SPECIFICATION

CUSTOMER :

DEVICE NAME :

MODEL NO. :

ISSUED DATE :

[CUSTOMER APPROVAL]

APPROVAL NO.				
APPROVAL DATE				
APPROVAL	INSPECTER	CHECK	APPROVAL	COMMENT

[SUPPLIER]

ISSUED DEPT.	ISSUE	REVIEW	REVIEW	APPR'D

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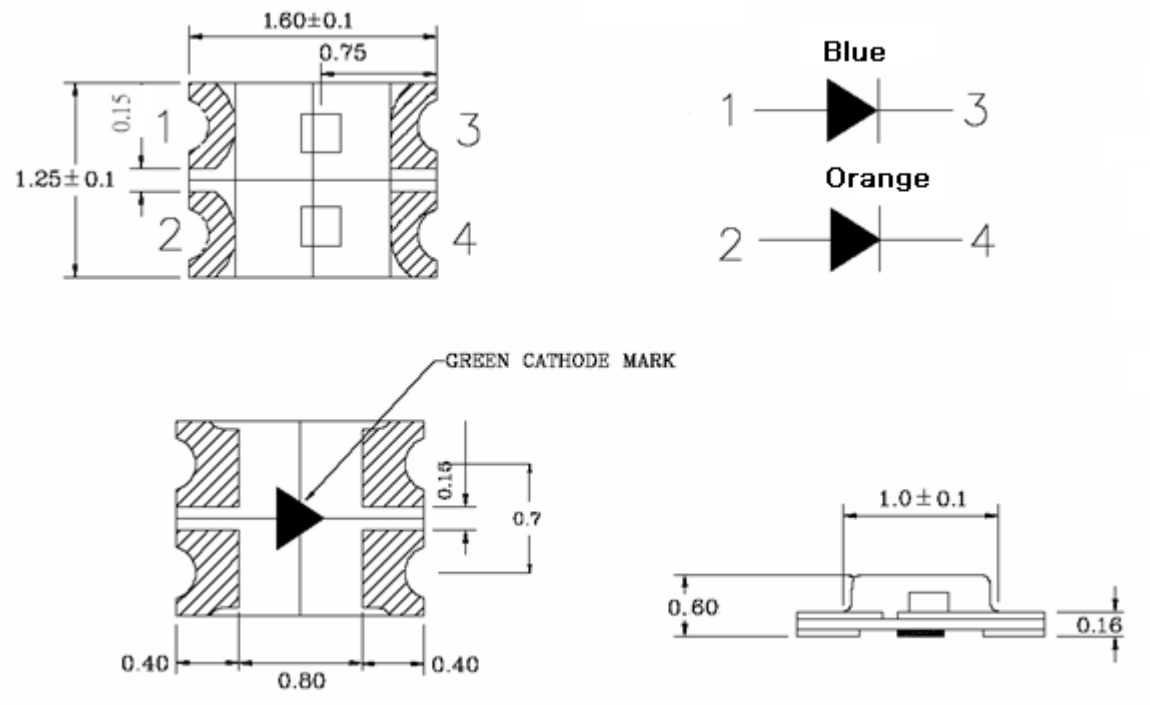
- CONTENTS -

1. FEATURES

- SMD Top View Type
- Suitable for variable color backlight
- Chip technology : O:AlGaInP, B:AlInGaN
- High luminous Intensity
- Viewing angle : Lambertian emitter(120˚)
- Package size : 1.6 × 1.25 × 0.6
- Reliability test completion
- Lead-free Package(According to RoHS)

HC-OB1-T1612

2. OUTLINE DIMENSIONS



Unspecified Tolerance : ±0.1mm

3. SPECIFICATIONS

▣ Absolute Maximum Rating

(Ta=25℃)

Parameter	Symbol	Value	Unit
Power Dissipation	P_D	O:80 / B:70	㎽
Peak Forward Current ▶1	I_{FP}	O:100 / B:80	㎃
Reverse Voltage	V_R	5	V
Forward Current	I_F	O:30, B:20	㎃
Operating Temperature	Topr	-25 to + 85	℃
Storage Temperature	Tstg	-30 to + 90	℃
Soldering temperature	Tsol	Reflow soldering : 240℃, 5 sec Hand Soldering : 350℃, 3 sec	

▶ 1 : Duty Ratio ≤ 1/10, Pulse Width ≤ 10 msec

▣ Electro-Optical Characteristics

(Ta=25℃)

