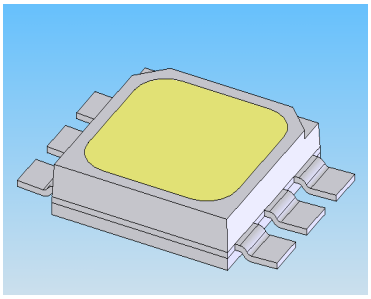
Wellypower

SMD Technical Data Sheet

High Power White LED

LH5070LDZ1.LW01



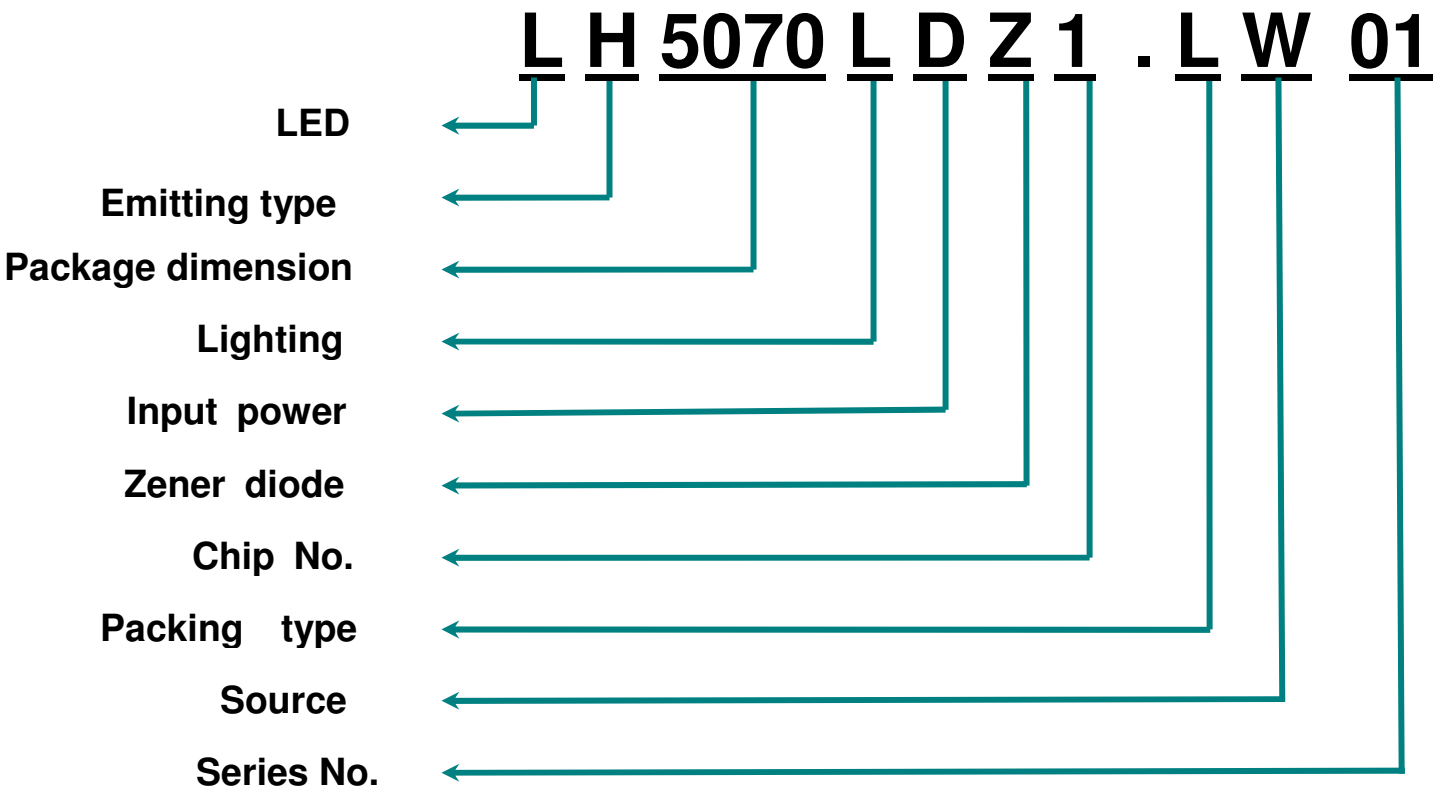
Features

- High power white LED (7.0 x 5.0 x 1.3 mm)
- White SMT package
- Lead frame package with individual 6 pins
- 1 chip inside
- 1 zener inside
- InGaN with yellow phosphor
- Wide view angle (X : 120° / Y : 120°)
- ESD protection
- Pb free
- Green product, remain within RoHS

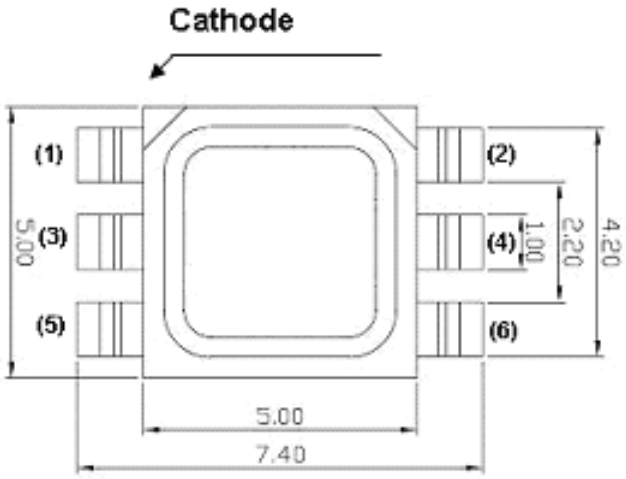
Application

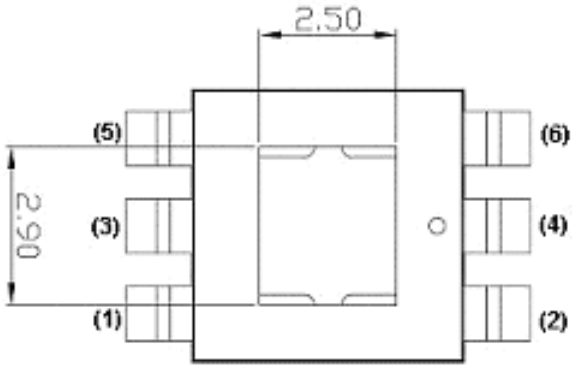
- General lighting
- Decoration lighting
- Indicator
- Outdoor lighting

