

# SPECIFICATION

LT P/N

LT216WH-A-Q

Mass Product

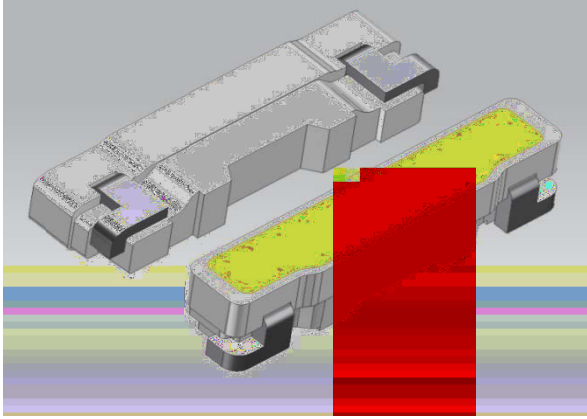


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## 1. Description

### 1.1



The White LED, which was fabricated by using a blue chip and the phosphor.

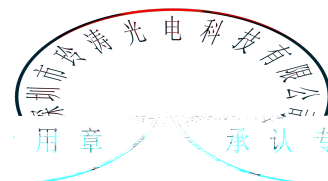
Product Package:

### 1.2 Features

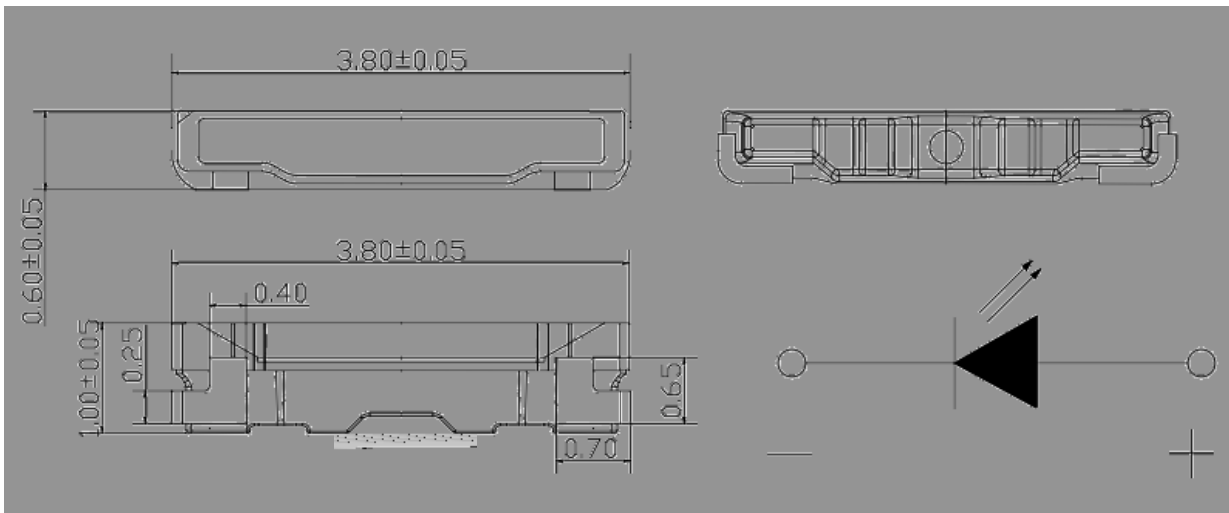
- ▶ PLCC Package.PLCC
- ▶ Wide viewing angle.
- ▶ Suitable for all SMT assembly and solder process.
- ▶ Available on tape and reel.
- ▶ Moisture sensitivity level: Level 3.
- ▶ RoHS compliant.

### 1.3 Application

- ▶ LCD Back Light.LCD
- ▶ Mobile Phones.



## 1.4 Package Dimension



### Notes

All dimensions units are millimeters

All dimensions tolerances are  $\pm 0.10\text{mm}$  unless otherwise noted.