Parameter	Symbol	Condition	Color	Min	Typ	Max	Unit
Forward Voltage	V_F	I_F=5 ㎃	Orange	1.75		1.95	V
			Blue	2.8		3.1	
Luminous Intensity ▶2	I_V	I_F=5 ㎃	Orange	30		65	mcd
			Blue	18		33	
Dominant Wavelength	λ_D	I_F=5 ㎃	Orange	600		610	nm
			Blue	464	-	476	
Viewing Angle ▶3	$2\Theta_{1/2}$	I_F=5 ㎃	-	-	120	-	deg.
Reverse Current	I_R	V_R=5V	-	-	-	10	㎂

▶ 2 : Luminous intensity is measured with a light sensor and CIE eye-response curve filter combination.

▶ 3 : $\Theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the peak intensity.

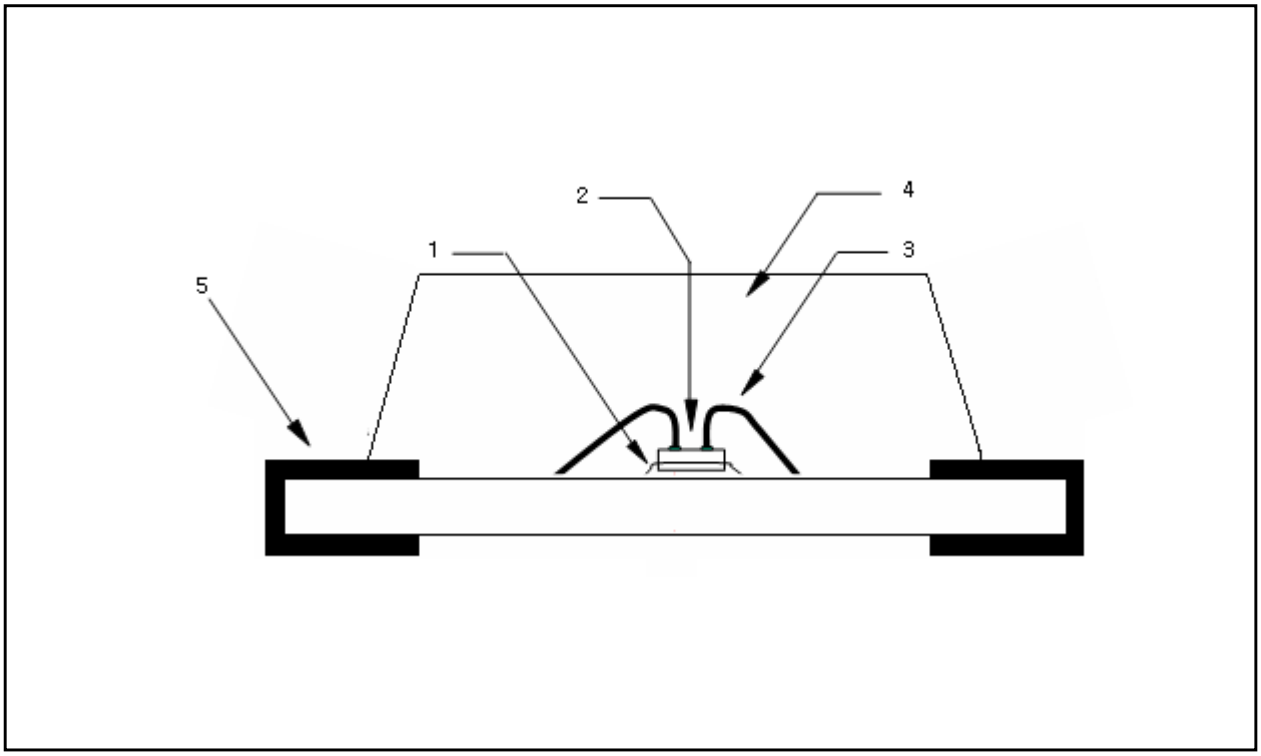
※ Measurement Uncertainty : ± 10%

4. COMPOSITION OF DEVICE

A. MATERIALS OF PACKAGE

Number	Item	Material
1	Die adhesive	Ag Epoxy
2	LED Chip	Orange : AlGaInP, Blue : AlInGaN
3	Au Wire	1.0mil
4	Encapsulating epoxy	Epoxy Resin
5	Electrodes	Copper Alloy/Ni/Au Plating

