

# APPROVAL SHEET

(Preliminary)



[ISCL-T11WC-70S]

CUSTOMER :

DEVICE NAME : 5450 White LED

MODEL NO. : ISCL-T11WC-70S

ISSUED DATE : 2010. 09.

## [ CUSTOMER APPROVAL ]


APPROVAL NO.				
APPROVAL DATE				
APPROVAL	INSPECTOR	CHECK	APPROVAL	COMMENT

ISSUED DEPT.	ISSUE	REVIEW		APPR'D
		R & D	QA	


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## 1. Revision history

Spec. No.			
Title	Specification for Approval		
Times	Date	Summary of revision	Remarks
1	2007. 10.	New establishment	
2	2008. 02.	Rank addition	
3	2009. 01.	Rank Modification	
4	2010. 09.	Chromaticity Coordinates Rank Modification	

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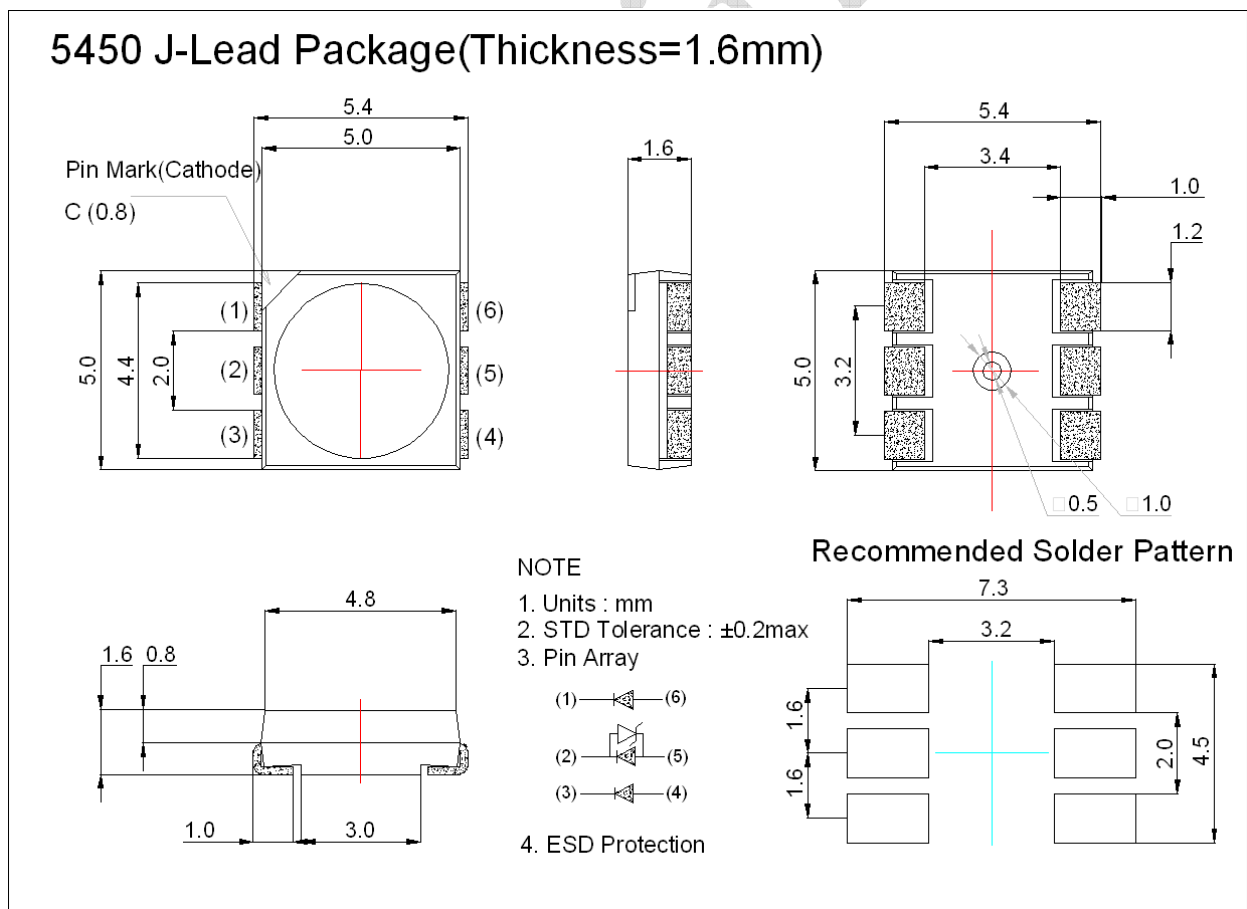
## 2. FEATURES


