ILJIN 5630 0.8T LEDs

(Preliminary)

IPTWH53FE1E3

APPROVAL NO.				
APPROVAL DATE				
APPROVAL	INSPECTER	CHECK	APPROVAL	COMMENT

ILJIN	Check		Agreement			APPR'D
	Issue	R&D	Sales	Manufacture	Q.A	

ILJIN LED **(Company)**

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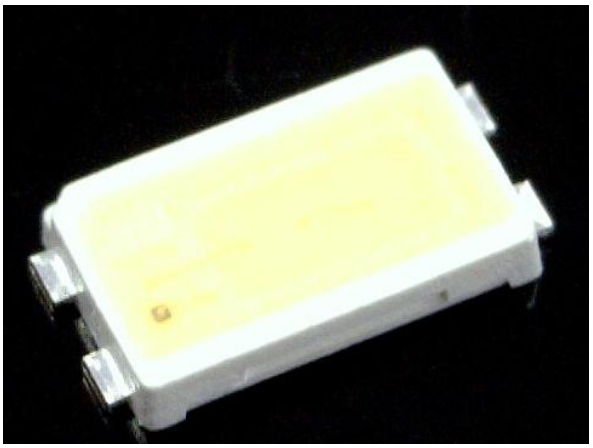
Website: www.ILJIN-LED.co.kr **Email:**

ILJIN 5630 0.8T LEDs

Data Sheet
IPTWH53FE1E3



APPLICATIONS

- Indoor / Outdoor Architectural & Decorative Lights
- Flashlights and Traffic Lights

FEATURES

- SMD Type
- Colored Diffusion
- Chip Based on GaN
- High Luminous Intensity
- Very Wide Viewing Angle
- Package Size : 5.6mm x 3.0mm x 0.8mm
- ESD Protection (Zener Diode Inserted)

ILJIN LED

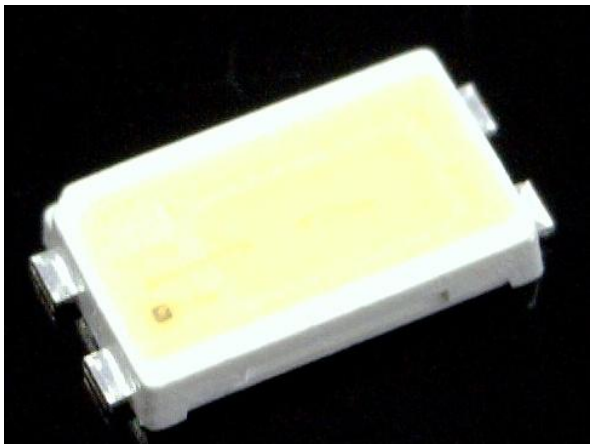
Contents

1. REVISION HISTORY

Spec. No.			
Title	Specification for Approval		
Times	Date	Summary of revision	Remarks
1	2013. 07. 04	New establishment	

2. FEATURES

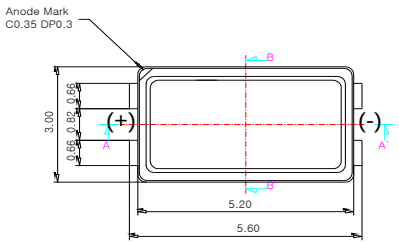
- SMD Type
- Colored Diffusion
- Chip Based on GaN
- High Luminous Intensity
- Very Wide Viewing Angle
- Package Size : 5.6mm x 3.0mm x 0.8mm
- ESD Protection (Zener Diode Inserted)



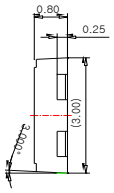
3. OUTLINE DIMENSIONS

5630 Flat Lead Package(Thickness=0.8mm)

Top View

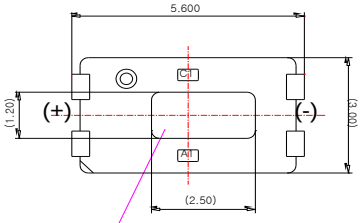


Side



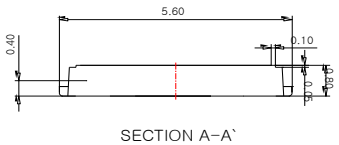
SECTION B-B`

Bottom View



Heatsink (connected to the Cathode)

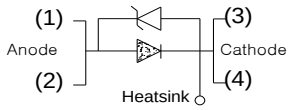
Side



SECTION A-A`

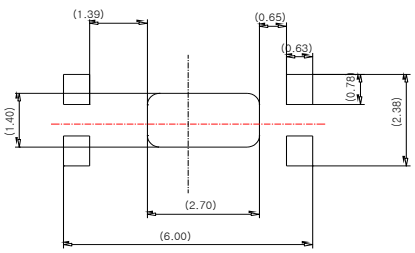
NOTE

1. Units : mm
2. STD Tolerance : ±0.2max
3. Pin Array



4. ESD Protection

Recommended Solder Pattern



4. SPECIFICATIONS

(1) Absolute Maximum Ratings **(TA = 25°C)**

Parameter	Symbol	Value	Unit
DC Forward Current	I_F	200	mA
Pulse Forward Current ★1	I_{FP}	500	mA
Power Dissipation	P_D	720	mW
Operating Temperature Range	Topr	-30 to +80	℃
Storage Temperature Range	Tstg	-40 to +100	℃
Soldering Temperature	Tsol	Reflow Soldering : 260℃, 10sec Hand Soldering : 300℃, 3sec	

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

(2) Electrical / Optical Characteristics **(TA = 25°C)**

Description	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	V_F	I_F = 65mA	2.7	-	3.2	V
Luminous Intensity ★2	I_V	I_F = 65mA	7,750	-	10,750	mcd
Luminous Flux	Φ_V	I_F = 65mA	24.8	-	35.2	lm
Viewing Angle ★3	$2\theta_{1/2}$	I_F = 65mA	-	120		Deg.
Color Rendering Index	Ra	I_F = 65mA	80	-	84.9	-

★2 : Luminous intensity is measured with a light sensor and filter combination that approximate 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.