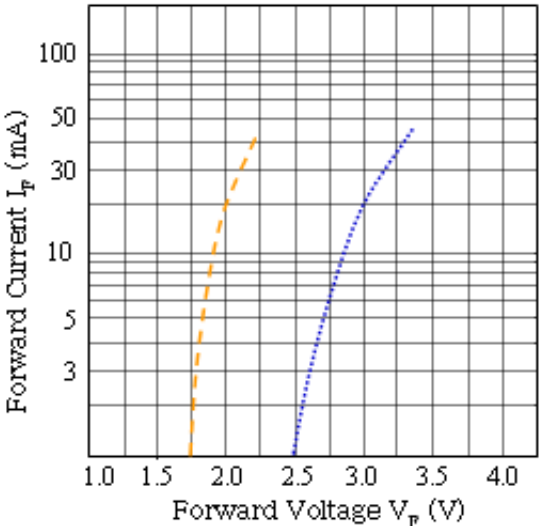
B. DIAGRAM OF COMPOSITION



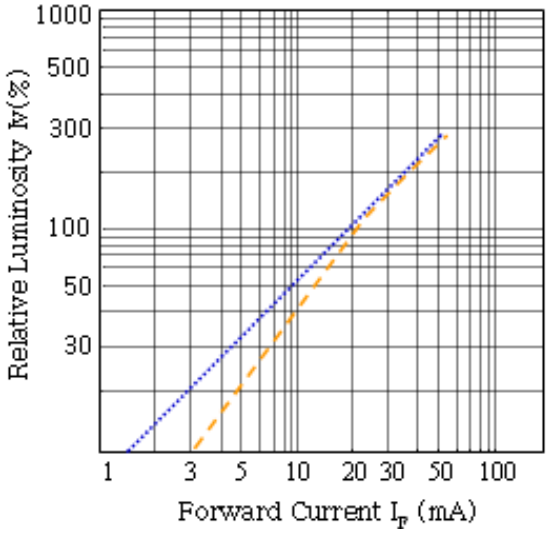
5. ELECTRO-OPTICAL CHARACTERISTICS CURVES ▶1

▶1 : These graph are based on 1-die performance

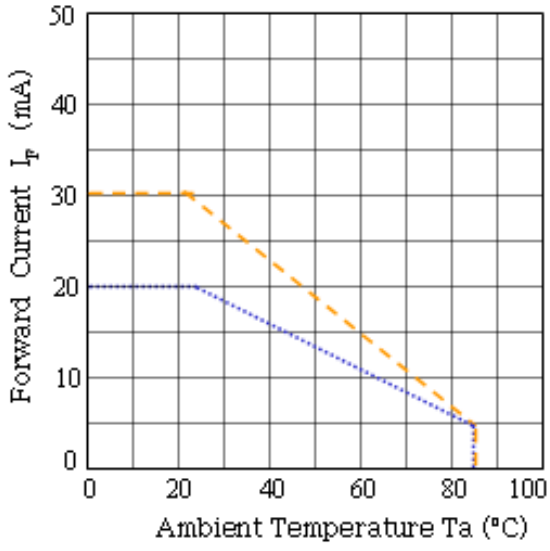
■ **Forward Voltage Vs. Forward Current**



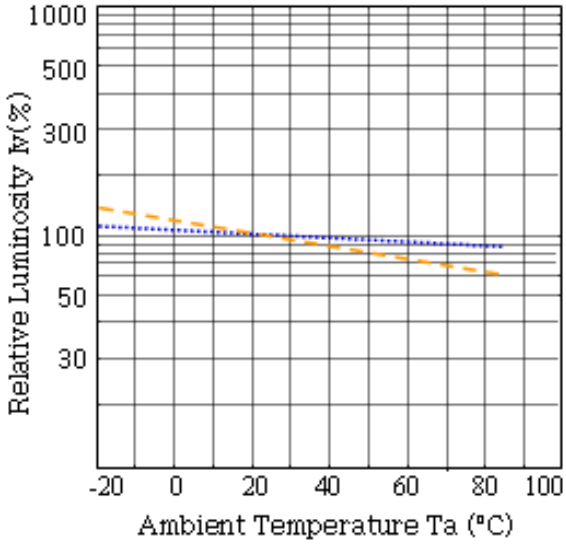
■ **Forward Current Vs. Relative Luminosity**