- SMD type
- Colored Diffusion
- Chip Based on GaN
- High Luminous Intensity
- Very Wide Viewing Angle
- Package Size : 5.4mm × 5.0mm × 1.6mm
- Reliability Test Completed
- ESD protection(Zener Diode Inserted)



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## 3. OUTLINE DIMENSIONS



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## 4. SPECIFICATIONS

### (1) Absolute Maximum Rating

(Ta=25°C)

Parameter	Symbol	Value	Unit
Forward Current (per chip)	$I_F$	30	mA
Peak Forward Current (per chip) ★1	$I_{FP}$	100	mA
Reverse Voltage	$V_R$	5	V
Power Dissipation	$P_D$	324	mW
Operating Temperature	$T_{opr}$	-30 to +80	°C
Storage Temperature	$T_{stg}$	-40 to +100	°C
Soldering temperature	$T_{sol}$	Reflow soldering : 260°C, 10 sec Hand Soldering : 300°C, 3 sec	

★1 : Duty Ratio  $\leq 1/10$ , Pulse Width  $\leq 10$  msec


### (2) Electrical / Optical Characteristics

(Ta=25°C)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	$V_F$	$I_F=60\text{mA}$	2.8	-	3.6	V
Reverse Current	$I_R$	$V_R=5\text{V}$	-	-	10	$\mu\text{A}$
Luminous Intensity ★2	$I_V$	$I_F=60\text{mA}$	5,000	7,500	-	mcd
Viewing Angle ★3	$2\theta_{1/2}$	$I_F=60\text{mA}$	-	120	-	deg.
Chromaticity coordinates	-	$I_F=60\text{mA}$	Refer to Chromaticity Coordinates Ranks			-

★2 : Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve. Please refer to rank table.

★3 :  $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

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## 5. RANKS

### (1) Luminous Intensity Ranks

Iv Rank	Chip Count	Condition	Min	Typ	Max	Unit
T050G	3Chip	$I_F = 60\text{mA}$	5,000	-	5,500	mcd
T055G			5,500	-	6,000	
T060G			6,000	-	6,500	
T065G			6,500	-	7,000	
T070G			7,000	-	7,500	


※ Measurement Uncertainty of the Luminous Intensity :  $\pm 10\%$

### (2) Forward Voltage Ranks

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

$V_F$ Rank	Condition	Min	Typ	Max	Unit
V281	$I_F = 60\text{mA}$	2.8	-	2.9	V
V291		2.9	-	3.0	
V301		3.0	-	3.1	
V311		3.1	-	3.2	
V321		3.2	-	3.3	
V331		3.3	-	3.4	
V341		3.4	-	3.5	
V351		3.5	-	3.6	

※ Measurement Uncertainty of the Forward Voltage :  $\pm 0.1\text{V}$

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## 5. RANKS

(3) Chromaticity Coordinates Ranks : IF = 60mA

(Ta=25°C)

※ Measurement Uncertainty of the Color Coordinates : ± 0.02

Rank	P060C		P060D		P055A		P055B	
	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3211	0.3453	0.3110	0.3424	0.3322	0.3180	0.3230	0.3180
	0.3126	0.3305	0.3126	0.3305	0.3238	0.3050	0.3323	0.3330
	0.3143	0.3178	0.3211	0.3453	0.3230	0.3180	0.3323	0.3480
	0.3221	0.3307	0.3202	0.3585	0.3323	0.3330	0.3221	0.3307
Rank	P055C		P055D		P050A		P050B	
	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3211	0.3453	0.3202	0.3585	0.3437	0.3352	0.3464	0.3700
	0.3323	0.3630	0.3211	0.3453	0.3322	0.3180	0.3323	0.3480
	0.3323	0.3480	0.3323	0.3630	0.3323	0.3330	0.3323	0.3330
	0.3221	0.3307	0.3322	0.3785	0.3451	0.3525	0.3451	0.3525
Rank	P050C		P050D		P047A		P047B	
	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3464	0.3700	0.3488	0.3950	0.3451	0.3525	0.3451	0.3525
	0.3323	0.3480	0.3474	0.3829	0.3437	0.3352	0.3464	0.3700
	0.3323	0.3630	0.3323	0.3630	0.3500	0.3400	0.3562	0.3826
	0.3474	0.3829	0.3322	0.3785	0.3531	0.3605	0.3531	0.3605

