



# 江西省晶能半导体有限公司

JiangXi LatticePower Semiconductor Corporation

## 产 品 规 格 书 Specification

产品名称 Product Name: Photo Transistor

产品型号 Product Type: PT970B-L01-2T

客 户 Client name: \_\_\_\_\_

客户料号 Client P/N: \_\_\_\_\_

版 本 号 Version No.: Y00

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客户承认栏 Client Approval	
核准 Approval	确认 Audit

制定 Confirmation: \_\_\_\_\_ 审核 Approval: \_\_\_\_\_

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# 目录 Contents

1、特点 Features .....	1
2、描述 Description .....	1
3、应用 Applications .....	1
4、性能 Performance .....	2
5、光电特性图 The Photoelectric Characteristics Graph .....	4
6、产品尺寸 Product Dimensions .....	5
7、防潮包装材料 Moisture Resistant Packing Materials .....	6
8、焊接条件 Soldering Condition .....	7
9、可靠性 Reliability .....	10
10、注意事项 Cautions .....	11
11、文件履历表 Document Resume .....	13

## 1、特点 Features

- ◆ 快速响应  
Fast response time
- ◆ 高感光度  
High photo sensitivity
- ◆ 侧焊接的包装厚度为 0.6mm  
Package thickness is 0.6mm for side soldering
- ◆ 适用于回流焊  
Suitable for reflow soldering
- ◆ 无铅  
Pd free
- ◆ 符合 RoHS 标准  
RoHS compliant
- ◆ IPC / JEDEC J-STD-020C: MSL-3

## 2、描述 Description

- ◆ PT970B-L01-2T 是一款采用微型 SMD 封装的光电晶体管采用黑色塑料模制而成，带有球面顶视镜。该器件的光谱与红外发光二极管相匹配。  
PT970B-L01-2T is a phototransistor in miniature SMD package which is molded in a black plastic with spherical top view lens. The device is spectrally matched to infrared emitting diode.

## 3、应用 Applications

- ◆ 微型开关  
Miniature switch
- ◆ 位置传感器  
Position sensor
- ◆ 红外应用系统  
Infrared applied system

## 4、性能 Performance

### a) 极限参数 Maximum Ratings (Ta =25 °C, unless specified otherwise)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
集电极-发射极电压 Collector-Emitter Voltage	$V_{CEO}$	35	V
发射极-集电极电压 Emitter-Collector-Voltage	$V_{ECO}$	5	V
集极电流 Collector Current	$I_C$	20	mA
消耗功率 Power Dissipation	$P_d$	75	mW
工作温度 Operating Temperature Range	$T_{otr}$	-40~85	°C
存储温度 Storage Temperature	$T_{stg}$	-40~100	°C

**b) 光电参数 Electro-Optical Characteristics (Ta =25 °C, unless specified otherwise)**

项目 Item	符号 Symbol	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Unit	条件 Condition
灵敏度的光谱范围 Spectral range of sensitivity	$\lambda_{0.5}$	740	----	1100	nm	----
灵敏度的光谱范围 Wavelength Of Peak Sensitivity	$\lambda_P$	----	940	----	nm	----
集极-发射极崩溃电压 Collector-Emitter Breakdown Voltage	$BV_{CEO}$	35	----	----	V	$I_C=100\mu A$ $E_e=0mW/cm^2$
发射极-集极崩溃电压 Emitter-Collector Breakdown Voltage	$BV_{ECO}$	5	----	----	V	$I_E=10\mu A$ $E_e=0mW/cm^2$
集极-发射极饱和电压 Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	----	----	0.4	V	$I_C=5mA$ $E_e=1mW/cm^2$
集极暗电流 Collector Dark Current	$I_{CEO}$	----	----	50	nA	$V_{CE}=20V$ $E_e=0mW/cm^2$
集极电流 On State Collector Current	$I_{C(ON)}$	1.5	----	----	mA	$V_{CE}=5V$ $E_e=1mW/cm^2$
视角 Viewing Angle	$2\theta_{1/2}$		110		°	$V_{CE}=5V$ $E_e=1mW/cm^2$
上升时间 Rise Time	$t_r$	----	15	----	us	$V_{CE}=5V$
下降时间 Fall Time	$t_f$	----	15	----		$I_C=1mA$ $R_L=1000\Omega$