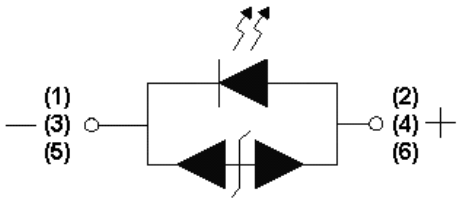
Product code



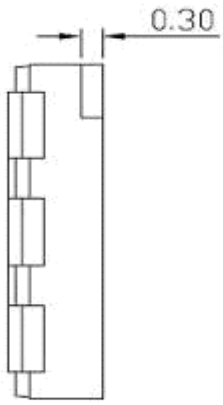
Package Dimensions

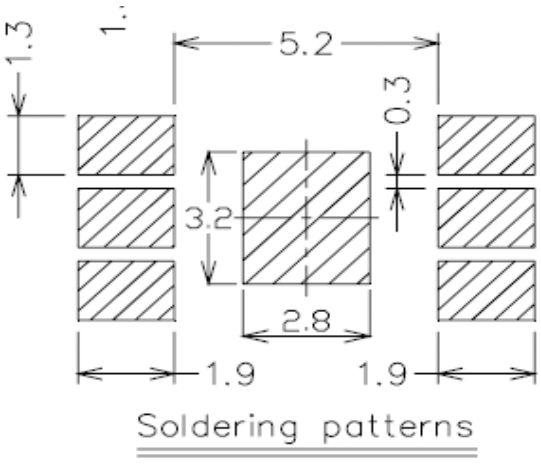


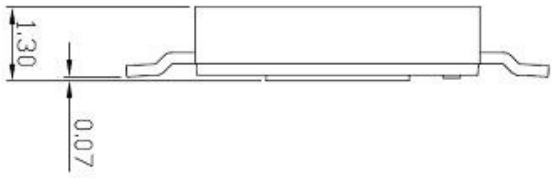




Polarit







Unit : mm

Absolute maximum ratings

(LED Die) **(Ta=25℃)**

Item	Symbol	Absolute Maximum Rating	Unit
Forward current	I_F	700	mA
Pulse forward current*	I_{FP}	1000	mA
Reverse voltage	V_R	5	V
Power dissipation	P_D	2800	mW
Operating temperature	T_{opr}	-30~+85	℃
Storage temperature	T_{stg}	-40~+110	℃
Junction temperature	Tj	125	℃
Soldering temperature	T_{sld}	Reflow Soldering : 260℃ for 10secs Hand Soldering : 350℃ for 3secs	

(Zener diode) **(Ta=25℃)**

Item	Symbol	Condition	Min.	Max.	Unit
Reverse leakage current	IR	VR=5V		0.5	uA
Zener voltage	Vz	Iz=10mA	8	13	V
Forward voltage	Vf	IF=10mA	6	8	V

*I_{FP} Conditions：Pulse Width ≤10msec, and duty≤1/10

Electro-optical characteristics

(Ta=25℃)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage*	Rank F4	Vf	I_F =700mA	3.6		3.8	Volt
	Rank G4			3.8		4.0	
	Rank G6			4.0		4.2	
	Rank H4			4.2		4.4	
Luminous flux**	Rank O12	Lm	I_F =700mA	131		143	Lm
	Rank O21			143		156	
	Rank O22			156		168	
	Rank P11			168		186	
	Rank P12			186		204	
	Rank P21			204		222	
	Rank P22			222		240	

* Forward Voltage is measured with an accuracy of ±0.05V.

**Luminous flux is measured with an accuracy of ±10%.

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Parameter Characteristics for SMT 5070 (物理特性表)

Cool White

Characteristics at IF=700mA (Ta=25℃): 特性檢測於恆溫25℃，電流700mA

Parameter (名稱)	Symbol (符號) I	Value (數值)			Unit (單位)
		Min (最小)	Type (一般)	Max (最大)	
Luminous flux	Φ_V	156	180	--	lm
Correlated color temperature	CCT	5000	--	7000	k
CRI (演色性)	R_a	--	70	--	
Forward current	I_F	--	0.7	--	A
Power dissipation	P_D	--	2.8	--	W
Thermal resistance	Rth	10			℃/W

Neutral White

Characteristics at IF=700mA (Ta=25℃): 特性檢測於恆溫25℃，電流700mA

Parameter (名稱)	Symbol (符號) I	Value (數值)			Unit (單位)
		Min (最小)	Type (一般)	Max (最大)	
Luminous flux	Φ_V	143	170	--	lm
Correlated color temperature	CCT	3500	--	4600	k
CRI (演色性)	R_a	--	60 | 70	--	
Forward current	I_F	--	0.7	--	A
Power dissipation	P_D	--	2.8	--	W
Thermal resistance	Rth	10			℃/W

Warm White

Characteristics at IF=700mA (Ta=25℃): 特性檢測於恆溫25℃，電流700mA

Parameter (名稱)	Symbol (符號) I	Value (數值)			Unit (單位)
		Min (最小)	Type (一般)	Max (最大)	
Luminous flux	Φ_V	143	160	--	lm
Correlated color temperature	CCT	2670	--	3500	k
CRI (演色性)	R_a	--	50 | 70	--	
Forward current	I_F	--	0.7	--	A
Power dissipation	P_D	--	2.8	--	W
Thermal resistance	Rth	10			℃/W

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Bin range of chromaticity coordinates

