength.



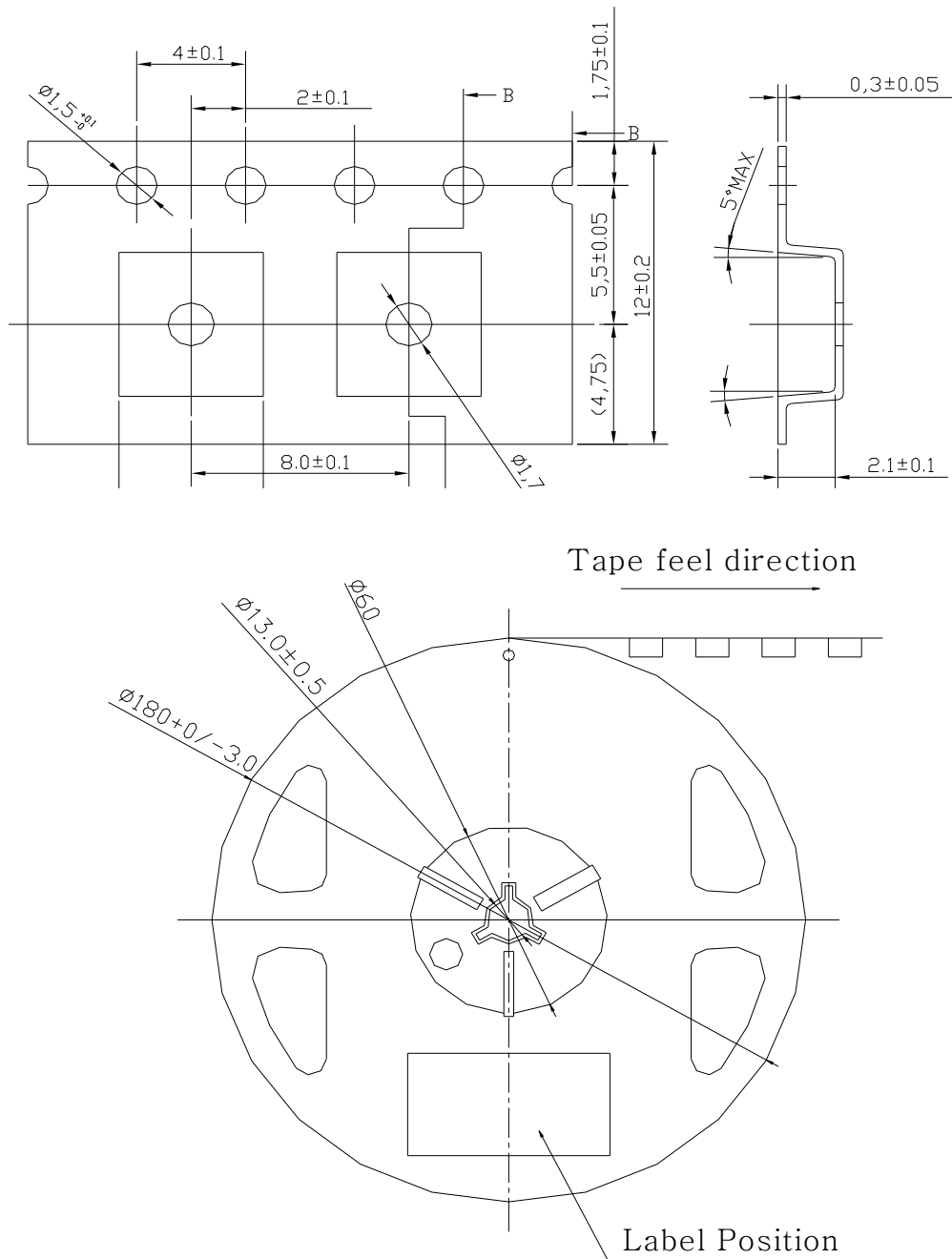
Radiation Characteristic



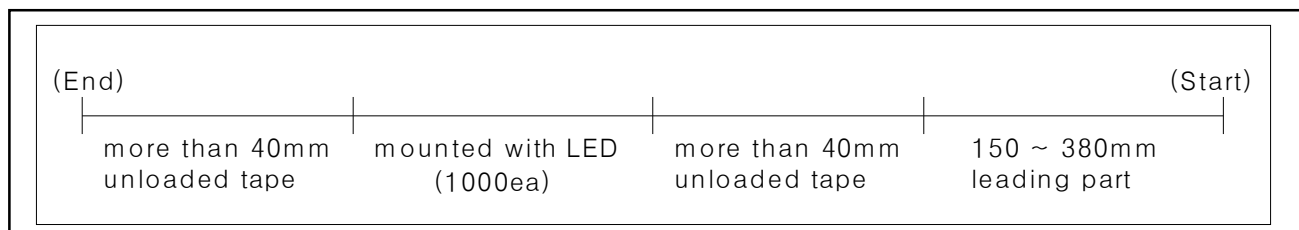
6. Packing Dimensions

6-1. Dimension of wheel, tape

(Unit : mm)



6-2. Details of CHIP LEDs loading on tape



6-3. Loading quantity per reel : 1,000pcs

6-4. Label Outline

<p>PART No. MRGBHT114</p> <p>QUANTITY 1,000EA</p> <p>RANK FC-A-1</p> <p>LOT No. DKXXXXXXXX-XX</p> <p>DATE 