CLOUDUPPER

东莞市亿彩电子科技有限公司

产品规格书

SPECIFICATION

客户名称customer name：	
客户编码Customer No.	
产品类型Product Name ：	反射式光电开关
产品型号 Part No.：	TCRT5000
版本 Version：	V1.2
发布日期 Date:	2022-3-25

客户承认 APPROVED BY CUSTOMER			亿彩承认 APPROVED BY CLOUDUPPER		
确认意见 COMMENTS	审核 CHECKED BY	批准 APPROVED BY	编写 PREPARED BY	审核 CHECKED BY	批准 APPROVED BY
			丁煜城	钟永成	田勇
判定: Judge outcome:			判定: Judge outcome:		OK

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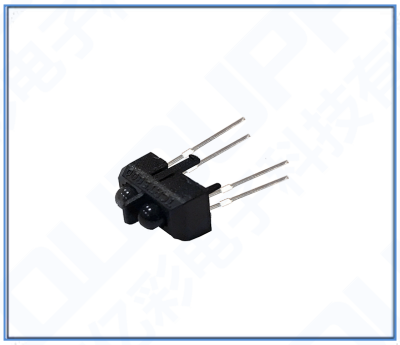
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反射式光电开关
Optical Senor Reflective

TCRT5000



*特性 Feature

·快速响应时间Fast response time
·高灵敏度 High sensitivity
·可见光截止波长 λp =940nm Cut-off visible wavelength λp=940nm
·该产品本身将保持符合RoHS标准的版本。
·This product itself will remain within a RoHS-compliant version

*描述 Description

·TCRT5000由一个红外发光二极管和一个硅光敏晶体管组成，两者并排安装于汇聚光轴上，并封装在黑色热塑性外壳内：
· The TCRT5000 consists of an infrared emitting diode and a silicon phototransistor, encased side by -side on a converging optical axis in a black thermoplastic housing,
·该光敏晶体管仅接收来自红外LED的辐射，此为正常工作状态。
·The phototransistor receives radiation from the IR LED only.This is the normal situation.
·但当无物体位于顶部遮挡反光时，光敏晶体管无法接收辐射。
·However, when no object is present at the top to block the reflection, the phototransistor cannot receive the radiation.
·如需获取更多组件信息，请参阅IR和PT。
·For additional component information,please refer to IR and PT

*应用 Application

·电机控制Motor control
·位置编码器Position encoder
·打印机、非接触开关 Printer 、Non-contact Switching
·物体存在或运动的通用检测General detection of object presence or motion
·自动售票机Automatic ticket vending machine
·智能电子产品 Intelligent Electronic Products
·工业机械设备 Industrial Intelligent Equipment
·安防防护应用 Safety Application Products

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反射式光电开关
Optical Senor Reflective

TCRT5000

*最大额定值 Absolute Maximum Ratings

测试项目 Parameter（Ta=25℃）		符合 Symbol	范围 Ratings	单位 Unit
输入端发射极 Input Emitter	功率 Power Dissipation *1	Pd	75	mW
	反向电压 Reverse Voltage	V_R	5	V
	持续正向电流 Forward Current	I_F	50	mA
	脉冲正向电流 Peak Forward Current *2	I_{FP}	1	A
输出端接收极 Output Detector	功率 Power Dissipation *1	Pd	75	mW
	集电极－发射极电压 Collector-Emitter Voltage	V_{CEO}	30	V
	发射极－集电极电压 Emitter-Collector Voltage	V_{ECO}	5	V
	集电极电流 Collector Current	$I_{C(ON)}$	20	mA
工作温度 Operating Temperature		Topr	-25~+85	℃
储存温度 Storage Temperature		Tstg	-40~+85	℃
焊接温度 Lead Soldering Temperature*3		Tsol	260	℃