## 1.5 Product Parameters

Table 1-1 Electrical / Optical Characteristics at  $T_s=25^\circ\text{C}$

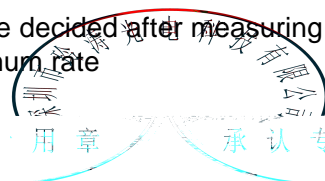
Item	Symbol	Test Condition	Value			Uni
			Min.	Typ.	Max.	
Forward Voltage	$V_F$	$I_F=20\text{mA}$	2.7	---	3.3	V
Reverse Current	$I_R$	$V_R=5\text{V}$	---	---	1	$\mu\text{A}$
Luminous	$I_v$	$I_F=20\text{mA}$	---	2950	---	$\text{mcd}$
Viewing Angle	$2\theta_{1/2}$	$I_F=20\text{mA}$	---	120	---	deg

Table 1-2 Absolute Maximum Ratings at Ts=25°C

Parameter	Symbol	Rating	Units
Forward Current	I <sub>F</sub>	30	mA
Peak Forward Current	I <sub>FP</sub>	100	mA
Reverse Voltage	V <sub>R</sub>	5	V
Electrostatic Discharge (HBM)	E <sub>SD</sub>	2000	V
LED Junction Temperature (LED )	T <sub>J</sub>	105	
Operating Temperature	T <sub>OPR</sub>	-30 ~ + 85	
Storage Temperature	T <sub>STG</sub>	-40 ~ 100	

Notes

1. 1/10 Duty cycle, 0.1ms pulse width.
2. The above forward voltage measurement allowance tolerance is  $\pm 0.03V$ .
3. The above color coordinates measurement allowance tolerance is  $\pm 0.003$ .
4. The above luminous intensity measurement allowance tolerance  $\pm 3\%$ .
5. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
6. All measurements were made under the standardized environment of LT.
7. When the LEDs are in operation the maximum current should be decided after measuring the package temperature, junction temperature should not exceed the maximum rate



## 1.6 Bin Range Of Forward BIN (IF=20mA)

Table 1-3 Bin Rang

eOf Lumin

30	2150
31	2250
32	2350
33	2450
34	2550
35	2650
36	2750
37	2850
38	2950
39	3050
40	3150
41	3250
42	3350
43	3450
44	3550
45	3650
46	3750

Table 1-4 Bin R:

V0	7
V1	
V2	.97
V3	.07
V4	
V5	

### Notes

VF Tolerance:  $\pm 0.03V @ I_F$   
Tolerance:  $\pm 3% @ I_F = 20$

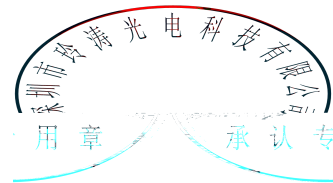


	0.2440	0.2102		0.2492	0.2102		0.2544	0.2102
H12S	0.2431	0.2181	J12S	0.2483	0.2181	K12S	0.2535	0.2181
	0.2474	0.2260		0.2526	0.2260		0.2578	M12S 0.2102
	0.2526	0.2260		0.2578	0.2260		0.2630	
	0.2483	0.2181		0.2535	0.2181		0.2587	
H13X	0.2474	0.2260	J13X	0.2526	0.2260	K13X	0.2578	
	0.2517	0.2339		0.2569	0.2339		0.2621	
	0.2569	0.2339		0.2621	0.2339		0.2673	
	0.2526	0.2260		0.2578	0.2260		0.2630	
H13S	0.2517	0.2339	J13S	0.2569	0.2339	K13S	0.2621	
	0.2560	0.2418		0.2612	0.2418		0.2664	
	0.2612	0.2418		0.2664	0.2418		0.2716	
	0.2569	0.2339		0.2621	0.2339		0.2673	
H14X	0.2560	0.2418	J14X	0.2612	0.2418	K14X	0.2664	
	0.2603	0.2497		0.2655	0.2497		0.2707	
	0.2655	0.2497		0.2707	0.2497		0.2759	
	0.2612	0.2418		0.2664	0.2418		0.2716	
H14S	0.2603	0.2497	J14S	0.2655	0.2497	K14S	0.2707	
	0.2646	0.2576		0.2698	0.2576		0.2750	
	0.2698	0.2576		0.2750	0.2576		0.2802	
	0.2655	0.2497		0.2707	0.2497		0.2759	
H15X	0.2646	0.2576	J15X	0.2698	0.2576	K15X	0.2750	
	0.2689	0.2655		0.2741	0.2655		0.2793	
	0.2741	0.2655		0.2793	0.2655		0.2845	
	0.2698	0.2576		0.2750	0.2576		0.2802	
H15S	0.2689	0.2655	J15S	0.2741	0.2655	K15S	0.2793	
	0.2732	0.2734		0.2784	0.2734		0.2836	
	0.2784	0.2734		0.2836	0.2734		0.2888	
	0.2741	0.2655		0.2793	0.2655		0.2845	
H16X	0.2732	0.2734	J16X	0.2784	0.2734	K16X	0.2836	
	0.2775	0.2813		0.2827	0.2813		0.2879	
	0.2827	0.2813		0.2879	0.2813		0.2931	
	0.2784	0.2734		0.2836	0.2734		0.2888	
H16S	0.2775	0.2813	J16S	0.2827	0.2813	K16S	0.2879	
	0.2818	0.2892		0.2870	0.2892		0.2922	
	0.2870	0.2892		0.2922	0.2892		0.2974	
	0.2827	0.2813		0.2879	0.2813		0.2931	
H17X	0.2818	0.2892	J17X	0.2870	0.2892	K17X	0.2922	
	0.2861	0.2971		0.2913	0.2971		0.2965	
	0.2913	0.2971		0.2965	0.2971		0.3017	
	0.2870	0.2892		0.2922	0.2892		0.2974	
H17S	0.2861	0.2971	J17S	0.2913	0.2971	K17S	0.2965	
	0.2904	0.3050		0.2956	0.3050		0.3008	