2011-XX-XX</p>	<p>RANK :</p> <p>Ex) <u>FC -A- 1</u></p> <p>① ② ③</p> <p>① : I_V Rank (A : Red: 700~900, Green: 1500~1700, Blue: 250~350)</p> <p>② : V_FRank (1 : Red: 2.0~2.2, Green: 3.0~3.2, Blue: 3.0~3.2)</p> <p>③ : W_DRank (FC: Red: 620~625, Green: 522~527, Blue: 450~455)</p>
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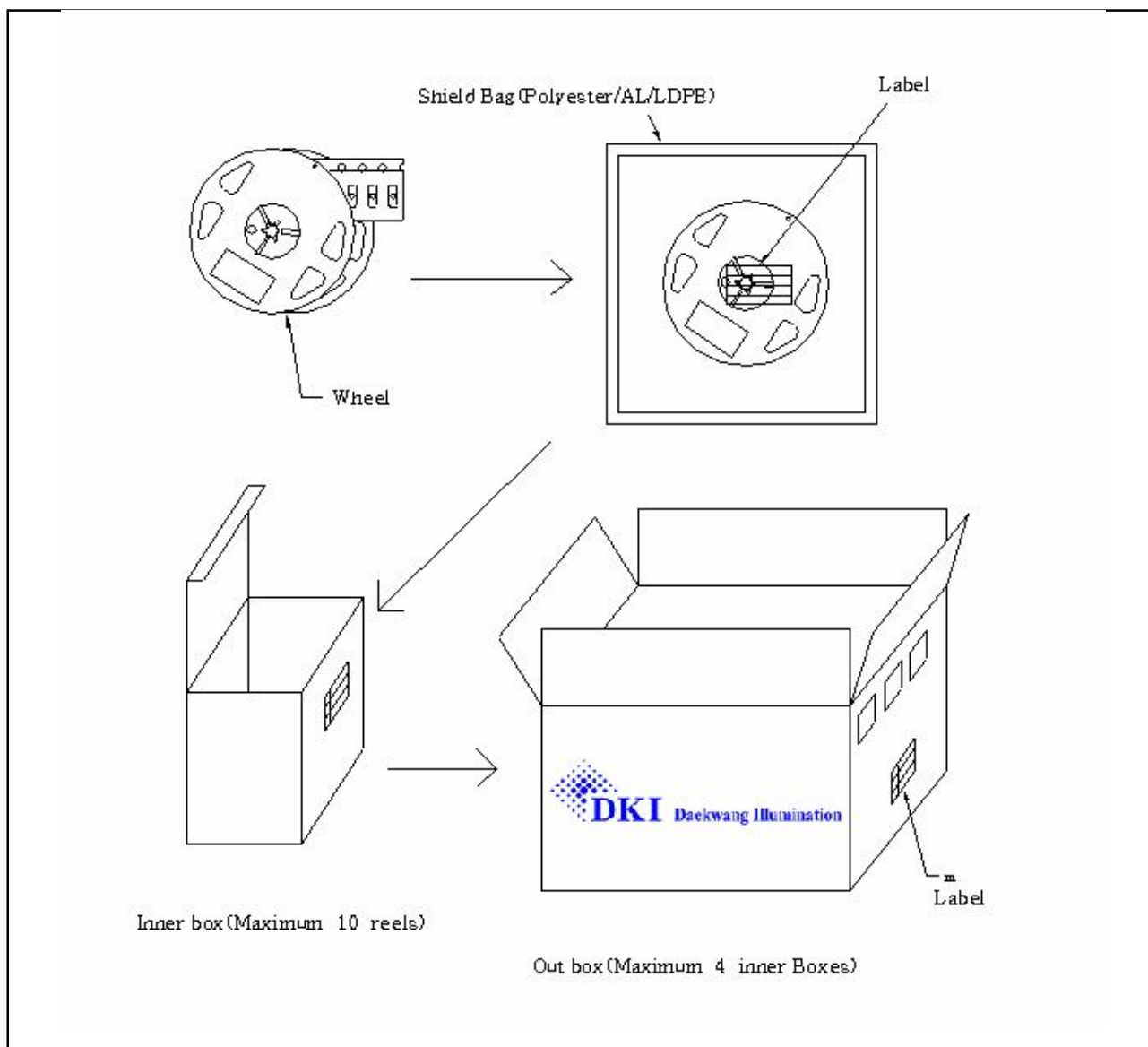
6-5. Lot Number