## 5、光电特性图 The Photoelectric Characteristics Graph

Fig 1.光谱响应度/ Spectral Sensitivity

$$S(\text{rel}) = f(\lambda); T_a = 25^\circ\text{C}$$

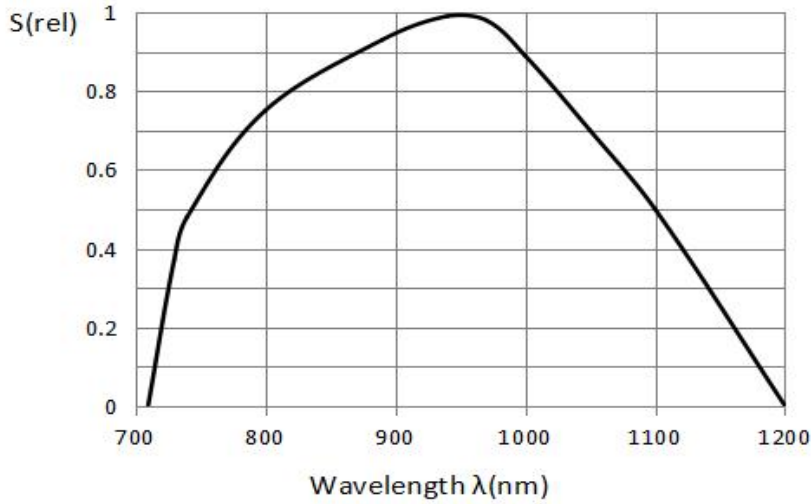


Fig 2.集极电流/Collector Current

$$I_{c(ON)} = f(E_e); T_a = 25^\circ\text{C}$$

