SPECIFICATION
产品规格书

REFOND P/N 产品型号

RF-P28Q6-IRN-FT

□R&D 研发

■Mass Product 量产供货

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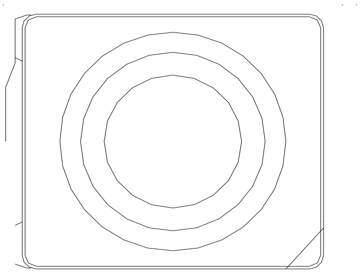

Fig.1-1 Top view 正面视图

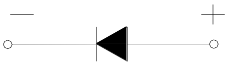

Fig.1-2 Polarity 极性

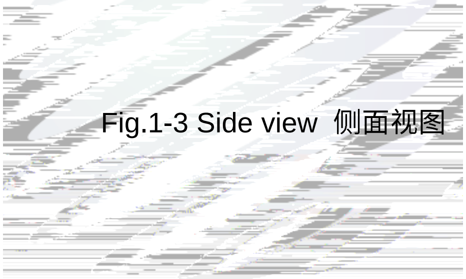

Fig.1-3 Side view 侧面视图

Fig.1-4 Bottom view 背面视图

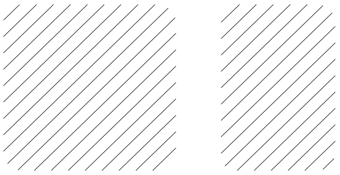

Fig.1-5 Soldering patterns 推荐焊盘

Notes 备注:

1. All dimensions units are millimeters. 所有尺寸标注单位为毫米

2. All dimensions tolerances are ±0.2mm unless otherwise noted. 除特别标注外，所有尺寸公差为 ±0.2 毫米

1.5 Product Parameters 产品参数

Table 1-1 Electrical / Optical Characteristics at Ts=25°C 电性与光学特性

Item 项目	Symbol 符号	Test Condition 测试条件	Value			Unit 单位
			Min. （最小值）	Typ （典型值）	Max. （最大值）	
Reverse Current （漏电流）	I_R	V_R=5V	---	---	10	uA
Forward Voltage （正向电压）	V_F	I_F=100mA	1.4	1.6	---	V
Peak Wavelength （峰值波长）	λ_p	I_F=100mA	---	850	---	nm
Spectrum Radiation Bandwidth 半波宽		I_F=100mA	---	45	---	nm
Total radiant flux 辐射功率	e	I_F=100mA	45	65		mW
Viewing Angle （发光角度）		I_F=100mA	---	75	---	deg
Thermal Resistance. （热阻）	R_{THJ-S}	I_F=100mA	---	50	---	℃/W

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Table 1-2 Absolute Maximum Ratings at Ts=25°C 绝对最大值

Parameter（参数）	Symbol（符号）	Rating（值）	Units（单位）
Power Dissipation （功耗）	P_D	160	mW
Forward Current （正向电流）	I_F	100	mA
Reverse Voltage （反向电压）	V_R	5	V
Electrostatic Discharge (HBM)（静电）	E_{SD}	2000	V
Operating Temperature （操作温度）	T_{OPR}	-40 ~ +85	℃
Storage Temperature （储存温度）	T_{STG}	-40 ~ +85	℃
Junction Temperature （结温）	T_J	105	℃

Notes 备注：

1.1/10 Duty cycle, 0.1ms pulse width. 脉宽0.1ms,占空比1/10.

2.The above forward voltage measurement allowance tolerance is ±0.1V. 以上所示电压测量误差 ±0.1V.