For Cool white

	CIE-X	CIE-Y		CIE-X	CIE-Y		CIE-X	CIE-Y
I21	0.3438	0.3378	I12	0.3288	0.3525	J22	0.3090	0.3041
	0.3293	0.3247		0.3153	0.3390		0.2991	0.2920
	0.3294	0.3143		0.3167	0.3259		0.3013	0.2849
	0.3428	0.3254		0.3290	0.3387		0.3106	0.2955
I14	0.3452	0.3528	I03	0.3287	0.3658	J13	0.3067	0.3150
	0.3290	0.3387		0.3140	0.3520		0.2960	0.3021
	0.3293	0.3247		0.3153	0.3390		0.2991	0.2920
	0.3438	0.3378		0.3288	0.3525		0.3090	0.3041
I11	0.3465	0.3680	J21	0.3181	0.3138	J12	0.3042	0.3271
	0.3288	0.3525		0.3090	0.3041		0.2930	0.3128
	0.3290	0.3387		0.3106	0.2955		0.2960	0.3021
	0.3452	0.3528		0.3192	0.3049		0.3067	0.3150
I04	0.3477	0.3806	J14	0.3167	0.3259	J03	0.3020	0.3385
	0.3287	0.3658		0.3067	0.3150		0.2900	0.3230
	0.3288	0.3525		0.3090	0.3041		0.2930	0.3128
	0.3465	0.3680		0.3181	0.3138		0.3042	0.3271
I22	0.3293	0.3247	J11	0.3153	0.3390	J04	0.3140	0.3520
	0.3181	0.3138		0.3042	0.3271		0.3020	0.3385
	0.3192	0.3049		0.3067	0.3150		0.3042	0.3271
	0.3294	0.3143		0.3167	0.3259		0.3153	0.3390
I13	0.3290	0.3387						
	0.3167	0.3259						
	0.3181	0.3138						
	0.3293	0.3247						

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Bin range of chromaticity coordinates

For Neutral white

	CIE-X	CIE-Y		CIE-X	CIE-Y		CIE-X	CIE-Y
G21	0.4000	0.3750	G12	0.3945	0.3982	H22	0.3568	0.3475
	0.3846	0.3660		0.3774	0.3878		0.3438	0.3378
	0.3803	0.3515		0.3740	0.3730		0.3428	0.3254
	0.3945	0.3600		0.3895	0.3820		0.3547	0.3345
G14	0.4055	0.3915	G03	0.3990	0.4130	H13	0.3590	0.3625
	0.3895	0.3820		0.3807	0.4020		0.3452	0.3528
	0.3846	0.3660		0.3774	0.3878		0.3438	0.3378
	0.4000	0.3750		0.3945	0.3982		0.3568	0.3475
G11	0.4110	0.4080	H21	0.3705	0.3573	H12	0.3615	0.3780
	0.3945	0.3982		0.3568	0.3475		0.3465	0.3680
	0.3895	0.3820		0.3547	0.3345		0.3452	0.3528
	0.4055	0.3915		0.3675	0.3435		0.3590	0.3625
G04	0.4163	0.4222	H14	0.3740	0.3730	H03	0.3634	0.3910
	0.3990	0.4130		0.3590	0.3625		0.3477	0.3806
	0.3945	0.3982		0.3568	0.3475		0.3465	0.3680
	0.4110	0.4080		0.3705	0.3573		0.3615	0.3780
G22	0.3846	0.3660	H11	0.3774	0.3878	H04	0.3807	0.4020
	0.3705	0.3573		0.3615	0.3780		0.3634	0.3910
	0.3675	0.3435		0.3590	0.3625		0.3615	0.3780
	0.3803	0.3515		0.3740	0.3730		0.3774	0.3878
G13	0.3895	0.3820						
	0.3740	0.3730						
	0.3705	0.3573						
	0.3846	0.3660						

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Bin range of chromaticity coordinates