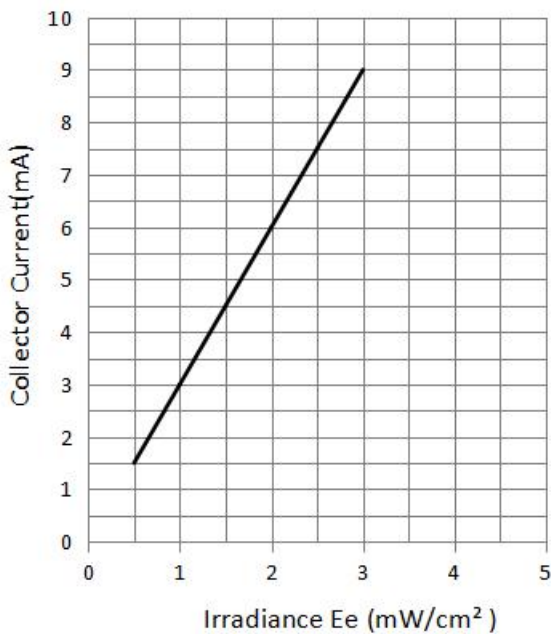
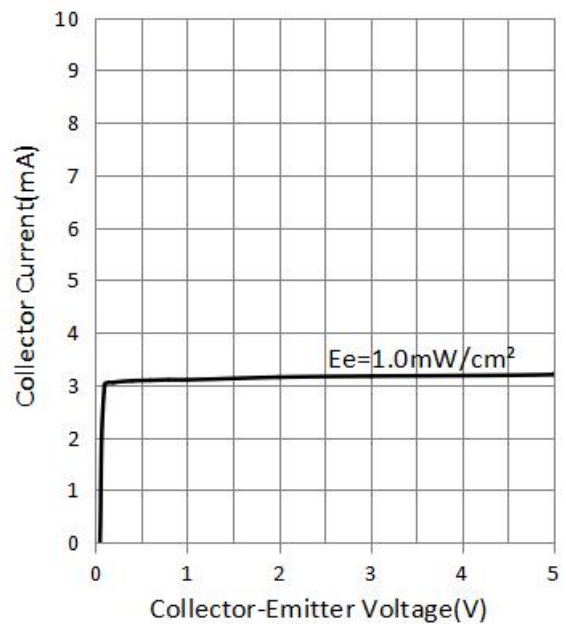
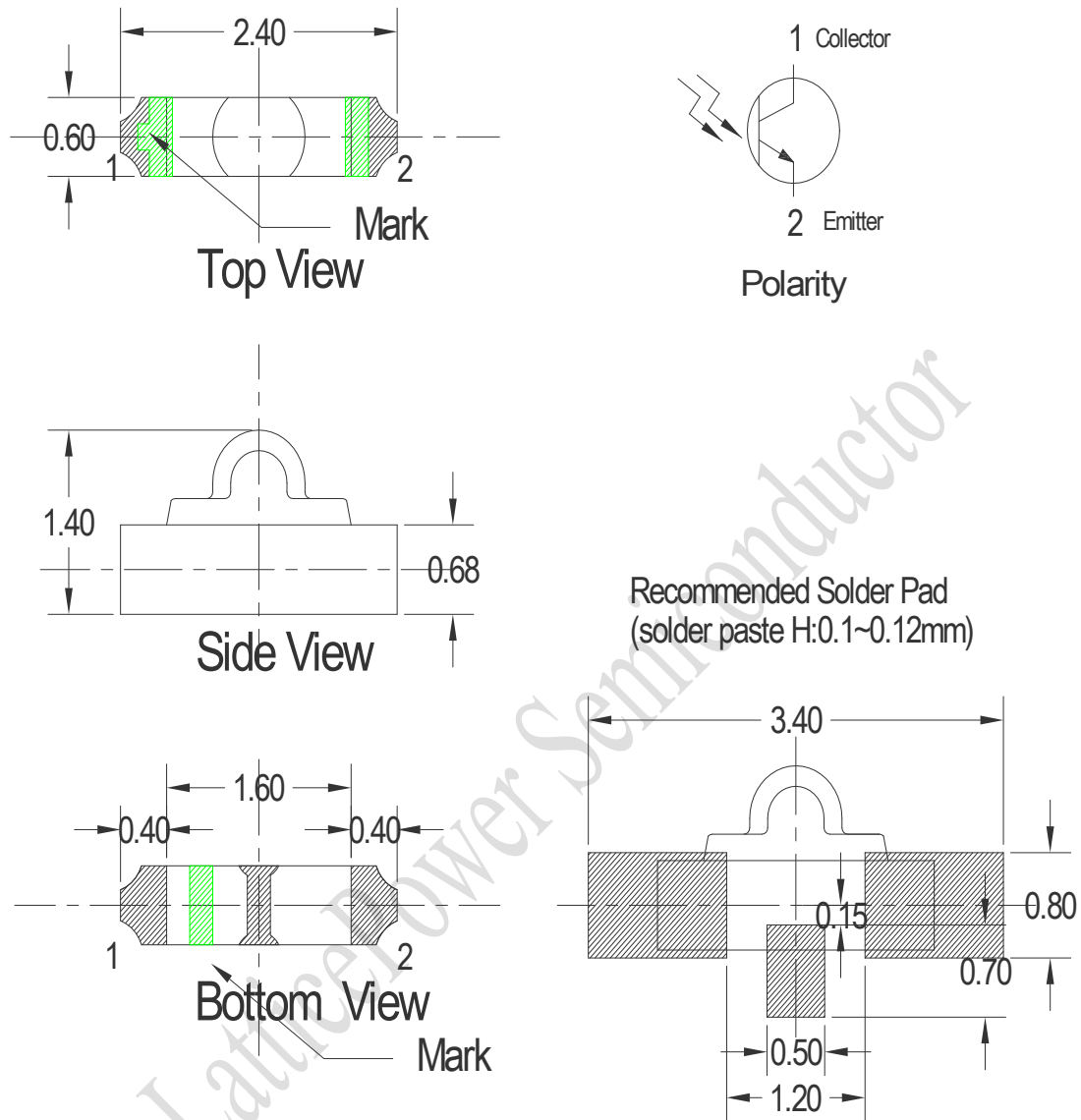


Fig 3.集极电流/Collector Current

$$I_{c(ON)} = f(V_{ce}); T_a = 25^\circ\text{C}$$



## 6、产品尺寸 Product Dimensions



备注 Notes:

◇ 所有尺寸均以 mm 为单位

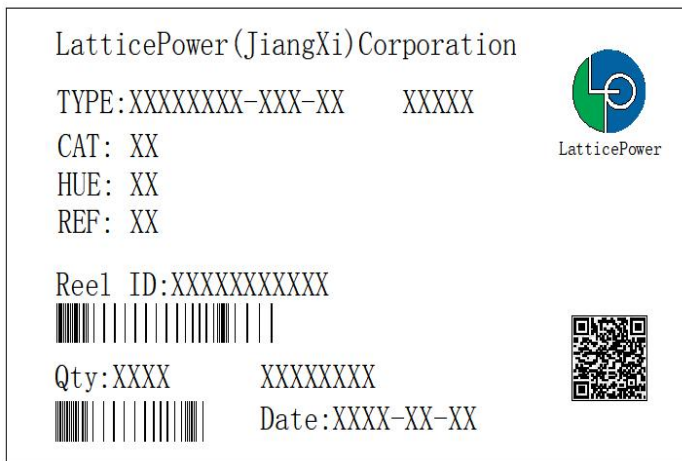
All dimensions are in millimeters

◇ 尺寸未按照公差 $\pm 0.1\text{mm}$ 标记的, 按照图纸标记

Size is not marked in accordance with tolerance  $\pm 0.1\text{mm}$  and dimension tolerances in accordance with drawings

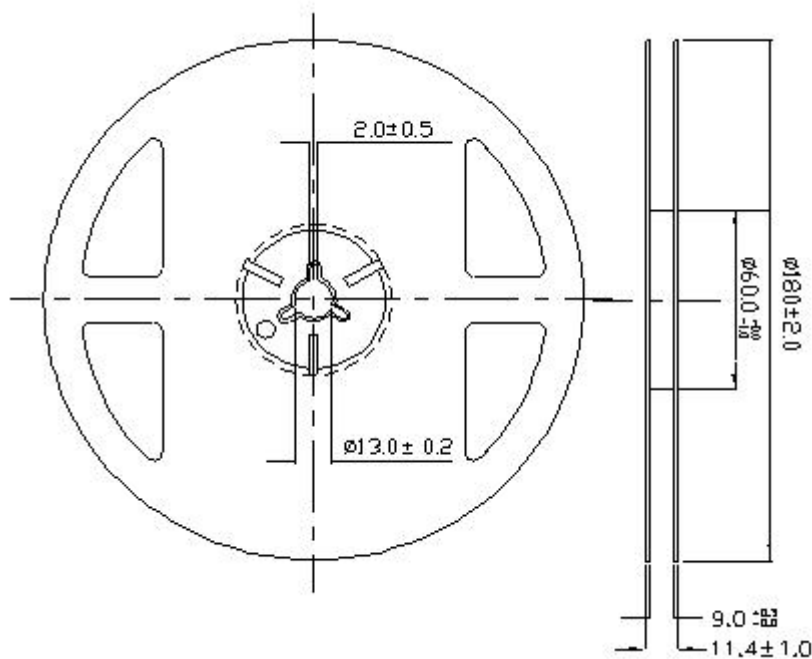
## 7、防潮包装材料 Moisture Resistant Packing Materials

### a) 标签说明 Label Explanation



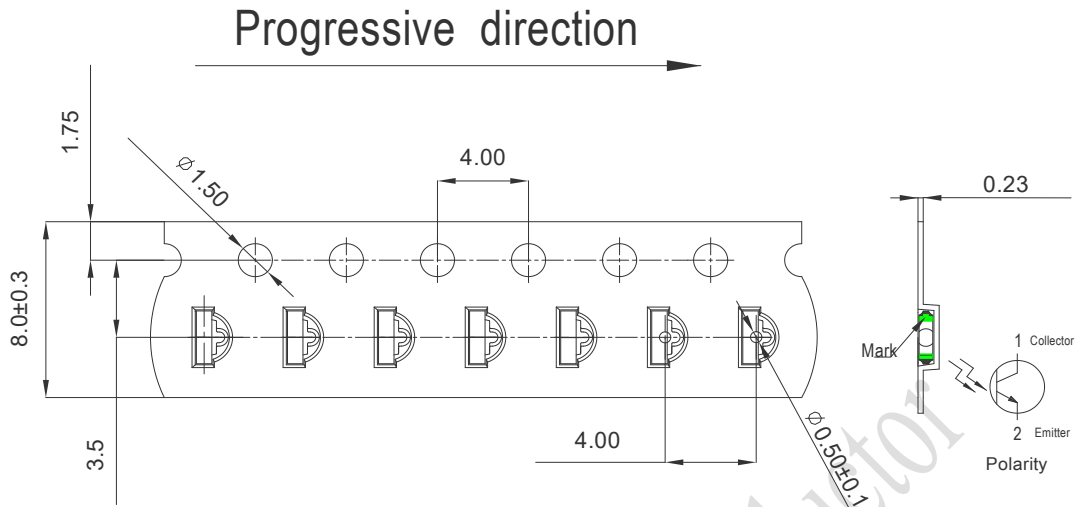
- TYPE: Product Type
- CAT: Rank
- HUE: Reference
- REF: Reference
- Reel ID.: Reference
- QTY: Packing Quantity

