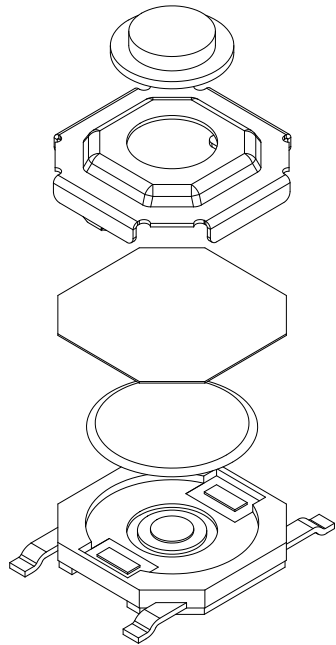
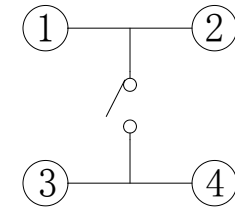
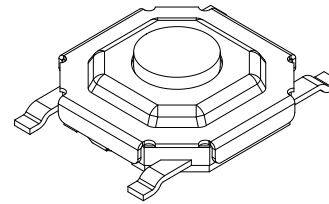
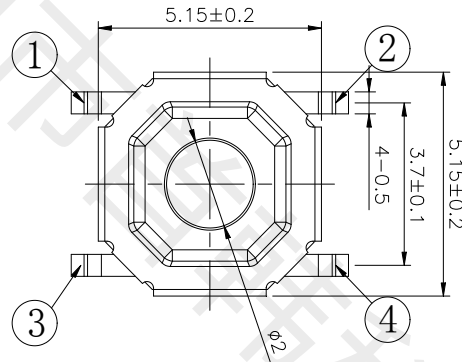
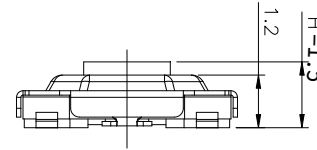
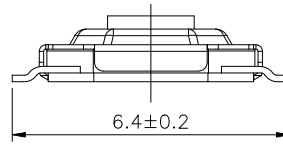
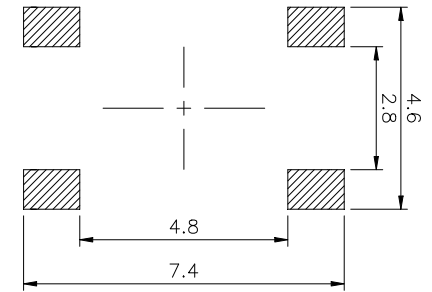




F  
E  
D  
C  
B  
A



电路图  
CIRCUIT DIAGRAM



PCB. 焊接图  
PCB. WELDING DRAWING

主要技术参数、性能  
The Main Thchnology Performance

|                                  |              |
|----------------------------------|--------------|
| 额定电流、电压<br>Rate voltage. current | 50mA DC12V   |
| 接触电阻<br>Contact resistance       | ≤100mΩ       |
| 按力<br>Operating force            | 160±50gf     |
| 行程<br>Travel                     | 0.20±0.10mm  |
| 绝缘电阻<br>Insulated resistance     | ≥100MΩ       |
| 介电强度<br>Dielectric strength      | ≥250VAC/1min |

|            |                   |                |           |                         |
|------------|-------------------|----------------|-----------|-------------------------|
| F          | 按钮                | 黄铜             | 1         | 酸洗                      |
| E          | 盖板                | 不锈钢            | 1         | 清洗                      |
| D          | 防尘膜               | 聚酰亚胺           | 1         | 橙黄色                     |
| C          | 弹片                | 不锈钢            | 1         | 镀银                      |
| B          | 本体                | PPA            | 1         | 黑色                      |
| A          | 卡件                | 黄铜             | 1         | 镀银                      |
| 项目<br>ITEM | 名称<br>DESCRIPTION | 材质<br>MATERIAL | 数量<br>QTY | 表面处理/颜色<br>FINISH/COLOR |

