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

SMD TYPE TOP VIEW WHITE COLOR LED

MODEL : AT556LWSE3

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1. General Description

(1) Features

- Package size - 5.4(L) × 5.0(W) × 1.6(T) mm
- Wide beam angle ($2\theta_{1/2}$=120deg)
- RoHS Compliant

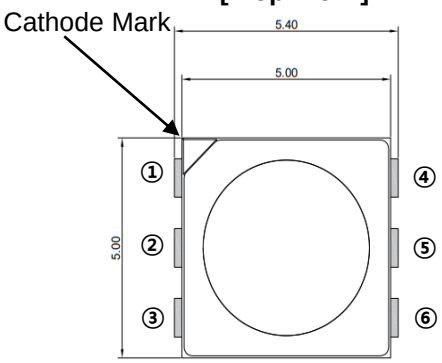
(2) Applications

- Backlighting (LCD, switchs, keys, displays)
- Coupling into light guides
- Optical indicator
- General lighting

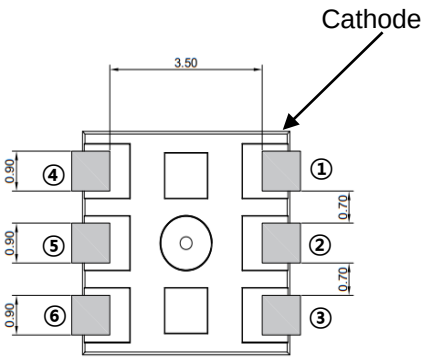
(3) Outline Dimensions

[Tolerance : ±0.1, unit : mm]

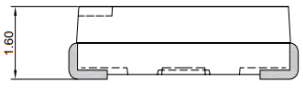
[Top View]



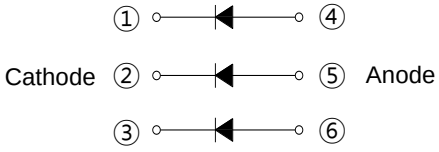
[Bottom View]



[Side View]



[Circuit]



Pin Connection
- Anode : ④, ⑤, ⑥
- Cathode : ①, ②, ③

2. Specifications

(1) Absolute Maximum Ratings

(T_a=25℃)

Parameter	Symbol	Absolute Maximum Rating	Unit	Remark
Power Dissipation	P_D	297	mW	
Forward Current	I_F	90	mA	
Operating Temperature	T_{OPR}	-30 to +85	℃	
Storage Temperature	T_{STG}	-40 to +100	℃	
Junction Temperature	T_J	110	℃	

(2) Initial Electrical/Optical Characteristics

(T_a=25℃)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	I_F = 60mA	2.8	3.0	3.3	V
Luminous Intensity	I_V	I_F = 60mA	-	8.0	-	cd
Luminous Flux	Φ_V	I_F = 60mA	-	26.0	-	lm
Reverse Current	I_R	V_R = 5V	-	-	1.0	μA
Color Rendering Index	Ra	I_F = 60mA	-	70	-	-

* Notes : Color rendering index(Ra) measurement tolerance is ± 3.
Initial electrical/optical characteristics data could be changeable if the user use the product in different condtion besides above data.

(3) Characteristics Rank

■ Forward Voltage & Luminous Intensity Rank (T_a=25℃)

Parameter	Symbol	Condition	Rank	Min	Max	Unit
Forward Voltage (1)	V_F	I_F = 60mA	V28	2.8	2.9	V
			V29	2.9	3.0	
			V30	3.0	3.1	
			V31	3.1	3.2	
			V32	3.2	3.3	
Luminous Intensity (2)	I_V	I_F = 60mA	SH70M	7.0	8.0	cd
			SH80M	8.0	9.0	
			SH90M	9.0	10.0	