For Warm white

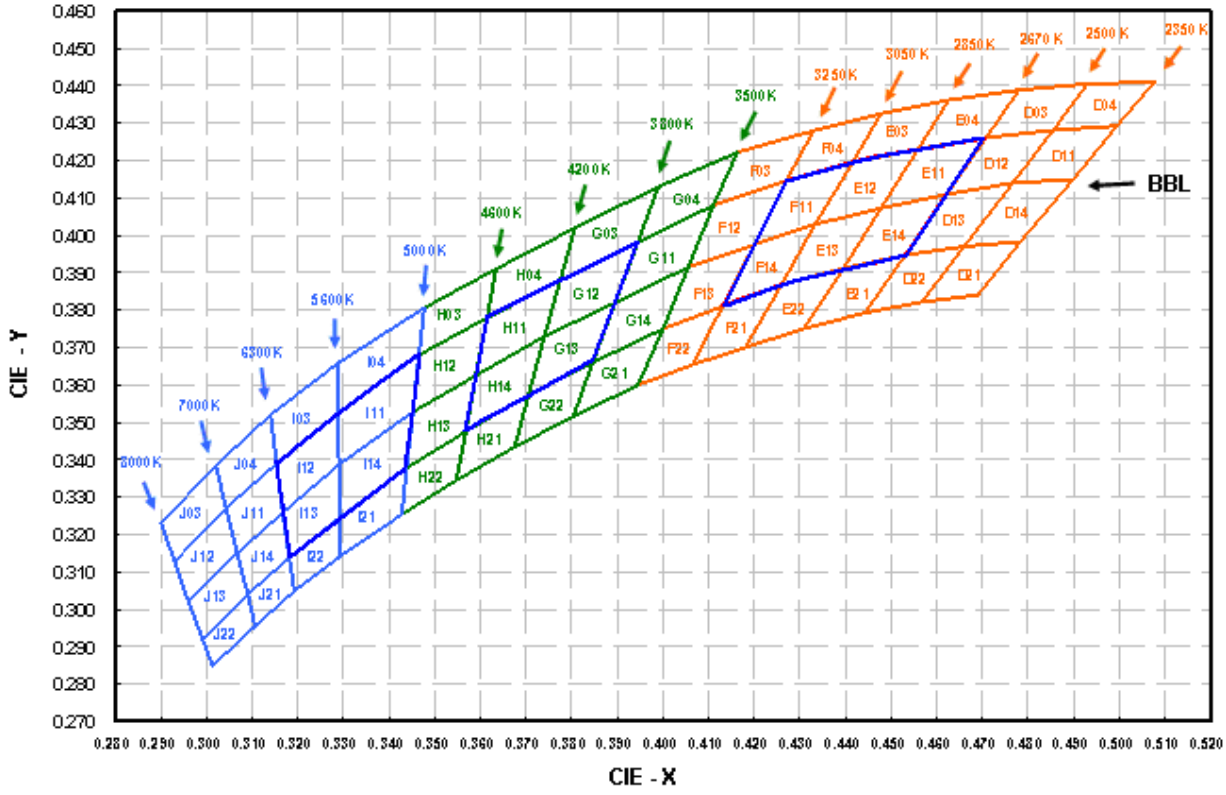
	CIE-X	CIE-Y		CIE-X	CIE-Y		CIE-X	CIE-Y
E21	0.4531	0.3947	E04	0.4780	0.4388	E12	0.4559	0.4231
	0.4395	0.3912		0.4626	0.4362		0.4416	0.4195
	0.4308	0.3750		0.4559	0.4231		0.4333	0.4029
	0.4443	0.3793		0.4708	0.4261		0.4478	0.4072
E14	0.4622	0.4110	E22	0.4395	0.3912	E03	0.4626	0.4362
	0.4478	0.4072		0.4260	0.3868		0.4477	0.4325
	0.4395	0.3912		0.4180	0.3700		0.4416	0.4195
	0.4531	0.3947		0.4308	0.3750		0.4559	0.4231
E11	0.4708	0.4261	E13	0.4478	0.4072	F21	0.4260	0.3868
	0.4559	0.4231		0.4333	0.4029		0.4130	0.3810
	0.4478	0.4072		0.4260	0.3868		0.4066	0.3655
	0.4622	0.4110		0.4395	0.3912		0.4180	0.3700
F14	0.4333	0.4029	F11	0.4416	0.4195	F04	0.4477	0.4325
	0.4200	0.3975		0.4270	0.4145		0.4330	0.4280
	0.4130	0.3810		0.4200	0.3975		0.4270	0.4145
	0.4260	0.3868		0.4333	0.4029		0.4416	0.4195
F22	0.4130	0.3810	F13	0.4200	0.3975	F12	0.4270	0.4145
	0.4000	0.3750		0.4055	0.3915		0.4110	0.4080
	0.3945	0.3600		0.4000	0.3750		0.4055	0.3915
	0.4066	0.3655		0.4130	0.3810		0.4200	0.3975
F03	0.4330	0.4280	D22	0.4660	0.3970	D13	0.4767	0.4140
	0.4163	0.4222		0.4531	0.3947		0.4622	0.4110
	0.4110	0.4080		0.4443	0.3793		0.4531	0.3947
	0.4270	0.4145		0.4567	0.3822		0.4660	0.3970
D12	0.4855	0.4281	D21	0.4783	0.3983	D11	0.4995	0.4292
	0.4708	0.4261		0.4660	0.3970		0.4855	0.4281
	0.4622	0.4110		0.4567	0.3822		0.4767	0.4140
	0.4767	0.4140		0.4690	0.3840		0.4899	0.4150
D03	0.4930	0.4405	D14	0.4899	0.4150	D04	0.5077	0.4410
	0.4780	0.4388		0.4767	0.4140		0.4930	0.4405
	0.4708	0.4261		0.4660	0.3970		0.4855	0.4281
	0.4855	0.4281		0.4783	0.3983		0.4995	0.4292

***If color binning is required, only one color group is allowed for each chip within a reel.**

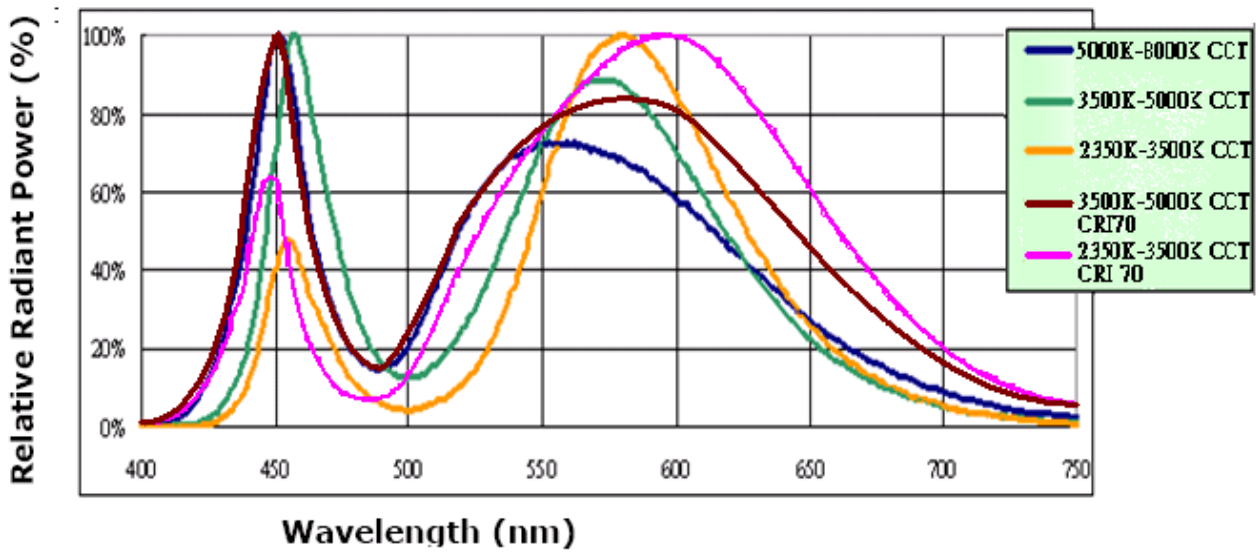
Chromaticity coordinate groups are measured with an accuracy of ±0.01.