3. Tolerance of measurement of Total radiant flux/ Radiant Intensity:±10%.辐射功率/强度测量公差：±10%。

4. Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product. 使用功率不能超过规定的最大值。

5. All measurements were made under the standardized environment of Refond. 所有测试都是基于瑞丰光电的标准测试平台。

6.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. LED 使用的最大电流需要根据散热条件确定，结温不能超过最大值。

7. ESD yield is over 90% at 2000V ESD (HBM). ESD protection during products handing is needed. 90%的LED通过人体模式ESD2000V 测试，在操作时请注意静电防护。

1.6 Typical optical characteristics curves 典型光学特性曲线

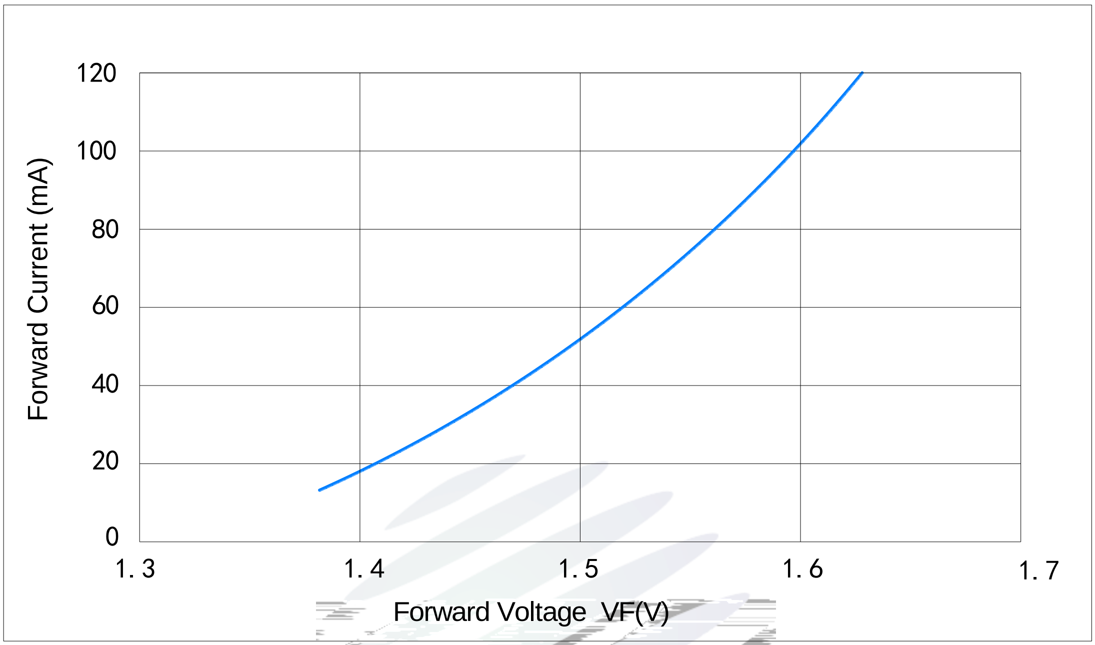

Fig 1-6 Forward Voltage Vs. Forward Current 伏安特性曲线

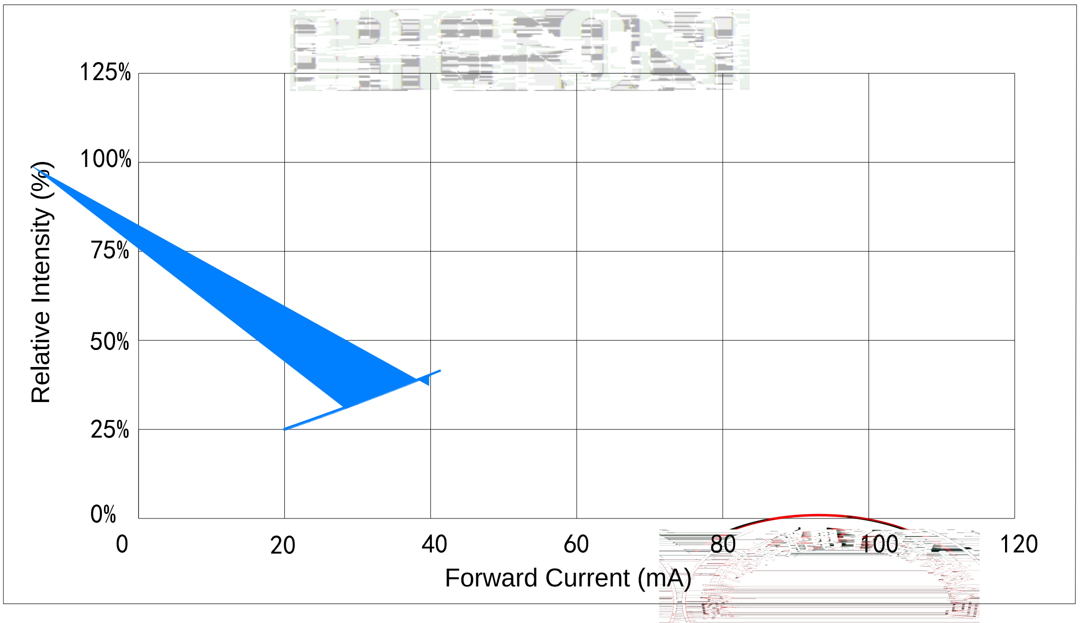

Fig 1-7 Forward Current Vs. Relative Intensity 正向电流与相对光强特性曲线

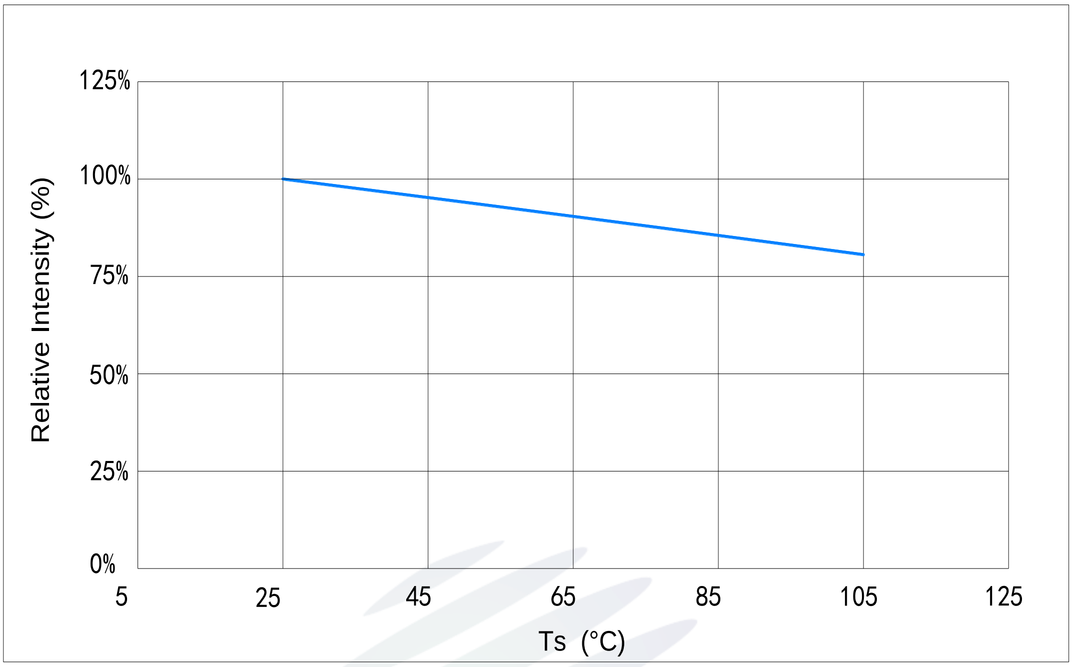

Fig 1-8　Ts Temperature Vs Relative Intensity 管脚温度与相对光强特性曲线

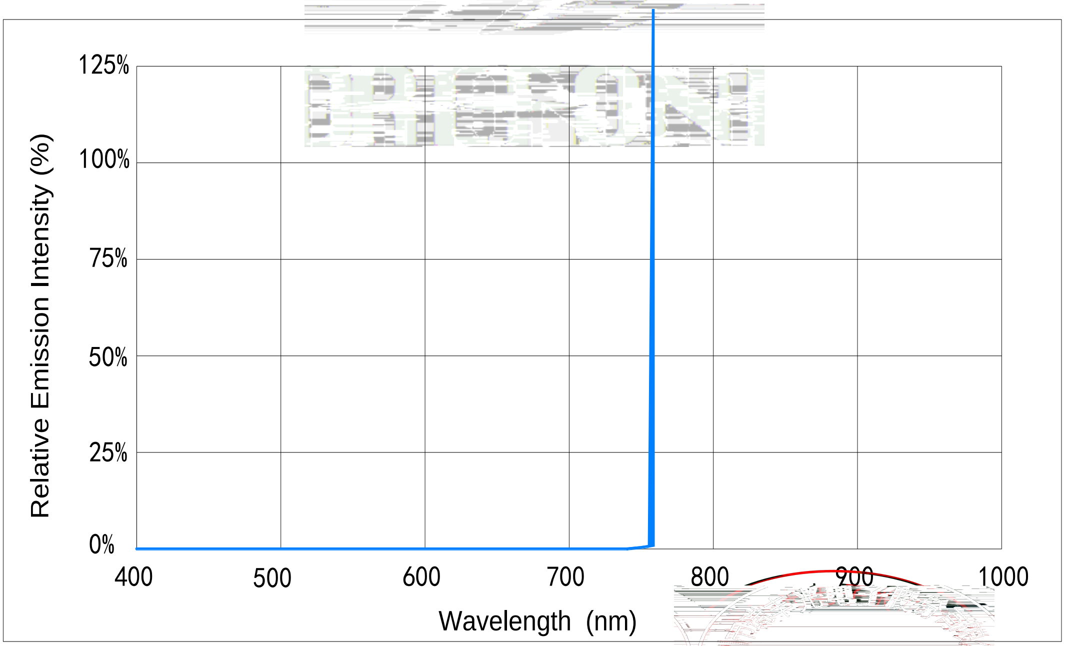

Fig 1-9 Spectrum Distribution 光谱分布特性曲线

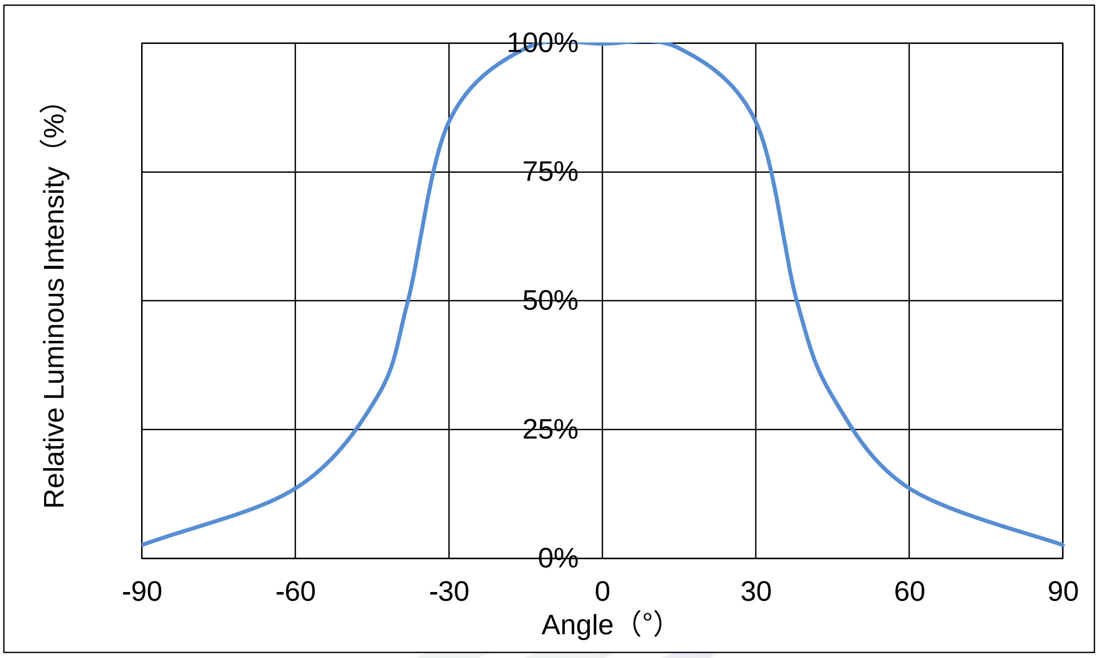

Fig 1-10 Radiation diagram 辐射特性曲线