5. RANK

(1)Luminous Intensity **(TA = 25°C)**

Condition	Nominal CCT	RANK	Min	Typ.	Max	Unit
I_F = 65mA lm/W (@2.95V)	2700K	I1	7,750 (24.0) [125]	-	8,250 (25.6) [133]	mcd (lm) [lm/W]
		I2	8,250 (25.6) [133]	-	8,750 (27.1) [141]	
		I3	8,750 (27.1) [141]	-	9,250 (28.7) [150]	
		I4	9,250 (28.7) [150]	-	9,750 (30.2) [158]	
	3000K	I1	8,000 (24.8) [129]	-	8,500 (26.4) [137]	
		I2	8,500 (26.4) [137]	-	9,000 (27.9) [146]	
		I3	9,000 (27.9) [146]	-	9,500 (29.5) [154]	
		I4	9,500 (29.5) [154]	-	10,000 (31.0) [162]	
	3500K	I1	8,250 (26.0) [136]	-	8,750 (27.6) [144]	
		I2	8,750 (27.6) [144]	-	9,250 (29.1) [152]	
		I3	9,250 (29.1) [152]	-	9,750 (30.7) [160]	
		I4	9,750 (30.7) [160]	-	10,250 (32.3) [168]	
	4000K	I1	8,500 (27.2) [142]	-	9,000 (28.8) [150]	
		I2	9,000 (28.8) [150]	-	9,500 (30.4) [159]	
		I3	9,500 (30.4) [159]	-	10,000 (32.0) [167]	
		I4	10,000 (32.0) [167]	-	10,500 (33.6) [175]	

※ Measurement Uncertainty of the Luminous intensity : ± 10%

5. RANK

(1)Luminous Intensity **(TA = 25°C)**

Condition	Nominal CCT	RANK	Min	Typ.	Max	Unit
I_F = 65mA lm/W (@2.95V)	5000K	I1	8,750 (28.4) [148]	-	9,250 (30.1) [157]	mcd (lm) [lm/W]
		I2	9,250 (30.1) [157]	-	9,750 (31.7) [165]	
		I3	9,750 (31.7) [165]	-	10,250 (33.3) [174]	
		I4	10,250 (33.3) [174]	-	10,750 (34.9) [182]	
	5700K	I1	8,750 (28.4) [148]	-	9,250 (30.0) [156]	
		I2	9,250 (30.0) [156]	-	9,750 (31.6) [165]	
		I3	9,750 (31.6) [165]	-	10,250 (33.2) [173]	
		I4	10,250 (33.2) [173]	-	10,750 (34.8) [182]	
	6500K	I1	8,500 (27.2) [142]	-	9,000 (28.8) [150]	
		I2	9,000 (28.8) [150]	-	9,500 (30.4) [159]	
		I3	9,500 (30.4) [159]	-	10,000 (32.0) [167]	
		I4	10,000 (32.0) [167]	-	10,500 (33.6) [175]	

※ Measurement Uncertainty of the Luminous intensity : ± 10%

(2)Forward Voltage Ranks **(TA = 25°C)**

V_F RANK	Condition	Min	Typ.	Max	Unit
E8	I_F = 65mA	2.7	-	2.8	V
E9		2.8	-	2.9	
E0		2.9	-	3.0	
V1		3.0	-	3.1	
V2		3.1	-	3.2	

※ Measurement Uncertainty of the Forward Voltage : ± 0.1V

5. RANK

(3) CIE Rank

WA		WB		WC		WD	
X	Y	X	Y	X	Y	X	Y
0.4790	0.4476	0.4688	0.4290	0.4790	0.4476	0.4688	0.4290
0.4688	0.4290	0.4585	0.4104	0.4688	0.4290	0.4585	0.4104
0.4813	0.4319	0.4703	0.4132	0.4813	0.4319	0.4703	0.4132
0.4923	0.4506	0.4813	0.4319	0.4923	0.4506	0.4813	0.4319
WE		**WF**		**WG**		**WH**	
X	Y	X	Y	X	Y	X	Y
0.4657	0.4444	0.4562	0.4260	0.4657	0.4444	0.4562	0.4260
0.4562	0.4260	0.4468	0.4077	0.4562	0.4260	0.4468	0.4077
0.4688	0.4290	0.4585	0.4104	0.4688	0.4290	0.4585	0.4104
0.4790	0.4476	0.4688	0.4290	0.4790	0.4476	0.4688	0.4290
WI		**WJ**		**WK**		**WL**	
X	Y	X	Y	X	Y	X	Y
0.4516	0.4392	0.4431	0.4213	0.4516	0.4392	0.4431	0.4213
0.4431	0.4213	0.4345	0.4033	0.4431	0.4213	0.4345	0.4033
0.4562	0.4260	0.4468	0.4077	0.4562	0.4260	0.4468	0.4077
0.4657	0.4444	0.4562	0.4260	0.4657	0.4444	0.4562	0.4260
WM		**WN**		**WO**		**WP**	
X	Y	X	Y	X	Y	X	Y
0.4375	0.4341	0.4299	0.4165	0.4375	0.4341	0.4299	0.4165
0.4299	0.4165	0.4223	0.3990	0.4299	0.4165	0.4223	0.3990
0.4431	0.4213	0.4345	0.4033	0.4431	0.4213	0.4345	0.4033
0.4516	0.4392	0.4431	0.4213	0.4516	0.4392	0.4431	0.4213
WQ		**WR**		**WS**		**WT**	
X	Y	X	Y	X	Y	X	Y
0.4212	0.4259	0.4148	0.4090	0.4212	0.4259	0.4148	0.4090
0.4148	0.4090	0.4083	0.3921	0.4148	0.4090	0.4083	0.3921
0.4299	0.4165	0.4223	0.3990	0.4299	0.4165	0.4223	0.3990
0.4375	0.4341	0.4299	0.4165	0.4375	0.4341	0.4299	0.4165
WU		**WV**		**WW**		**WX**	
X	Y	X	Y	X	Y	X	Y
0.4050	0.4178	0.3996	0.4015	0.4050	0.4178	0.3996	0.4015
0.3996	0.4015	0.3943	0.3853	0.3996	0.4015	0.3943	0.3853
0.4148	0.4090	0.4083	0.3921	0.4148	0.4090	0.4083	0.3921
0.4212	0.4259	0.4148	0.4090	0.4212	0.4259	0.4148	0.4090

5. RANK

(3) CIE Rank

NA		NB		NC		ND	
X	Y	X	Y	X	Y	X	Y
0.3915	0.4115	0.3871	0.3959	0.3828	0.3803	0.3784	0.3647
0.3871	0.3959	0.3828	0.3803	0.3784	0.3647	0.3741	0.3491
0.4006	0.4044	0.3952	0.3880	0.3898	0.3716	0.3844	0.3552
0.4060	0.4208	0.4006	0.4044	0.3952	0.3880	0.3898	0.3716
NE		**NF**		**NG**		**NH**	
X	Y	X	Y	X	Y	X	Y
0.3769	0.4022	0.3736	0.3874	0.3703	0.3726	0.3670	0.3578
0.3736	0.3874	0.3703	0.3726	0.3670	0.3578	0.3637	0.3430
0.3871	0.3959	0.3828	0.3803	0.3784	0.3647	0.3741	0.3491
0.3915	0.4115	0.3871	0.3959	0.3828	0.3803	0.3784	0.3647
NI		**NJ**		**NK**		**NL**	
X	Y	X	Y	X	Y	X	Y
0.3673	0.3952	0.3642	0.3805	0.3617	0.3663	0.3591	0.3522
0.3642	0.3805	0.3617	0.3663	0.3591	0.3522	0.3571	0.3385
0.3736	0.3874	0.3703	0.3726	0.3670	0.3578	0.3637	0.3430
0.3769	0.4022	0.3736	0.3874	0.3703	0.3726	0.3670	0.3578
NM		**NN**		**NO**		**NP**	
X	Y	X	Y	X	Y	X	Y
0.3566	0.3871	0.3548	0.3736	0.3530	0.3601	0.3512	0.3465
0.3548	0.3736	0.3530	0.3601	0.3512	0.3465	0.3494	0.3329
0.3642	0.3805	0.3617	0.3663	0.3591	0.3522	0.3571	0.3385
0.3673	0.3952	0.3642	0.3805	0.3617	0.3663	0.3591	0.3522