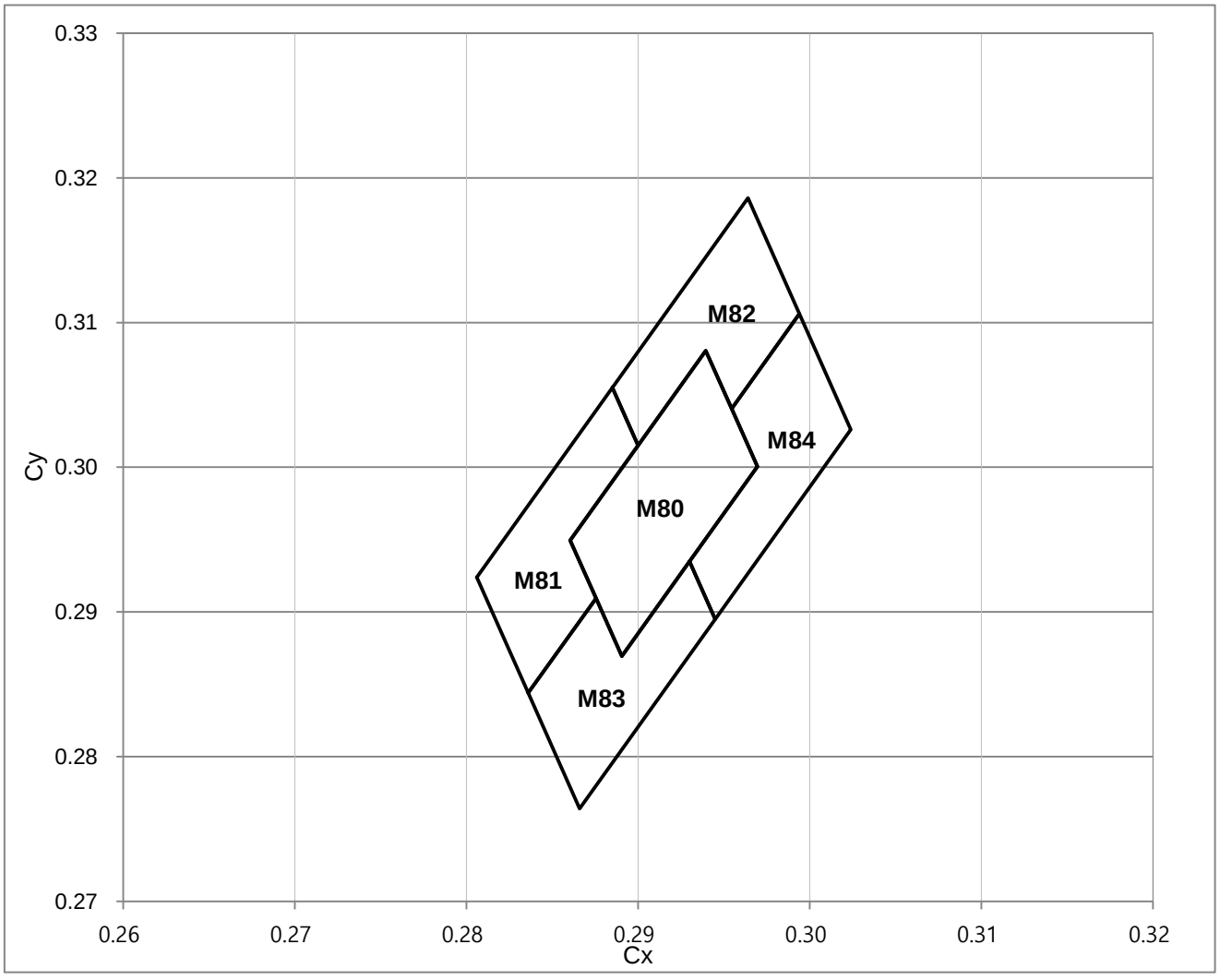
* Notes : (1) Forward voltage measurement tolerance is ± 0.1V.
(2) Luminous intensity measurement tolerance is ± 7%.
Based on the measuring instruments of Dongbu LED

■ Color Rank

(I_F = 60mA, T_a=25℃)

Rank (CCT : 8647K ± 1155K)									
M81		M82		M83		M84		M80	
Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy
0.2806	0.2924	0.2885	0.3055	0.2836	0.2844	0.2930	0.2935	0.2861	0.2950
0.2885	0.3055	0.2964	0.3186	0.2876	0.2910	0.2970	0.3001	0.2940	0.3081
0.2900	0.3015	0.2994	0.3106	0.2891	0.2870	0.2955	0.3041	0.2970	0.3001
0.2861	0.2950	0.2955	0.3041	0.2930	0.2935	0.2994	0.3106	0.2891	0.2870
0.2876	0.2910	0.2940	0.3081	0.2945	0.2895	0.3024	0.3026	0.2861	0.2950
0.2836	0.2844	0.2900	0.3015	0.2866	0.2764	0.2945	0.2895		
0.2806	0.2924	0.2885	0.3055	0.2836	0.2844	0.2930	0.2935		