	0.2956	0.3050		0.3008	0.3050		0.3060	0.3050		0.3112	0.3050		0.3164	0.3050		0.3216	0.3050
	0.2913	0.2971		0.2965	0.2971		0.3017	0.2971		0.3069	0.2971		0.3121	0.2971		0.3173	0.2971
H18X	0.2904	0.3050	J18X	0.2956	0.3050	K18X	0.3008	0.3050	M18X	0.3060	0.3050	N18X	0.3112	0.3050	P18X	0.3164	0.3050
	0.2947	0.3129		0.2999	0.3129		0.3051	0.3129		0.3103	0.3129		0.3155	0.3129		0.3207	0.3129
	0.2999	0.3129		0.3051	0.3129		0.3103	0.3129		0.3155	0.3129		0.3112	0.3050		0.3164	0.3050
	0.2956	0.3050		0.3008	0.3050		0.3060	0.3050		0.3112	0.3050		0.3164	0.3050		0.3216	0.3050
H18S	0.2947	0.3129	J18S	0.2999	0.3129	K18S	0.3051	0.3129	M18S	0.3103	0.3129	N18S	0.3155	0.3129	P18S	0.3207	0.3129
	0.2990	0.3208		0.3042	0.3208		0.3094	0.3208		0.3146	0.3208		0.3198	0.3208		0.3250	0.3208
	0.3042	0.3208		0.3094	0.3208		0.3146	0.3208		0.3198	0.3208		0.3250	0.3208		0.3302	0.3208
	0.2999	0.3129		0.3051	0.3129		0.3103	0.3129		0.3155	0.3129		0.3207	0.3129		0.3259	0.3129
H19X	0.2990	0.3208	J19X	0.3042	0.3208	K19X	0.3094	0.3208	M19X	0.3146	0.3208	N19X	0.3198	0.3208	P19X	0.3250	0.3208
	0.3033	0.3287		0.3085	0.3287		0.3137	0.3287		0.3189	0.3287		0.3241	0.3287		0.3293	0.3287
	0.3085	0.3287		0.3137	0.3287		0.3189	0.3287		0.3241	0.3287		0.3293	0.3287		0.3345	0.3287
	0.3042	0.3208		0.3094	0.3208		0.3146	0.3208		0.3198	0.3208		0.3250	0.3208		0.3302	0.3208
H19S	0.3033	0.3287	J19S	0.3085	0.3287	K19S	0.3137	0.3287	M19S	0.3189	0.3287	N19S	0.3241	0.3287	P19S	0.3293	0.3287
	0.3076	0.3366		0.3128	0.3366		0.3180	0.3366		0.3232	0.3366		0.3284	0.3366		0.3336	0.3366
	0.3128	0.3366		0.3180	0.3366		0.3232	0.3366		0.3284	0.3366		0.3336	0.3366		0.3388	0.3366
	0.3085	0.3287		0.3137	0.3287		0.3189	0.3287		0.3241	0.3287		0.3293	0.3287		0.3345	0.3287

## Notes

- 1 Measurement uncertainty of the color coordinates: 0.003.
- 2 The new white dustbin refers to the application of small backlight standard.