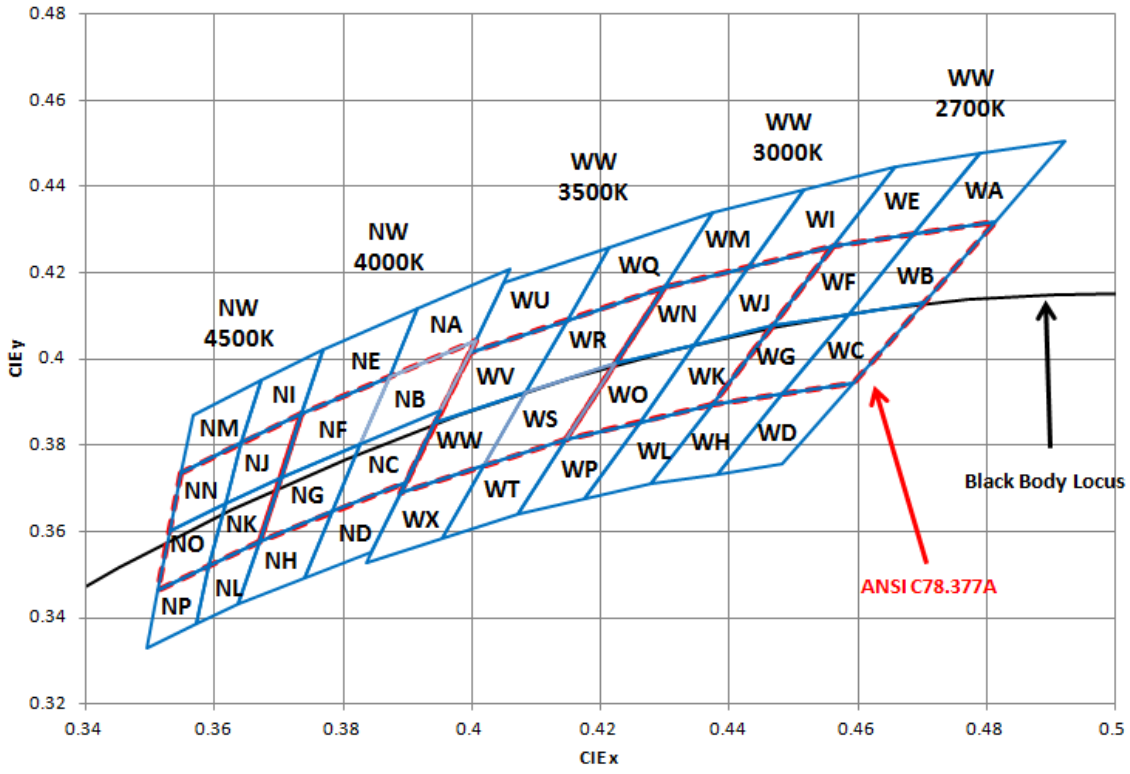
5. RANK

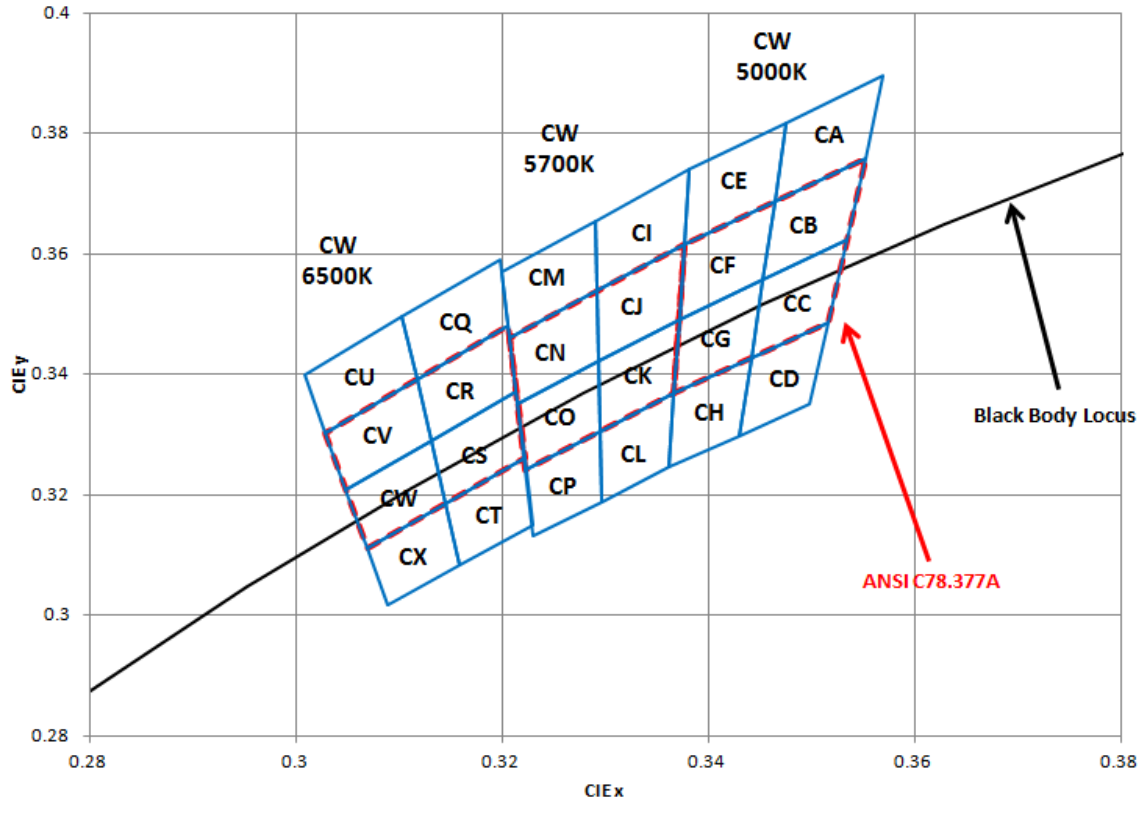
(3) CIE Rank

CA		CB		CC		CD	
X	Y	X	Y	X	Y	X	Y
0.3475	0.3818	0.3464	0.3688	0.3452	0.3558	0.3441	0.3428
0.3464	0.3688	0.3452	0.3558	0.3441	0.3428	0.3429	0.3298
0.3551	0.3760	0.3533	0.3624	0.3515	0.3487	0.3497	0.3351
0.3569	0.3897	0.3551	0.3760	0.3533	0.3624	0.3515	0.3487
CE		**CF**		**CG**		**CH**	
X	Y	X	Y	X	Y	X	Y
0.3381	0.3740	0.3376	0.3616	0.3371	0.3493	0.3366	0.3369
0.3376	0.3616	0.3371	0.3493	0.3366	0.3369	0.3361	0.3246
0.3464	0.3688	0.3452	0.3558	0.3441	0.3428	0.3429	0.3298
0.3475	0.3818	0.3464	0.3688	0.3452	0.3558	0.3441	0.3428
CI		**CJ**		**CK**		**CL**	
X	Y	X	Y	X	Y	X	Y
0.3290	0.3656	0.3292	0.3539	0.3293	0.3423	0.3294	0.3306
0.3292	0.3539	0.3293	0.3423	0.3294	0.3306	0.3295	0.3190
0.3376	0.3616	0.3371	0.3493	0.3366	0.3369	0.3361	0.3246
0.3381	0.3740	0.3376	0.3616	0.3371	0.3493	0.3366	0.3369
CM		**CN**		**CO**		**CP**	
X	Y	X	Y	X	Y	X	Y
0.3200	0.3571	0.3207	0.3462	0.3215	0.3353	0.3222	0.3243