■ CIE Chromaticity Diagram

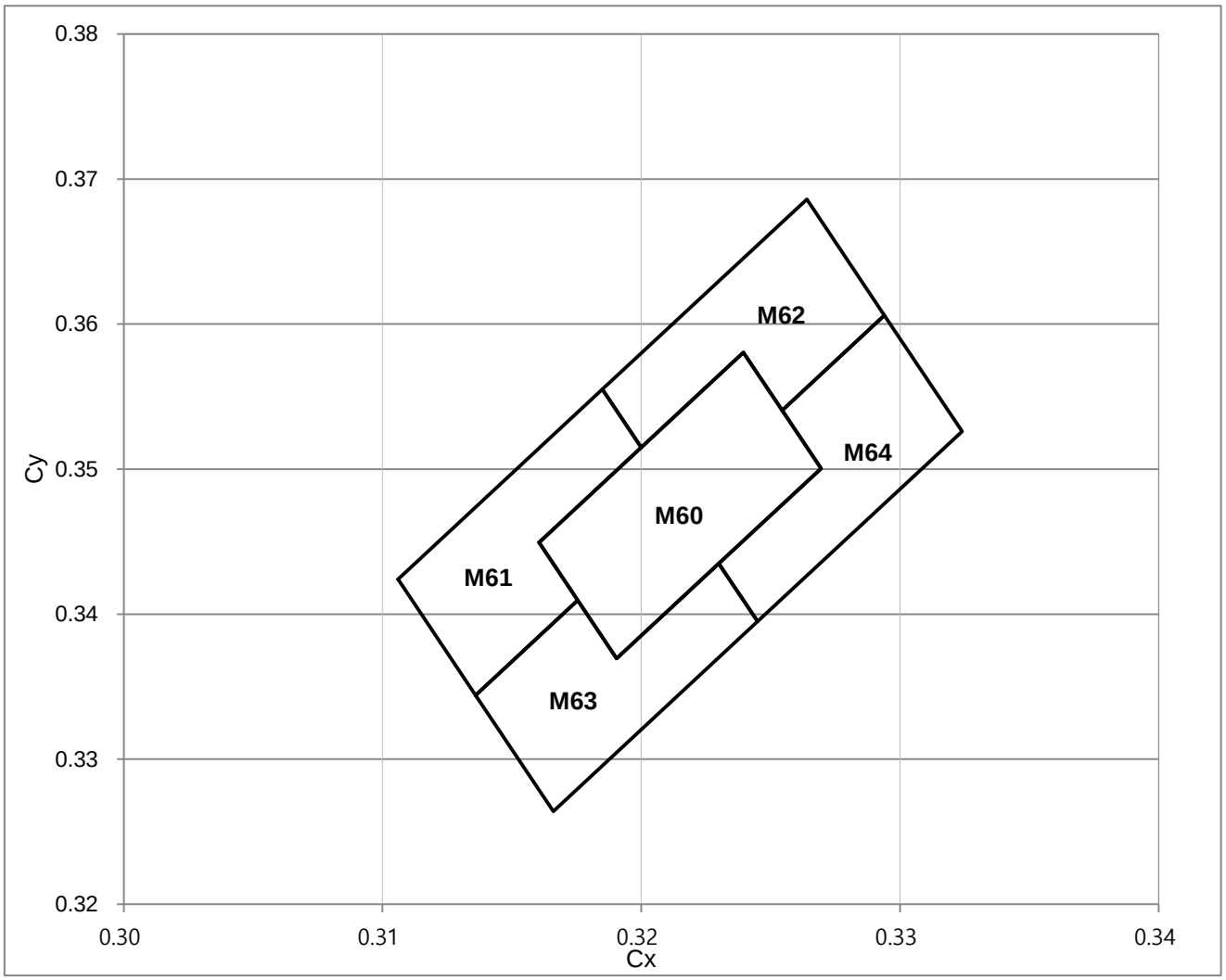


■ Color Rank

(I_F = 60mA, T_a=25℃)

Rank (CCT : 6,009K ± 511K)									
M61		M62		M63		M64		M60	
Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy
0.3106	0.3424	0.3185	0.3555	0.3136	0.3344	0.3230	0.3435	0.3161	0.3450
0.3185	0.3555	0.3264	0.3686	0.3176	0.3410	0.3270	0.3501	0.3240	0.3581
0.3200	0.3515	0.3294	0.3606	0.3191	0.3370	0.3255	0.3541	0.3270	0.3501
0.3161	0.3450	0.3255	0.3541	0.3230	0.3435	0.3294	0.3606	0.3191	0.3370
0.3176	0.3410	0.3240	0.3581	0.3245	0.3395	0.3324	0.3526	0.3161	0.3450
0.3136	0.3344	0.3200	0.3515	0.3166	0.3264	0.3245	0.3395		
0.3106	0.3424	0.3185	0.3555	0.3136	0.3344	0.3230	0.3435		

■ CIE Chromaticity Diagram



■ Color Rank

(I_F = 60mA, T_a=25℃)

Rank (CCT : 4,000K ± 186K)									
M41		M42		M43		M44		M40	
Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy
0.3786	0.3979	0.3881	0.4035	0.3746	0.3817	0.3876	0.3893	0.3811	0.3925
0.3881	0.4035	0.3975	0.4091	0.3789	0.3842	0.3919	0.3918	0.3902	0.3978
0.3857	0.3951	0.3919	0.3918	0.3767	0.3760	0.3863	0.3745	0.3850	0.3808
0.3811	0.3925	0.3876	0.3893	0.3809	0.3784	0.3785	0.3700	0.3767	0.3760
0.3789	0.3842	0.3902	0.3978	0.3785	0.3700	0.3809	0.3784	0.3811	0.3925
0.3746	0.3817	0.3857	0.3951	0.3706	0.3655	0.3850	0.3808		
0.3786	0.3979	0.3881	0.4035	0.3746	0.3817	0.3876	0.3893		