*1、 在 25 摄氏度的环境中测试 below 25 Free Air Temperature

*2、脉宽小于等于 100us， 占空比 1% Pulse width≦100μs,Duty cycle= 1%

*3、离胶体 2mm 以上焊接 5s 内 2mm form body for 5 seconds

*光电特性 Electro-Optical Characteristics

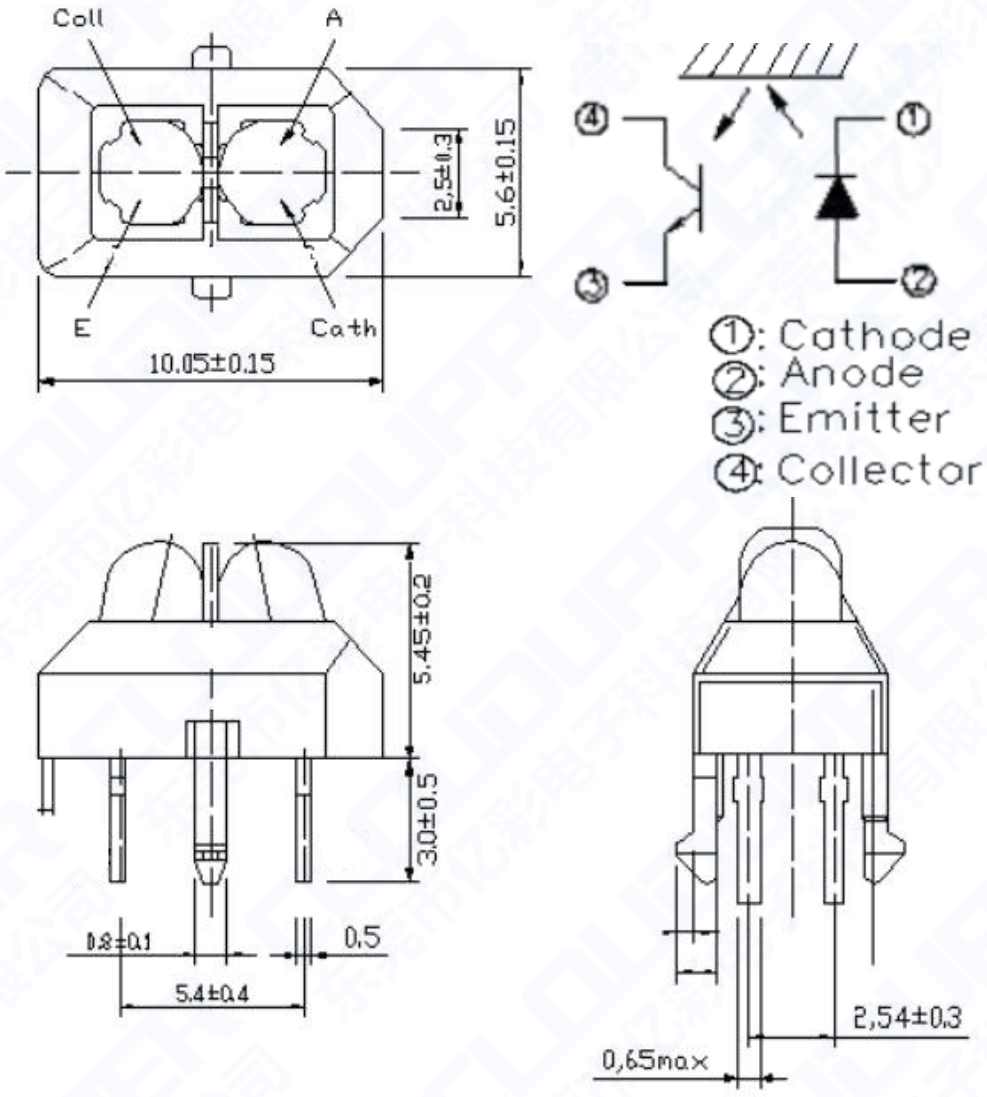
电性参数（温度=25℃） Parameter（Ta=25℃）		符号 Symbol	条件 Condition	最小值 Min.	典型值 Typ.	最大值 Max.	单位 Units
输入端 Input	正向电压 Forward Voltage	V_F	I_F=20mA	--	1.2	1.6	V
			IF=100mA*2	--	1.4	1.85	
			IF=1A *2	--	2.6	4.0	
	峰值波长 Peak Wavelength	λp	I_F=20mA	--	940	--	nm
	反向电流 Reverse Current	I_R	V_R=5V	--	--	10	μA
输出端 Output	暗电流 Dark Current	I_{CEO}	Ee=0mW/cm² V_{CE}=20V	--	--	100	nA
	集电极－发射极的工作电压C-E Saturation Voltage	$V_{CE(SAT)}$	I_C=2mA Ee=1mW/cm²	--	--	0.4	V
转换特性 Transfer Characteristics	上升时间 Rise Time	t_r	V_{CE}=5V I_C= 1mA R_L= 1000Ω	--	15	--	μS
	下降时间 Fall Time	t_f		--	15	--	
	光电流 Collector Current	$I_{C(ON)}$	IF=20mA V_{CE}=5V	0.2	--	--	mA