0.3207	0.3462	0.3215	0.3353	0.3222	0.3243	0.3230	0.3133
0.3292	0.3539	0.3293	0.3423	0.3294	0.3306	0.3295	0.3190
0.3290	0.3656	0.3292	0.3539	0.3293	0.3423	0.3294	0.3306
CQ		**CR**		**CS**		**CT**	
X	Y	X	Y	X	Y	X	Y
0.3103	0.3496	0.3117	0.3393	0.3131	0.3290	0.3145	0.3187
0.3117	0.3393	0.3131	0.3290	0.3145	0.3187	0.3159	0.3085
0.3205	0.3481	0.3213	0.3371	0.3221	0.3261	0.3229	0.3151
0.3197	0.3591	0.3205	0.3481	0.3213	0.3371	0.3221	0.3261
CU		**CV**		**CW**		**CX**	
X	Y	X	Y	X	Y	X	Y
0.3008	0.3400	0.3028	0.3304	0.3048	0.3209	0.3068	0.3113
0.3028	0.3304	0.3048	0.3209	0.3068	0.3113	0.3088	0.3018
0.3117	0.3393	0.3131	0.3290	0.3145	0.3187	0.3159	0.3085
0.3103	0.3496	0.3117	0.3393	0.3131	0.3290	0.3145	0.3187

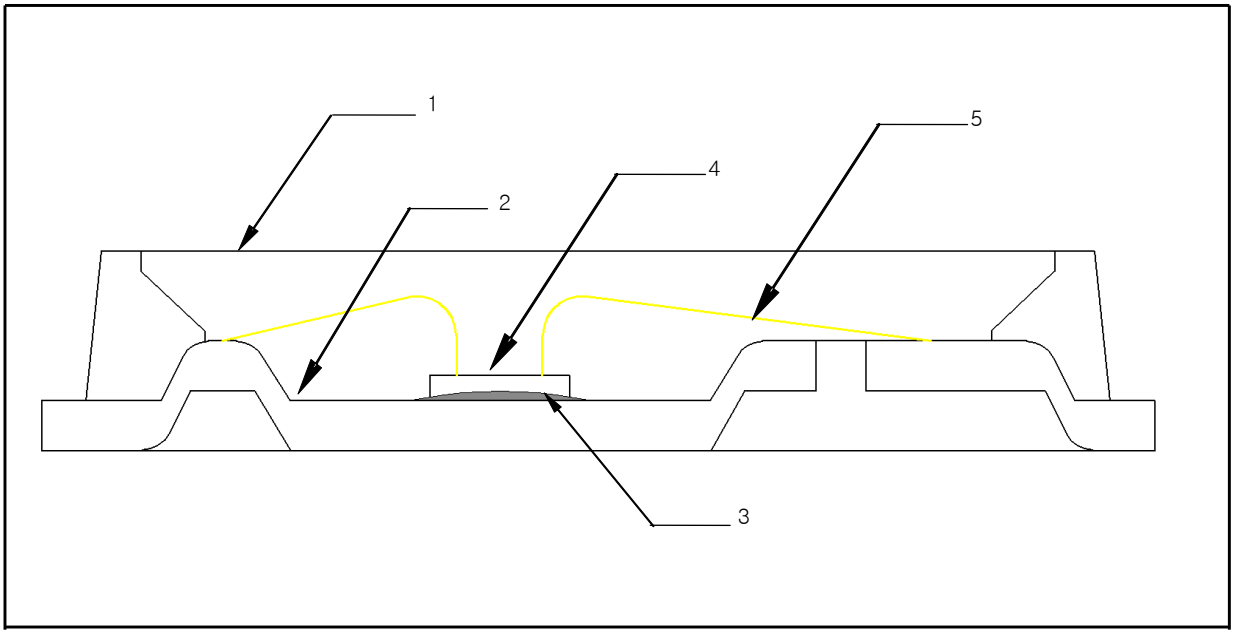
5. RANK

(4) Chromaticity Region & Coordinates





5. COMPOSITION OF PACKAGE



(1) Component Material

Number	Item	Material
1	Encapsulant	Silicone
2	Electrode	Ag plating Cu alloy
3	Die adhesive	Silicone
4	LED chip	GaN/sappire
5	Wire	Gold