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## 5. RANKS

### (3) Chromaticity Coordinates Ranks : IF = 60mA

(Ta=25℃)

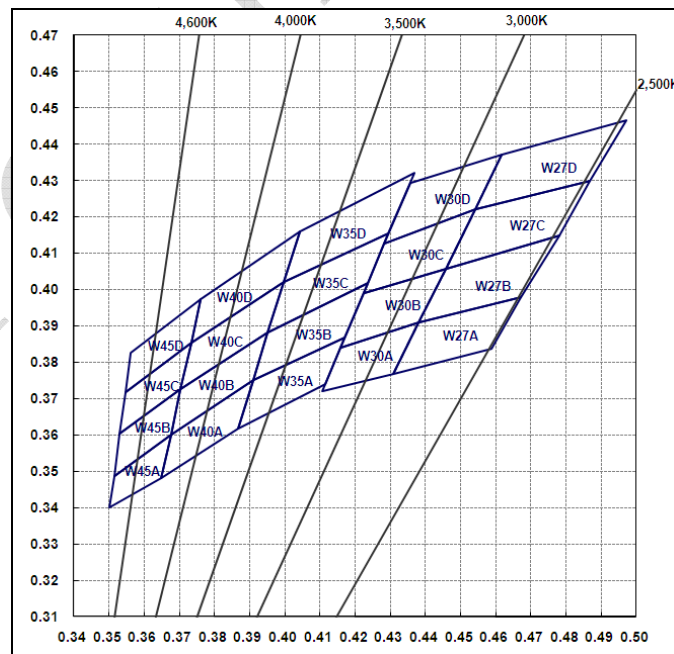
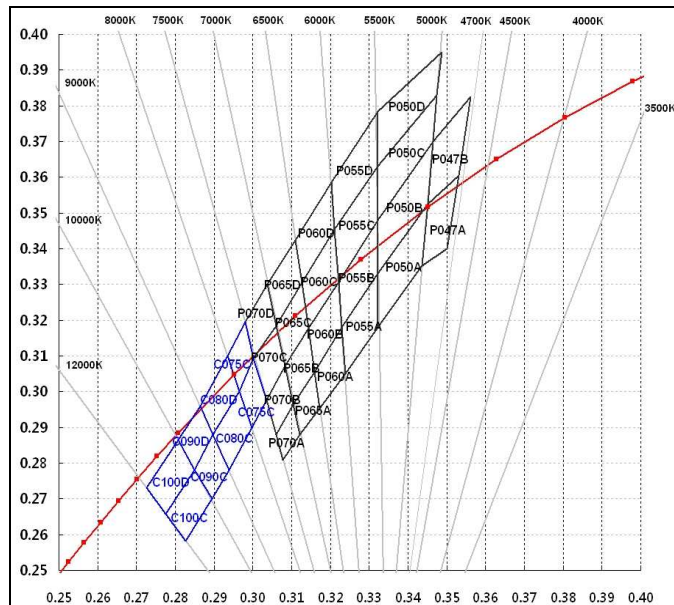
※ Measurement Uncertainty of the Color Coordinates : ± 0.02

