S P E C I F I C A T I O N S

- Preliminary -

SMD TYPE WHITE LED

Model : AL301

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※ Suggested values in this preliminary specification can be changed without notice.

1. General Descriptions

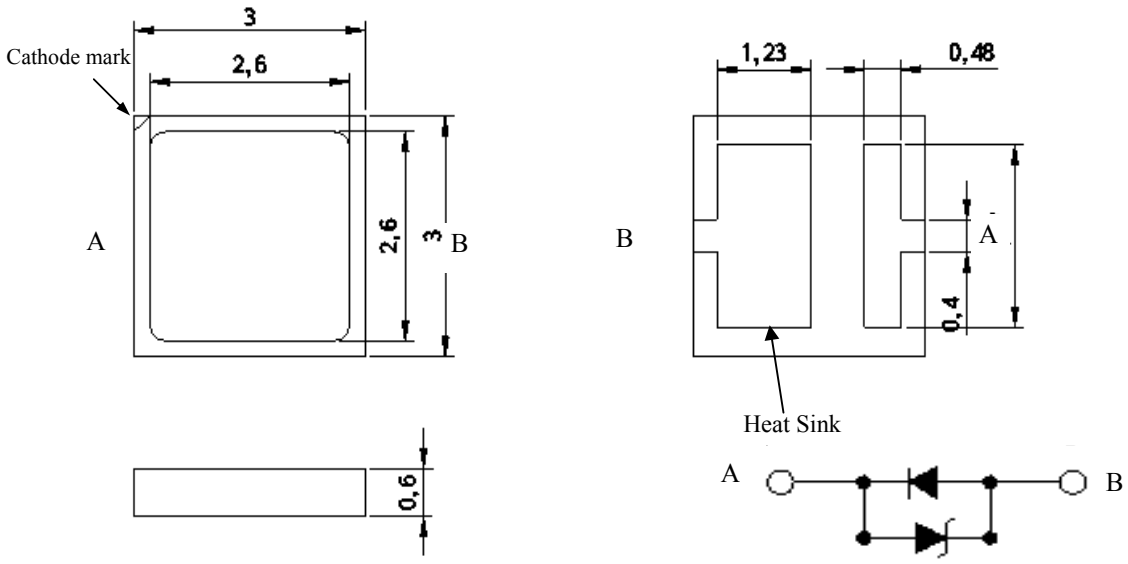
(1) Features

- Package Dimension : 3.0(L) × 3.0(W) × 0.6(T) mm
- White Emission Package (Top View)
- Wide View Angle ($2\Theta_{1/2}$=120deg.)

(2) Applications

- Bulb
- L-Tube
- MR, PAR
- Down Light
- Flat Panel Light

(3) Outline Dimensions



2. Specifications

(1) Absolute Maximum Ratings

Parameter	Symbol	Absolute maximum rating	Unit	Remark
Power Dissipation	P_D	0.5	W	
Forward Current	I_F	150	mA	
Peak Pulse Current(1)	I_{FP}	400	mA	
Reverse Voltage	V_R	1.2	V	
Operating Temperature	T_{OPR}	-30 to +85	℃	
Storage Temperature	T_{STG}	-40 to +100	℃	
Junction Temperature	T_{STG}	120	℃	

- Notes : (1) Duty ratio = 1/10, pulse width = 10msec

(2) Initial Electrical/Optical Characteristics

(T_a=25℃)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage(1)	V_F	I_F =65mA	2.8	-	3.1	V
Luminous Intensity(2)	Flux			32.0		lm
Chromaticity Coordinate(3)	Cx			0.3450		-
	Cy			0.3610		-
Color Rendering Index(4)	-		80.0	-	-	-

- Notes : (1) Forward Voltage Measurement allowance is ± 10%.
(2) Luminous Intensity Measurement allowance is ± 10%
Measuring equipment : CAS140B(Instrument system)
(3) The coordinate refers to CIE 1931 chromaticity diagram.
(4) Color Rendering Index Measurement allowance is ±3
(5) Initial Electircal/Optical Characteristics can be changed without notice.