■ **Forward Current Derating Curve**

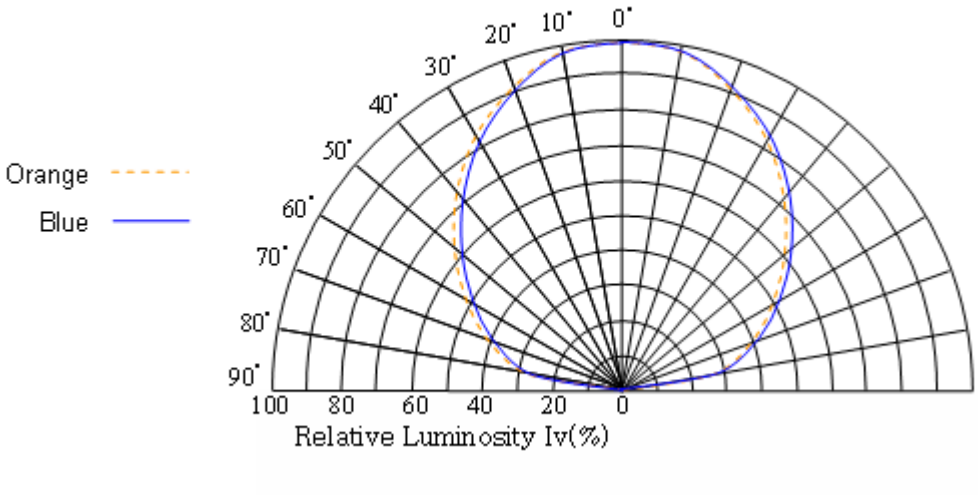


■ **Relative Luminosity Vs. Ambient Ta(℃)**

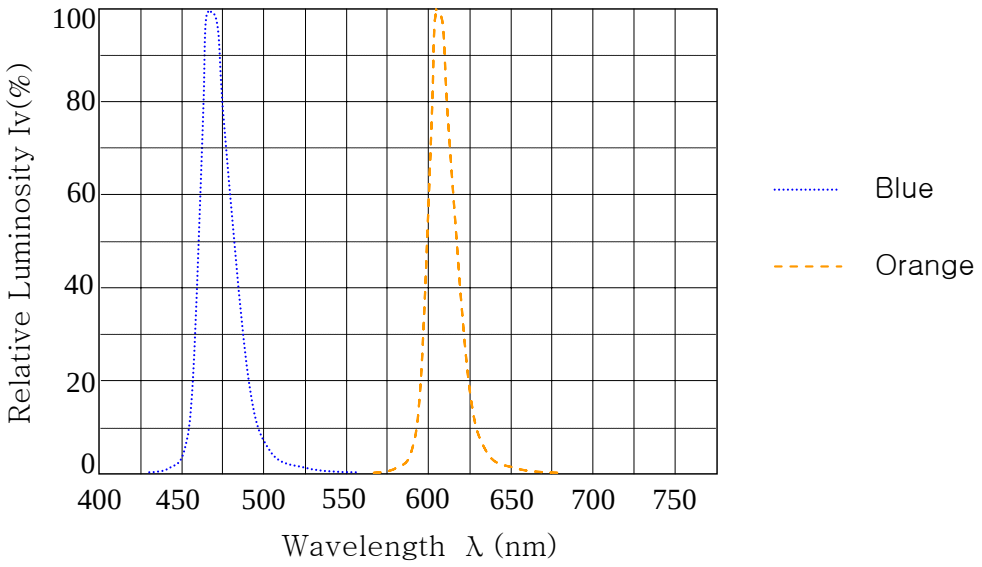


5. ELECTRO-OPTICAL CHARACTERISTICS CURVES

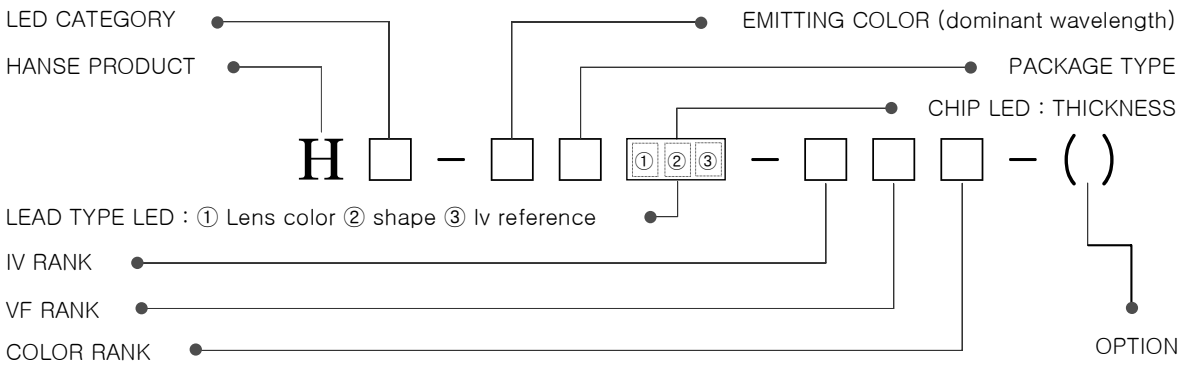
■ Radiation Characteristics



■ Relative Luminous intensity vs. Wavelength



6. SELECTION GUIDE : CLASSIFICATION BY NAME



LED CATEGORY

C : Chip LED L : Lead type LED

EMITTING COLOR (dominant wavelength)

460, 465, 470, 475, 480 : Blue	595, 600, 605 : Orange	RB1- : Red+Blue(Dual color)
500 : Cyan	610, 615, 620, 625 : Amber	RB3- : Red+Blue(Another color)
510, 515, 520, 565 : **P**ure Green	630, 640, 660(λ_p) : Red	RGB1- : R+G+B(Full color)
570, 575 : **Y**ellow Green	W : White **(WF : WHITE FOR FLASH)**	RGB3- : R+G+B(Another color)
580, 585, 590 : Yellow	BW : Bluish White	RM : Red+Yellow Green

PACKAGE TYPE

T1608 : Top View 1608	T3528 : Top View 3528	Round type : R2, R3, R4, R5,R8, R10
T1612 : Top View 16125	T5450 : Top View 5450	Flat type : F2, F3, F5
T1615 : Top View 1625	S2110 : SideView 2110 Type	Tower type : E2
T2012 : Top View 20125	S2812 : SideView 2812 Type	Oval type : O3, O4, O5
T3030 : Top View 3030	S4014 : SideView 4014 Type	Rectangular type : C4, C5
T3216 : Top View 3216	S3215 : SideView 3215 Type	(Number = diameter)
T3530 : Top View 3530	S143 : SideView 143 Type	

Chip LED : THICKNESS : A : 0.3T, B : 0.4T, C : 0.55T, D : 0.6T, E : 0.8T, F : 1.0T, G : 2.0T, BLANK(Normal)

Lead Type LED :