*2、脉宽小于等于 100us， 占空比 1% Pulse width≦100μs,Duty cycle= 1%

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*产品尺寸 Package Dimension



备注Notes:

一所有尺寸为毫米标识

All dimensions are in millimeters

一未标识尺寸正负公差为 0.3mm

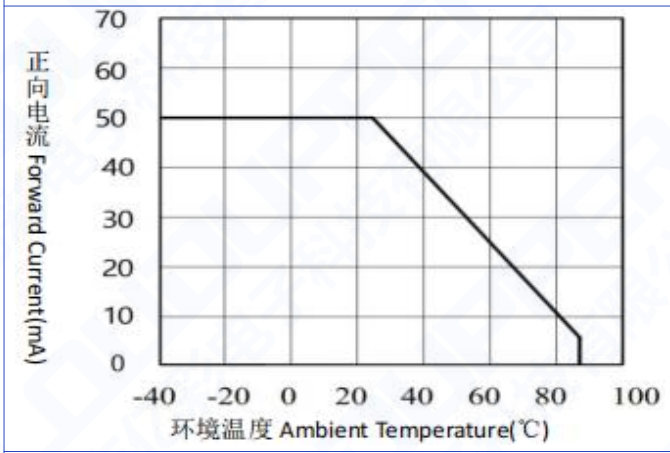
Tolerances: unless dimensions ±0.3mm

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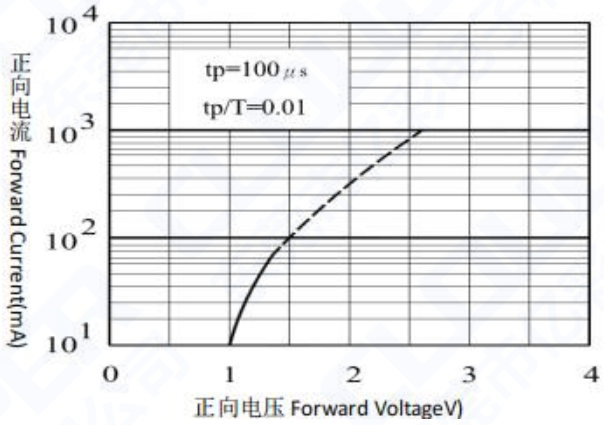
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*发射管特性曲线图 Typical Electro-Optical Characteristics Curves-IR

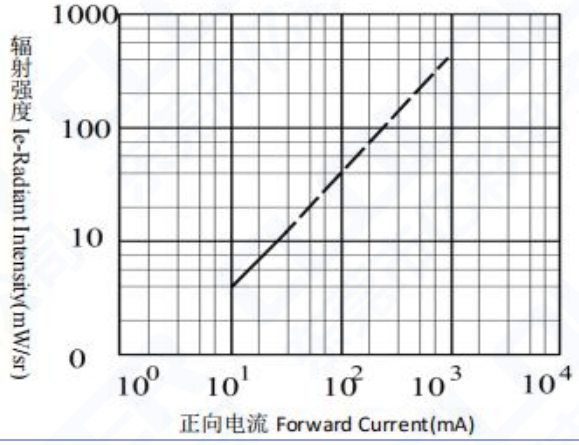
正向电流与环境温度的关系
ForwardCurrentvs.AmbientTemperature