(3) Characteristics Rank

■ Forward voltage & Luminous intensity rank

(T_a=25℃)

Parameter	Symbol	Condition	Rank	Min.	Max.	Unit	Flux(1) (lm,Typ.)
Forward Voltage	V_F	I_F = 65mA	V28	2.9	3.0	V	
			V29	3.0	3.1		
			V30	3.1	3.2		
			V31	3.2	3.3		
			L30	30.0	31.0	lm	30.5
			L31	31.0	32.0		31.5
			L32	32.0	33.0		32.5
			L33	33.0	-		-

- Notes : (1) The typical lumen values are included for reference only.

■ **Color Rank** (I_F=100mA, Ta=25℃)

7A				
Cx	0.3028	0.3116	0.3140	0.3055
Cy	0.3374	0.3462	0.3330	0.3250

7B				
Cx	0.3055	0.3140	0.3158	0.3077
Cy	0.3250	0.3330	0.3215	0.3145

6A				
Cx	0.3116	0.3205	0.3215	0.3140
Cy	0.3462	0.3547	0.3410	0.3330

6B				
Cx	0.3140	0.3215	0.3225	0.3158
Cy	0.3330	0.3410	0.3275	0.3215

6C				
Cx	0.3205	0.3290	0.3292	0.3215
Cy	0.3547	0.3615	0.3480	0.3410

6D				
Cx	0.3215	0.3292	0.3295	0.3225
Cy	0.3410	0.3480	0.3335	0.3275

5A				
Cx	0.3290	0.3376	0.3370	0.3292
Cy	0.3615	0.3686	0.3550	0.3480

5B				
Cx	0.3292	0.3370	0.3362	0.3295
Cy	0.3480	0.3550	0.3392	0.3335

5C				
Cx	0.3376	0.3463	0.3450	0.3370
Cy	0.3686	0.3758	0.3610	0.3550

5D				
Cx	0.3370	0.3450	0.3438	0.3362
Cy	0.3550	0.3610	0.3455	0.3392

5E				
Cx	0.3463	0.3550	0.3530	0.3450
Cy	0.3758	0.3830	0.3660	0.3610

5F				
Cx	0.3450	0.3530	0.3508	0.3438
Cy	0.3610	0.3660	0.3520	0.3455

4A				
Cx	0.3551	0.3643	0.3620	0.3530
Cy	0.3830	0.3890	0.3730	0.3660

4B				
Cx	0.3530	0.3620	0.3600	0.3508