### b) 卷轴尺寸 Reel Dimensions

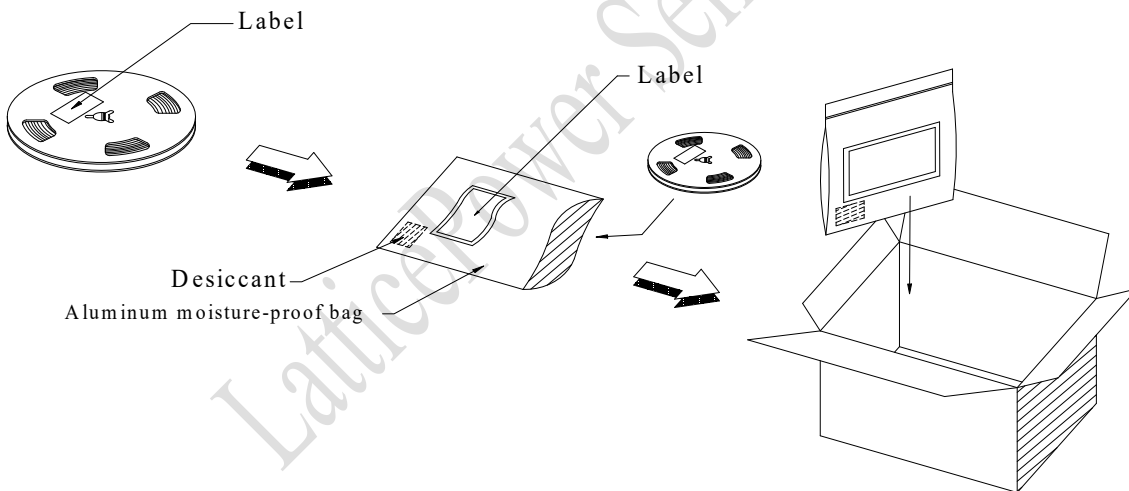




### c) 包装数量规格 Packing Quantity Specification



### d) 防潮包装工艺 Moisture Resistant Packing Process



备注 Notes:

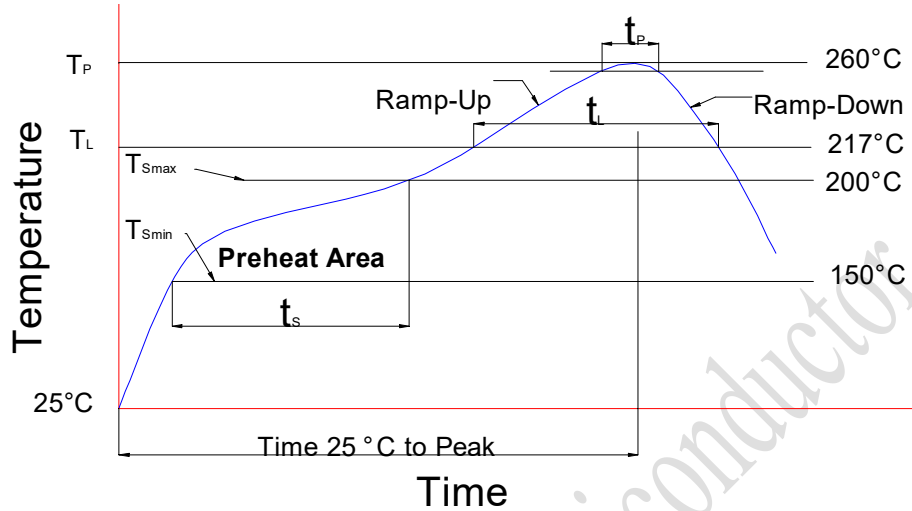
- ◇ 未标注的公差均为±0.1mm, 单位为 mm. Tolerance unless mentioned is ±0.1mm, Unit = mm
- ◇ 卷轴包装 4000pcs Reel:4000pcs.
- ◇ 尾料包装最小数量为 500pcs Minimum packing quantity is 500 pieces for remainders.
- ◇ 当包装与标签有特殊要求时,以客户需求为准。
- ◇ When there are special requirements for packaging and labeling, customer demand prevails.
- ◇ 当卷轴由于工作中断而重绕时, 载带上压力不应超过 10N, 否则 LED 可能会粘在盖带上  
When the tape is rewound due to work interruptions, no more than 10N should be applied to the embossed carrier tape.  
The LEDs may stick to the cover tape.