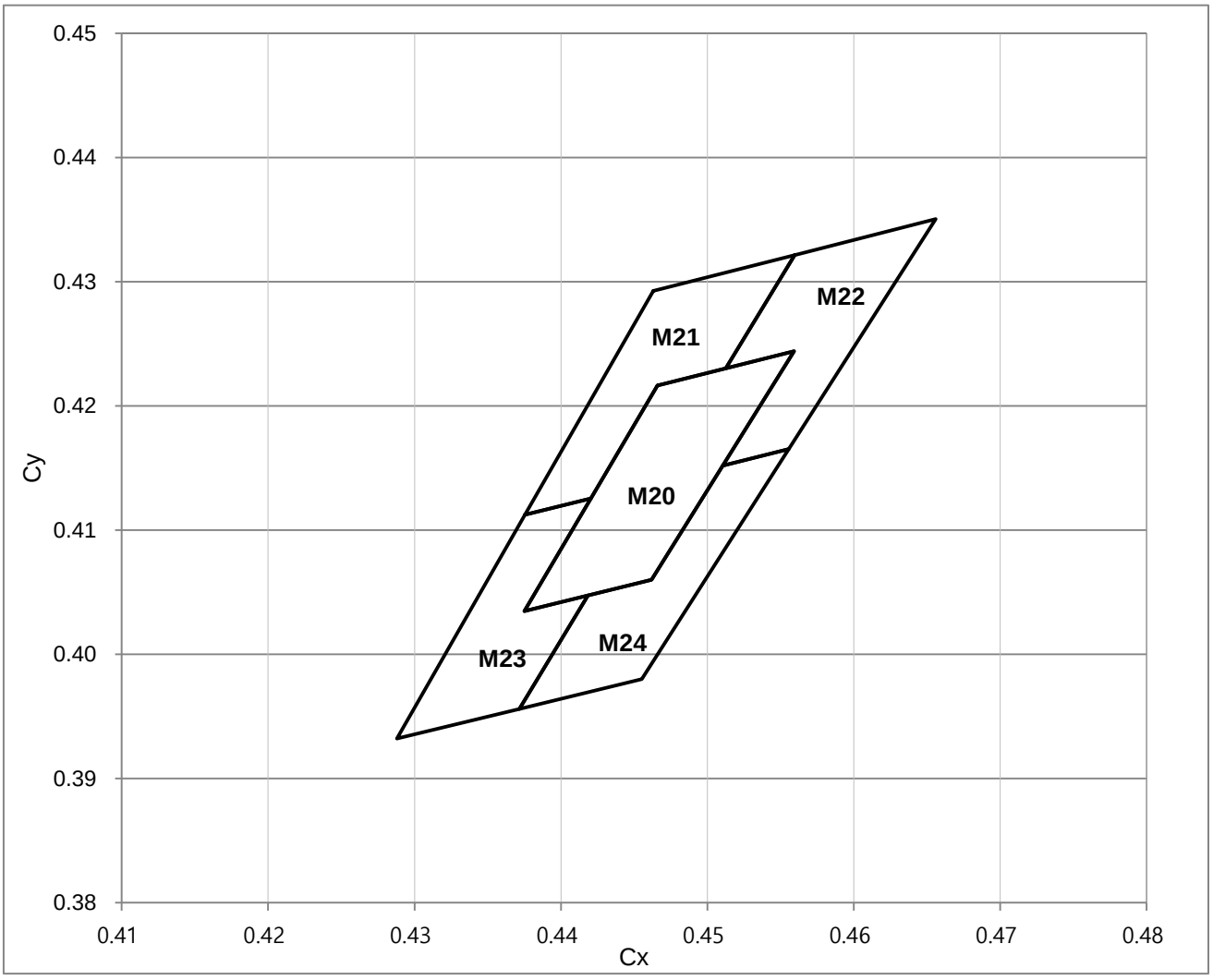
■ CIE Chromaticity Diagram

■ Color Rank

(I_F = 60mA, T_a=25℃)

Rank (CCT : 2926K ± 120K)									
M21		M22		M23		M24		M20	
Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy	Cx	Cy
0.4463	0.4293	0.4560	0.4322	0.4376	0.4112	0.4511	0.4152	0.4466	0.4216
0.4560	0.4322	0.4656	0.4350	0.4421	0.4126	0.4556	0.4165	0.4559	0.4244
0.4513	0.4230	0.4556	0.4165	0.4375	0.4035	0.4455	0.3980	0.4462	0.4060
0.4466	0.4216	0.4511	0.4152	0.4419	0.4047	0.4372	0.3956	0.4375	0.4035
0.4421	0.4126	0.4559	0.4244	0.4372	0.3956	0.4419	0.4047	0.4466	0.4216
0.4376	0.4112	0.4513	0.4230	0.4288	0.3932	0.4462	0.4060		
0.4463	0.4293	0.4560	0.4322	0.4376	0.4112	0.4511	0.4152		

■ CIE Chromaticity Diagram



* Notes : The Color Coordinates Measurement tolerance is ± 0.01.
Based on the measuring instruments of Dongbu LED

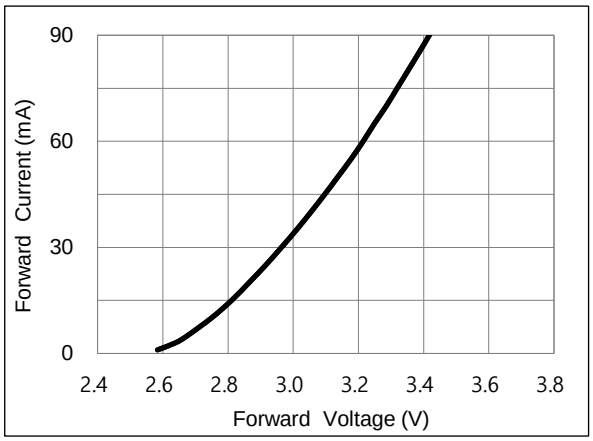
3. Rank Code

The rank inscription is composed of the follow method.