***Color coordinate is derived from the CIE 1931 chromaticity.**

Chromaticity Diagram

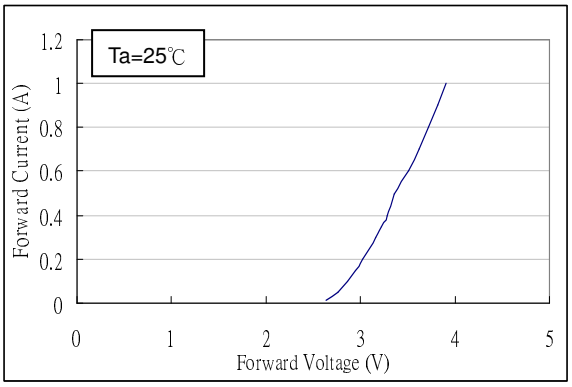


Relative Spectral Power Distribution

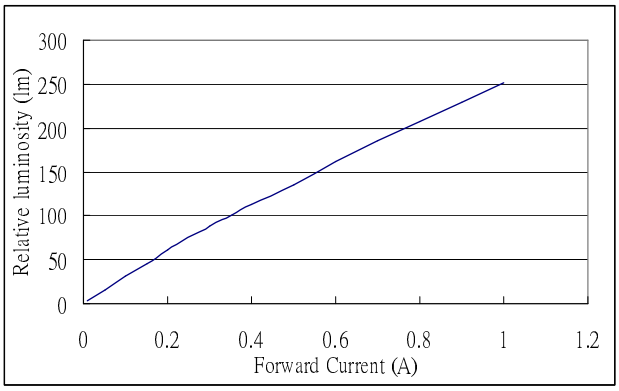


Typical electro-optical characteristics curves

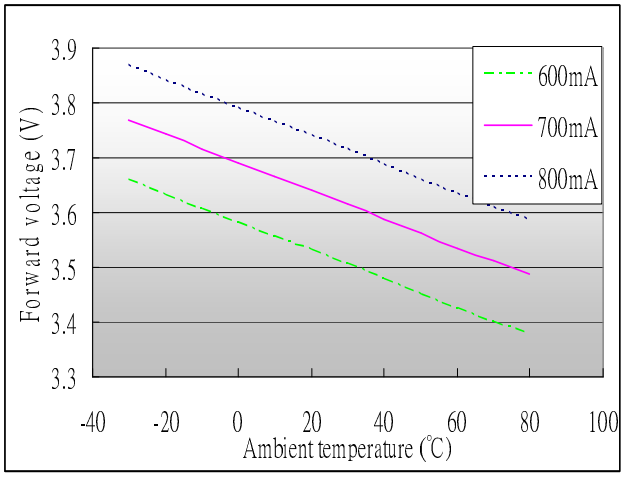
Forward voltage vs. Forward current



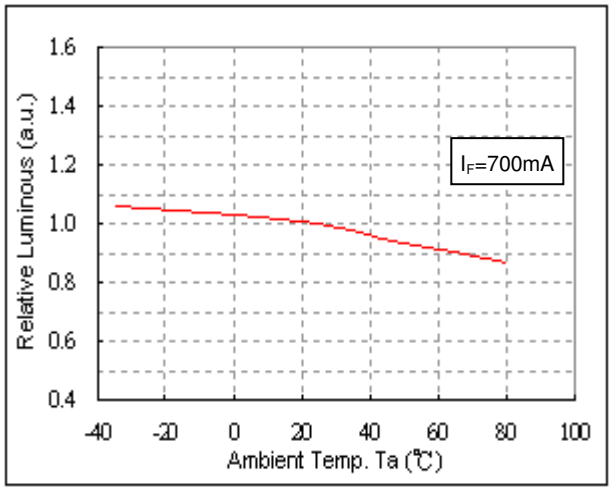
Forward current vs. Relative luminosity



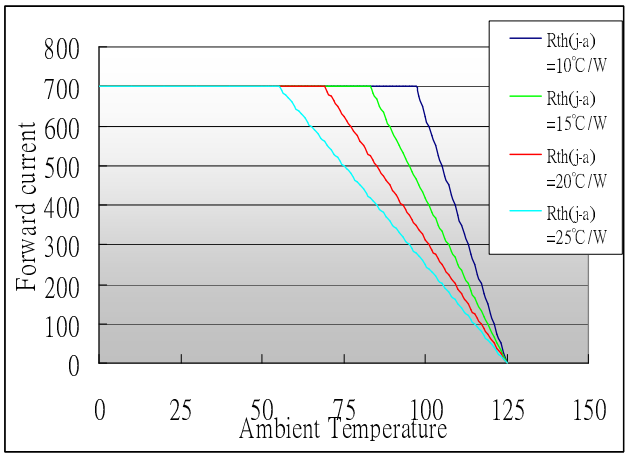
Ambient temperature vs. Forward voltage



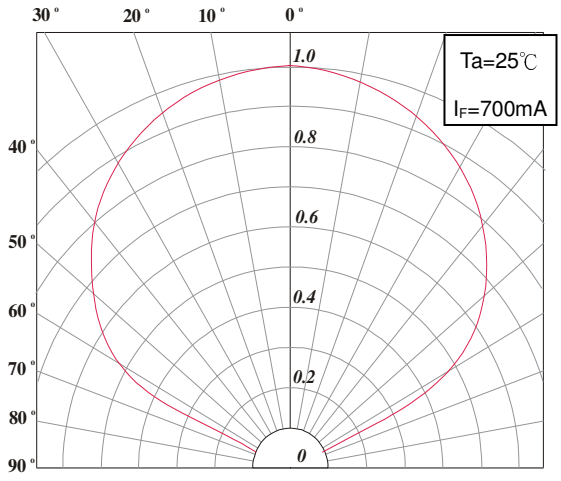
Ambient temp. vs. Relative luminositv



Ambient temp. vs. Allowable forward current

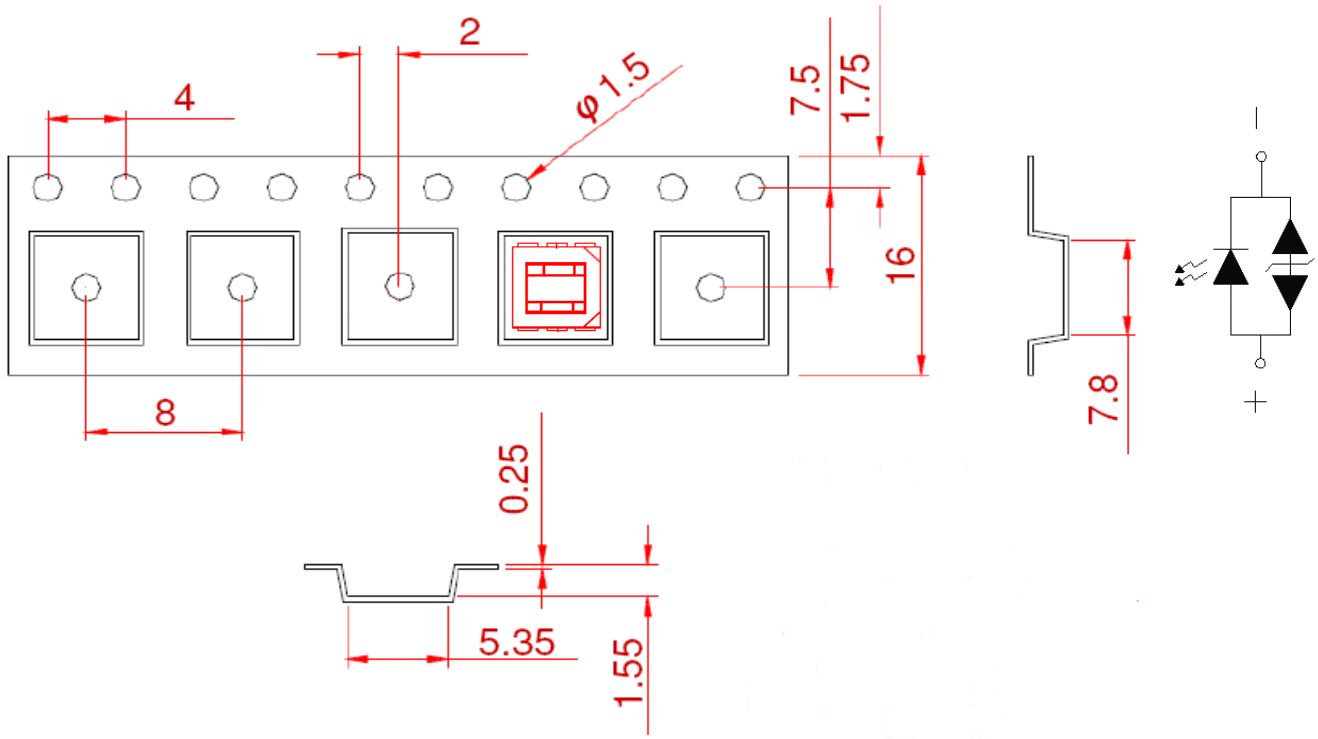


Radiation pattern



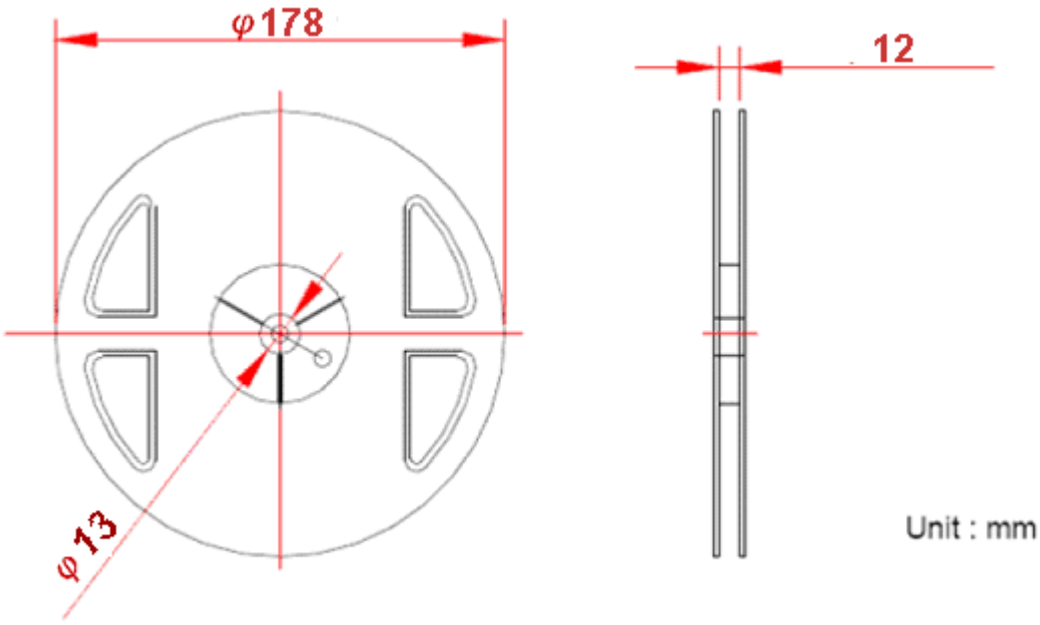
Package model

• **Taping and Package Spec :**