Cy	0.3660	0.3730	0.3590	0.3520

4C				
Cx	0.3643	0.3755	0.3720	0.3620
Cy	0.3890	0.3960	0.3800	0.3730

4D				
Cx	0.3620	0.3720	0.3680	0.3600
Cy	0.3730	0.3800	0.3640	0.3590

4E				
Cx	0.3755	0.3871	0.3828	0.3720
Cy	0.3960	0.4030	0.3870	0.3800

4F				
Cx	0.3720	0.3828	0.3780	0.3680
Cy	0.3800	0.3870	0.3695	0.3640

4G				
Cx	0.3871	0.4006	0.3950	0.3828
Cy	0.4030	0.4110	0.3950	0.3870

4H				
Cx	0.3828	0.3950	0.3889	0.3780
Cy	0.3870	0.3950	0.3760	0.3695

3A				
Cx	0.4006	0.4150	0.4095	0.3950
Cy	0.4110	0.4170	0.4005	0.3950

3B				
Cx	0.3950	0.4095	0.4018	0.3889
Cy	0.3950	0.4005	0.3822	0.3760

3C				
Cx	0.4150	0.4299	0.4223	0.4095
Cy	0.4170	0.4235	0.4059	0.4005

3D				
Cx	0.4095	0.4223	0.4147	0.4018
Cy	0.4005	0.4059	0.3884	0.3822

3E				
Cx	0.4299	0.4431	0.4345	0.4223
Cy	0.4235	0.4283	0.4105	0.4059

3F				
Cx	0.4223	0.4345	0.4260	0.4147
Cy	0.4059	0.4105	0.3924	0.3884

3G				
Cx	0.4431	0.4562	0.4467	0.4345
Cy	0.4283	0.4330	0.4147	0.4105

3H				
Cx	0.4345	0.4467	0.4373	0.4260
Cy	0.4105	0.4147	0.3963	0.3924

2A				
Cx	0.4562	0.4688	0.4590	0.4467
Cy	0.4330	0.4360	0.4180	0.4147

2B				
Cx	0.4467	0.4590	0.4483	0.4373
Cy	0.4147	0.4180	0.3988	0.3963

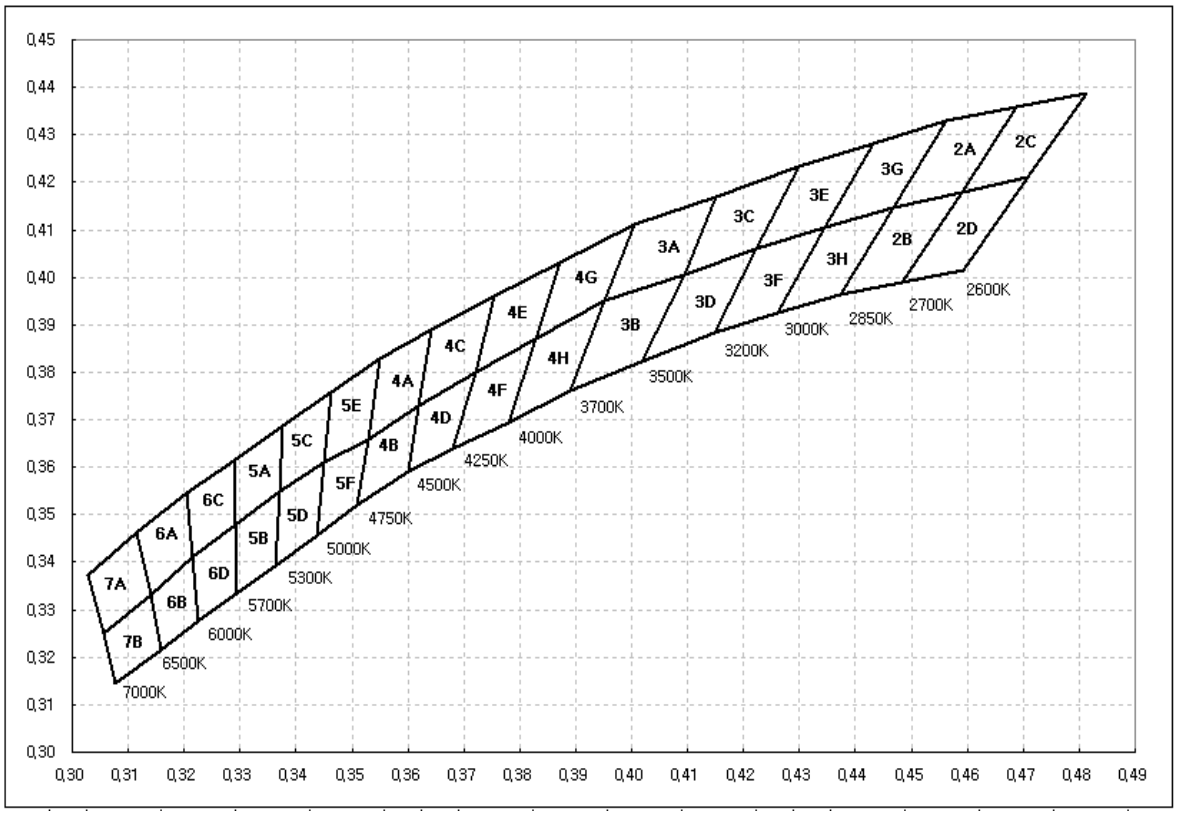
2C				
Cx	0.4688	0.4813	0.4709	0.4590
Cy	0.4360	0.4389	0.4210	0.4180

2D				
Cx	0.4590	0.4709	0.4593	0.4483
Cy	0.4180	0.4210	0.4014	0.3988

- Notes. (1) Chromaticity coordinates measurement allowance is ±0.01.