|             |                 |                   |                |              |                                                                                       |                                                                                                   |                           |                                    |  |
|-------------|-----------------|-------------------|----------------|--------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------|------------------------------------|--|
|             |                 |                   |                |              | 第一视角<br>FIRST VIEW                                                                    |                                                                                                   |                           | 名称/NAME:<br>轻触开关<br>TACTILE SWITCH |  |
|             |                 |                   |                |              |  |                                                                                                   |                           | 型号/MODEL:                          |  |
| 标记<br>SING  | 处数<br>FREQUENCY | 更改文件号<br>REVISION | 签名<br>APPROVED | 日期<br>DATE   | 比例<br>SCALE                                                                           | 1:1                                                                                               | 一般公差<br>GENERAL TOLERANCE |                                    |  |
| 设计 DESIGN   |                 | 李春风               | 2021.06.01     | 单位<br>UNIT   | mm                                                                                    | ≥0~2<                                                                                             | ±0.15                     |                                    |  |
| 审核 CHECKED  |                 | 钟华华               | 2021.06.01     | 重量<br>WEIGHT |                                                                                       | ≥2~5<                                                                                             | ±0.25                     |                                    |  |
| 批准 APPROVED |                 | 罗孝金               | 2021.06.01     |              |                                                                                       | ≥5                                                                                                | ±0.35                     |                                    |  |
|             |                 |                   |                |              |                                                                                       | 角度<br>ANGLE                                                                                       | ±0.5°                     |                                    |  |
|             |                 |                   |                |              |                                                                                       |  深圳市首韩科技有限公司 |                           |                                    |  |



深圳市首韩科技有限公司

SHENZHEN SHOUHAN TECHNOLOGY CO., LTD

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## 承 认 书

## SPECIFICATION FOR APPROVAL

产 品 编 码  
Material code:

产品名称 Project: 轻触开关

规格型号 Part No: TS5215A 160gf

贵公司承认印 Approval signatures

| 料 号/Part No. | 签 章/Signatures |
|--------------|----------------|
|              |                |

日期 Date:

|             |     |  |
|-------------|-----|--|
| 拟制/Drawn    | 李春风 |  |
| 审核/Check    | 钟华华 |  |
| 批准/Approved | 罗孝金 |  |



## 1、概述

### GENERAL

### 1.1 适用范围

#### APPLICATION

此规格书适用于机械式轻触开关的相关要求

This specification is applied to the requirements for TACTILE SWITCH (MECHANICAL CONTACT)

### 1.2 工作温度范围

#### Operating Temperature Range

-20℃~80℃ (在标准大气压、标准湿度条件下)

-20℃~80℃ (Normal humidity, normal air pressure)

### 1.3 贮藏温度范围

#### Storage Temperature Range

-20℃~80℃ (在标准大气压、标准湿度条件下)

-20℃~80℃ (Normal humidity, normal air pressure)

### 1.4 测试条件

#### Test Conditions

在没有其它特定的条件下, 应该在以下的条件下进行测试和测量:

Unless otherwise specified, tests and measurement shall be made in the following standard conditions:

常温.....5℃~35℃

Normal temperature.....5℃~35℃

标准湿度.....相对湿度 25%~85%

Normal humidity.....relative humidity 25%~85%

标准大气压.....86KPa~106Kpa

Normal air pressure.....86Kpa~106Kpa

在制造过程中, 测试和测量应该在以下的条件下进行:

If any doubt arise from the judgment, tests shall be conducted at the following conditions:

温度.....20℃±2℃

Temperature.....20℃±2℃

相对湿度.....65%±5%

Relative humidity.....65%±5%

环境气压.....86KPa~106Kpa

Air pressure.....86KPa~106Kpa



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## 2、详细说明

Detailed specification

### 2.1 外观：应无影响、降低产品性能的缺陷；

Appearance: There should be no defects that affect the serviceability of product.

### 2.2 结构尺寸和安装尺寸：应符合装配图要求

Style and dimension: shall conform to the assemble drawings.

### 2.3 操作形式：有触觉反应的操作

Type of actuating: Tactile feedback.

### 2.4 开关结构：单回路单输出(具体的触点结构在装配图中已绘出)；

Contact arrangement: 1 pole, 1 throw

(Details of contact arrangement are given in the assembly drawings.)