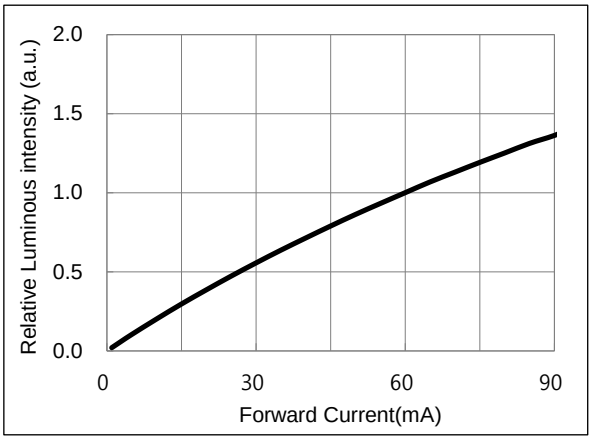
Ex)	SH70M	M60	V31	070	060
	①	②	③	④	⑤

①	I_V Rank
②	Color Rank
③	V_F Rank
④	CRI Rank (070 : 70Ra)
⑤	I_F (60mA)

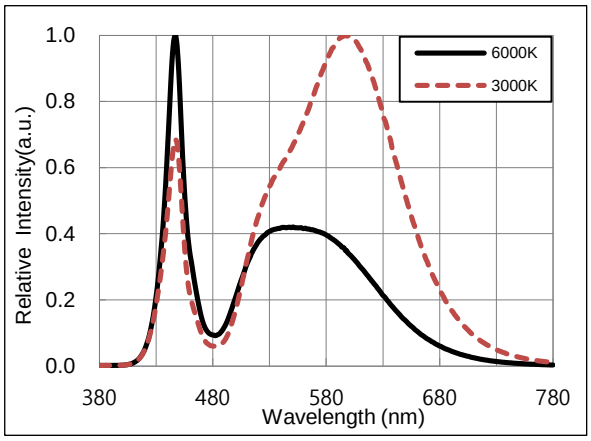
4. Characteristics Diagrams



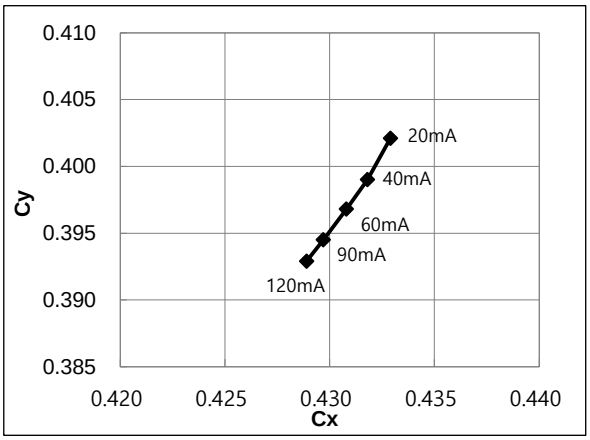
Forward Voltage vs Forward Current, T_a=25℃



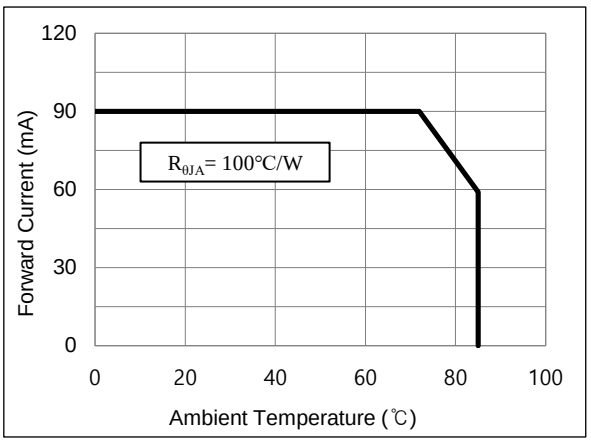
Forward Current vs Relative Luminous intensity, T_a=25℃



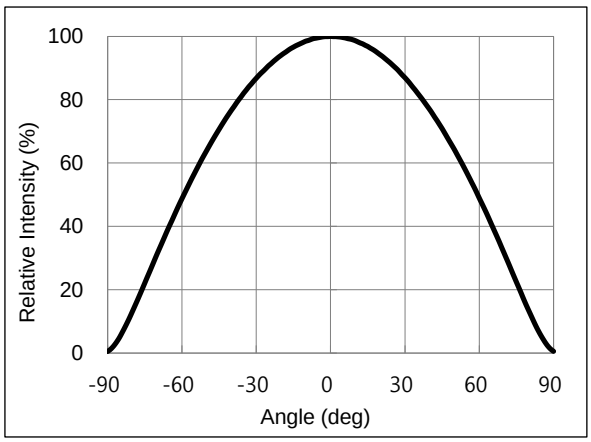
Spectrum, T_a=25℃, I_F=60mA



Forward Current vs Chromaticity Coordinate, T_a=25℃



Derating Curve



Beam Angle, T_a=25℃, I_F=60mA

* Note : The graph of characteristics is the sampling data for the reference.