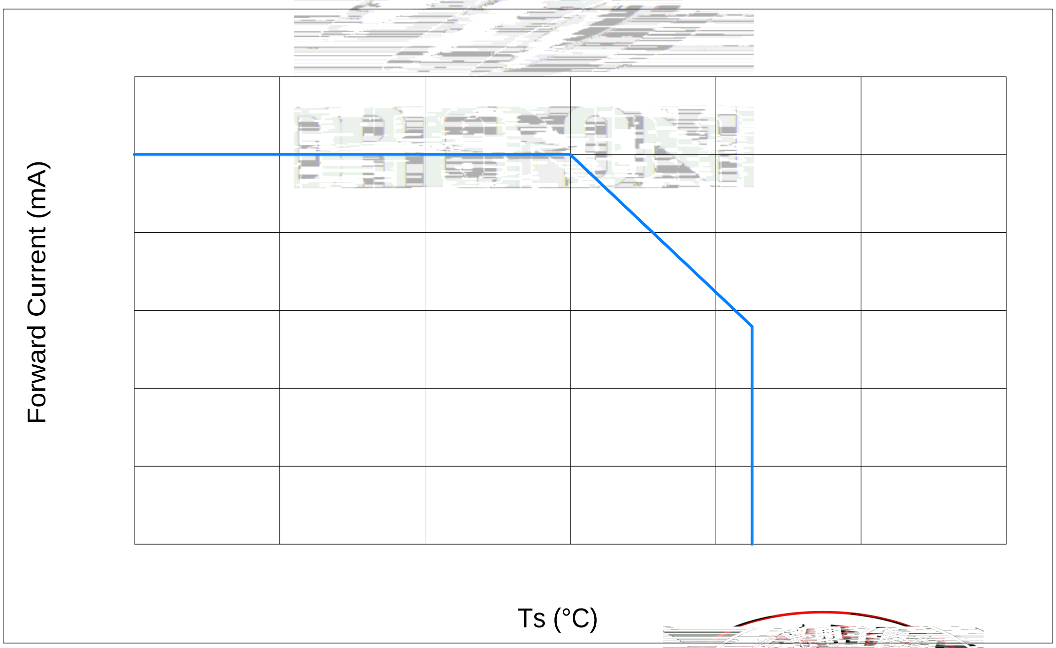

Fig 1-11 Ts Temperature Vs Forward Current 管脚温度与正向电流特性曲线

2. Packaging 产品包装

2.1 Packaging Specification 包装规格

Package:3500pcs/reel.包装每卷 3500pcs。

2.1.1 Carrier Tape Dimension 载带尺

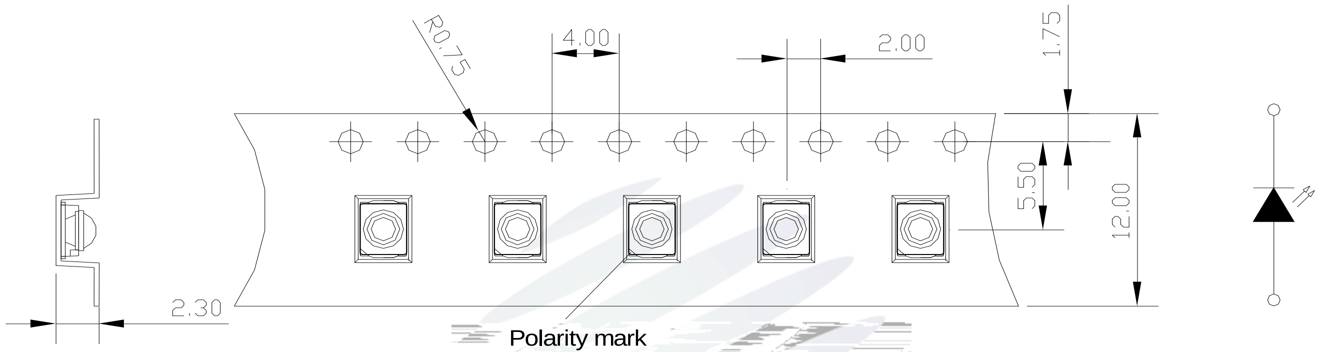

Fig.2-1 Carrier Tape Dimension 载带尺寸

2.1.2 Reel Dimension 卷盘尺寸

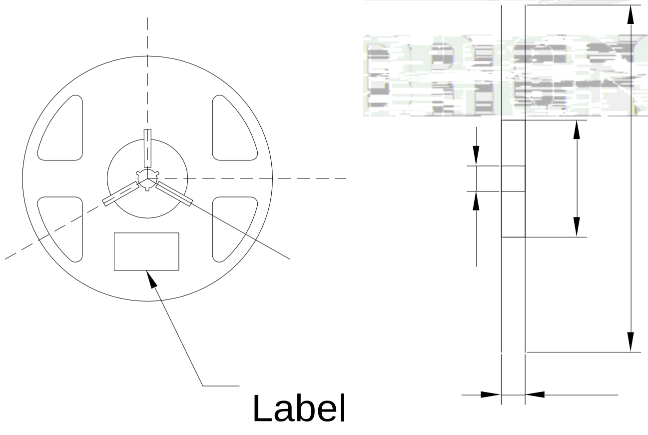

Fig.2-2Reel Dimension 卷盘

Table 2-1 Dimension 尺寸

A	12.7±0.3mm
B	330.2±2mm
C	79.5±1mm
D	14.3±0.2mm

Notes 备注：

The tolerances unless mentioned ±0.1mm. Unit : mm 注：未注公差为±0.1毫米，尺寸单位：毫米。