### 2.5 开关工作额定值：DC 12V, 50mA (有效值) DC 12V, 50mA (最大额定值) DC 1V, 10 $\mu$ A (最小额定值)

Ratings: 12V DC, 50mA (effective value) 12V DC, 50mA (maximum) 1V DC, 10  $\mu$ A (minimum)

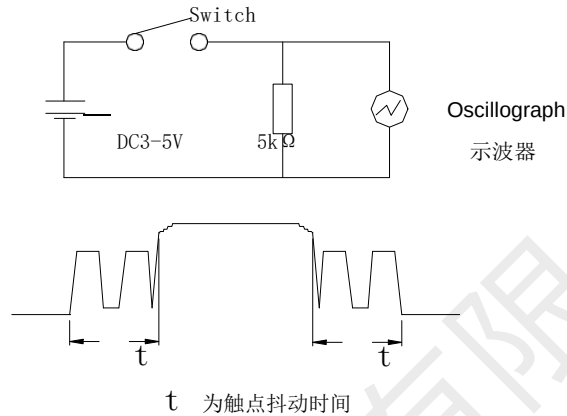
## 3、电气性能：

ELECTRICAL SPECIFICATION

| NO. | 项目<br>ITEM                          | 试验条件 TEST<br>CONDITIONS                                                                                                                                                                                                                          | 要求<br>REQUIREMENTS                                          |
|-----|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 3.1 | 接触电阻<br>Contact<br>Resistance       | 在以 5V 10mA 的直流电源或不低于 1KHz 的交流电源的电路中，以一个等于 2 倍按力的静负荷施加于手柄中心<br>Applying a static load of 2 times operating force to the center of the stem, measurements shall be made by 5V DC 10mA or more than 1KHZ AC small-current contact resistance meter. | $\leq 100m\Omega$                                           |
| 3.2 | 绝缘电阻<br>Insulation<br>Resistance    | 在端子之间施加 DC 100V /1min 的条件下，测量端子之间底座、盖板的电阻值<br>Measurement shall be made following application of 100V DC potential, across terminals, and across terminals and cover, for one minute.                                                            | $\geq 100M\Omega$                                           |
| 3.3 | 介质耐压<br>Dielectric<br>voltage proof | 在端子之间施加 250V AC(50HZ 或 60HZ)/1min<br>250V AC (50HZ or 60HZ) shall be applied across terminals, for one minute.                                                                                                                                   | 无击穿、无飞弧<br>There should be no<br>breakdown and<br>flashover |

**3.4**
**抖动**  
Bounce

在正常使用中(以每秒 3-4 次周期)轻轻地在手柄中心加力, 在通与断瞬间测试抖动 Lightly striking the center of the stem at a rate encountered in normal use (3 to 4 operations per sec), Bounce shall be tested when "ON" and "OFF".


 $\leq 10\text{ms}$ 
**4、机械性能:**
**MECHANICAL SPECIFICATION**
**NO.**
**项目**  
ITEM

**试验条件 TEST**  
CONDITIONS

**要求**  
REQUIRE

**4.1**
**按力**  
Operating Force

开关的动作方向为垂直放置开关向推柄中心逐渐地增加 负荷直到推柄停止时所测量的最大负荷。  
Placing the switch such that the direction of switch operation is vertical and then gradually increasing the load applied to the center of the stem, the maximum load required for the switch to come to a stop shall be measured.

按力:  
 $160 \pm 50\text{gf}$   
Operating Force: $160 \pm 50\text{gf}$

**4.2**
**最大行程**  
Full Travel

开关垂直于操作方向放置, 以一个等于 2 倍按力的静负荷施加在开关驱动件顶端中心, 测量顶端移动的距离。 Placing the switch such that the direction of switch operation is vertical and then applying static load of 2times operating force to the center of the stem; the travel distance for the switch to come to a stop shall be measured.

 $0.20 \pm 0.1\text{mm}$ 
**4.3**
**回弹力**  
Return Force

开关垂直于操作方向放置, 在开关驱动件顶端中心下降 至全行程后, 测量顶端向自由位置转换的力度。  
The sample switch is installed such that the direction of switch operation is vertical and upon depressing the stem in its center to the whole travel distance, the force of the stem to return to its free position shall be measured.

回弹力  
Return Force:  
(60~  
100) gf min



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4.4

停止强度  
Stop Strength

开关垂直于操作方向放置，从操作方向向驱动件施加 10N 的静负荷持续 1min。  
Placing the switch such that the direction of switch operation is vertical, and then a static load of 10N shall be applied in the direction of stem operation for a period of 1 min.

无机械和电气损坏 There shall be no sign of damage mechanically and electrically.

