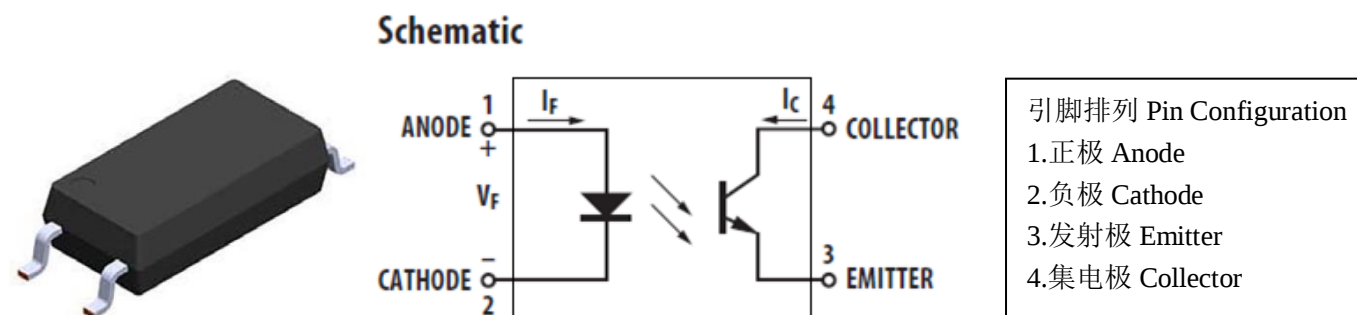


## 一、概述 Description

**SL1018** 产品由一个红外发光二极管和一个光电晶体管组成；光耦器件可实现不同电路之间的电气隔离和信号传输，产品广泛应用于电源设备上，例如手机充电器，家电产品电源供应器等。

**SL1018** photocoupler consist of an infrared light-emitting diode and a phototransistor. The devices can realize electrical isolation and signal transmission between different circuits, The products are widely used in power supply equipment, such as mobile phone charger, home appliance product power supply device, etc.



## 二、特性 Features

✧ 电流转换比(CTR: 130% -260% @ $I_F=5\text{mA}$ ,  $V_{CE}=5\text{V}$ )

Current transfer ratio (CTR: 130% -260% @ $I_F=5\text{mA}$ ,  $V_{CE}=5\text{V}$ )

✧ 输入-输出隔离电压: ( $V_{ISO}=5,000V_{rms}$ )

High isolation voltage between input and output( $V_{ISO}=5,000V_{rms}$ )

✧ 爬电距离>8mm

Creepage distance > 8mm

✧ 工作温度最高可达+ 110℃

Operating temperature up to +110 ℃

✧ 集电极-发射极击穿电压  $BV_{CEO} \geq 80\text{V}$

Collector-Emitter voltage  $BV_{CEO} \geq 80\text{V}$

✧ 产品符合RoHS、REACH及HF等环保法规要求；

The products comply with RoHS, REACH and HF;

### 三、电性参数 Electrical Characteristics

◇最大绝对额定值 (常温=25℃)

Absolute Maximum Ratings (Temperature=25 °C)

| 参数名称<br>Parameter                   |                                        | 符号<br>Symbol | 数值<br>Rating | 单位<br>Unit |
|-------------------------------------|----------------------------------------|--------------|--------------|------------|
| 输入<br>Input                         | 正向电流<br>Forward Current                | $I_F$        | 50           | mA         |
|                                     | 反向电压<br>Reverse Voltage                | $V_R$        | 6            | V          |
|                                     | 功耗<br>Power Dissipation                | $P_D$        | 90           | mW         |
| 输出<br>Output                        | 集电极-发射极电压<br>Collector-Emitter voltage | $V_{CEO}$    | 80           | V          |
|                                     | 发射极-集电极电压<br>Emitter-Collector voltage | $V_{ECO}$    | 6            |            |
|                                     | 集电极电流<br>Collector current             | $I_C$        | 50           | mA         |
|                                     | 功耗<br>Power Dissipation                | $P_C$        | 180          | mW         |
| 总功率消耗<br>Total Power Dissipation    |                                        | $P_{tot}$    | 270          | mW         |
| *1 隔离电压<br>*1 Isolation Voltage     |                                        | $V_{iso}$    | 5,000        | Vrms       |
| 工作温度<br>Operating Temperature       |                                        | $T_{opr}$    | -55 to + 110 | ℃          |
| 存贮温度<br>Storage Temperature         |                                        | $T_{stg}$    | -55 to + 125 |            |
| *2 焊锡温度<br>*2 Soldering Temperature |                                        | $T_{sol}$    | 260          |            |