## 8、焊接条件 Soldering Condition

### a) 回流焊 Reflow soldering

➤ 无铅回流焊温度曲线

Pb-free solder temperature profile



根据 EDEC-J-STD-020E 内容，参考以下内容。

Compatible with the JEDEC-J-STD-020E, using the parameters listed below.

特制参数 Profile Feature	无铅焊料 Lead-Free Solder
平均上升速率 (T <sub>smax</sub> 至 T <sub>p</sub> ) Average Ramp-Up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3 °C/sec max.
预热: 温度最小值 (T <sub>smin</sub> ) Preheat: Temperature Min (T <sub>smin</sub> )	150
预热: 最高温度 (T <sub>smax</sub> ) Preheat: Temperature Max (T <sub>smax</sub> )	200
预热: 时间 (t <sub>smin</sub> 到 t <sub>smax</sub> ) Preheat: Time (t <sub>smin</sub> to t <sub>smax</sub> )	60-180 secs
回流温度 (T <sub>L</sub> ) Time Maintained Above: Temperature (T <sub>L</sub> )	217°C
回流时间 (t <sub>L</sub> ) Time Maintained Above: Time (t <sub>L</sub> )	60-150 secs
峰值/分类温度 (T <sub>p</sub> ) Peak/Classification Temperature (T <sub>p</sub> )	255 ± 5°C
实际峰值温度 (t <sub>p</sub> ) 在 5°C 以内的时间 Time Within 5°C of Actual Peak Temperature (t <sub>p</sub> )	30 secs max.
降低速率 Ramp-Down Rate	4°C/sec max.



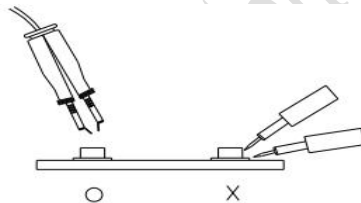
- 回流焊不应做两次以上。  
Reflow soldering should not be done more than two times.
- 在焊接升温过程中,不要挤压 LED。  
When soldering, do not put stress on the LED during heating.
- 在焊接后,不要使电路板翘曲。  
After soldering, do not warp the circuit board.

## b) 手工焊接 Hand Soldering

- 推荐使用功率低于 20W 的烙铁,焊接时烙铁的温度必须保持在 350°C 以下,且每个电极只能进行一次焊接,每次焊接的持续时间不得超过 3 秒。  
If manual soldering is necessary used, the power of less than 20W is recommended. The temperature of the iron must be kept at below 350° C, with soldering time within 3 seconds and each electrode can be only soldered at one time

## c) 返修 Repairing

- 焊接 LED 后,不应进行维修。当修复不可避免时,应使用双头烙铁(如下图所示)。应事先确认 LED 的特性是否会因维修而损坏。  
Repair 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 beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.