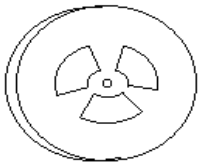


• **Package Dimensions of Reel :**

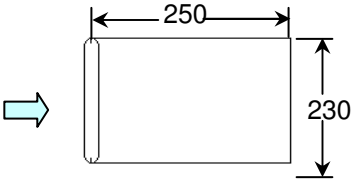
1 Reel 1000ea



Packing formation

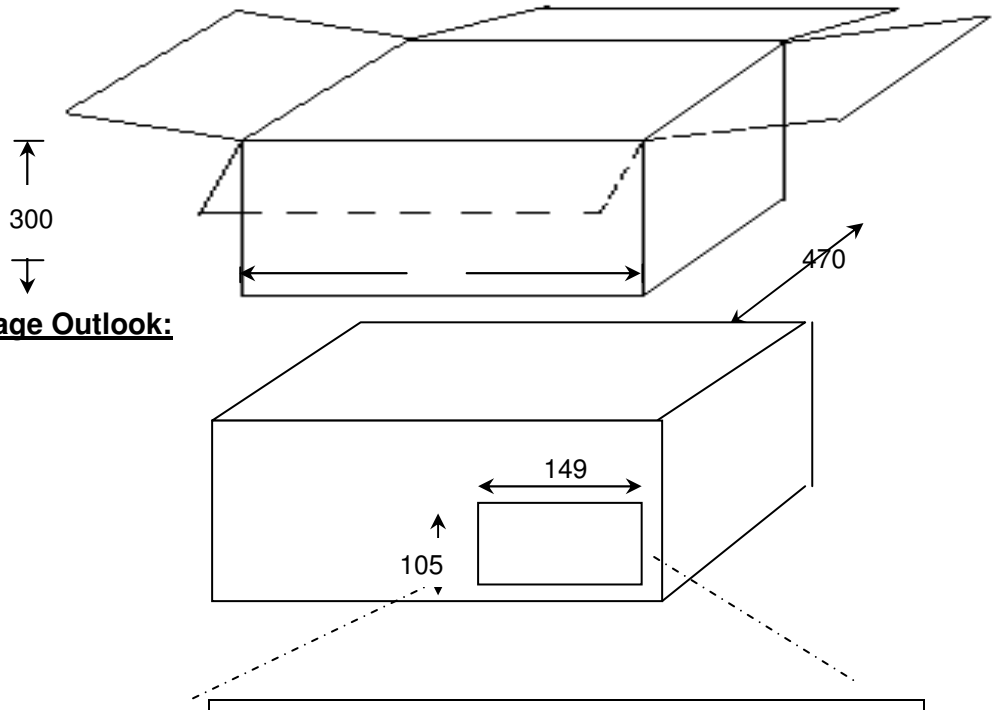


Diameter : 178 mm
Width : 12 mm
1,000 pcs/reel
Anti-static black reel



Aluminum bag, anti-static Shielding
1 reel/bag (T=0.1mm)

Package Outlook:



Wellypower	
Customer	
Part number	
Quantity	
Date	
Remark	

Reliability

Test Items and results **20 pcs**

No.	Test item	Test condition	Notes	Equipment	# of damaged
1	Temperature cycle	-40℃~25℃~100℃~25℃ 30min~5min~30min~5min	100 cycles	T/H chamber	0/20
2	High temperature storage	Ta=110℃	1000 hrs	Oven	0/20
3	Thermal shock	-40℃~100℃ 1min~1min 10sec	100 cycles	T/S chamber	0/20