① Lens Color - **2** : Milky Diffusion(M/D) / **3** : Water Clear(W/C) / **4** : Color Clear(C/C) / **5** : Colored Diffusion(C/D)

② Shape – 11 / 12 / 13 / 14 / 15/ etc : *please refer to package dimension sheet*

③ Iv reference : -H(High) / -V(Very) / -U(Ultra) / -SU(Super ultra)

IV RANK, VF RANK, COLOR RANK - Refer to rank sheet

OPTION : OPTIONAL

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7. RELIABILITY

A. TEST ITEMS AND RESULTS

Test Item	Standard test method	Test Conditions	Note	Number of Damaged
Resistance to Soldering Heat (Reflow Soldering)	JEITA ED-4701 300 301	Tsol=240℃, 10sec. (Pre treatment 30℃, 70%, 168hrs.)	2 times	0/50
Solderability (Reflow Soldering)	JEITA ED-4701 100 105	Tsol=215±5℃, 3sec.	1 time over 95%	0/50
Heat Shock	JEITA ED-4701 100 105	0℃ ~ 100℃ 5sec. 15sec.	20 cycles	0/50
Temperature Cycle	JEITA ED-4701 100 105	-40℃ ~ 25℃ ~ 100℃ ~ 25℃ 15min. 5min. 15min. 5min.	100 cycles	0/50
High Humidity Heat Cycle	JEITA ED-4701 200 203	30℃ ~ 65℃ ~ -10℃ 90%RH 24hrs./1cycle	10 cycles	0/50
High Temperature Storage	JEITA ED-4701 200 203	Ta=100℃	1000 hrs.	0/50
Humidity Heat Load	JEITA ED-4701 100 103	Ta=60℃, RH=90%	1000 hrs.	0/50
Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40℃	1000 hrs.	0/50
Life Test Condition 1		Ta=25℃, IF=80mA	1000 hrs.	0/50
High Temperature Life Test		Ta=85℃, IF=20mA	1000 hrs.	0/50
High Humidity Heat Life Test		60℃, RH=90%, IF=60mA	500 hrs.	0/50
Low Temperature Life Test		Ta=-30℃, IF=80mA	1000 hrs.	0/50