## 9、可靠性 Reliability

### a) 测试和结果 Tests and Results

测试项目 Test Item	标准 Reference Standard	测试条件 Test Conditions	测试周期 Test Duration
回流焊 Solder ability(Reflow Soldering)	JEITA ED-4701 300 302	Tsld=255±5℃,5sec,Lead-free Solder	3 times
高低温循环 Temperature Cycle	JEITA ED-4701 100 105	-40℃(30min)~85℃(30min)	300cycles
冷热冲击 Thermal Shock	MIL-STD-202G-107G- A	-40℃(15min)~85℃(15min)/ Transfer time <20sec	300cycles
低温存储 Low Temperature Storage	JEITA ED-4701 100 202	T <sub>A</sub> =-40℃	1000H
高温存储 High Temperature Storage	JEITA ED-4701 100 201	T <sub>A</sub> =85℃	1000H
室温寿命 Room Temperature Life	JESD22-A108	T <sub>a</sub> =25℃,VCE=5V	1000H

### b) 失效标准 Failure Criteria

Criteria #	Items	Conditions	Failure Criteria
#1	Collector-Emitter Breakdown Voltage (V <sub>CE</sub> )	I <sub>c</sub> =100μA E <sub>e</sub> =0mW/cm <sup>2</sup>	>Initial value×1.1 or < Initial value×0.9
	Collector Dark Current(I <sub>CEO</sub> )	V <sub>CE</sub> =20V E <sub>e</sub> =0mW/cm <sup>2</sup>	> 50nA

## 10、注意事项 Cautions

### a) 过流保护 Over-current-proof

- 客户必须应用电阻进行保护，否则轻微的电压偏移会导致大电流变化（会发生烧坏）。  
Customer must apply resistors for protection , otherwise slight voltage shift will cause big current change ( Burn out will happen ).
- LED 是一恒流驱动器件，不建议恒压驱动,如果必须事先联系晶能销售人员。  
LED is a constant current drive piece, constant voltage drive is not recommended, if you must contact the LatticePower sales staff in advance.

### b) 存储 Storage

- 开封前，LED 需存放在温度不高于 30℃,湿度不高于 60%RH 的环境中,应在一年内用完。  
The LED should be stored in the environment of temperature<30℃ and humidity<60% RH before opening the package,should be used within a year.
- 开包后建议在 24 小时内过完回流焊,如果开封时间超出一周需烘烤除湿，车间条件≤30℃/60%RH。  
After opening the package, it is recommended to finish the reflow within 24 hours. If the opening time exceeds one week, it should be baked and dehumidified,The workshop conditions are ≤30℃/60%RH.
- 如果吸湿剂或包装失效，或者 LED 已超出存放时间,应使用如下条件进行烘烤。  
烘烤处理: 60±5℃,至少 24 小时以上。  
If the moisture absorbent material has faded away or the LED have exceeded the storage time, baking treatment should be performed using the following conditions.  
Baking treatment : 60±5℃ for Min. 24 hours.
- 防止静电死亡，手动操作需要戴橡胶手套并佩戴静电环。  
Prevent electrostatic killed, Manual operation is required to wear rubber gloves and wear electrostatic ring.

### c) 清洗 Cleaning

- 通常，LED 不建议对部件进行湿式清洁处理，因为封装不是密封的。  
In general, LED does not recommend a wet cleaning process for component as the package is not hermetically sealed.

### d) 静电 ESD

- 静电或电源涌会损坏 LED。防止防静电损坏的建议：  
Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:
  - 离子风扇配置；  
-Ionizing fan setup
  - 所有的设备、设备和机械\工作台等都必须正确接地。  
-All devices, equipment, machinery,work tables, etc. must be properly grounded.
  - 在处理这些 led 时，请使用导电腕带或抗静电手套  
-Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.

### e) 操作注意 Handling Precautions

- 在处理过程中，还应注意确保组件顶面没有压力。  
During the handling, care should be taken as well to ensure no pressure on the top surface of component.
- 应避免使用所有类型的尖锐物体（例如镊子，指甲等），以防止对树脂造成压力，因为这会导致部件损坏。  
All types of sharp objects(e.g. forceps, fingernail, etc) should be avoided in order to prevent stress to the resin, since this can lead to damage of the component.

### f) 其他 Others

- 产品的外观和规格可另行修改以作改进，而不另行通知  
The appearance and specifications of the product may be modified for improvement without prior notice.

LatticePower Semiconductor

## 11、文件履历表 Document Resume

序号	变更日期	变更人	版本	变更内容
01	2022.3.12	丁焕	Y00	研发新制定初版

LatticePower Semiconductor