4	Steady state operating life condition	Ta=25℃,I_F=700mA	1000 hrs	Life test sys.	0/20
5	Steady state operating life of high temperature 1	Ta=55℃,I_F=700mA	1000 hrs	Oven	0/20
6	Steady state operating life of high temperature 2	Ta=85℃,I_F=450mA	1000 hrs	Oven	0/20
7	Steady state operating life of high humidity heat	Ta=85℃,RH=60%,I_F=450mA	1000 hrs	T/H chamber	0/20
8	Resistance to solding heat	Tsld=260℃ ,10sec	2 times	Reflow	0/20

Recommend reflow soldering profile

Surface mounting condition

In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs should be kept min. to prevent them from electrical failures and mechanical damages of the devices.

Soldering reflow

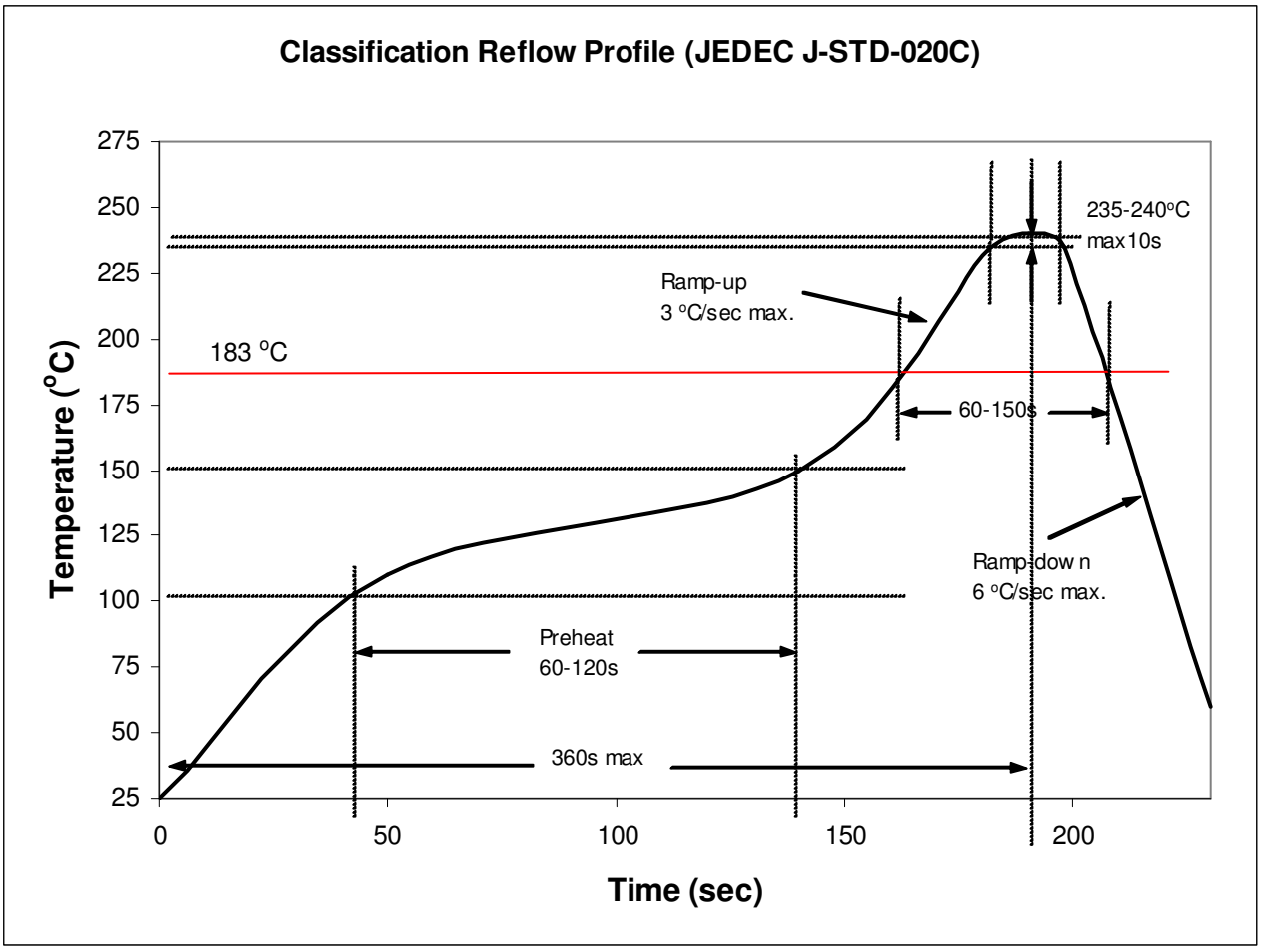
-Soldering of the SMD LEDs should conform to the soldering condition in the individual specifications.