5. Results of Reliability Tests

(1) Test Items and Results

Item	Test Condition	Notes	No. of Damaged
Temperature Cycle	-40℃ ~25℃ ~100℃ ~25℃ (30min~5min~30min~5min)	100 cycles	0/50
Steady State Operating Life	T_a = 25℃, I_F = 60mA	1000 hrs	0/50
Steady State Operating Life of High Temperature	T_a = 85℃, I_F = 15mA	1000 hrs	0/50
Steady State Operating Life of High Humidity Heat	T_a = 60℃, RH = 90%, I_F = 45mA	1000 hrs	0/50
Steady State Operating Life of Low Temperature	T_a = -30℃, I_F = 60mA	1000 hrs	0/50
High Temperature Storage	T_a = 100℃	1000 hrs	0/50
High Temperature & Humidity Storage	T_a = 60℃, RH = 90%	1000 hrs	0/50
Low Temperature Storage	T_a = -40℃	1000 hrs	0/50
Resistance to Soldering Heat	Tmax=260℃, 10sec (Pre treatment 30℃,70%, 168hrs)	2 times	0/50

* The above reliability data is only for the reference data about the environment test.

(2) Criteria for Judging the Damage

Parameter	Symbol	Condition	Criteria for Judgement
Forward Voltage	V_F	I_F = 60mA	Max. Initial Value*1.2
Luminous Intensity	I_V	I_F = 60mA	Min. Initial Value*0.7

6. Soldering Conditions

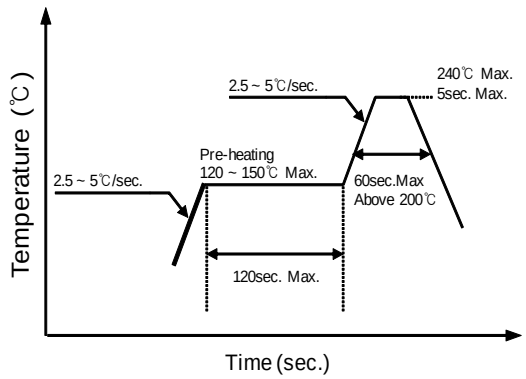
(1) Recommended Soldering Conditions

Reflow Soldering			Hand Soldering	
Conditions	Lead Solder	Lead-Free Solder		
Pre-Heating	120 ~ 150℃	180 ~ 200℃	Temperature	300℃ Max.
Pre-Heat Time	120sec. Max.	120sec. Max.	Soldering time	3 sec. Max. (one time only)
Peak Temperature	240℃ Max.	260℃ Max.		
Soldering Time	5sec. Max.	5sec. Max.		

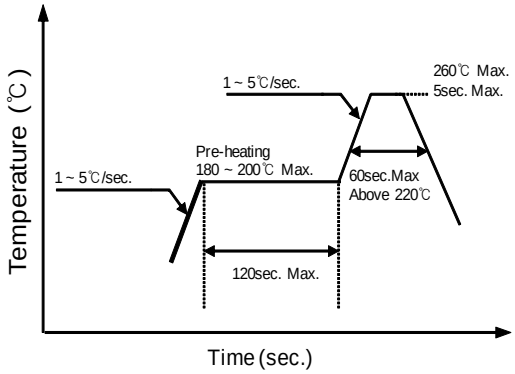
* After reflow soldering, rapid cooling should be avoid.

(2) Recommended Reflow Soldering Profile

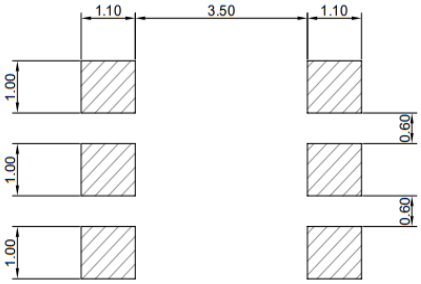
■ Lead Solder



■ Lead Free Solder



(3) Recommended Soldering Pad Pattern



(Unit : mm)