2.4 Reliability Test Items And Conditions 信赖性测试项目及条件

Table 2-3 Reliability Test Items And Conditions 信赖性测试项目及条件

Test Items 项目	Ref.Standard 参考标准	Test Condition 测试条件	Time 时间	Quantity 数量	Ac/Re 接收/拒收
Reflow 回流焊	JESD22-B106	Temp:260℃max T=10 sec	3times.	10pcs	0/1
Temperature Cycle 温度循环	JESD22-A104	100°C 30 min. -40°C 30 min.	100 cycles	10Pcs.	0/1
Thermal Shock 冷热冲击	JESD22-A104	-40℃ 15min 10s 100℃ 15min	300 cycles	10pcs.	0/1
High Temperature Storage 高温保存	JESD22-A103	Temp:100℃	1000hrs.	10pcs	0/1
Low Temperature Storage 低温保存	JESD22-A119	Temp:-40℃	1000hrs.	10pcs.	0/1
Life Test 常温通电	JESD22-A108	Ta=25℃ I_F=100mA	1000hrs.	10pcs.	0/1

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2.5 Criteria For Judging Damage 失效判定标准

Table Criteria For Judging Damage 失效判定标准

Test Items 项目	Symbol 符号	Test Condition 测试条件	Criteria For Judgement 判定标准	
			Min. 最小	Max. 最大
Forward Voltage 正向电压	V_F	I_F=100mA	-	U.S.L*)x1.1
Reverse Current 反向电流	I_R	V_R = 5V	-	U.S.L*)x2.0
Total radiant flux 辐射功率	e	I_F=100mA	L.S.L*)x0.7	-