6. ENVIRONMENTAL POLLUTION FREE

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

(2)Test material : LED-Lead Frame ▶ ①Resin, ②Metal

① Resin Test

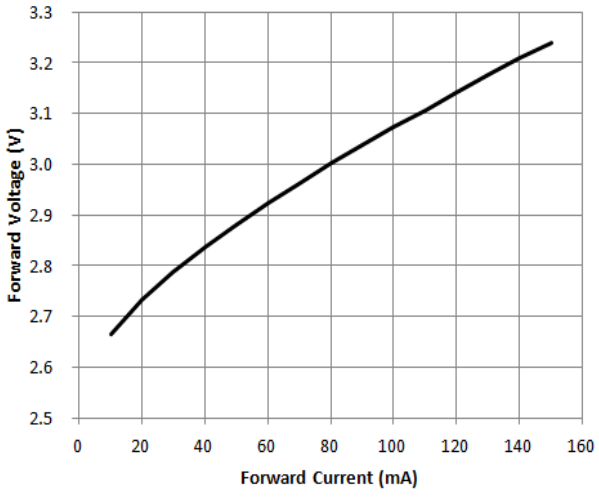
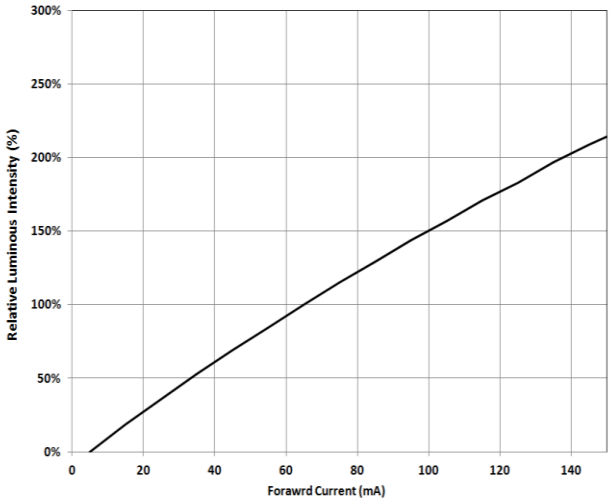
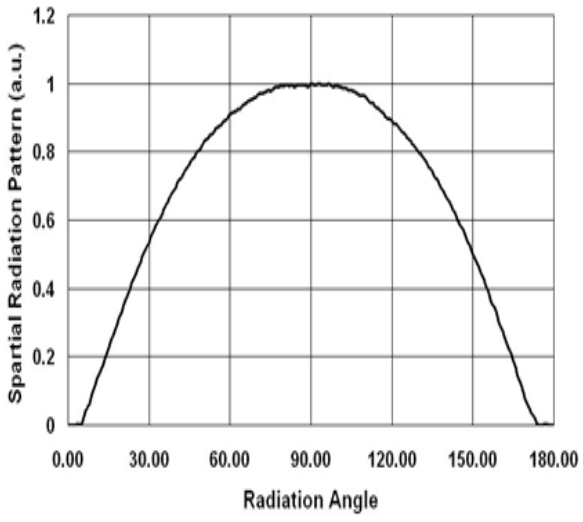
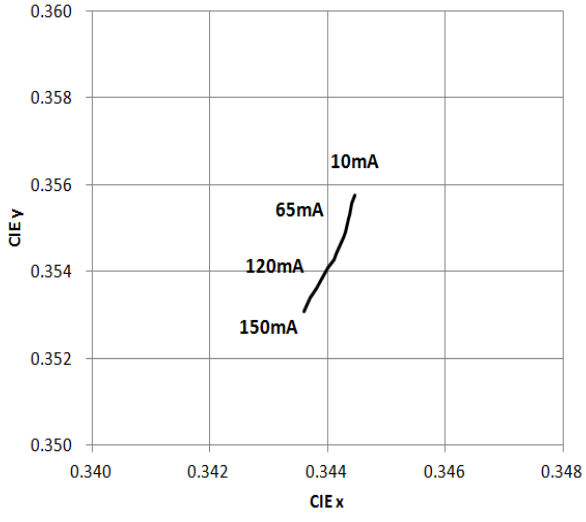
Test Item	Unit	Result	Test Method
Pb	**mg/kg**	**No Detection**	**ISO 6101-2 (AAS) EN 1122 (ICP) ISO 3856/7 (AAS) ISO 3856/5 UV-Vis. Spectrophotometer**
Cd	**mg/kg**	**No Detection**	
Hg	**mg/kg**	**No Detection**	
Cr^{6+}	**mg/kg**	**No Detection**	
PBB_S	**mg/kg**	**No Detection**	
$PBDE_S$	**mg/kg**	**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^{6+}	**mg/kg**	**No Detection**	
PBB_S	**mg/kg**	**No Detection**	
$PBDE_S$	**mg/kg**	**No Detection**	

7. TYPICAL ELECTRICAL / OPTICAL CHARACTERISTICS CURVES

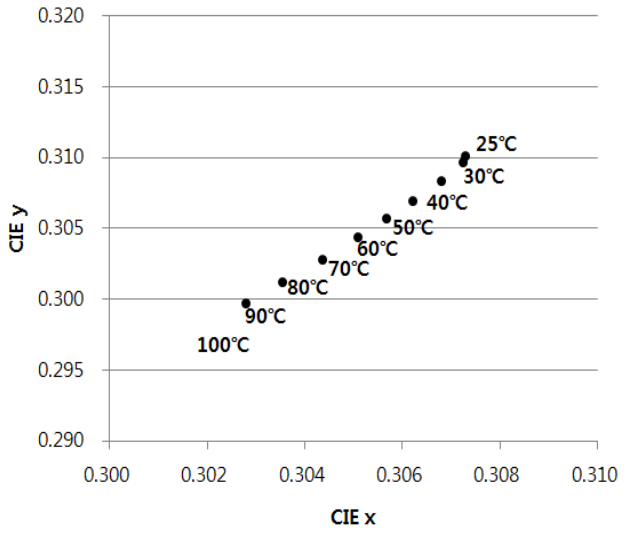
(25℃ Ambient Temperature Unless Otherwise Noted)

Forward Current Vs. Forward Voltage	Forward Current Vs. Relative Luminosity
	
Directivity	**Forward Current Vs. Chromaticity Coordinate**
	

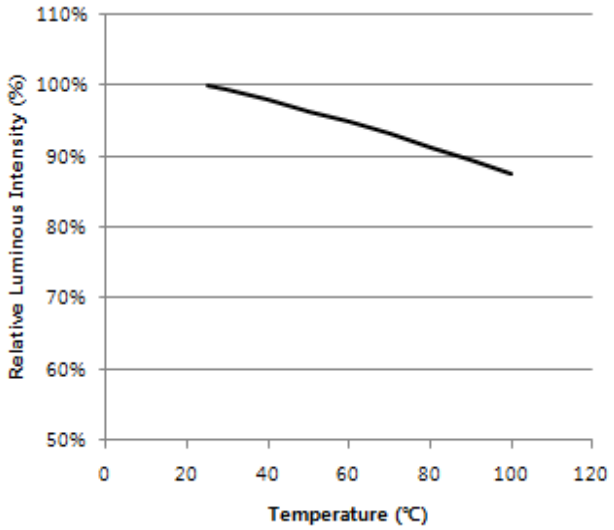
8. TYPICAL ELECTRICAL / OPTICAL CHARACTERISTICS CURVES

(25℃ Ambient Temperature Unless Otherwise Noted)