B. CRITERIA FOR JUDGING THE DAMAGE

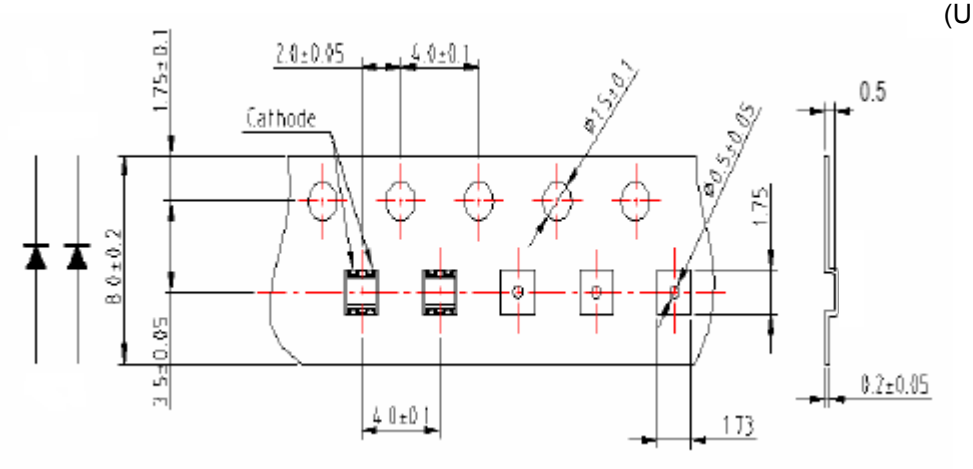
Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	VF	IF=80mA	-	U.S.L.*) × 1.1
Reverse Current	IR	VR=5V	-	U.S.L.*) × 2.0
Luminous Intensity	IV	IF=80mA	L.S.L.**) × 0.7	-

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

8. TAPING

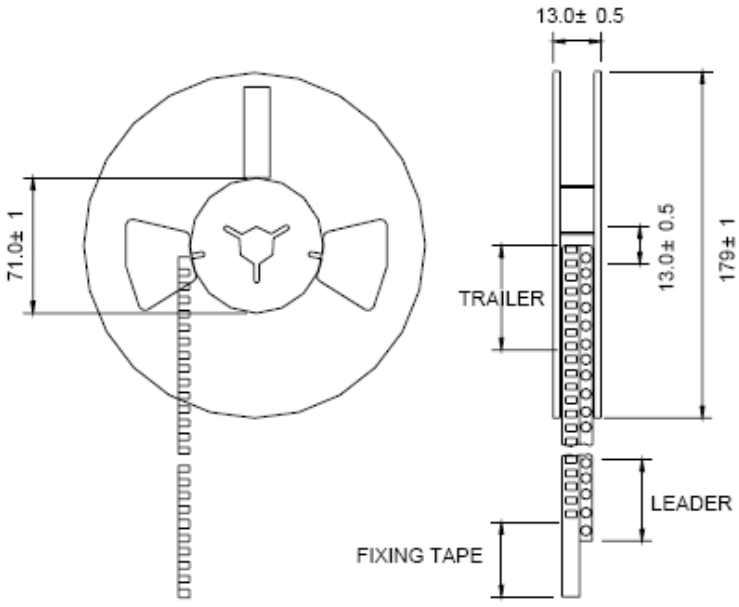
A. Dimension of Tape (Material : PS Carbon, 10E5Ω)

(Unit : mm)