\* 注:

\*1.交流测试, 时间 1 分钟, 湿度. =40~60%;

\*1.AC For 1 Minute, R.H. = 40 ~ 60%;

隔离电压测试的方法如下:

Isolation voltage shall be measured using the following method:

(1) 将产品的两端短路;

(1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side;

(2) 测试隔离电压时无电流通过;

(2) The isolation voltage tester with zero-cross circuit shall be used;

(3) 测试时加正弦波形电压。

(3) The waveform of applied voltage shall be a sine wave.

\*2.锡焊时间为 10 秒

\*2. Soldering time is 10 seconds

◇ 电性参数 (温度=25℃):

**Electrical Characteristics (Temperature=25 ℃)**

| 参数名称<br>Parameter                  |                                                     | 符号<br>Symbol  | 条件<br>Condition                                                    | 最小值<br>Min.        | 典型值<br>Typ. | 最大值<br>Max. | 单位<br>Unit    |
|------------------------------------|-----------------------------------------------------|---------------|--------------------------------------------------------------------|--------------------|-------------|-------------|---------------|
| 输入<br>Input                        | 正向电压<br>Forward Voltage                             | $V_F$         | $I_F=50\text{mA}$                                                  | ---                | 1.35        | 1.6         | V             |
|                                    | 反向电流<br>Reverse Current                             | $I_R$         | $V_R=4\text{V}$                                                    | ---                | ---         | 10          | $\mu\text{A}$ |
|                                    | 终端电容<br>Terminal Capacitance                        | $C_t$         | $V=0, f=1\text{MHz}$                                               | ---                | 30          | 250         | pF            |
| 输出<br>Output                       | 集电极暗电流<br>Collector dark current                    | $I_{CEO}$     | $V_{CE}=20\text{V}, I_F=0$                                         | ---                | ---         | 100         | nA            |
|                                    | 集电极-发射极击穿电压<br>Collector-Emitter breakdown voltage  | $BV_{CEO}$    | $I_C=0.1\text{mA}$<br>$I_F=0$                                      | 80                 | ---         | ---         | V             |
|                                    | 发射极-集电极击穿电压<br>Emitter-Collector breakdown voltage  | $BV_{ECO}$    | $I_E=0.1\text{mA}$<br>$I_F=0$                                      | 6                  | ---         | ---         | V             |
| 传输特性<br>transfer<br>characteristic | 集电极电流<br>Collector Current                          | $I_C$         | $I_F=5\text{mA}$<br>$V_{CE}=5\text{V}$                             | 2.5                | ---         | 30          | mA            |
|                                    | *1 电流传输比<br>*1 Current Transfer Ratio               | CTR           |                                                                    | 50                 | ---         | 600         | %             |
|                                    | 集电极-发射极饱和电压<br>Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F=20\text{mA}$<br>$I_C=1\text{mA}$                              | ---                | 0.1         | 0.2         | V             |
|                                    | 绝缘电阻<br>Isolation resistance                        | $R_{iso}$     | DC500V<br>40~60%R.H.                                               | $5 \times 10^{10}$ | ---         | ---         | $\Omega$      |
|                                    | 隔离电容<br>Floating Capacitance                        | $C_f$         | $V=0, f=1\text{MHz}$                                               | ---                | 0.6         | 1           | pF            |
|                                    | 转换频率<br>Cut-off Frequency                           | $f_c$         | $V_{CE}=5\text{V}, I_C=2\text{mA}$<br>$R_L=100\Omega, -3\text{dB}$ | ---                | 80          | ---         | kHz           |
|                                    | 上升时间<br>Rise time                                   | $t_r$         | $V_{CE}=2\text{V}, I_C=2\text{mA}$<br>$R_L=100\Omega$              | ---                | 4           | 18          | $\mu\text{s}$ |
|                                    | 下降时间<br>Fall time                                   | $t_f$         |                                                                    | ---                | 3           | 18          | $\mu\text{s}$ |