Notes 备注：

1.U.S.L: Upper standard level 规格上限 L.S.L: Lower standard level 规格下限

2. The above reliability tests is based on the verification of a single/strip LED of Refond's 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. 以上可靠性测试是基于瑞丰现有实验平台单颗/条 LED 在良好散热条件验证下的结果。客户端将 LED 应用于串、并联线路时，需自行评估电流、电压分配、散热等问题。

3.The technical information shown in the data sheets are 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. 以上技术数据仅为产品的典型值，只作为参考，不作为任何应用条件及应用方式的保证。

3. SMT Reflow Soldering Instructions SMT 回流焊说明

3.1 SMT Reflow Soldering Instructions SMT 回流焊说明

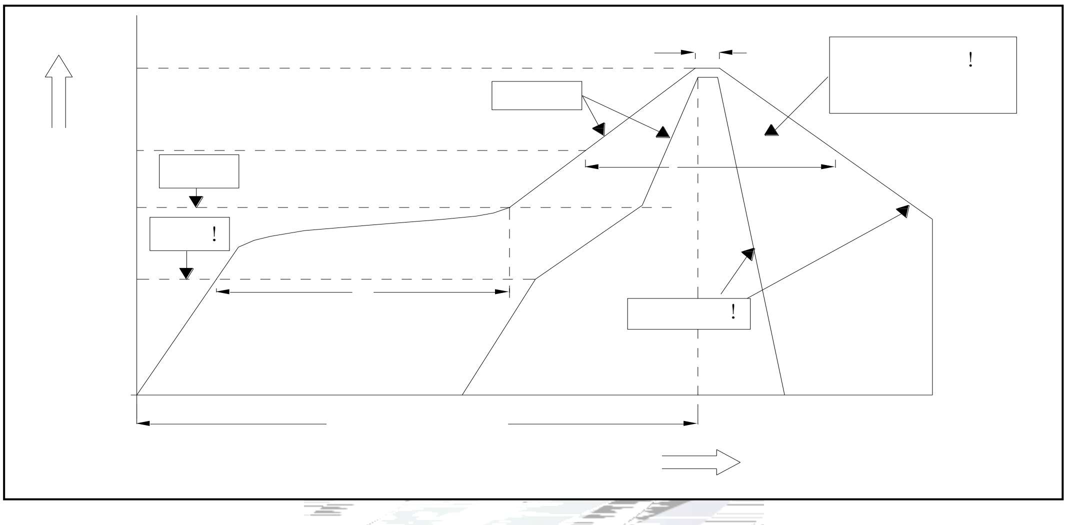

Fig.3-1 SMT Reflow Soldering Instructions SMT 回流焊说明

Table 3-1　Parameter 参数

Average temperature rise speed平均升温速度（Tsmax 至 T_P）	最高3 °C/秒 Max 3 °C/ s
Preheating: minimum temperature预热：最低温度 (Tsmin)	160°C
Preheating: Max temperature预热：最高温度 (Tsmax)	180°C
Preheating: Time预热：时间（Tsmin 至 Tsmax）	60 - 120秒 60s-120s
Time limited to maintain high temperature: the temperature限时维持高温：温度(T_L)	200 °C
Time limited to maintain high temperature: The Time 限时维持高温：时间 (t_L)	最多60秒 Max 60s
Peak /Classification of temperature:峰值 / 分类温度 (T_P)	220°C
Time limit classification of peak temperature time限时峰值分类温度：时间（t_P）	最多5秒 Max 5s
Hold time within 5 °C with the actual peak temperature (TP) 与实际峰值温度 (T_P) 相差 5 °C 以内的保持时间	最多30秒 Max 30s
Cooling speed 降温速度	最高6 °C/秒 Max 6 °C/ s
Needed time from 25 °C to Tp 25 °C 升至峰值温度所需时间	最多8分钟 Max 8 minutes