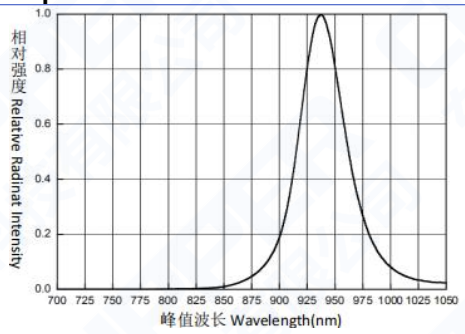
正向电流与正向电压的关系
Forward Current vs. Forward Voltage



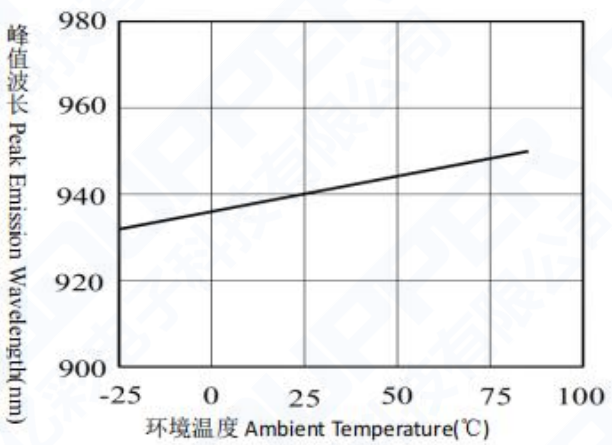
辐射强度与正向电流的关系
RadiantIntensityvs.ForwardCurrent



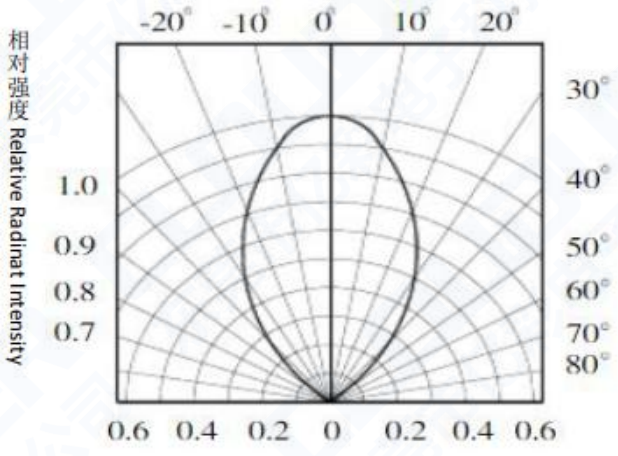
波长曲线图
SpectralDistribution



峰值波长与环境温度的关系
Peak Emission Wavelength vs. Ambient Temperature



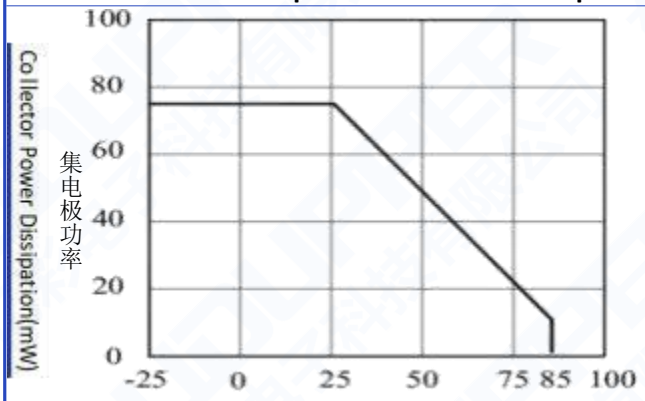
相对辐射强度与角位移的关系
Relative Radiant Intensity vs. Angular Displacement



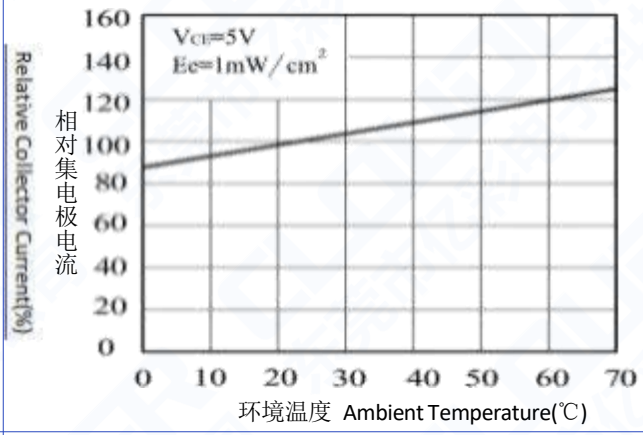
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*接收管特性曲线图 Typical Electro-Optical Characteristics Curves- PT