注: \*1 电流传输比=  $I_C / I_F \times 100\%$ , 公差  $\pm 3\%$ 。

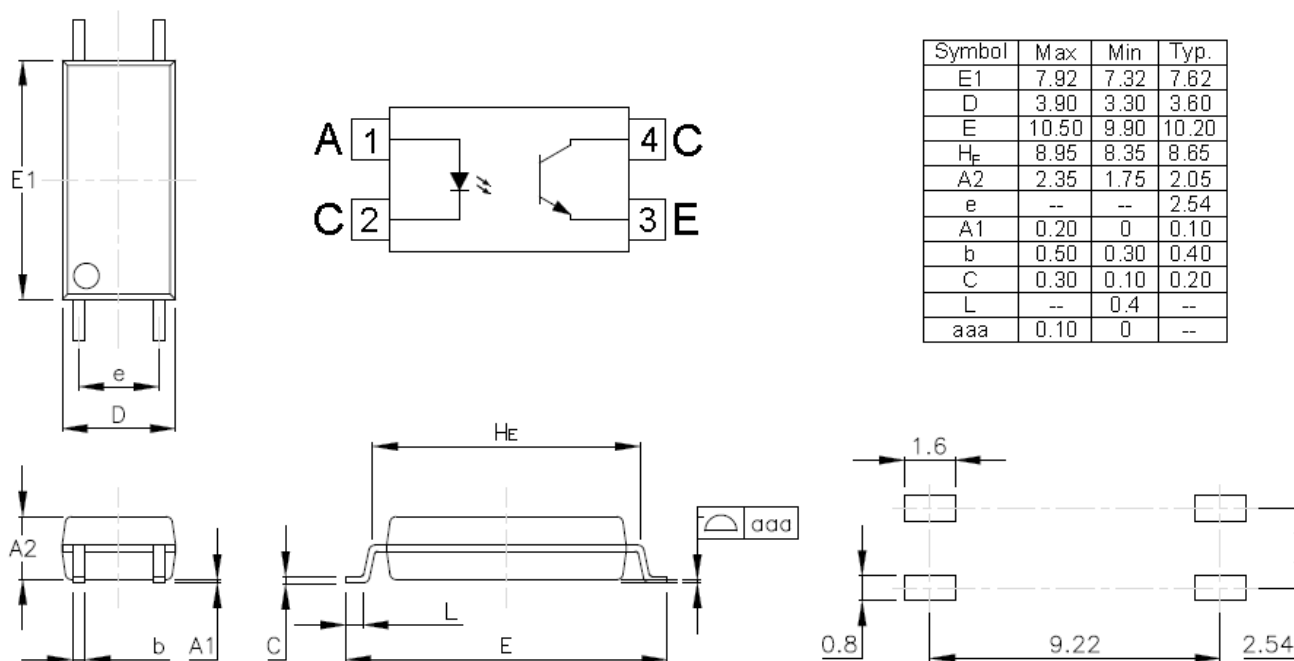
\*1 Current Transfer Ratio =  $I_C / I_F \times 100\%$ , Tolerance:  $\pm 3\%$ .

◇ 电流传输比等级表(温度=25℃):

**Rank Table of Current Transfer Ratio(Temperature=25 ℃)**

| CTR 等级 CTR Rank | 最小.Min (%) | 最大.Max (%) | 条件 Condition                       |
|-----------------|------------|------------|------------------------------------|
| SL1018          | 130        | 260        | $I_F=5\text{mA}, V_{CE}=5\text{V}$ |