B. Dimension of Wheel (Material : PS Conductive, 10E9~12Ω)

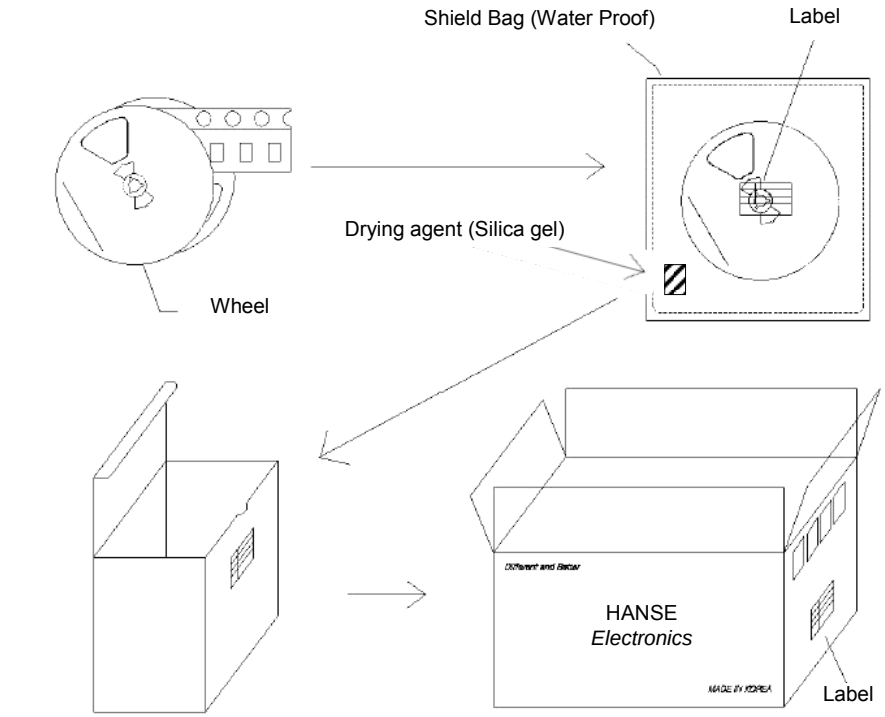
(Unit : mm)



Loading quantity per reel
3,000 : pcs

9. PACKING

A. Packing diagram



B. Precaution

A. 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.

B. 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.

C. 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 HANSE Electronics

10. CAUTIONS

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

(1) Precaution For Use

- **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.**
- **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.**
- **When the LEDs illuminate, operating current should be decided after considering the ambient maximum temperature.**
- **LEDs must be stored in a clean environment.**
  If the LEDs are to be stored for 1 months or more after being shipped from HANSE, they should be packed by a sealed container with nitrogen gas injected. (Shelf life of sealed bags: 12 months, temp. 0~40℃,~ 30%RH)
- **After storage bag is open, device subjected to soldering, solder reflow, or other high temperature processes must be:**
  a . Mounted within 72 hours (3 days) at an assembly line with a condition of no more than 30℃/30%RH,
  b. Stored at <10% RH.
- **Repack unused Products with anti-moisture packing, fold to close any opening and then store in a dry place.**
- **Devices require baking before mounting, if humidity card reading is >40% at 23±5℃.**
- **Devices must be baked for 24hours at 65±5℃, if baking is required.**
- **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.**

(2) Soldering Conditions

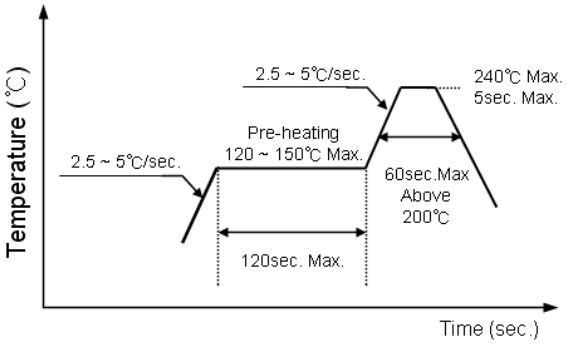
- **The LEDs can be soldered in place using the reflow soldering method.**
- **The recommended soldering conditions are as follows:**

Reflow Soldering			Hand Soldering	
	Lead Solder	Lead-free Solder		
Pre-heat	120~150℃	180~200℃	Temperature	300℃ Max
Pre-heat time	120sec Max	120sec Max	Soldering time	3sec Max
Peak temperature	240℃ Max	260℃ Max		(one time only)
Soldering time	5 sec Max	5 sec Max		
Condition	refer to Temperature profile ①	refer to Temperature profile ②		

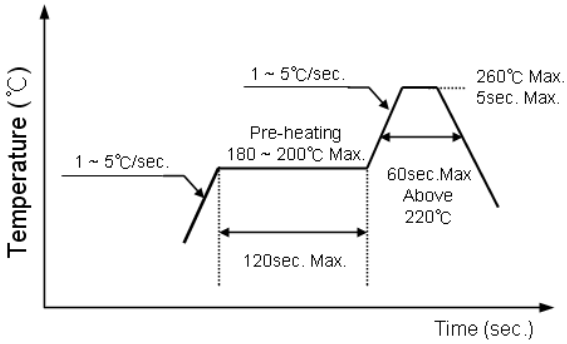
* After reflow soldering rapid cooling should be avoided.