4.5

手柄拔出强度  
Stem Strength

开关垂直于操作方向放置，反方向实施最大操作力，并测量手柄的行程范围。  
Placing the switch such that the direction of switch operation is vertical, and then the maximum force to withstand a pull applied opposite to the direction of stem operation shall be measured.

20N.min.

4.6

可焊性  
Solderability

在以下设定条件下进行测量：  
Measurements shall be made following the test set forth below:  
(1) 焊接温度:  $245 \pm 5^\circ\text{C}$   
Solder temperature :  $245 \pm 5^\circ\text{C}$  (2)  
浸入时间:  $2\text{s} \pm 0.5\text{s}$  Immersion time:  
 $2\text{s} \pm 0.5\text{s}$   
对于其它步骤参考《GB 5095.6—86》试验 12a  
The other steps please refer to 《GB 5095.6—86》 TEST 12a

除边缘外涂层应均匀覆盖 90%以上  
Except for the edge, the coating should cover a minimum 90%

5、 极限电气性能:

ENVIRONMENTAL SPECIFICATION

NO.

项目  
ITEM

试验条件  
TEST CONDITIONS

要求  
REQUIREMENTS

5.1

低温测试  
Resistance to low temperature

样品应按照以下实验条件进行测试，实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试：  
Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:  
(1) 温度:  $-30 \pm 2^\circ\text{C}$   
Temperature :  $-30 \pm 2^\circ\text{C}$   
(2) 时间: 96h  
Time: 96h

5.2

高温测试  
Heat resistance

样品应按照以下实验条件进行测试，实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试：  
Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:  
(1) 温度:  $80 \pm 2^\circ\text{C}$   
temperature:  $80 \pm 2^\circ\text{C}$   
(2) 时间: 96h  
time: 96h

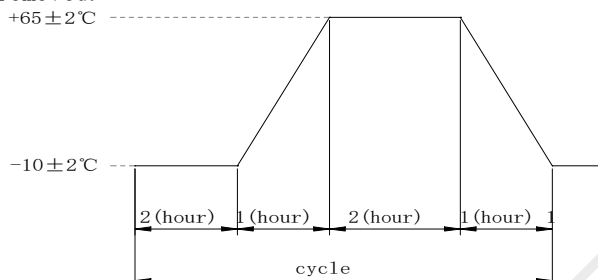
接触电阻:  $\leq 100\text{m}\Omega$   
Contact resistance:  
 $\leq 100\text{m}\Omega$   
项目 3, 4  
Item 3, 4

5.3

温度周期性测试  
Change of  
temperature

根据下面的测试要求进行 5 次循环的温度周期性测试，实验后样品应放在常温及标准湿度的环境中 1 小时后做性能测试。测试期间样品应保持干燥。

After 5 cycles of following conditions, the sample shall be allowed to stand under normal temperature and humidity conditions for 1 h. and measurements shall be made. During the test water drops shall be removed.



5.4

湿温测试  
Moisture  
resistance

样品应按照以下实验条件进行测试，实验后样品应放在 常温及标准湿度的环境中 1 小时后做性能测试： Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:

- (1) 温度:  $60 \pm 2^\circ\text{C}$   
temperature:  $60 \pm 2^\circ\text{C}$
- (2) 相对湿度: 90%~95%  
relative humidity: 90% to 95%
- (3) 时间: 96h  
time: 96h

接触电阻:  $\leq 100\text{m}\Omega$   
Contact  
resistance:  $\leq$   
 $100\text{m}\Omega$   
项目  
3, 4  
Item  
3, 4

5.5

硫化试验  
Sulfuration  
resistance

样品应按照以下实验条件进行测试，实验后样品应放在 常温及标准湿度的环境中 1 小时后做性能测试： Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements are made:

- (1)  $\text{H}_2\text{S}$  气体浓度:  $3\text{ppm} \pm 1\text{ppm}$   
 $\text{H}_2\text{S}$  gas concentration:  $3\text{ppm} \pm 1\text{ppm}$
- (2) 时间: 72h  
Time: 72h
- (3) 温度:  $40 \pm 2^\circ\text{C}$  (90~95%RH)  
temperature:  $40 \pm 2^\circ\text{C}$  (90~95%RH)

5.6

盐雾试验  
Salt Mist

在以下设定条件下进行测量:

The switch shall be checked after following test:

- (1) 温度:  $35^\circ\text{C} \pm 2^\circ\text{C}$   
temperature:  $35^\circ\text{C} \pm 2^\circ\text{C}$
- (2) 盐溶液浓度:  $5 \pm 1\%$  (质量百分比)  
salt solution:  $5 \pm 1\%$  (solids by mass)
- (3) 时间:  $4\text{h} \pm 1\text{h}$   
Time:  $4\text{h} \pm 1\text{h}$  实验

后的盐沉积物后水冲掉

After test, salt deposit shall be removed by running water.