□□ - □□□ □□ □□ □□ □ - □□

1 2 3 4 5 6 7

- 1 - DKI Initial (DKI for Daekwang Illumination)
- 2 - Chip maker
- 3 - Year (03 for 2003, 04 for 2004)
- 4 - Month (A for Jan., B for Feb.)
- 5 - Day (01 for 01., 12 for 12.)
- 6 - Product input No. (A for first, B for second.)
- 7 - DKI's Product Number

7. Packing



- ☐ The LEDs are packed in cardboard boxes after taping
- ☐ The label on the minimum packing unit shows : Part Number, Lot Number, Ranking, Quantity In order to protect the LEDs from mechanical shock, we pack them in cardboard boxes for transportation.
- ☐ The LEDs may be damaged if the boxes are dropped or receive a strong impact against them,so precautions must be taken to prevent any damage.
- ☐ The boxes are not water resistant and therefore must be kept away from water and moisture.
- ☐ When the LEDs are transported, we recommend that you use the same packing method as DKI.

8. Cautions on use

- ☐ White LEDs are devices which are materialized by combining Blue LEDs and special phosphors. Consequently, the color of White LEDs is changed a little by an operating current. Care should be taken after due consideration when using LEDs.

8-1. Moisture Proof Package

- ☐ When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs.
For this reason, the moisture proof package is used to keep moisture to a minimum in the package.
- ☐ A package of a moisture absorbent material (silica gel) is inserted into the shielding bag.

8-2. Storage

- ☐ Storage Conditions
Before opening the package :
The LEDs should be kept at 30℃ or less and 90%RH or less.
The LEDs should be used within a year.
When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.
After opening the package :
The LEDs should be kept at 30℃ or less and 70%RH or less.
The LEDs should be soldered within 168 hours (7days) after opening the package.
If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel).
It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.
- ☐ If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.
Baking treatment : more than 24 hours at 65±5℃
- ☐ DKI LED electrode sections are comprised of a silver plated copper alloy.
The silver surface may be affected by environments which contain corrosive gases and so on.
Please avoid condition may cause difficulty during soldering operations.
It is recommended that the User use the LEDs as soon as possible.
- ☐ Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

8-3. Heat Generation

- ☐ Thermal design of the end product is of paramount importance. Please consider the heat generation of the LED when making the system design.
The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.
- ☐ The operating current should be decided after considering the ambient maximum temperature of LEDs.