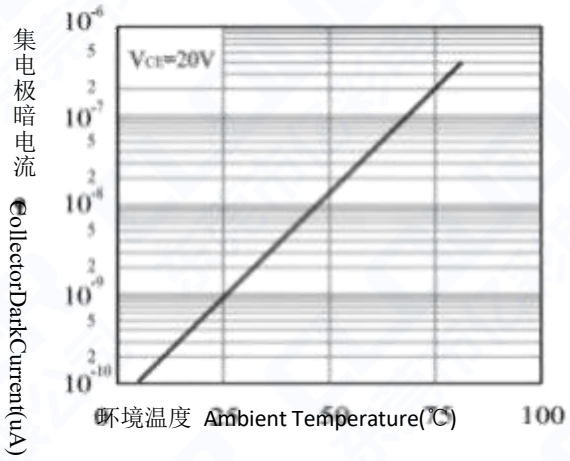
集电极功率与环境温度的关系
Collector Power Dissipation vs. Ambient Temperature



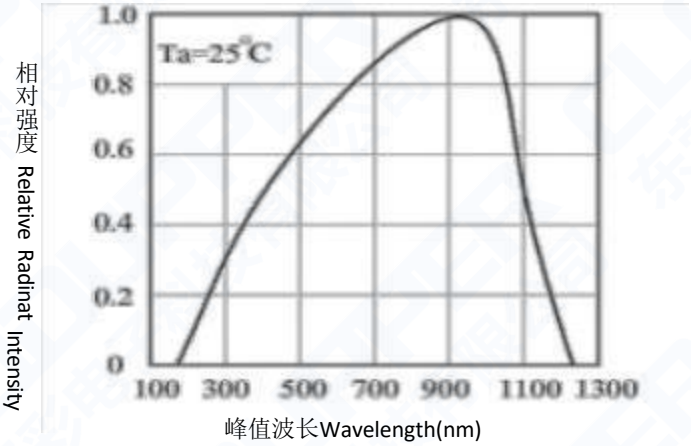
相对集电极电流与环境温度的关系
Relative Collector Current vs. Ambient Temperature



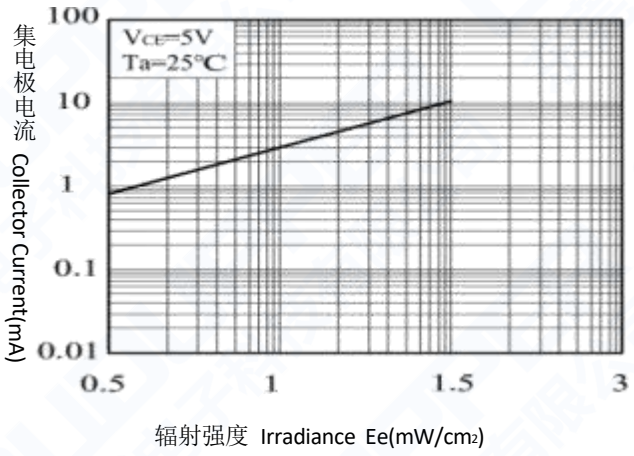
集电极暗电流与环境温度的关系
Collector Dark Current vs. Ambient Temperature