Rank	W45A		W45B		W45C		W45D		W40A	
	X	Y	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3515	0.3487	0.3531	0.3605	0.3546	0.3717	0.3562	0.3826	0.3676	0.3600
	0.3500	0.3400	0.3515	0.3487	0.3531	0.3605	0.3546	0.3717	0.3649	0.3482
	0.3649	0.3482	0.3676	0.3600	0.3704	0.3725	0.3733	0.3855	0.3866	0.3618
	0.3676	0.3600	0.3704	0.3725	0.3733	0.3855	0.3760	0.3974	0.3910	0.3750
Rank	W40B		W40C		W40D		W35A		W35B	
	X	Y	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3704	0.3725	0.3733	0.3855	0.3760	0.3974	0.3910	0.3750	0.3952	0.3881
	0.3676	0.3600	0.3704	0.3725	0.3733	0.3855	0.3866	0.3618	0.3910	0.3750
	0.3910	0.3750	0.3952	0.3881	0.3997	0.402	0.4115	0.3741	0.4170	0.3868
	0.3952	0.3881	0.3997	0.4020	0.4044	0.416	0.4170	0.3868	0.4237	0.4018
Rank	W35C		W35D		W30A		W30B		W30C	
	X	Y	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.3997	0.4020	0.4044	0.4160	0.4158	0.3841	0.4225	0.3991	0.4283	0.4127
	0.3952	0.3881	0.3997	0.4020	0.4106	0.3720	0.4158	0.3841	0.4225	0.3991
	0.4237	0.4018	0.4295	0.4155	0.4307	0.3768	0.4381	0.3910	0.4457	0.4058
	0.4295	0.4155	0.4368	0.4322	0.4381	0.3910	0.4457	0.4058	0.4541	0.4220
Rank	W30D		W27A		W27B		W27C		W27D	
	X	Y	X	Y	X	Y	X	Y	X	Y
Chromaticity Coordinates	0.4356	0.4294	0.4381	0.3910	0.4457	0.4058	0.4541	0.4220	0.4617	0.4371
	0.4283	0.4127	0.4307	0.3768	0.4381	0.3910	0.4457	0.4058	0.4541	0.4220
	0.4541	0.4220	0.4588	0.3838	0.4670	0.3979	0.4780	0.4150	0.4867	0.4300
	0.4617	0.4371	0.4670	0.3979	0.4780	0.4150	0.4867	0.4300	0.4970	0.4466




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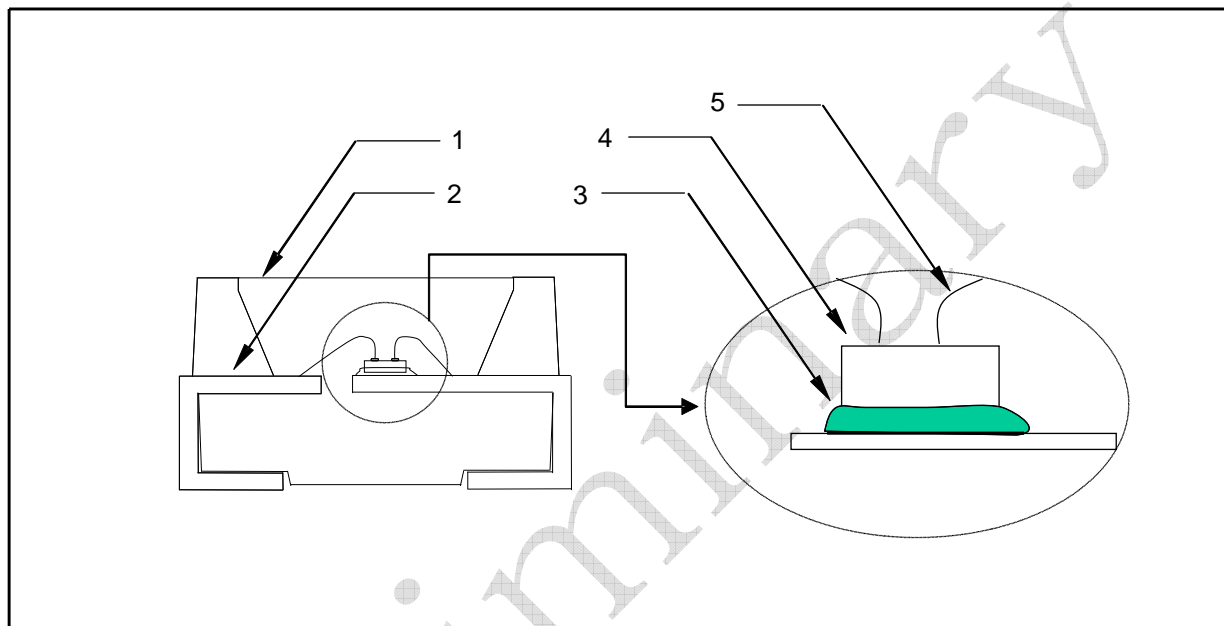
#### (4) Chromaticity Coordinate Graph



(3) Chromaticity Coordinates Ranks : IF = 60mA


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## 6. Composition of Package



### (1) Component Material

Number	Item	Material
1	Encapsulant	Silicone
2	Electrodes	Ag Plating Cu Alloy
3	Die adhesive	Silicone
4	LED Chip	GaN/Sapphire
5	Wire	Gold