8-4. Soldering Conditions

- ☐ The LEDs can be soldered in place using the reflow soldering method. DKL cannot make a guarantee on the LEDs after they have been assembled using the dip soldering method.
- ☐ Recommended soldering conditions

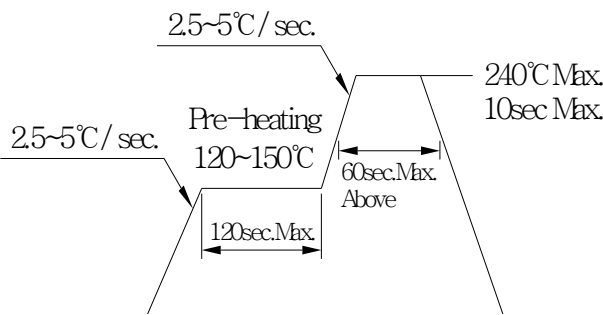
Reflow Soldering			Hand Soldering	
	Lead Solder	Lead-free Solder		
Pre-heat Pre-heat time Peak temperature Soldering time Condition	120~150℃ 120sec Max 240℃ Max 10sec Max refer to Temperature- profile①	180~200℃ 120sec Max 260℃ Max 10sec Max refer to Temperature- profile②	Temperature Soldering time	350℃ Max 3sec Max (one time only)

※ After reflow soldering rapid cooling should be avoided.

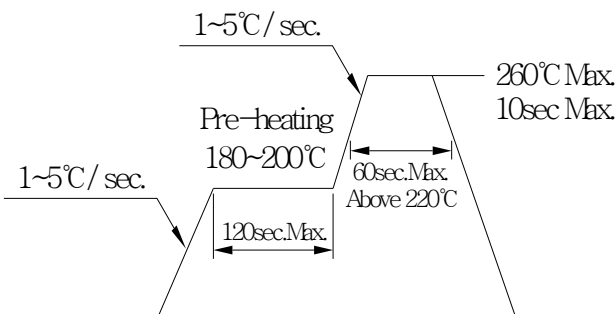
- ☐ Use the following conditions shown in the figure.

[Temperature-profile (Surface of circuit board)]

①Lead Solder



②Lead-free Solder



- ☐ Occasionally there is a brightness decrease caused by the influence of heat or ambient atmosphere during air reflow. It is recommended that the user use the nitrogen reflow method.
- ☐ Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristic of the LEDs will or will not be damaged by repairing.
- ☐ Reflow soldering should not be done more than two times.
- ☐ When soldering, do not put stress on the LEDs during heating.
- ☐ After soldering, do not warp the circuit board.

8-5. Cleansing

- ☐ It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. When using other solvents will dissolve the package and the resin or not. Freon solvents should not be used to clean the LEDs because of worldwide regulations. Do not clean the LEDs by the ultrasonic. When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and the assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

8-6. Static Electricity

- ☐ Static electricity or surge voltage damages the LEDs. It is recommended that a wrist band or an anti-electrostatic glove be used when Handling the LEDs.
- ☐ All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.
- ☐ When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static damaged LEDs by a light-on test or a VF test at a lower current (below 1mA is recommended).
- ☐ Damaged LEDs will show some unusual characteristics such as the leak current remarkably increases, the forward voltage becomes lower, or the LEDs do not light at the low current.

Criteria : (VF > 2.0V at IF=10μA)

9. Others

- ☐ Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.
- ☐ The LED light out put is strong enough to injure human eyes. Precautions must be taken to prevent looking directly at the LEDs with unaided eyes for more than a few seconds.
- ☐ Flashing light have been known to cause discomfort in people; you can prevent this by taking precautions during use. Also, people should be cautious when using equipment that has LEDs incorporated into it.

10. Revision History

No.	Contents	Date of Change
0	A new establishment	2013-03-27