-SMD LEDs are designed for reflow soldering.

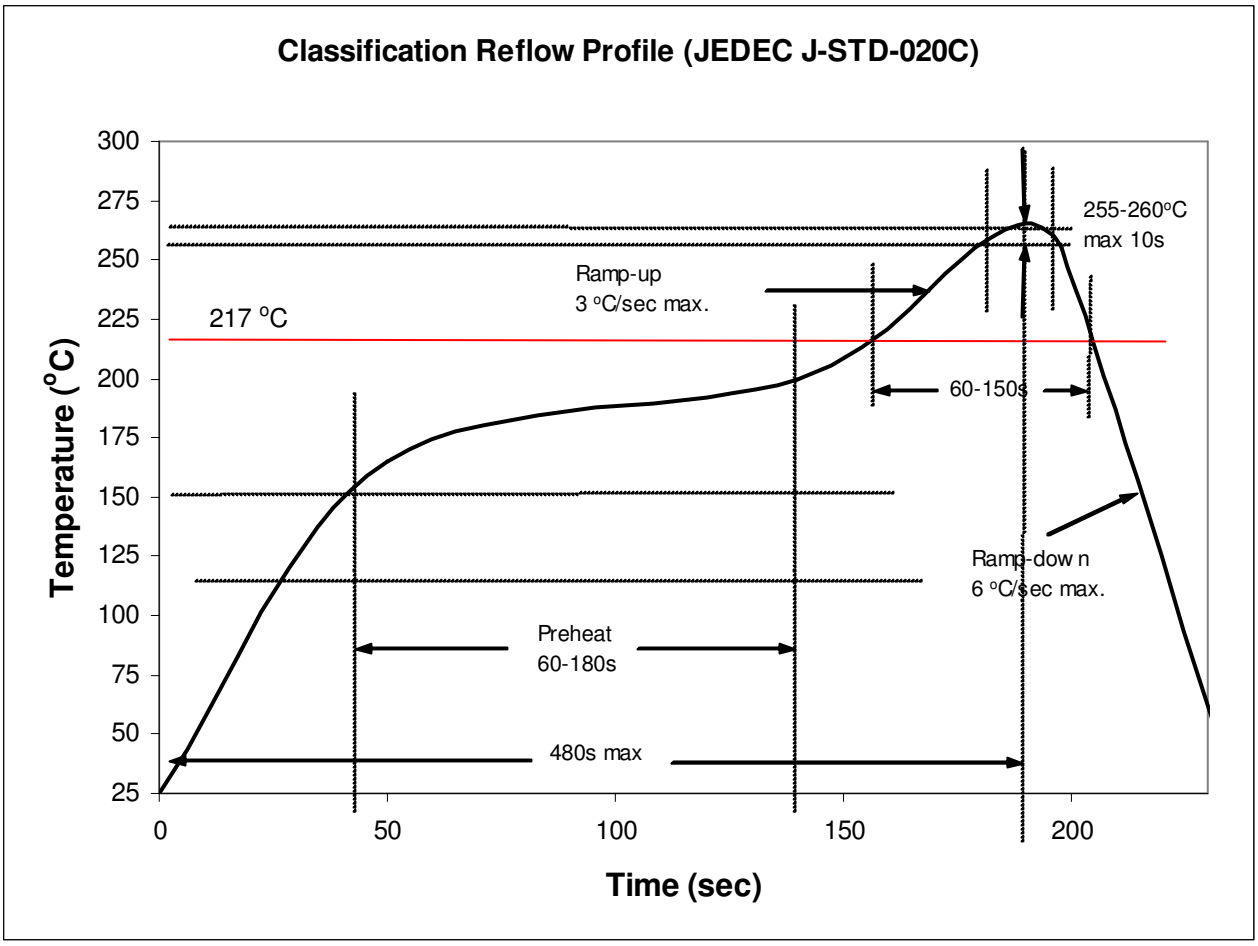
-In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating/cooling may cause electrical & optical failures and damages of the devices.

-Wellypower can't guarantee the LEDs after they have been assembled using the solder dipping method.

1) Lead solder



2) Lead-free solder (JEDEC J-STD-020B).



3) Manual soldering.

- Lead solder

  Max. 300℃ for max. 3sec, and only one time.

- Lead-free solder

  Max. 350℃ for max. 3sec, and only one time.

- There is possibility that the brightness of LEDs is decreased, which is influenced by heat or ambient atmosphere during reflow. It is recommended to use the nitrogen reflow method use the nitrogen reflow method.
- After LEDs have been soldered, repairs should not be done. As repairs is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will be damaged by repairing or not.
- Reflow soldering should not be done more than two times.

Cautions

(1) Moisture proof package

The moisture proof package should be used to prevent moisture in the package as the moisture may cause damage to optical characteristics of the LEDs.

The aluminum bag with zipper is used for moisture proof package. And, the moisture absorbent material, silica gel, is inserted into aluminum bag.

(2) Storage:

Storage conditions

Before opening the package:

The LEDs should be kept at 30℃ or less than 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material is recommended.

After opening the package:

After open the package, the LED should be kept at 30°C, 60%RH or less. The LED should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, it should be stored in moisture proof condition.

If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment: more than 24 hours at 65±5°C.

(3) Heat generation

Thermal design of the end products is of paramount importance. The heat generation must be taken into design consideration when using the LED. The coefficient of the temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components.

(4) Static electricity

Static electricity or surge voltage damages the LEDs. All equipment and machinery must be properly grounded. It is recommended to use a wristband or anti-electrostatic glove when handing the LEDs. When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by a light-on test or a Vf test at a lower current. (below 1mA is recommended).

Criteria: Vf >2.0V at I_F=0.01 mA

(5) Cleaning

Use isopropyl alcohol as a solvent for cleaning the LEDs. The other solvent may dissolve the LEDs package and the epoxy.

Ultrasonic cleaning should not be done.

(6) Others

When using the LEDs, it must care that the reverse voltage will not exceed the absolute maximum rating.

The LED light is enough to injure human eyes, so it should avoid looking at LED light directly.

Note

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