## 1.7 Typical Optical Characteristics Curves

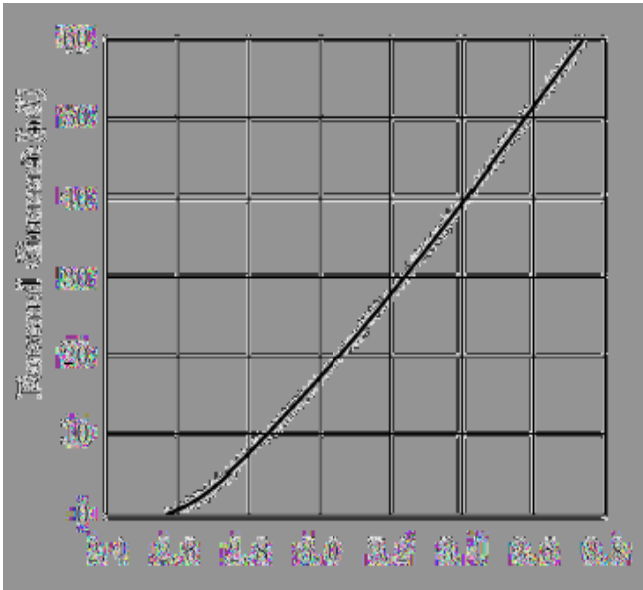


Fig. 1-13 Forward Voltage Vs Forward Current

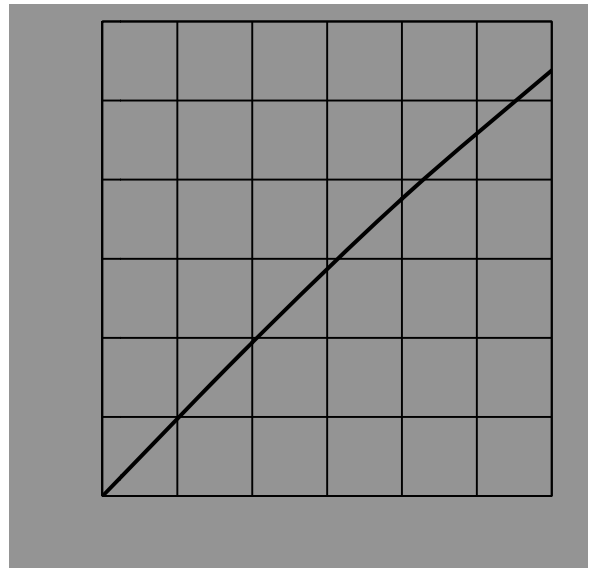


Fig. 1-14 Forward Current Vs Relative Intensity