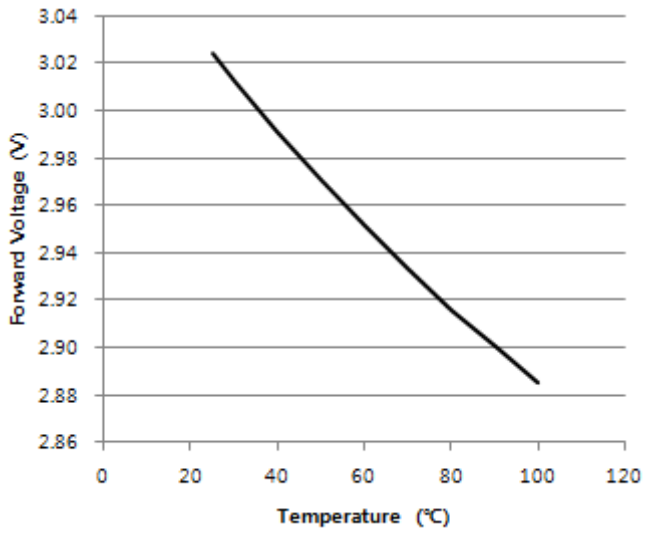
Ambient Temperature Vs. Chromaticity Coordinate



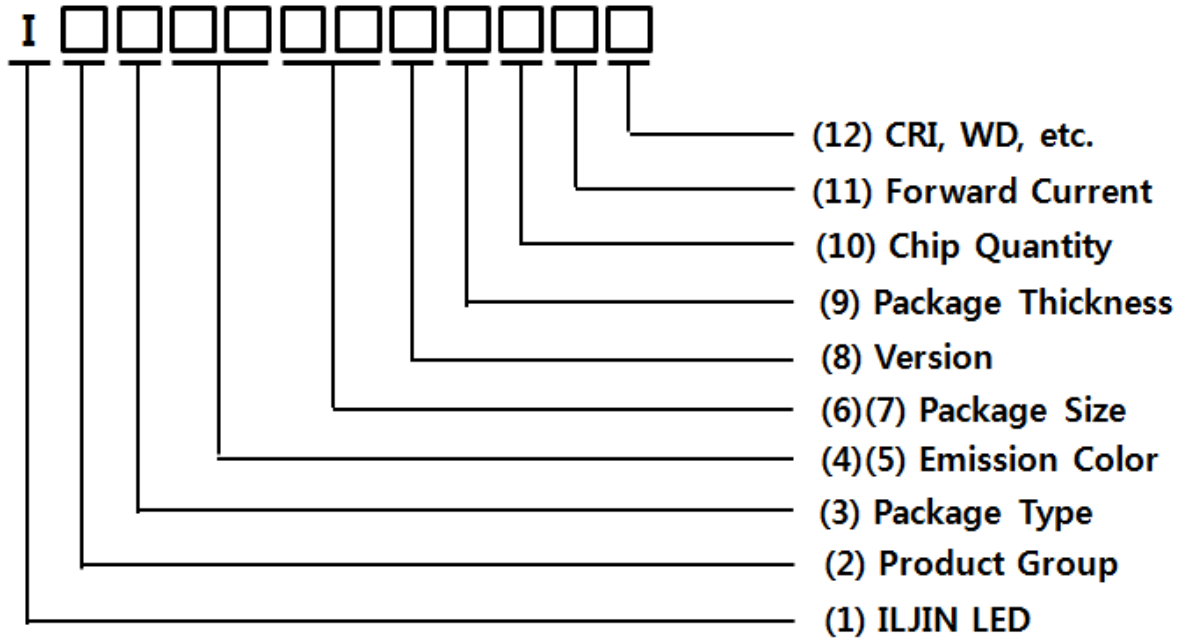
Ambient Temperature vs. Relative Luminosity



Ambient Temperature vs. Forward Voltage



9. CLASSIFICATION BY NAME



(1) Company	I	ILJIN LED
(1) Product group	P	Package
(2) Package Type	T	Top View
(4)(5) Emission Color	WH	White
(6)(7) Package Size[nm]	53	5630
(8) Version	F	Internal Code
(9) Package Thickness[nm]	E	0.8
(10) Chip Quantity	1	1chip
(11) Forward Current [mA]	E	65
(12) Etc. [Chip Wavelength]	3	CRI 80~84.9

10. RELIABILITY

(1)Test item and results (Application LED PKG type : Top – View LED PKG

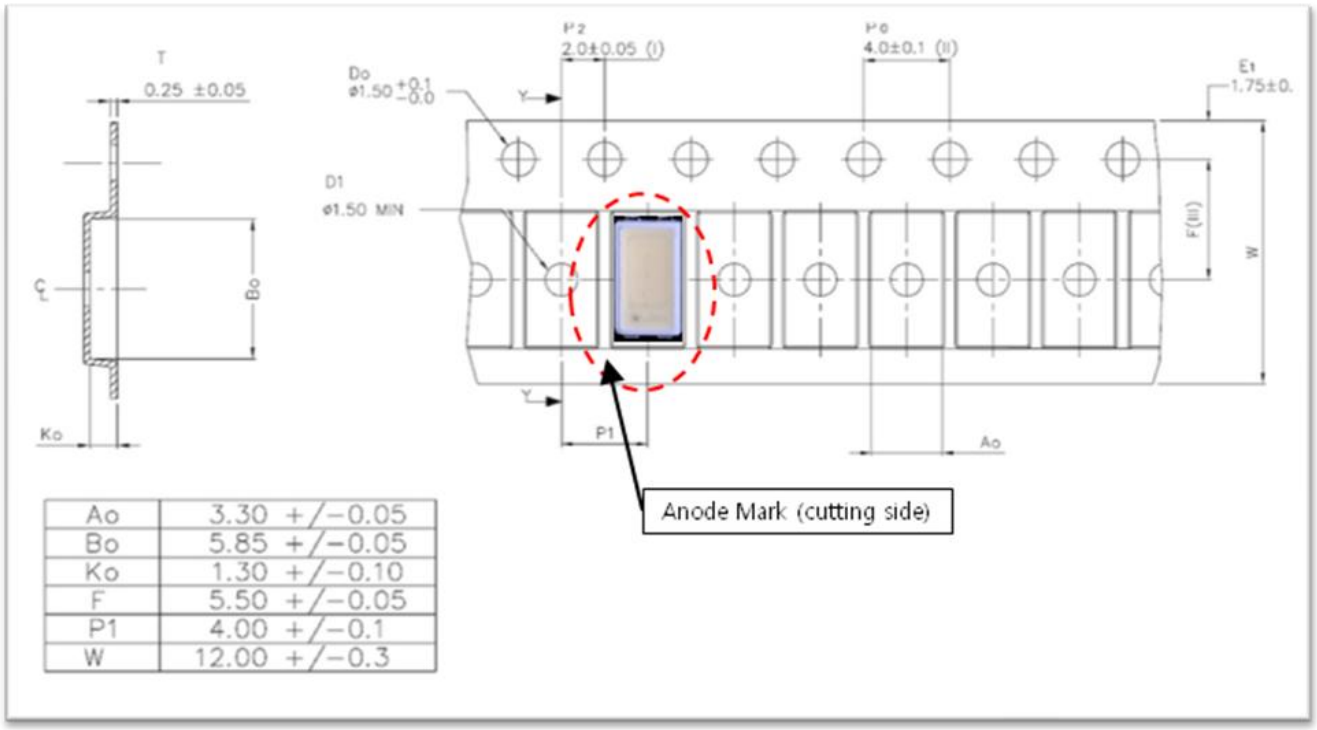
Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Room Temperature Operating Life Test	EIAJ ED-4701	Ta=25℃±5℃, IF=65mA	1000 hrs.	0/50
Room Temperature Storage Test		Ta=25℃±5℃	500 hrs.	0/50
High Humidity & High Temperature Operating Life Test		60℃, RH=90%, IF=65mA	1000 hrs.	0/50
High Humidity & High Temperature Storage Test	EIAJ ED-4701	Ta=60℃, RH=90%	1000 hrs.	0/50
High Temperature Operating Life Test	EIAJ ED-4701	Ta=85℃, IF=65mA	1000 hrs.	0/50
High Temperature Storage Test	EIAJ ED-4701	Ta=100℃	1000 hrs.	0/50
Low Temperature Operating Life Test		Ta=-40℃, IF=65mA	1000 hrs.	0/50
Low Temperature Storage Test	EIAJ ED-4701	Ta=-40℃	1000 hrs.	0/50
Temperature Cycle Test	EIAJ ED-4701	-40℃ ~ 25℃ ~ 100℃ ~ 25℃ 32min, 2min, 32min, 2min	100 cycles	0/50
Solderability Test	EIAJ ED-4701	Tsol=215±5℃, 3sec. (Lead Solder)	1 time Over 90%	0/50
Soldering Heat Test	EIAJ ED-4701	Tsol=260℃, 10sec. (Pre treatment 30℃, 70%, 168hrs.)	2 Times	0/50