(2) The Chromaticity coordinates refer to CIE 1931 chromaticity diagram.

■ **Chromaticity Diagram**



3. Rank

The rank inscription is composed of the following method.

Ex.) L31 5ES V29

- V29 → V_F : 2.9~3.0 V
- 5ES → Cx, Cy
- L31 → Iv : 31~32lm

· S : Used 4 rank in one rank

· D : Used 2 vertical rank in one rank

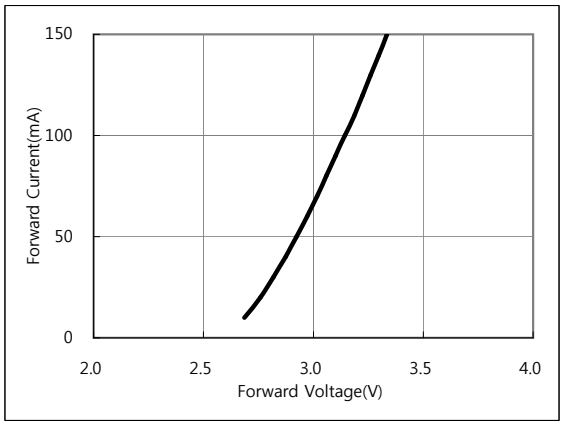
· R : Used 2 horizontal rank in one rank