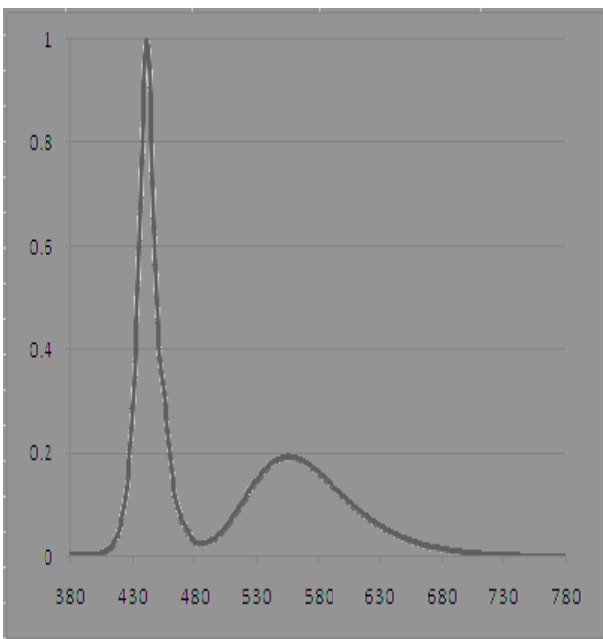


Fig. 1-16 Spectrum Distribution

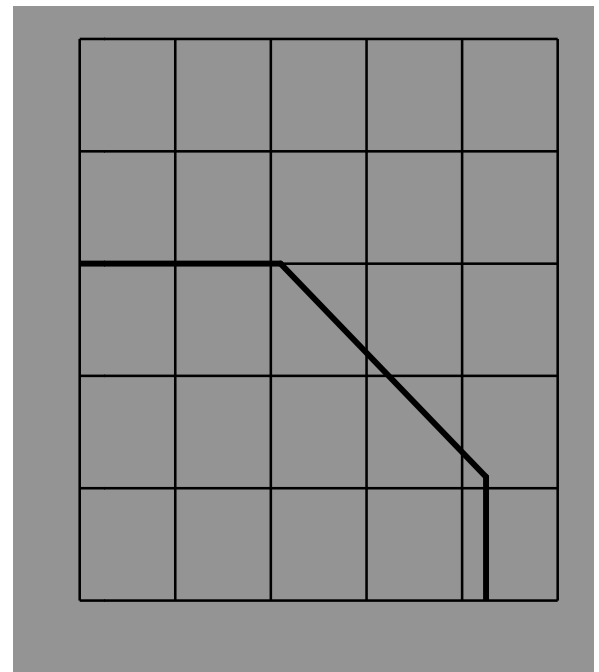
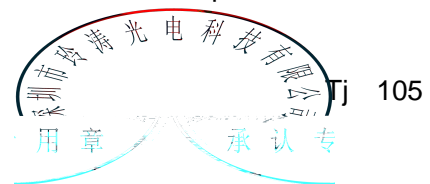


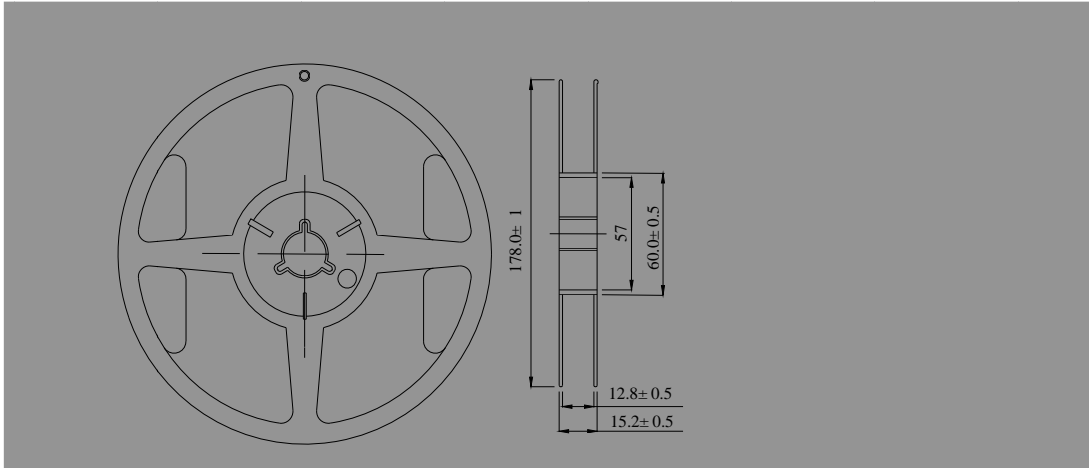
Fig 1-15 Solder Temperature Vs Forward Current