#### 四、外形尺寸（单位：mm）Package Dimension (Unit: mm)



## 五、特性曲线 Characteristics Curves

图1.正向电流VS正向电压

Figure1. Forward Current vs. Forward Voltage

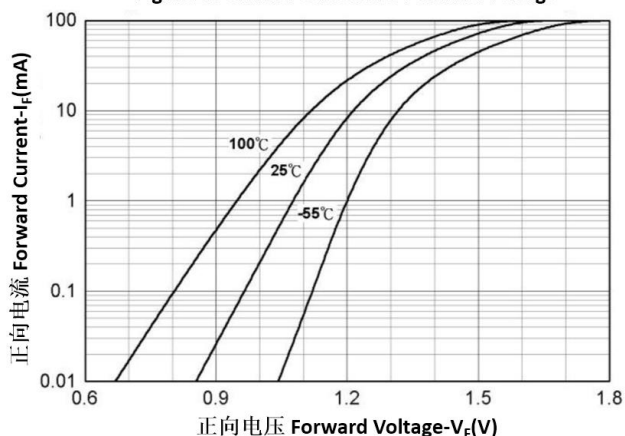


图2.集电极暗电流VS环境温度

Figure2. Collector Dark Current vs. Ambient Temperature

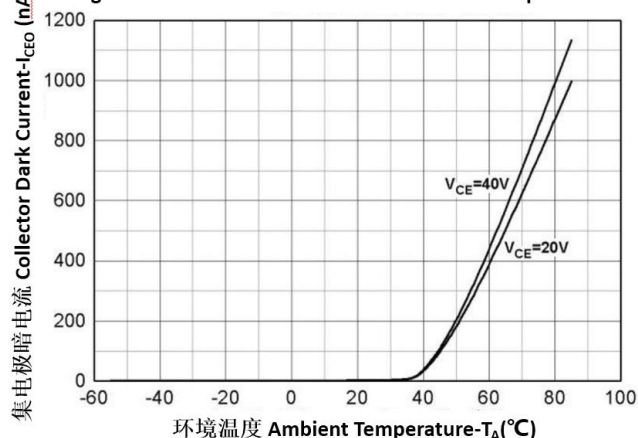


图3.集电极电流VS集电极发射极电压

Figure3. Collector Current vs. Collector Emitter Voltage

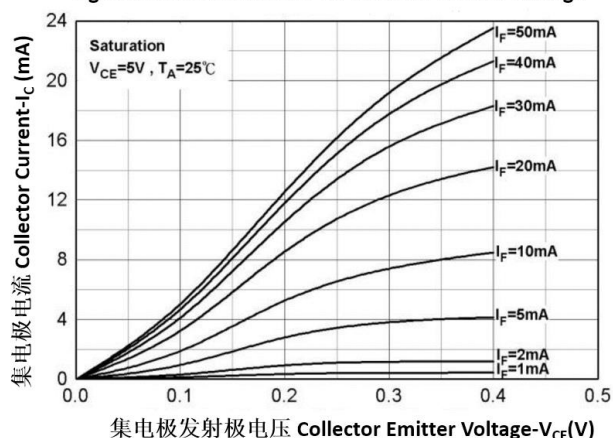


图4.集电极电流VS集电极发射极电压

Figure4. Collector Current vs. Collector Emitter Voltage

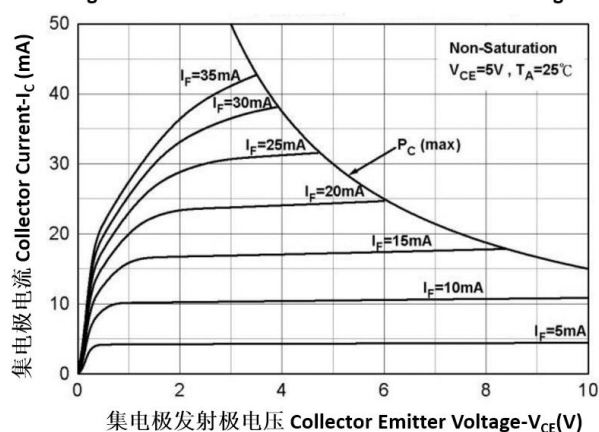


图5.归一化集电极电流VS正向电流

Figure5. Normalized Collector Current vs. Forward Current

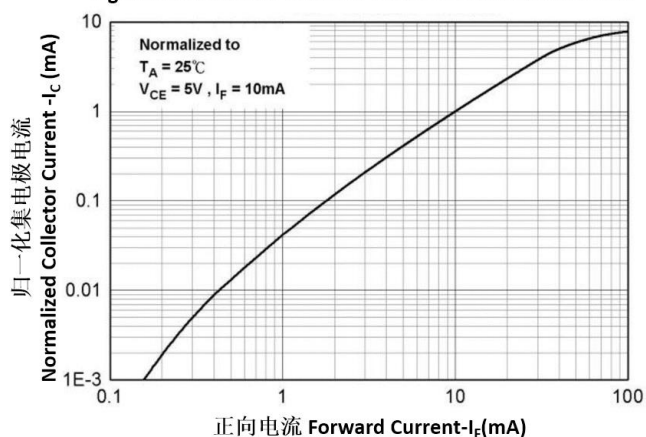


图6.归一化电流传输比VS正向电流

Figure6. Normalized Current Transfer Ratio vs. Forward Current

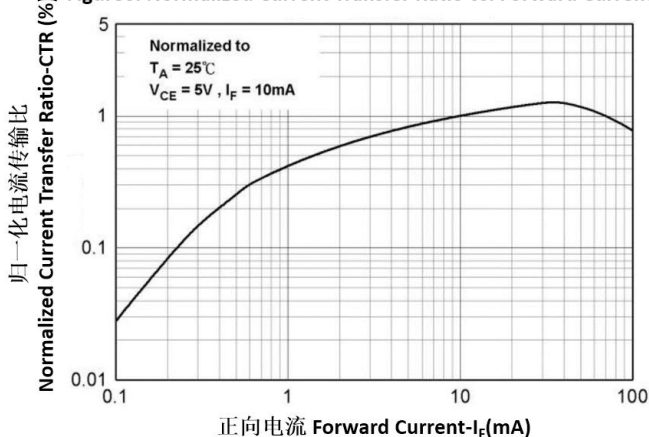


图7.归一化电流传输比VS环境温度

Figure7. Normalized Current Transfer Ratio vs. Ambient Temperature

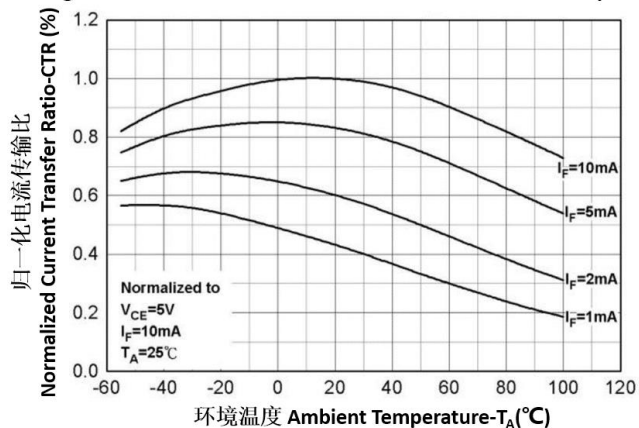


图8.归一化电流传输比VS环境温度

Figure8. Normalized Current Transfer Ratio vs. Ambient Temperature

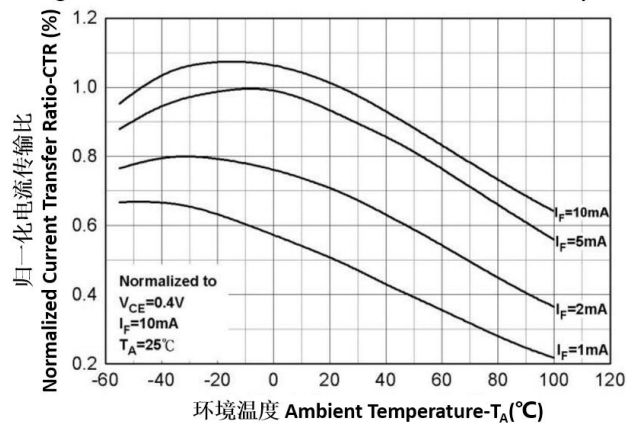


图9.开关时间VS集电极电流

Figure9. Turn on/off Time vs. Collector Current

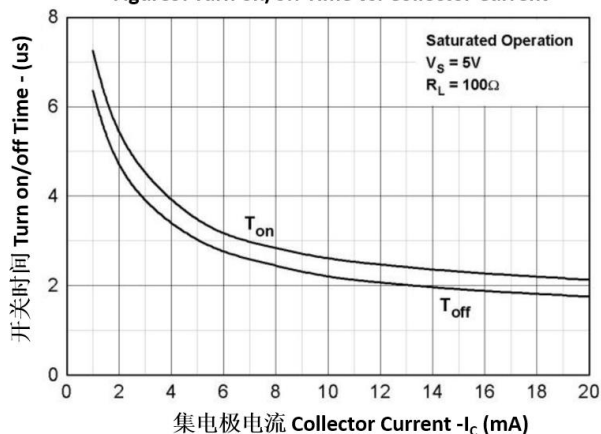


图10.开关时间VS正向电流

Figure10. Turn on/off Time vs. Forward Current

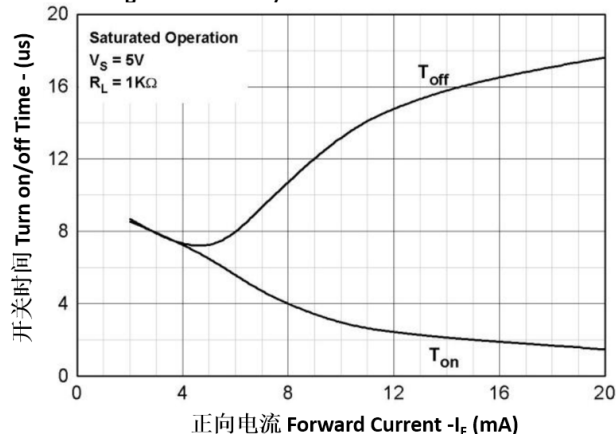