(4) Soldering Cautions

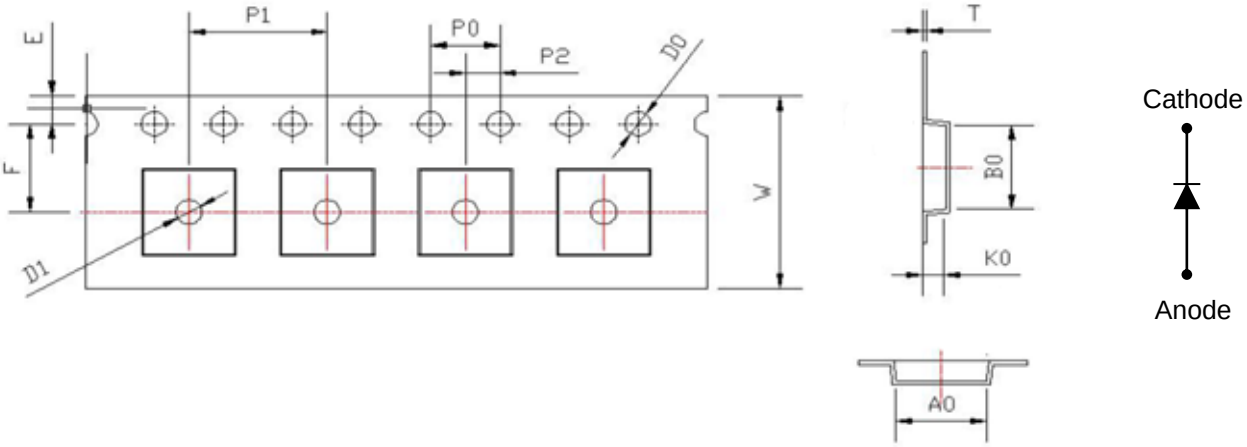
-. Reflow soldering should not be done more than two times.
-. When soldering, do not put stress on the LEDs during heating.
-. After soldering, do not wrap the circuit board.
-. The LEDs can be soldered on place using the reflow soldering method.
-. Occasionally there is a brightness decrease cause by the influence of heat or ambient atmosphere during air reflow. It is recommend that the user use the nitrogen reflow method.
-. After complete soldering, the product should be handled after cooling. (required to be handled under 60℃)

7. Packing

(1) Carrier Tape & Carrier Reel Dimensions

■ Carrier Tape

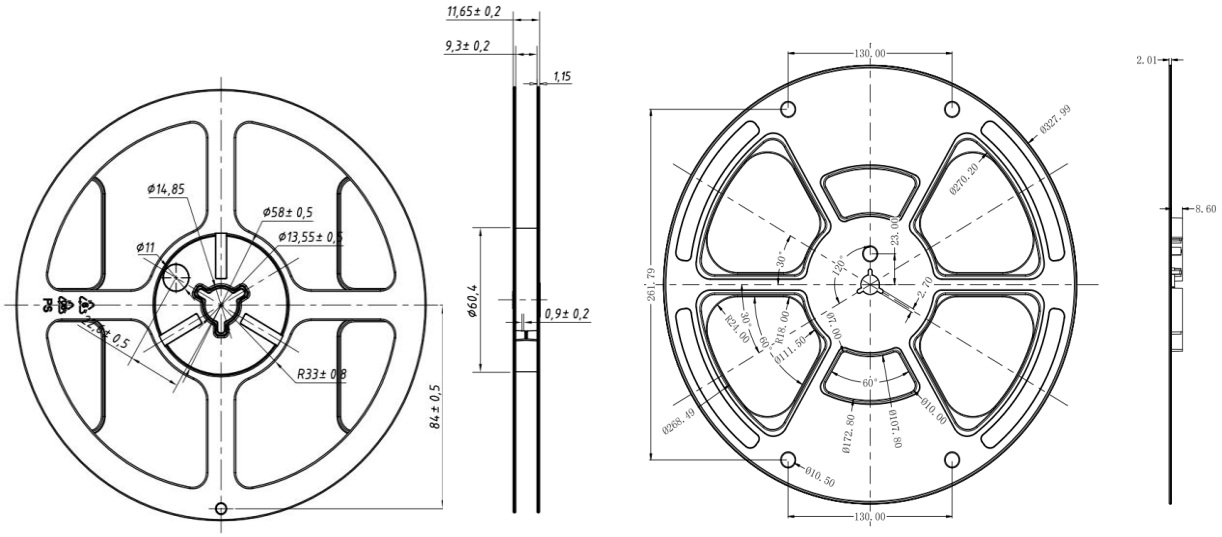
(Unit : mm)



Symbol	A0	B0	K0	P0	P1	P2
Spec	5.35±0.10	5.75±0.10	1.85±0.10	4.00±0.10	8.00±0.10	2.00±0.10
Symbol	W	T	E	F	D0	D1
Spec	12.00±0.20	0.20±0.10	1.75±0.10	5.50±0.10	1.55±0.10	1.55±0.10