(2)Criteria for judging the damage

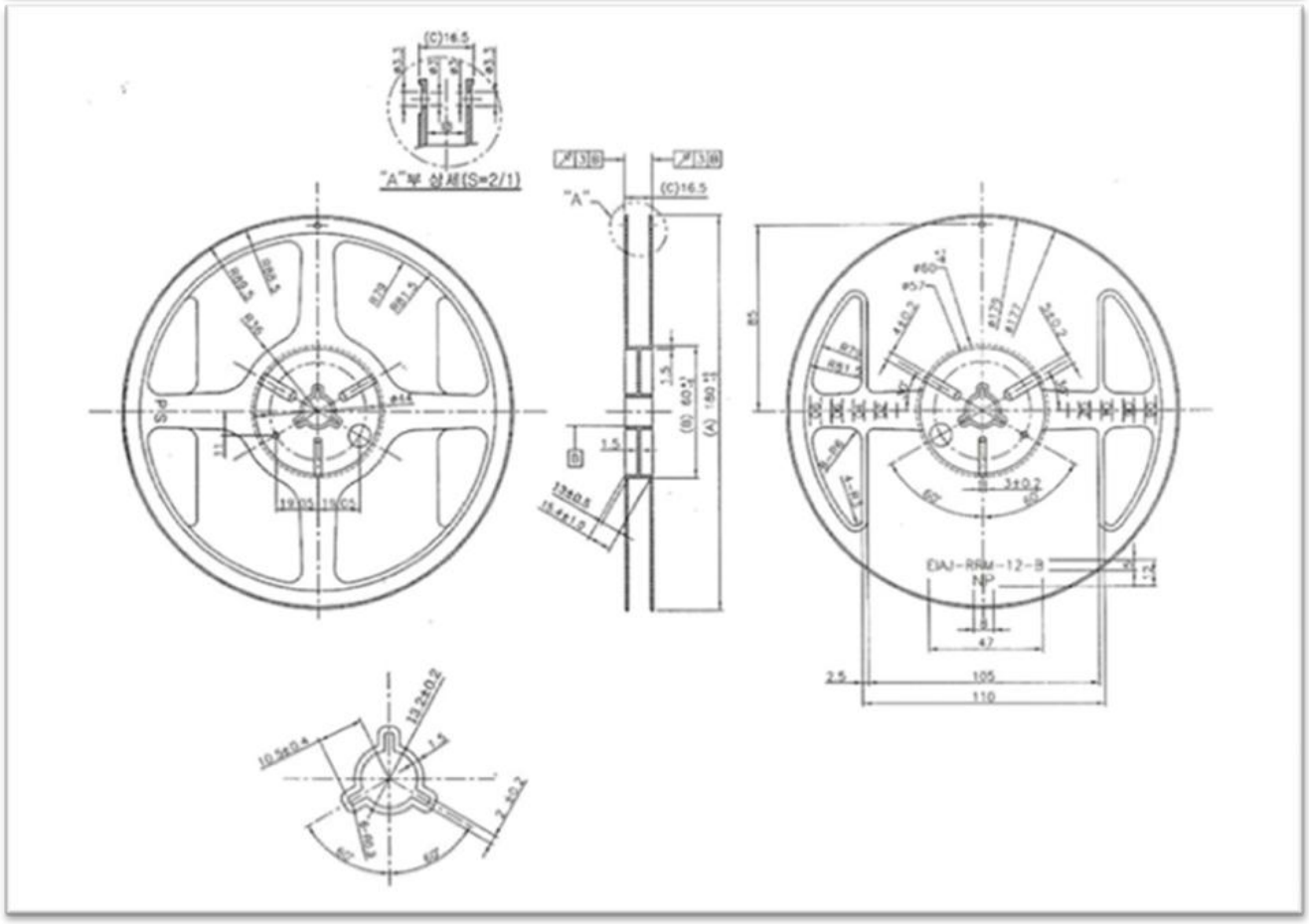
Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	VF	IF=65mA	-	U.S.L.*) × 1.2
Luminous Intensity	IV	IF=65mA	L.S.L.**) × 0.7	-

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

11. TAPING

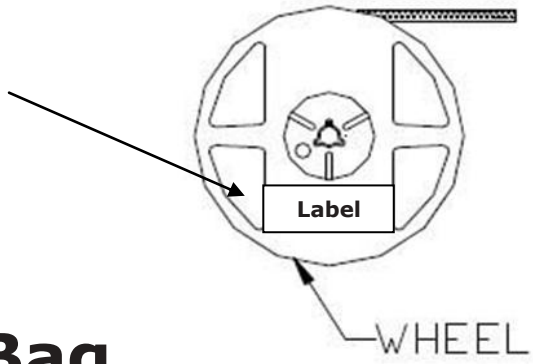


Ao	3.30 +/−0.05
Bo	5.85 +/−0.05
Ko	1.30 +/−0.10
F	5.50 +/−0.05
P1	4.00 +/−0.1
W	12.00 +/−0.3