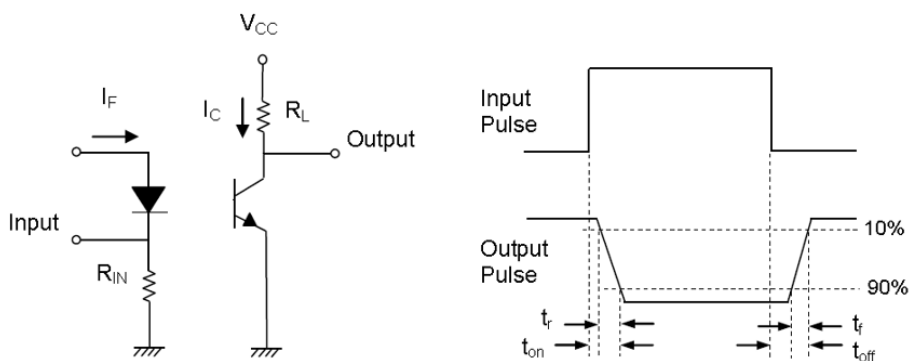


图11.开关时间测试电路和波形

Figure11. Switching Time Test Circuit & Waveforms



## 六、可靠性测试 Reliability Test Items And Conditions

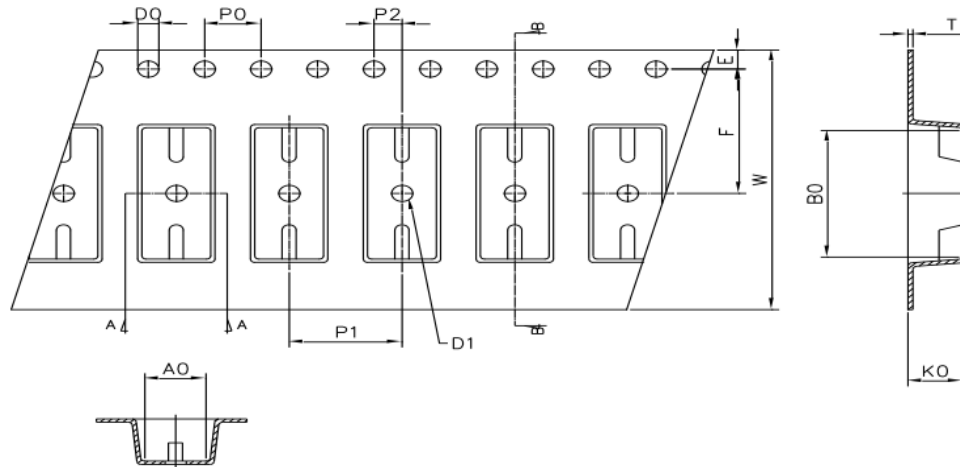
| 实验项目<br>Test Items                                    | 参考标准<br>Reference | 实验条件<br>Test Conditions             | 时间<br>Time             | 样品数<br>Quantity | 判据<br>Criterion |
|-------------------------------------------------------|-------------------|-------------------------------------|------------------------|-----------------|-----------------|
| 可焊性<br>Solderability                                  | JESD22-B102       | Tsol= (245±5) °C, t=5s;             | 1 次<br>1 times         | 22              | 0/22            |
| 耐焊接热<br>Resistance to Soldering Heat                  | JESD22-A106       | Tsol= (260±5) °C, t=10s             | 3 次<br>3 times         | 22              | 0/22            |
| 静电放电<br>ESD-HBM                                       | JESD22-A114       | Ta=25°C, HBM (2000V)                | 正反各 3 次<br>P&N 3 times | 10              | 0/10            |
| 高温贮存<br>High Temperature Storage                      | JESD22-A103       | Ta=125°C                            | 1000h                  | 22              | 0/22            |