■ Carrier Reel

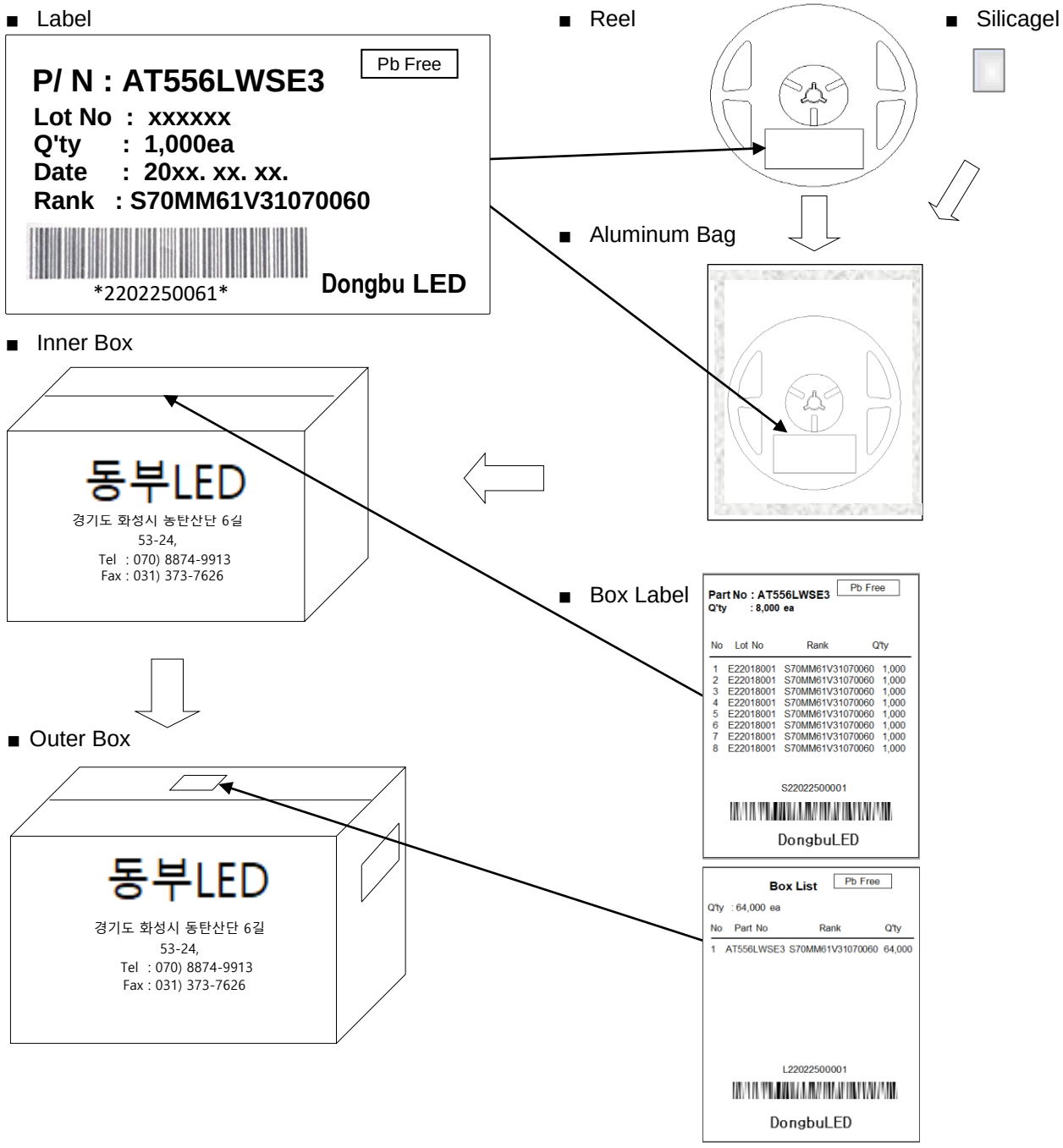
(Unit : mm)



< 7" Reel > < 13" Reel >

1) Quantity : Taping of 1 reel will be from min 1,000pcs to 4,000pcs in unit of a number in the thousands.
2) Adhesion strength of cover tape is 0.1 ~ 0.7N(20gf ~60gf) when the cover tape is turned off from the carrier tape.

(2) Packing and Packaging



Box Type	Inner Box	Outer Box	
		Medium	Large
7" Reel Max. Packing Q'ty(pcs)	8,000	32,000	64,000
13" Reel Max. Packing Q'ty(pcs)	24,000	120,000	

1) The carrier tape winded on the reel are placed into an ESD protected pack with a silicagel and sealed by the thermal pressure sealer. Then this sealed pack is packaged in a cardboard box.

8. 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.

(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

Ethanol can be used for LED cleaning. The maximum exposure time with ethanol is 1 minute for cleaning.

Do not use ultrasonic for cleaning the LEDs or other solvents, If ultrasonic cleaning is absolutely necessary, a pre-test should be done before cleaning to see if the LED is damaged.

(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

The products have to be used within one year from the date marked on label which is attached to reel or aluminium bag. 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℃, 10 ~ 24 hours

A slight amount of sulfur, chlorine or VOC from the surrounding environment may cause discoloration of the LEDs.

(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. It must be considered the heat generation of the LEDs 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 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.

Light emitting part should not be exposed by physical contact. It can be the reason of material desquamation and progressive disconnection.

This LED is made for in-door use only. If the user wants the LED for out-door use, it is necessary to take some additional treatment on the product after surface mounting technology(SMT).

This specification could be changed without a notice to the customer because of the inside circumstance of the company.