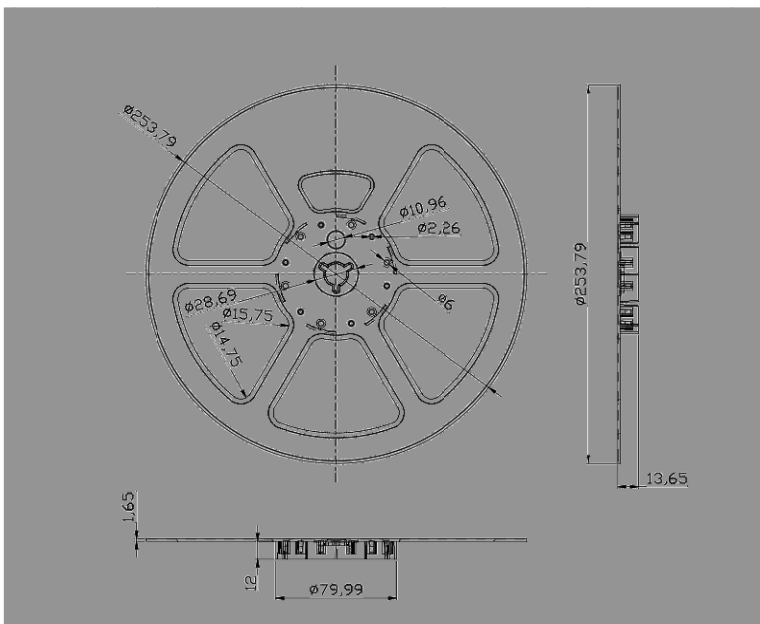
## 2. Packaging

### Packaging Specification

A. Package: 5000pcs/reel.                      5000pcs

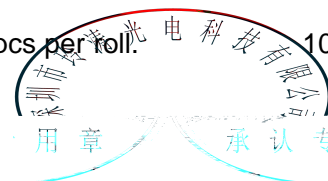


B. Package: 10000pcs/reel.                      10000pcs



#### Notes

When the quantity is less than 10000pcs/roll, the quantity is 5000pcs per roll.



### 2.1.1 Carrier Tape Dimension

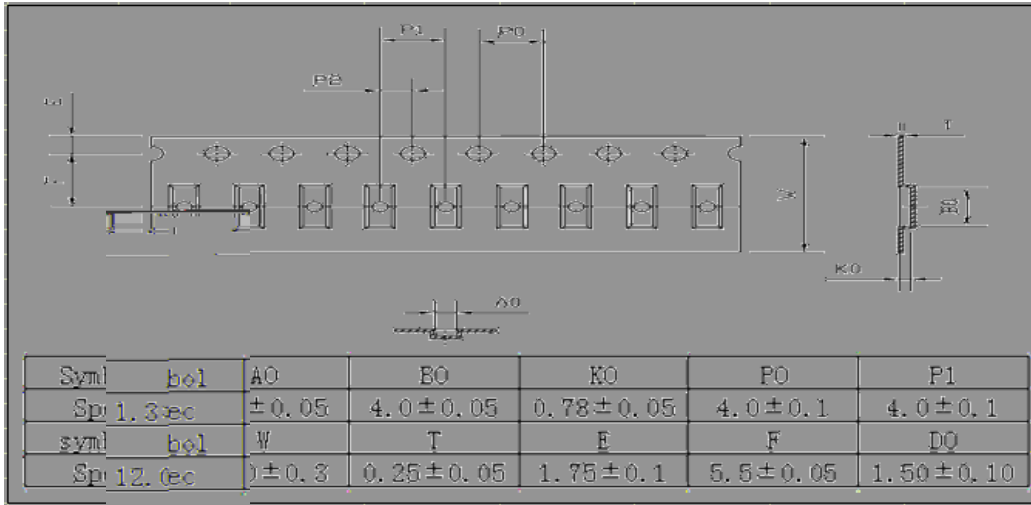


Fig.2-1 Carrier Tape Dimension

#### Notes

The tolerances unless mentioned  $\pm 2.0\text{mm}$ . Unit : mm

### 2.1.2 Label Form Specification

Table 2-2 Lable Map



Table 2-3 Label Form Specification

PART NO.	Part Number
BIN CODE	Bin Code
IV	Luminous intensity
V <sub>F</sub>	Forward Voltage
WL	Wavelength
QTY	Packing Quantity
DATE	Made Date
LOT NO	Lot Number