| 低温贮存<br>Low Temperature Storage                       | JESD22-A119       | Ta= -55°C                           | 1000h                  | 22              | 0/22            |
| 冷热冲击<br>Thermal Shock                                 | JESD22-A104       | -55°C(15min)←→125°C(15min)          | 循环 300 次<br>300 cycles | 22              | 0/22            |
| 常温寿命试验<br>Lifespan Test                               | JESD22-A108       | Ta=25°C, IF=50mA, VCC=5V            | 1000h                  | 22              | 0/22            |
| 高温寿命试验<br>DC Operating Life                           | JESD22-A108       | Ta=110°C, IF=20mA, VCC=5V           | 1000h                  | 76              | 0/76            |
| 高温高湿偏压<br>High Temperature High Humidity bias Voltage | JESD22-A101       | Ta =85°C, RH=85%<br>IF=0mA, VCE=64V | 1000h                  | 22              | 0/22            |
| 高温偏压<br>High Temperature bias Voltage                 | JESD22-A108       | Ta =110°C, IF=0mA, VCE=80V          | 1000h                  | 22              | 0/22            |
| 高压蒸汽试验<br>High pressure steam test                    | JESD22-A102       | P=15PSIG, 121°C, 100%RH             | 96h                    | 22              | 0/22            |