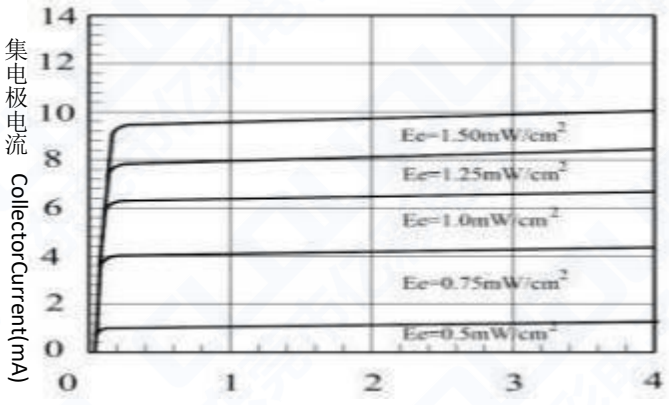
感应波长曲线图
Spectral Sensitivity



集电极电流与辐射强度的关系
Collector Current vs. Irradiance



集电极电流与集电极 - 发射极电压的关系
CollectorCurrentvs.Collector-EmitterVoltage

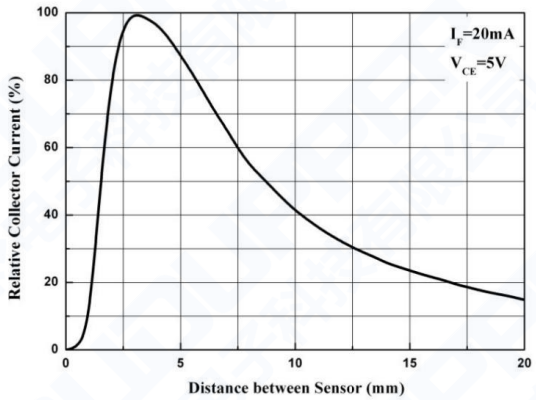


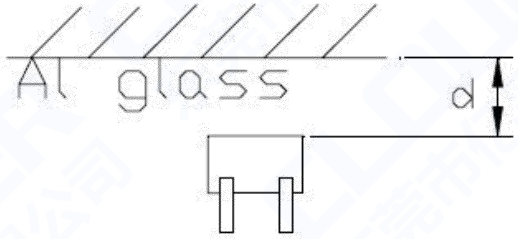
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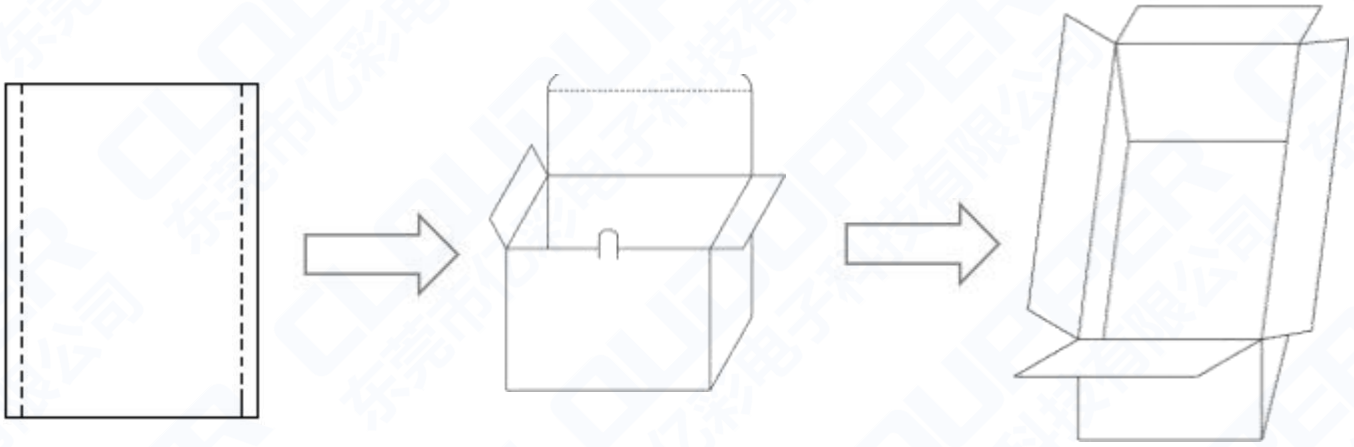
*光电开关特性曲线图 Typical Electro-Optical Characteristics Curves- ITR

光电流与感应距离之间的关系 Relative Collector Current vs DIistance Between Sensor





*包装规格 Packing Specification



包装方式	包装	内盒	外箱
袋装	250 PCS/ 包	4 包/内盒	10 内盒/外箱

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*注意事项 Note

--成型（Lead Forming）

1. 在引线框架弯曲过程中，引线框架应在环氧树脂底部3毫米以外的位置进行弯曲。

1. During lead frame bending, the lead frame should be bent at a distance more than 3mm from bottom of the epoxy.

注意：弯曲前必须固定引线框架且勿触碰环氧树脂层，以避免光电开关损坏。

Note: Must fix lead frame and do not touch epoxy before bending to avoid Optical Senor breakage.