### 2.2 Moisture Resistant Packing

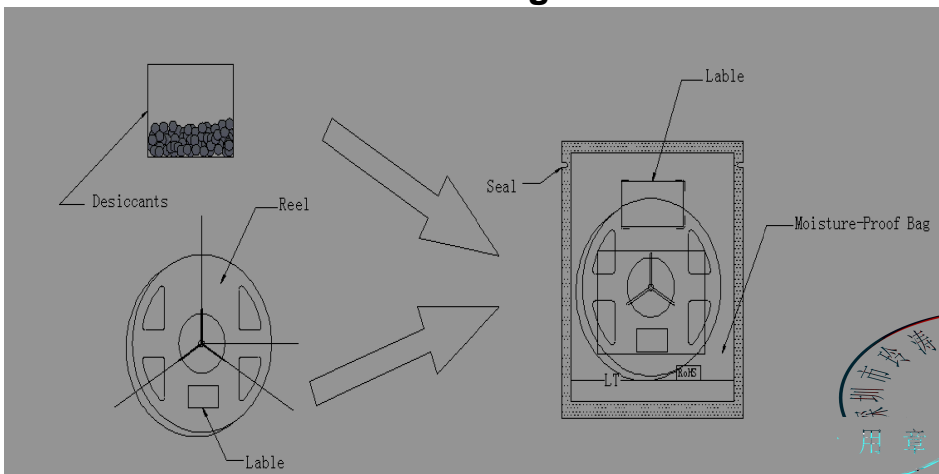
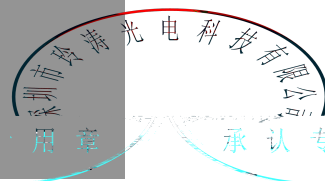
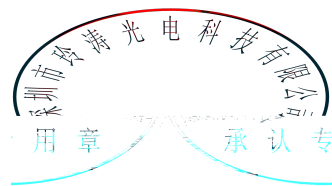
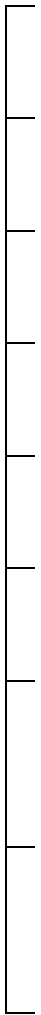


Fig.2-4 Moisture Resistant Packing



## 2.3

## 2.4



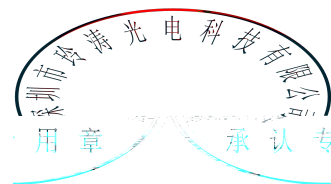
## 2.5 Criteria For Judging Damage

Table 2-7 Criteria For Judging Damage

Test Items	Symbol	Test Condition	Criteria For Judgement	
			Min.	Max.
Forward Voltage	$V_F$	$I_F=20\text{mA}$	-	$>U.S.L^*)\times 1.1$
Reverse Current	$I_R$	$V_R = 5V$	-	$>U.S.L^*)\times 2.0$
Luminous Flux	$\Phi$	$I_F=20\text{mA}$	$<L.S.L^*)\times 0.7$	-

### Notes

- 1.U.S.L: Upper standard level                      L.S.L: Lower standard level
- 2.The above reliability tests is based on the verification of a single/strip LED of LT existing experimental platform,the reliability experiment was taken under good heat dissipation conditions. when customers applies the LED to the series and parallel circuit, should take consideration of all the factors such as the current, voltage distribution, heat dissipation and others.
- 3.The technical information shown in the data sheets is limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.