### 失效判断标准 Criteria For Judging Damage

| 测试项目<br>Test Items                                  | 符号<br>Symbol          | 测试条件<br>Test Conditions                    | 判定标准<br>Criteria For Judging Damage                                          |
|-----------------------------------------------------|-----------------------|--------------------------------------------|------------------------------------------------------------------------------|
| 正向电压<br>Forward Voltage                             | V <sub>F</sub> (V)    | I <sub>F</sub> =20mA                       | 初始值 ±20%<br>Initial Data ±20%                                                |
| 反向电流<br>Reverse Current                             | I <sub>R</sub> (uA)   | V <sub>R</sub> =4V                         | I <sub>R</sub> ≤10μA                                                         |
| 电流传输比<br>Current Transfer Ratio                     | CTR(%)                | I <sub>F</sub> =5mA, V <sub>CE</sub> =5V   | 初始值 ±20%<br>Initial Data ±20%                                                |
| 集电极-发射极饱和电压<br>Collector-Emitter Saturation Voltage | V <sub>CE</sub> (sat) | I <sub>F</sub> =20mA, I <sub>C</sub> =1mA  | V <sub>CE</sub> (sat) ≤0.2V                                                  |
| 集电极-发射极击穿电压<br>Collector-Emitter breakdown voltage  | BV <sub>CEO</sub> (V) | I <sub>C</sub> =0.1mA, I <sub>F</sub> =0mA | BV <sub>CEO</sub> ≥80V&初始值 ±20%<br>BV <sub>CEO</sub> ≥80V& Initial Data ±20% |
| 集电极电流<br>Collector Current                          | I <sub>CEO</sub> (nA) | V <sub>CE</sub> =20V, I <sub>F</sub> =0    | I <sub>CEO</sub> ≤0.1μA                                                      |

## 七、产品包装 Packaging

包装：3000pcs/卷 ( standard packing：3000pcs/reel )



| Dimension No.  | Ao             | Bo             | Do             | D1             | Po             | P1             | P2             | E              | F              | T              | W              | Ko             |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                | +0.10<br>-0.10 | +0.10<br>-0.10 | +0.10<br>-0.00 | +0.10<br>-0.00 | +0.10<br>-0.10 | +0.10<br>-0.10 | +0.10<br>-0.10 | +0.10<br>-0.10 | +0.10<br>-0.10 | +0.05<br>-0.05 | +0.30<br>-0.10 | +0.10<br>-0.10 |
| Dimension (mm) | 5.10           | 10.50          | 1.50           | 1.50           | 4.00           | 8.00           | 2.00           | 1.75           | 7.50           | 0.40           | 16.00          | 4.20           |

## 八、使用注意事项 Precautions for Use

### ✧ 手工焊接条件 Hand soldering Condition

用电烙铁一次性手工性焊接条件:

Hand soldering by soldering iron, One time soldering is recommended:

温度 Temperature:  $380 \pm 5/5$  °C

时间 Time: 3 sec max

### ✧ 回流焊接: Reflow Soldering

在回流焊接升温过程中, 请不要对器件施加任何压力。

Stress on the product should be avoided during heating in soldering process.

在焊接完成后, 待产品温度下降到室温之后, 再进行其他处理。

After soldering, do not deal with the product before its temperature drop down to room temperature.