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## 7. Environmental Pollution Free

(1) **Testing Institute** : Korea Environment & Merchandise Testing Institute


(2) **Test Material** : LED-PCB ▶ ① Resin, ② Metal

### ① Resin Test

Test item	Unit	Result	Test method
Pb	mg/kg	No Detection	ISO 6101-2 (AAS) EN 1122 (ICP) ISO 3856/7 (AAS) ISO 3856/5 UV-Vis. Spectrophotometer
Cd	mg/kg	No Detection	
Hg	mg/kg	No Detection	
Cr <sup>6+</sup>	mg/kg	No Detection	

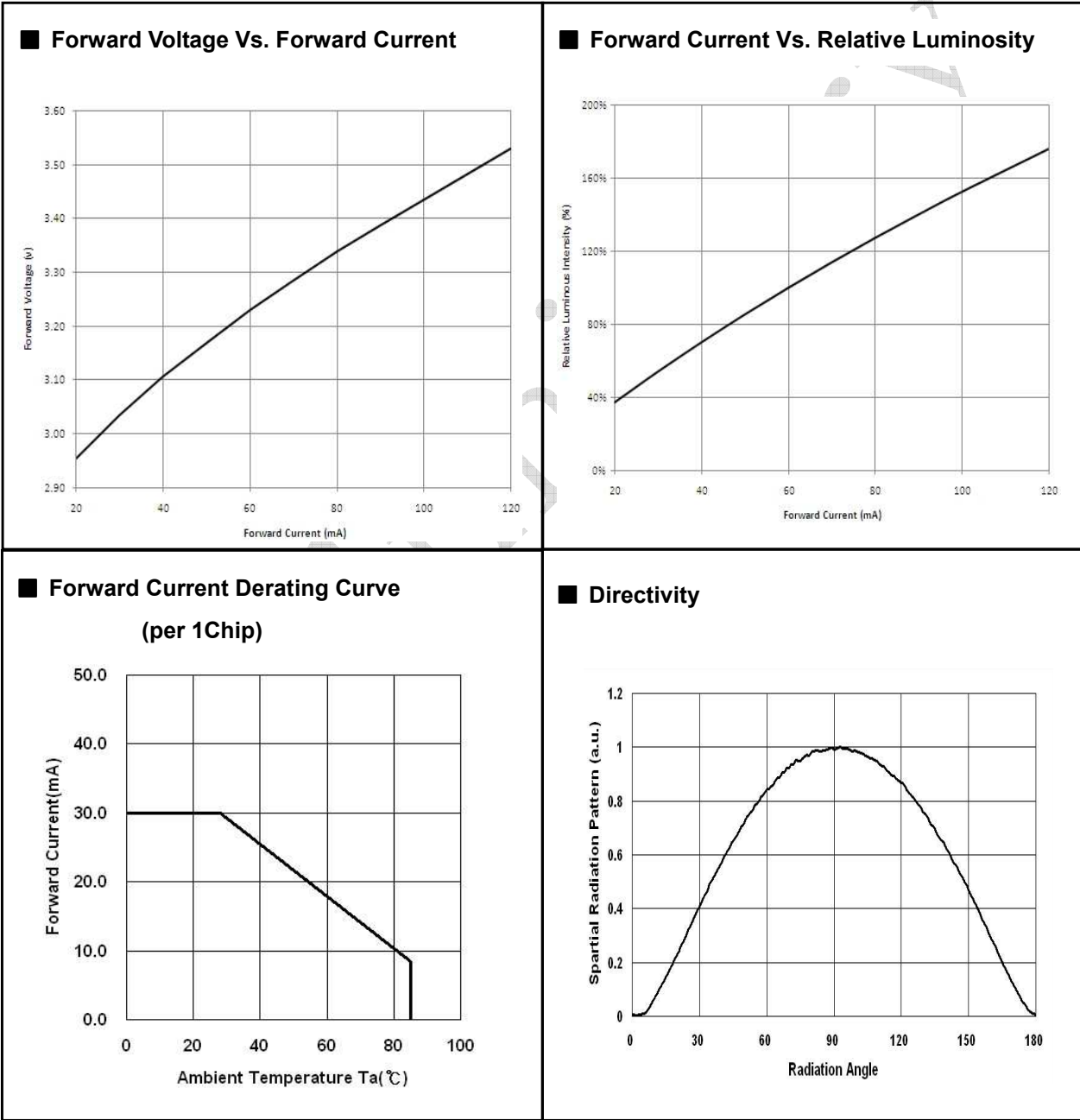
### ② Metal Test

Test item	Unit	Result	Test method
Pb	mg/kg	No Detection	ISO 4749-98 ISO 5960-84 JIS H 1066-93 ICP analysis method ISO 3613:2000(E)
Cd	mg/kg	No Detection	
Hg	mg/kg	No Detection	
Cr <sup>6+</sup>	μg/kg	No Detection	