2. 引线成型应在焊接之前完成。

2. Lead forming should be done before soldering.

3. 在引线成型过程中应避免对光电开关封装施加应力。对基座施加的应力可能损害光电开关的性能特性，甚至导致其损坏。

3. Avoid stressing the Optical Senor package during leads forming. The stress to the base may damage the characteristics of Optical Senor, or it may break the Optical Senor.

4. 应在室温下切割光电开关引线框架。在高温条件下切割引线框架可能导致光电开关失效。

4. Cut the Optical Senor lead frame at room temperature. Cutting the lead frame at high temperatures may cause failure of the Optical Senor.

5. 将光电开关安装到PCB上时，PCB上的孔位必须与光电开关引脚位置精确对齐。若光电开关在安装时引脚处承受应力，会导致环氧树脂劣化，从而影响光电开关的性能。

5. When mounting the Optical Senor onto a PCB, the PCB holes must be aligned exactly with the lead position of the Optical Senor. If the Photo Interrupter are mounted with stress at the leads, it causes deterioration of the epoxy resin and this will degrade the Optical Senor.

--存储（Storage）

1. 光电开关自亿彩电子公司发货后，应储存于10~30℃、相对湿度70%或更低的环境中，保存期限为3个月。若需储存3个月及以上，则可置于10℃~25℃、20%RH~60%RH条件下，使用氮气环境密封容器中存放一年。开箱后必须立即存放在上述相同条件（10℃~25℃、20%RH~60%RH）下，并建议在24小时内或尽快使用；同时请将剩余设备尽快密封回包装袋内。

1. The Optical Senor should be stored at 10~30℃ and 70%RH or less after being shipped from CLOUDUPPER, with a storage life of 3 months. If stored for 3 months or more, it can be stored at 10℃~25℃ and 20%RH~60%RH for one year in a sealed container with a nitrogen atmosphere. After opening the package, the devices must be stored at 10℃~25℃ and 20%RH~60%RH, and it is recommended to use them within 24 hours or as soon as possible. In addition, please seal the remaining devices back into the packaging bag as soon as possible.

2. 请避免环境温度的急剧变化，尤其在可能发生冷凝的高湿度环境中。

2. Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

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---焊接（Soldering）

1. 焊接时需格外注意：焊接部位与环氧树脂球体之间应保持超过3毫米的距离；建议将焊点延伸至连接杆底部以外。

1. Careful attention should be paid during soldering. When soldering, leave more than 3mm from the solder joint to the epoxy bulb, and soldering beyond the base of the tie bar is recommended.