### 3. SMT Reflow Soldering Instructions SMT

#### 3.1 SMT Reflow Soldering Instructions

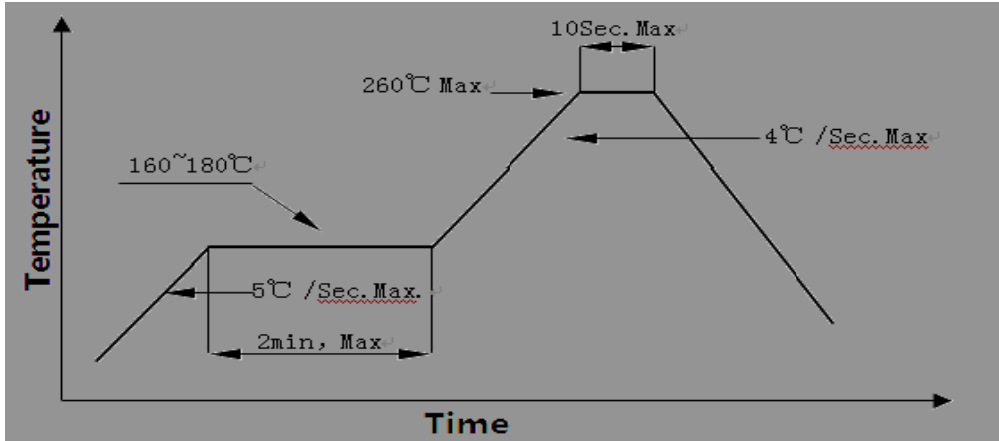


Fig.3-1 SMT Reflow Soldering Map

Fig.3-2 SMT Reflow Soldering Instructions SMT

Average temperature rise speed	$T_{smax}$	$T_P$	5 °C/	Max 5 °C/ s
Preheating: minimum temperature	( $T_{smin}$ )		160 °C	
Preheating: Max temperature	( $T_{smax}$ )		260 °C	
Preheating: Time	$T_{smin}$	$T_{smax}$	60 - 120	60s-120s
Time limited to maintain high temperature: the temperature		( $T_L$ )	217 °C	
Time limited to maintain high temperature: The Time		( $t_L$ )	60	Max 60s
Peak /Classification of temperature:	/	( $T_P$ )	260 °C	
Time limit classification of peak temperature time		$t_p$	10	Max 10s
actual peak temperature ( $T_P$ )	5 °C	Hold time within 5 °C with the	30	Max 30s
Cooling speed			6 °C/	Max 6 °C
25 °C		Needed time from 25 °C to $T_p$	8	Max 8 minu

## Notes

(1)Reflow soldering should not be done more than twice. If more than 24 hours between the two solderings , LED will be damaged.

(2)Whensoldering , do not put stress on the LEDs during heating.

### 3.1.1 Soldering Iron

(1) When do soldering by hand, keep the temperature of iron below less 300°C less than 3 seconds

(2) Soldering by hand should be done only one time.

### 3.1.2 Repairing

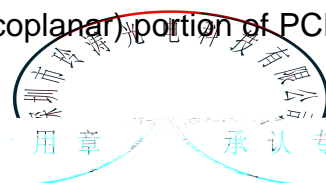
Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable,a double-head soldering iron should be used (as below figure). It should be confirmed in advance whether the characteristics of LEDs will or not be damaged by repairing.

LED

### 3.1.3 Cautions

The encapsulated material of the LEDs is silicone. Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be impacted on the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when use the picking up nozzle, the pressure on the silicone resin should be proper. LED

(2) Components should not be mounted on warped (non coplanar) portion of PCB. After soldering, do not warp the circuit board.LED



(3) Do not apply mecha  
temperature after solde

#### 4.1 Handling Preca

(1) LED operating enviro  
LEDmating usage mate  
or endorsement.LED

(2) In order to prevent e  
malfunction of LED, the  
900PPM,the single con  
content of Bromine ele  
products is required to b  
and is not a warranty or

(3) VOCs (Volatile orga  
can penetrate silicone e  
energy. The result can l  
properties of the materi  
these issues. ~~but~~ Advise  
are suspected to have  
verifycompati  
application an  
adhesives the

(4) Handle the component along the side surface by using forceps or appropriate tools; do not directly touch or Handle the silicone lens surface, it may damage the internal circuitry.

(5) In designing a circuit, the current through each LED must exceed the absolute maximum rating specified for each LED. In the meanwhile, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen. The driving circuit must be designed to allow forward voltage only when it is ON or OFF. If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

(6) Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color change and so on. Please consider the heat generation of the LEDs when making the system design. LED

(7) Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust, requiring special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components. LT suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

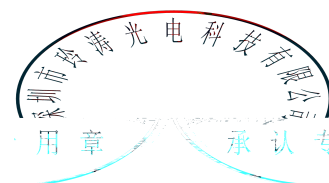


Table 4-1 Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening Aluminum Bag	30	75%	Within 1 Year From Date
	After Opening Aluminum Bag	30	60%	24hours 24
Baking		60 5	-	24hours 24

(8) If the moisture absorbent material ( silica gel ) has faded away or the LEDs have exceeded the storage time , baking treatment should be performed after unpacking and based on the following condition (  $65\pm 5$  ) °C for above 24 hours.

If the package is flatulence or damaged, please notify the sales staff to assist.

(9) Similar to most Solid state devices; LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).