※ Ex) 5CS = 5C,5D,5E,5F

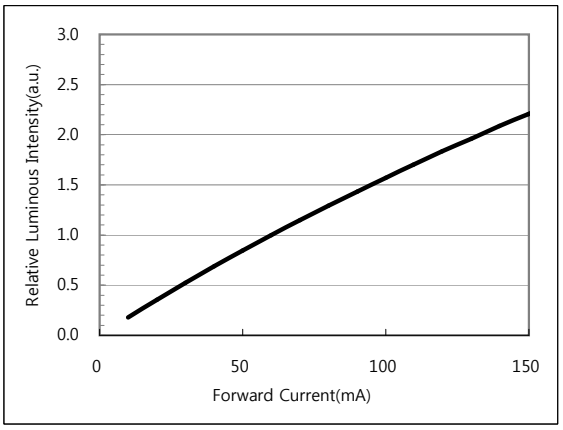
5CD = 5C,5D

5CR = 5C,5E

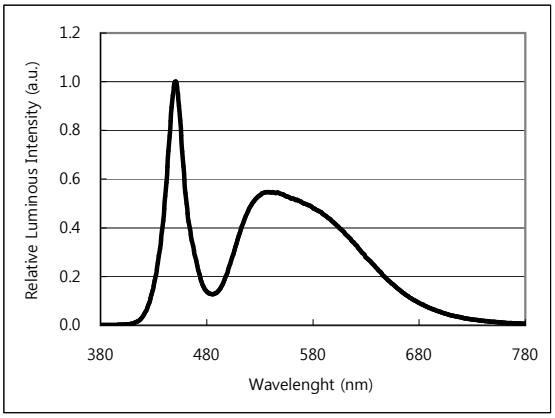
4. Characteristics Diagrams



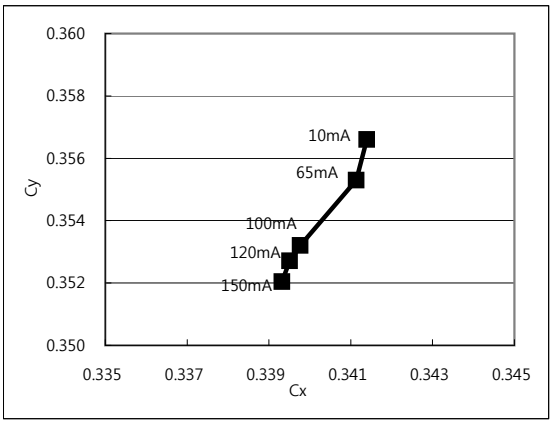
Forward Current vs. Forward Voltage



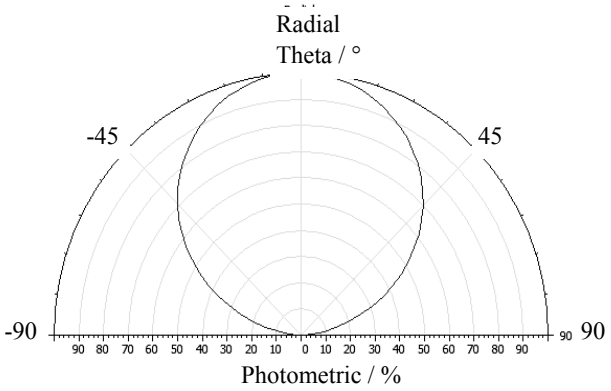
Relative Luminous Intensity vs. Forward Current



Relative Spectral Power Distribution(Spectrum)



Forward Current vs Chromaticity



5. Reliability Tests

(1) Test Items and Test Conditions

Items	Test Conditions	Notes	No. of Damaged
Temperature Cycle	-40℃ ~25℃ ~100℃ ~25℃ (30min~5min~30min~5min)	200Cycle	0/50
Steady State Operating Life	Ta = 25℃, IF =65mA	1000hrs	0/50
Steady State Operating Life of High Temperature	Ta = 60℃, IF =65mA	1000hrs	0/50
Steady State Operating Life of High Humidity Heat	Ta = 85℃, IF =65mA	1000hrs	0/50
High Temperature Storage	T_a = 100℃	1000hrs.	0/50
Steady State Operating Life of High Temperature & High Humidity	T_a = 85℃/RH = 85%, IF = 65mA	1000hrs	0/50
Low Temperature Storage	T_a = -40℃	1000hrs	0/50
Resistance to Soldering Heat	Tmax=260℃, 10sec (Pre treatment 30℃,70%, 168hrs)	2 times	0/50
ESD(HBM)	R1=10MΩ, R2=1.5KΩ, C=100pF	3 times	5kV

(2) Criteria for Judging the Damage

Parameter	Symbol	Condition	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V_F	I_F = 65mA	-	U.S.L.(1) * 1.2
Luminous Intensity	Iv	I_F =65mA	L.S.L.(2) * 0.7	-
Reverse Current	I_R	V_R = 4V	-	10㎂

Notes (1) U.S.L. : Upper Specification Level

(2) L.S.L. : Lower Specification Level

6. Soldering Conditions

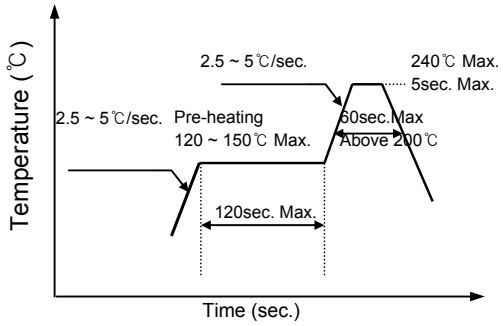
(1) Recommended Soldering Conditions

Reflow Soldering			Hand Soldering	
	Lead Solder	Lead-Free Solder	Temperature Soldering time	350℃ Max. 3 sec. Max. (one time only)
Pre-Heating	120 ~ 150℃	180 ~ 200℃		
Pre-Heat Time	120sec. Max.	120sec. Max.		
Peak Temperature	240℃ Max.	260℃ Max.		
Soldering Time	5sec. Max.	5sec. Max.		