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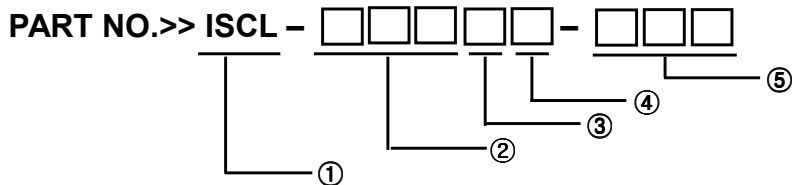
### 8. Typical Electrical / Optical Characteristics Curves

(25°C Ambient Temperature Unless Otherwise Noted)



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## 9. Classification by name



① ILJIN Semiconductor Chip LED LAMP

② PACKAGE TYPE

S11	3812 Side View LED, T=0.8mm	T21	3528 Top View LED, T=1.9mm
S12	3812 Side View LED, T=0.6mm	T22	3528 Top View LED, T=1.0mm
S13	3810 Side View LED, T=0.4mm	T23	3528 Top View LED, T=0.9mm
S14	3810 Side View LED, T=0.6mm	T31	3020 Top View LED, T=1.3mm
S15	3709 Side View LED, T=0.4mm	T32	3020 Top View LED, T=0.8mm
S16	5508 Side View LED, T=0.8mm	T36	3014 Top View LED, T=0.8mm
S17	5506 Side View LED, T=0.6mm	T41	1615 Top View LED, T=0.4mm
S60	6036 Side View LED, T=3.0mm	T51	5630 Top View LED, T=1.0mm
T10	5450 Top View LED, T=2.2mm	T52	5620 Top View LED, T=0.8mm
T11	5450 Top View LED, T=1.6mm	P33	3535 Power LED (1W, 2W)
T12	5450 Top View LED, T=0.9mm	P53	5630 Power LED (1W)
		P55	5450 Power LED (1W)

③ EMISSION COLOR

B	G	Y	O	A	R	W	X	I	S
Blue	P-Green	Yellow	Orange	Amber	Red	White	Y-Green	Infrared	Sky Blue

④ LENS COLOR

A	Colored Transparency	C	Colored Diffusion
B	Colorless Transparency	D	Milky Diffusion

⑤ COLOR RENDERING INDEX

Mark	00S	70S	75S	80S	85S	90S	95S
CRI (Ra)	60~69.9	70~74.9	75~79.9	80~84.9	85~89.9	90~94.9	95~97

※ Refer to Rank Sheet

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## 10. RELIABILITY

### (1) TEST ITEMS AND RESULTS (Application LED PKG Type : Top - View LED PKG)

Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Room Temperature Operating Life Test	EIAJ ED-4701	Ta=25°C±5°C, IF=60mA	1000 hrs.	0/22
Room Temperature Storage Test		Ta=25°C±5°C	500 hrs.	0/50
High Humidity & High Temperature Operating Life Test		60°C, RH=90%, IF=60mA	1000 hrs.	0/22
High Humidity & High Temperature Storage Test	EIAJ ED-4701	Ta=60°C, RH=90%	1000 hrs.	0/50
High Temperature Operating Life Test	EIAJ ED-4701	Ta=85°C, IF=60mA	1000 hrs.	0/22
High Temperature Storage Test	EIAJ ED-4701	Ta=100°C	1000 hrs.	0/50
Low Temperature Operating Life Test		Ta=-40°C, IF=60mA	1000 hrs.	0/22
Low Temperature Storage Test	EIAJ ED-4701	Ta=-40°C	1000 hrs.	0/50
Temperature Cycle Test	EIAJ ED-4701	-40°C ~ 25°C ~ 100°C ~ 25°C 32min, 2min, 32min, 2min	100 cycles	0/100
Solderability Test	EIAJ ED-4701	Tsol=215±5°C, 3sec. (Lead Solder)	1 time Over 90%	0/22
Soldering Heat Test	EIAJ ED-4701	Tsol=260°C, 10sec. (Pre treatment 30°C, 70%, 168hrs.)	2 Times	0/22