4. Handling Precautions 产品使用注意事项

4.1 Handling Precautions 产品使用注意事项

(1) LED operating environment and sulfur element composition cannot be over 100PPM in the LED mating usage material. This is provided for informational purposes only and is not a warranty or endorsement.LED 工作环境及与 LED 适配的材料中硫元素及化合物成分不可超过100PPM.这只是一个建议，不作任何品质担保。

(2) In order to prevent ex- ternal material from getting into the inside of LED, which may cause the malfunction of LED, the single content of Bromine element is required to be less than 900PPM, the single content of Chlorine element is required to be less than 900PPM,the total content of Bromine element and Chlorine element in the external materials of the application products is required to be less than 1500PPM. This is provided for informational purposes only and is

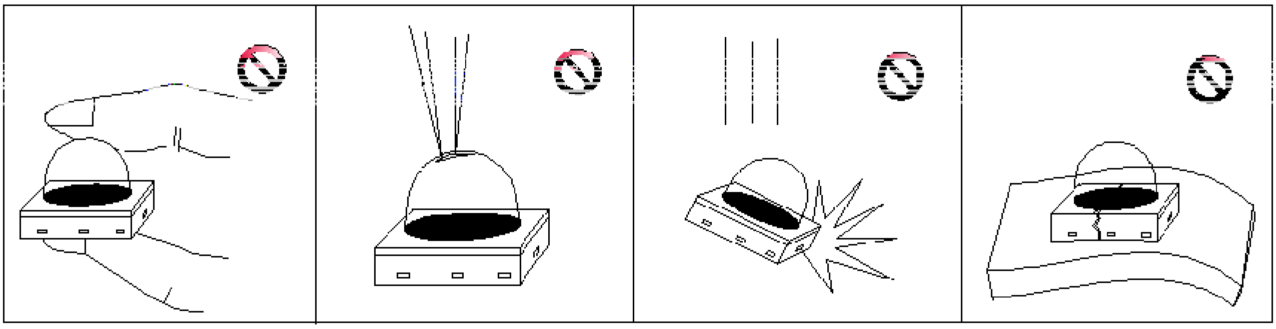

Fig 4-1

(5) In designing a circuit,the current through each LED can not be 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. 设计电路时，通过 LED 的电流不能超过规定的最大值，同时，还需使用保护电阻，否则，微小[illegible] 电路设计必须保证只有在开启或者关闭的时候出现正向电压的变化，不要施加反压，否则会损坏 LED。

(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 容易因为自身的发热和环境的温度改变而改变，温度升高会降低 LED 发光效率，影响发光颜色，所以在设计时应充分考虑散热问题。

Table 4-1 Storage 储存

Conditions 种类		Temperature 温度	Humidity 湿度	Time 时间
Storage	Before Opening Aluminum Bag 拆包前	30℃	≤75%	Within 1 Year From Date 一年内
	After Opening Aluminum Bag 拆包后	≤30℃	60%	48hours 48小时
Baking 烘烤		60±5℃		≥24hours 大于24小时

(7) 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（60±5）℃ for above 24 hours.如果干燥剂或包装失效，或者产品不符合以上有效储存条件，需拆包后进行烘烤，烘烤条件：60±5℃，大于 24 小时。

If the package is flatulence or damaged,please notify the sales staff to assist.如果包装胀气或者破损，请通知销售人员协助处理。

(8) Similar to most Solid state devices; LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS). 像其他的半导体电子器件一样，LED 对静电过流击穿非常敏感，需要做好防护。

(9) Other points for attention, please refer to our relevant information.

其它注意事项请参照瑞丰相关资料。

Version History/修订历史

Date日期	Revisor修订者	Version版本	Verifier审核	Remarks备注
2019-8-12	刘旭阳	E/0	王华建	新版发行

Declare 申明

This specification is written both in English and in Chinese and the latter is formal.

产品规格书以中英文方式书写，[illegible]。

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