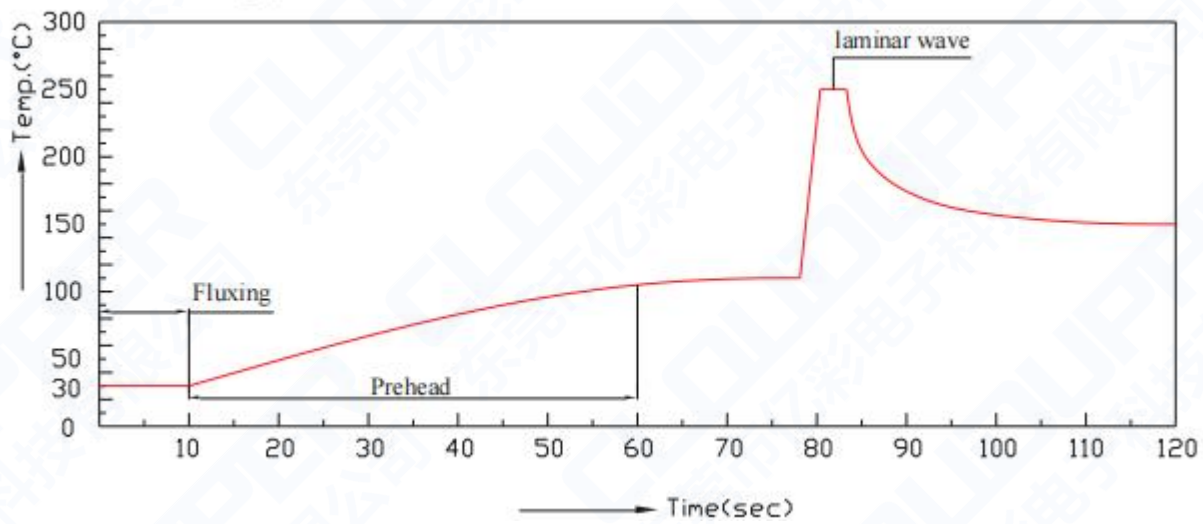
2. 推荐焊接条件：

2. Recommended soldering conditions:

Hand Soldering 手焊		DIP Soldering 波峰焊	
Temp.at tip of iron 铁尖端温度	300℃ Max.(30W Max.) 最高温度：300℃（最大功率：30W）	Preheat temp. 预热温度。	100° C Max.(60 sec Max.) 最高温度：100°C（最长加热时间：60秒）
Soldering time 焊接时间	3 sec Max. 最长 3 秒。	Bath temp.&time 浸泡温度与时间	260 Max.,5 sec Max 260 最大值：5秒；最大持续时间
Distance 距离	3mm Min.(From solder joint to epoxy bulb) 最小厚度为 3 mm（从焊点到环氧树脂球体）	Distance 距离	3mm Min.(From solder joint to epoxy bulb) 最小厚度为 3 mm（从焊点到环氧树脂球体）

3. 推荐焊接曲线：

3. Recommended soldering profile:



4. 在光电开关处于高温状态时（尤其是焊接过程中），应避免对引线框架施加任何应力。

4. Avoid applying any stress to the lead frame while the Optical Senor is at high temperature, particularly during soldering.

5. 浸渍焊和手工焊接操作不应超过一次。

5. Dip and hand soldering should not be done more than once.

6. 完成光电开关的焊接后，应将环氧树脂灯泡置于免受机械冲击或振动的环境中，直至光电开关恢复至室温。

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6. After soldering the Optical Senor, the epoxy bulb should be protected from mechanical shock or vibration until the Photo Interrupter returns to room temperature.

7. 不建议采用快速冷却过程来使光电开关从峰值温度降至正常温度。

7. A rapid-rate cooling process is not recommended for bringing the Optical Senor down from peak temperature to normal temperature.

8. 尽管推荐的焊接条件已在上表中明确列出，但对于光电开关而言，在尽可能低的温度下进行浸焊或手工焊接更为理想。

8. Although the recommended soldering conditions are specified in the above table, dip or hand soldering at the lowest possible temperature is desirable for the Optical Senor.

9. 波峰焊接参数必须根据推荐的焊接温度和停留时间进行设置并保持。

9. Wave soldering parameters must be set and maintained according to the recommended temperature and dwell time in the solder wave.

--清洁（Cleaning）

1、溶剂温度应在45。C或以下。浸泡时间应在3分钟或以下。Solventtemperatureshouldbe45。Cor below.Immersiontimeshouldbe3minutesorless.

2、不执行超声波清洗。Donotexecuteultrasoniccleaning.

3、推荐溶剂材料：乙醇、甲醇和异丙醇Recommendedsolventmaterials:Ethylalcohol,Methylalcoholand Isopropylalcohol.

--热管理（Heat Management）

1. 在光电开关应用的设计阶段，必须充分考虑其热管理问题。应参照各产品规格书中提供的降额曲线对电流进行适当降额处理。

1.Heat management of Optical Senor must be taken into consideration during the design stage of Photo Interrupter application.The current should be de-rated appropriately by referring to the de-rating curve found in each product specification.

2. 应用过程中需对光电开关周围的温度进行控制。

2.The temperature surrounding the Optical Senor in the application should be controlled.

--其他 （Other）

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