### (2) CRITERIA FOR JUDGING THE DAMAGE

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	VF	IF=60mA	-	U.S.L.*) × 1.2
Reverse Current	IR	VR=5V	-	U.S.L.*) × 2.0
Luminous Intensity	IV	IF=60mA	L.S.L.***) × 0.7	-

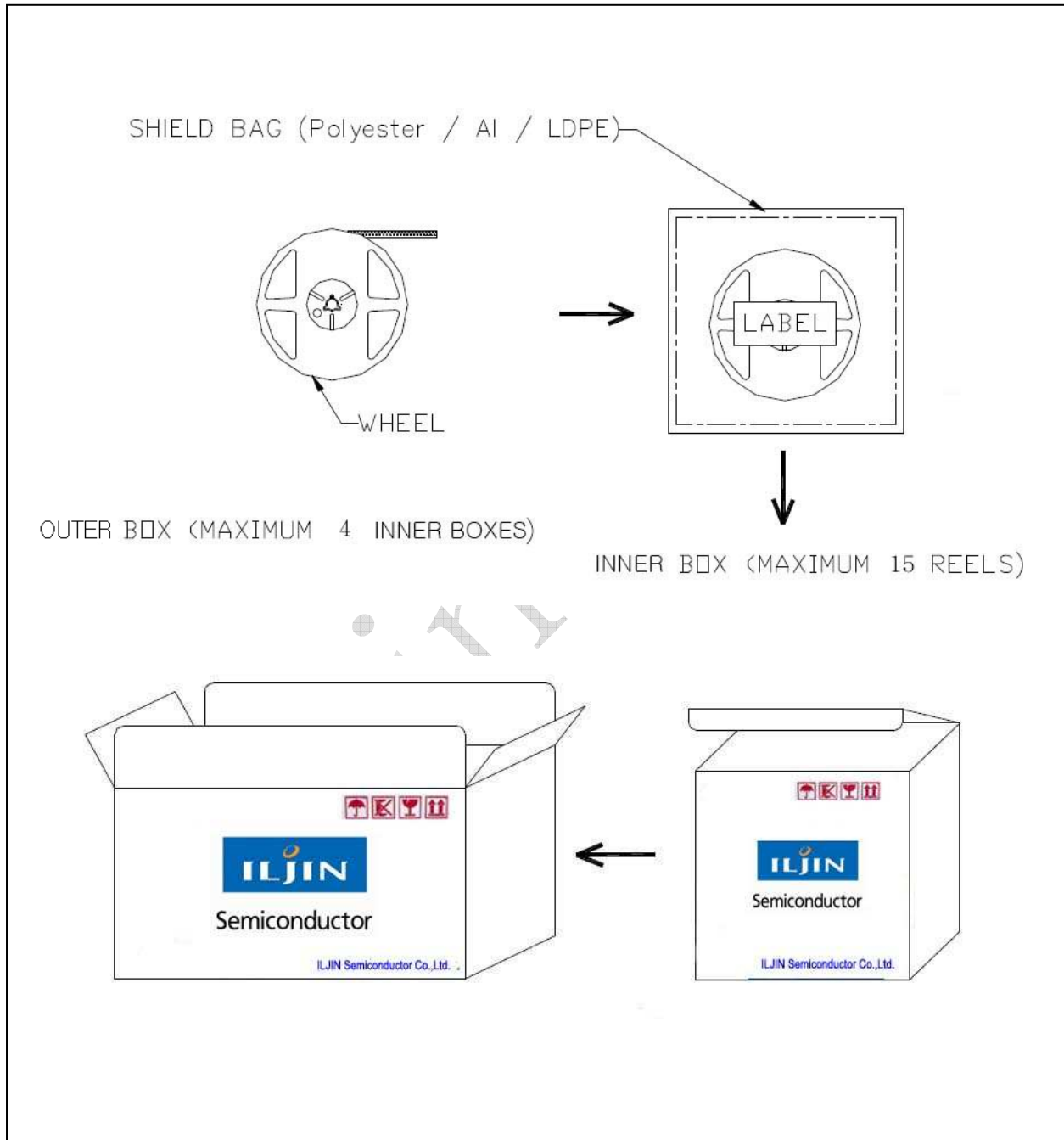
\*) U.S.L. : Upper Standard Level

\*\*) L.S.L. : Lower Standard Level




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## 12. PACKING



• Remark : Quantity : 1000pcs/reel



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### 13. CAUTIONS

The follow cautions should be taken when handling LEDs.