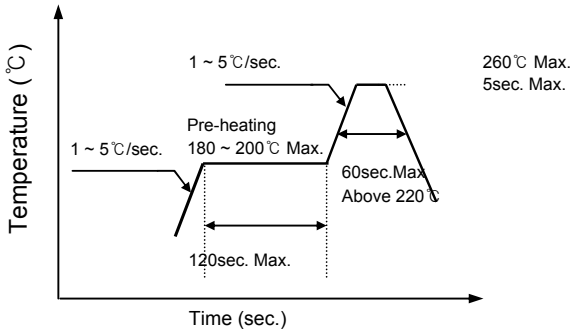
* After reflFW soldering, Rapid cooling should be avoid.

(2) Recommended Reflow Soldering profile

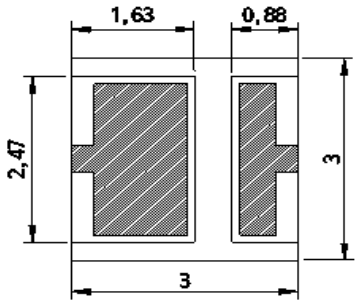
■ Lead Solder



■ Lead-Free Solder



(3) Recommended Soldering Pattern



Unit : mm)

(4) Soldering Cautions

-. Because of the zener diode, the isolation pad should not connect the other pad. .

-. 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 wrap the circuit board.

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

-. Occasionaly there is a brightness decrease cause by the influence of heat or ambient atmosphere during air reflow. It is recommend that the user use the nitrogen reflow method.

7. Precaution

(1) Static Electricity

These LEDs are highly susceptible to static electricity or surge voltage. So a wrist strap or an anti-electrostatic glove necessarily be used when handling the LEDs. Do not use the equipment that surge voltage is came into existence.

All devices and equipment that measure or mount the LEDs must be properly grounded.

After being assembled LEDs, it should be ascertained a electrical characteristic whether that are damaged by static electricity or not. It is easy to find the damaged LEDs by a light-on or VF test at forward a belFW 1mA current.

(2) Packing

The moisture that is absorbed into the LED products may cause a badness and damage to the optical characteristics of the LEDs. Therefore the moisture barrier aluminum bag is used to keep moisture in the packing. And a silicagel is inserted into a moisture barrier aluminum bag that sealed by the thermal pressure sealer.

(3) Cleaning

It is recommended that isopropyl alcohol(IPA) be used as a solvent for cleaning the LEDs.

Do not clean the LEDs by the ultrasonic. When it use other solvents or is absolutely necessary ultrasonic, before cleaning, a pre-test should be done to confirm whether the LEDs are any damaged or not

(4) Storage

In order to avoid the absorption of moisture, it is recommended to store LEDs in the moisture barrier aluminum bag is not opened.

Storage condition before opening the packing :

Temperature : below 30℃

Humidity : 90%RH max

The LEDs should be used within a year.

Storage condition after opening the packing :

Temperature : below 30℃

Humidity : 60%RH max

After opening the packing, the LEDs should be used within 168 hours(7days). If unused LEDs remain, they should be stored in the place kept away moisture.

If the LEDs have exceeded the above storage time, it should be used after to bake using the following conditions.

Baking condition : 60±5℃, more than 24 hours

(5) Pick and Place

It should be avoided to rub or scratch the surface of resin by any hard material. It is possible that the LEDs are damaged to the optical characteristics.

(6) Heat

The LEDs are products that are generated heat. Please consider the heat generation of the LED when it is designed the PCB. After considering the ambient temperature and the heat generation of LEDs, the operating current should be decided

(7) Others

If the forward or reverse voltage which exceeds the absolute maximum rating is applied to the LEDs, that will cause the damage to the LEDs. It is possible that the damaged LEDs do not light on at the lFW current.

Be careful not to look the LEDs that the output Power is strongly increased in the face. It is possible that eyesight has been getting weaker.

This specifications of the product may be revised without notice.