- **Temperature-Profile**

■Lead Solder

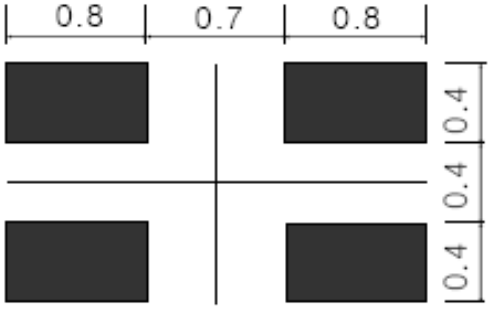


■Lead-free Solder



- **Recommended Soldering**

(Unit : mm)



- **Modifications should not be done after the LEDs have been soldered.**
  If modifications cannot be avoided, a double-head soldering iron should be used after checking whether the characteristics of the LEDs will not be damaged by modification after soldering.

(3) Heat Generation

- **Heat generation must be taken into design consideration when using the LEDs.**
  The coefficient of temperature increase per input electric power is about 0.62℃/mW at the LED's active layer. This coefficient will be affected by the heat resistance of the circuit board and by dense mounting of the LEDs. At the same time, precautions must be taken into the design of circuitry to avoid intense heat generation. Proper designs which allow radiation of heat, etc. may be needed.

(4) Static Electricity

- **Static Electricity and surge damages the LEDs. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.**
- **All devices, equipment and machinery must be properly grounded.**
- **When inspecting own final products on which LEDs were mounted, it is recommended to check also whether the mounted LEDs are damaged by static electricity or not.**
- **Damaged LEDs will show some unusual characteristics such as leak current remarkably increases, starting forward voltage becomes lower, or the LEDs get unlighted at the low current.**

(5) Cleaning

- **Use Isopropyl Alcohol as a solvent for cleaning the LEDs. Using other solvents may dissolve the LED package and the epoxy. Caution is needed.**
  Ultrasonic cleaning of the LEDs should not be done.

(6) Others

- **The electrode sections are plated with silver. Those will become discolored by contact with corroded gas etc. Precautions must be taken to maintain a clean storing atmosphere.**
- **These LEDs described in this brochure are intended to be used for ordinary electronic equipment. Consult HANSE's sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as airplanes, aerospace,**

automobiles, life support systems and safety devices).

- **User shall not reverse engineer by disassembling or analysis of the LEDs without having the prior written consent of HANSE. When defective LEDs are found, User shall inform to HANSE directly before disassembling or analysis.**
- **The appearance and specifications of the product may be modified for improvement without notice.**

11. RANKS

▣ Luminous Intensity(I_V) Ranks

(unit : mcd , Ta=25℃)

RANK	A	B	C	D	E	F
ORANGE	30 ~ 38		38 ~ 50		50 ~ 65	
BLUE	18 ~ 25	25 ~ 33	18 ~ 25	25 ~ 33	18 ~ 25	25 ~ 33

※ Measurement Uncertainty of the Luminous Intensity : ± 10%

▣ Forward Voltage(V_F) Ranks

(unit : V , Ta=25℃)

RANK	a	b	c
ORANGE	1.75 ~ 1.95		
BLUE	2.8 ~ 2.9	2.9 ~ 3.0	3.0 ~ 3.1

※ Measurement Uncertainty of the Forward Voltage : ± 0.1V

▣ Color Wavelength (Wd) Ranks

(unit : nm , Ta=25℃)

RANK	1	2
ORANGE	600 ~ 610	
BLUE	464 ~ 472	472 ~ 476

※ Measurement Uncertainty of the Dominate Wavelength : ± 1 nm

12. REVISION HISTORY

No..	Date	Summary of Revision	Remarks
1	2003.05.	New establishment	
2	2004.11.	New Chromaticity Coordinates ranks	
3	2005.01.	Appliance Pb free material	
4	2006.05.	Document registration number change	
5	2008.09.	Edit Characteristics	
6	2009.07.	Revised All Sheets	

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