#### (1) Moisture

- When moisture is absorbed by the LEDs, it may vaporize and expand during soldering. There is a possibility that this can cause the exfoliation of the contacts and the damage the optical characteristics of the LEDs. For this reason, the moisture proof package is used to minimize moisture in the package.
- After opening the package, the LEDs should be kept at 25°C, 60%RH or less. The LEDs should be soldered within 168 hours(7days) after opening the package.
- When storing the LEDs after opening the package, use a sealable away from package with a moisture absorbent material inside.
- If the blue color of the desiccant indicator has faded after storing, a baking treatment should be performed as follows : 55 ± 5°C for more than 24 hours.

#### (2) Soldering Conditions

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

##### 【Hand Soldering】

Soldering iron : 300°C Max., 3 seconds  
(one time only) A soldering iron less than 20W must be used.

##### 【Reflow Soldering】

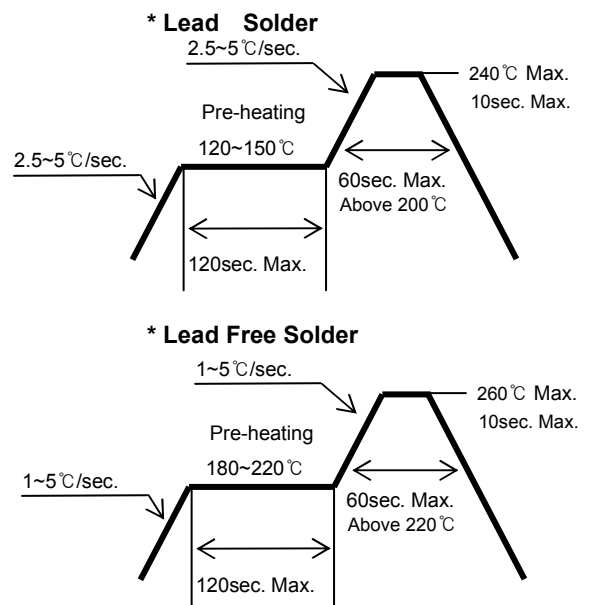
Use the conditions shown in the figures on the right.

Pre-heating : 120~150°C 120 seconds Max.

Soldering : 240°C Max. 10 seconds Max.

(Rapid cooling should be avoided.)

#### 【Temperature-Profile】



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- 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.
- In reflow soldering, do not apply force to the package during heating.
- After soldering, do not warp the circuit board.

### (3) Heat Dissipation

- Heat Dissipation must be taken into design consideration when using the LEDs. The coefficient of temperature increase per input electric power is about 0.62°C/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.
- The operating current should be decided after considering the ambient maximum temperature when the LEDs are illuminating.

### (4) Static Electricity(ESD)

- 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. It is easy to find static-damaged LEDs by light emission test at lower current (below 1 mA is recommended).



Damaged LEDs will show some unusual characteristics such as substantial increase in leakage current, lower starting forward voltage, or unlit LEDs at low current.

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#### (5) Cleaning

- When cleaning, don't press the surface. 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

- Don't touch the light emitting surface, while handling with sharp tools like tweezer.
- Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using LEDs with matrix drive.
- The electrode sections are plated with silver. Those will become discolored by contact with corrosion gas etc. Precautions must be taken to maintain a clean storing atmosphere.
- The LEDs light output 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.
- These LEDs described in this brochure are intended to be used for ordinary electronic equipment (such as office equipment, communications equipment, measurement instruments and household appliance). Consult ILJIN SEMICONDUCTOR'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, traffic control equipment, life support systems and safety devices).
- User shall not reverse engineer by disassembling or analyzing of the LEDs without having a prior written consent of ILJIN SEMICONDUCTOR. When defective LEDs are found, user shall inform ILJIN SEMICONDUCTOR directly before disassembling or analyzing.
- The formal specifications must be exchanged and signed by both parties before large volume purchase begins.
- The appearance and specifications of the product may be modified for improvement without notice.