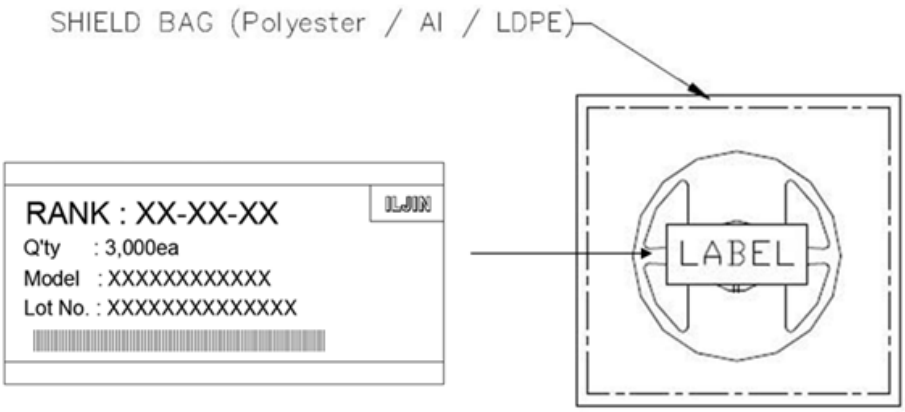


12. PACKING

Reel

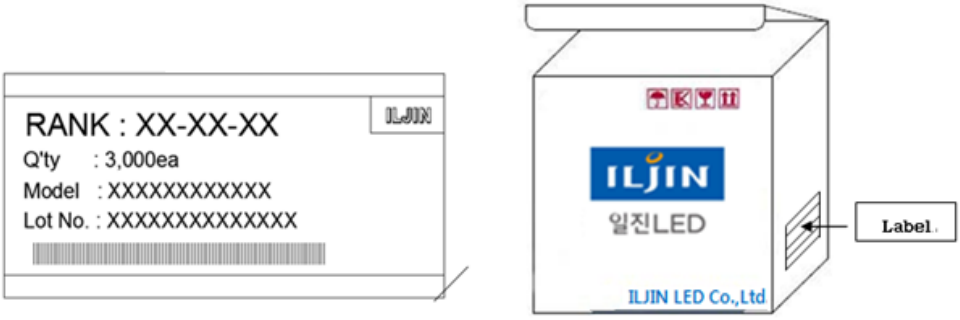


Aluminum Vinyl Bag

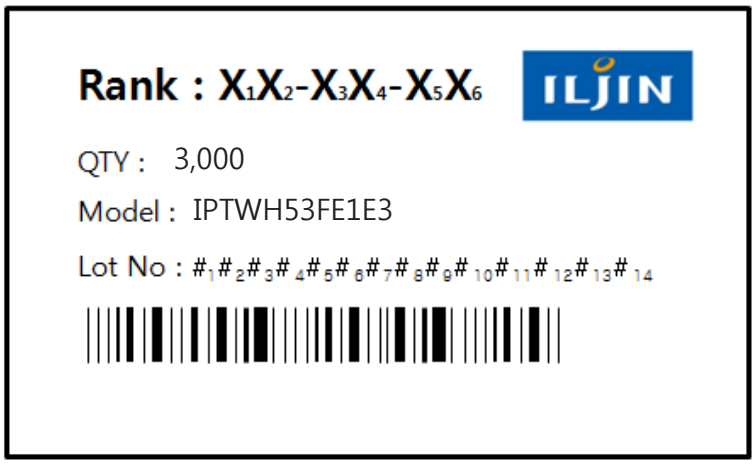


• **Quantity = 3000pcs/reel**

Outer Box



13. LABELING



(1) Rank Code

X_1X_2 : IV Rank (refer to page 6)

X_3X_4 : Chromaticity Coordinate Rank, CIE (refer to page 6)

X_5X_6 : VF Rank (refer to page 7)

(2) Model Code : refer to page 11

(3) Lot Number

#1#2#3#4#5#6#7#8#9#10#11#12#13#14

- **#5#6 : Year**
- **#10#11 : Month**
- **#13#14 : Day**
- **Others : ILJIN's Identification Number**

14. 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.
- The product is packed in a dry aluminum bag containing desiccant indicator. If the color of the desiccant indicator has faded after storing, a baking treatment should be performed as follows : 55 ± 5℃ for more than 24 hours. LEDs may be baked on the original reels. Remove LEDs from the aluminum packaging before baking. Do not bake parts at temperatures higher than 60ºC.
- After opening the package, the LEDs should be kept at 25℃, 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..

(2) Soldering Conditions

- The LEDs can be soldered in place using the reflow soldering method.

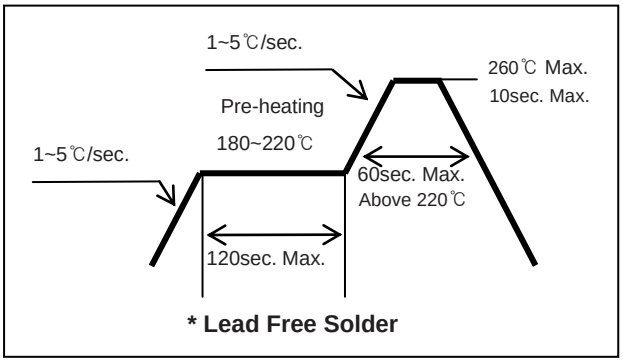
• The recommended soldering conditions are as follows:

【Hand Soldering】

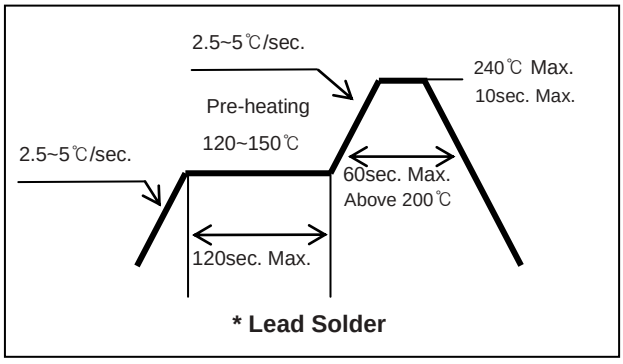
Soldering iron : 300℃ Max., 3 seconds
A soldering iron less than 20W must be used.

【Reflow Soldering】

Use the conditions shown in the figures on the right.
Pre-heating : 120~150℃ 120 seconds Max.
Soldering : 240℃ Max. 10 seconds Max.
(Rapid cooling should be avoided.)



*** Lead Free Solder**



*** Lead Solder**

- 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.
- Reflow soldering should not be done more than two times.

14. CAUTIONS

(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℃/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.

- PCB pattern should be designed as recommended soldering pattern. ILJIN LED especially suggests that Heat sink soldering pattern should be designed as recommend soldering pattern. If the designed pattern is smaller than recommended soldering pattern or no pattern of heat sink, LEDs may be taken heat damage.

(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.

(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 LED'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 LED. When defective LEDs are found, user shall inform ILJIN LED 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.

- Mixed ranks on a board affect LED's characteristics such as the luminous intensity, color differences, the forward voltage, and chip damage by overvoltage, etc. ILJIN LED holds NO responsibility for these problems occurred by users' carelessness. Please distinguish each rank carefully when they are mounted on a board.