金属件上没有腐蚀斑点  
No remarkable  
corrosion shall be  
recognized in  
metal part.



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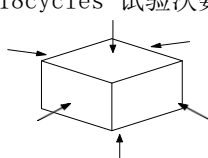
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6、 极限机械性能:

ENDURANCE SPECIFICATION

| NO. | 项目<br>ITEM                     | 试验条件<br>TEST CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 要求<br>REQUIREMEN                                                                                                                                                                                                |
|-----|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.1 | 工作寿命<br>Operation life         | 根据下面的测试要求进行测试:<br>Measurement shall be made following the test set forth below:<br>(1) DC 12V, 50mA 带负载<br>DC 12V, 50 mA resistive load<br>(2) 按动速率: 2 次/秒<br>Rate of operation: 2 times/s<br>(3) 按力: 320g<br>Operating Force: 320g<br>(4) 平均无故障寿命/Average fault-free life:100000 次                                                                                                                                                                                                                                                                  | 接触电阻<br>$\leq 100\text{M}\Omega$ Contact resistance<br>$\leq 100\text{m}\Omega$ 触点弹力<br>$\leq 10\text{ms}$ Contact bounce<br>$\leq 10\text{ms}$ 按力: 初值的 $\pm 30\%$<br>Operating Force: initial value $\pm 30\%$ |
| 6.2 | 耐 振 动<br>Vibration Resistance  | Measurements shall be made following the test set forth below: 按下列条件进行抗振动试验<br>(1) Range of oscillation: 10 to 55Hz 频率范围<br>(2) Amplitude, pk-to-pk: 1.5 mm 振幅: 峰-峰 1.5mm<br>(3) Cycle of sweep: 10-55-10Hz in one minute, approx. 扫描周期: 10-55-10Hz 约一分钟内<br>(4) Mode of sweep: Logarithmically sweep or uniform sweep. 扫描方式: 对数扫描式 恒定扫描<br>(5) Direction of oscillation: 振动方向<br>Three mutually perpendicular directions, including the direction of stem travel. 3 个相互垂直方向, 包括推柄行程方向<br>(6) 2 hours each, for a total of 6 hours. 每方向 2 小时, 共 6 小时 | 项目 3<br>项目 4.1、4.2<br>Item 3<br>Item 4.1、4.2                                                                                                                                                                    |
| 6.4 | 抗冲击<br>Impact Shock Resistance | Measurements shall be made following the test set forth below: 按下列条件进行冲击试验<br>(1) Acceleration: 80g 加速度<br>(2) Cycles of test : 3 cycles each in 6 directions, for a total of 18 cycles 试验次数: 每个方向 3 次, 6 个方向共 18 次<br>                                                                                                                                                                                                                                          | 项目 3<br>项目 4.1、4.2<br>Item 3<br>Item 4.1、4.2                                                                                                                                                                    |

7、 焊接条件:

SOLDERING CONDITIONS:

| NO. | 项目<br>ITEM             | 试验条件 TEST<br>CONDITIONS                                                                                                                                                                                                                                                                                                                       | 要求<br>REQUIREME |
|-----|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 7.1 | 手工焊接<br>Hand soldering | 请按以下条件进行焊接:<br>(1) 焊锡温度: $\leq 350^{\circ}\text{C}$<br>(2) 连续焊接时间: $\leq 3\text{ s}$ v h v m m n<br>(3) 电烙铁的功率: $\leq 20\text{W}$<br>Please practice according to below conditions:<br>(1) Soldering temperature: $350^{\circ}\text{C}$ Max.<br>(2) Continuous soldering time: 3 s Max.<br>(3) Capacity of soldering iron: $\leq 20\text{ W}$ |                 |



7.2

自动焊接  
Automatic  
soldering

在使用的情况下自动焊接

In case the automatic flow soldering is to be used

(1) 预热 ----- 150°C ~ 175°C, 40 ~ 80 sec

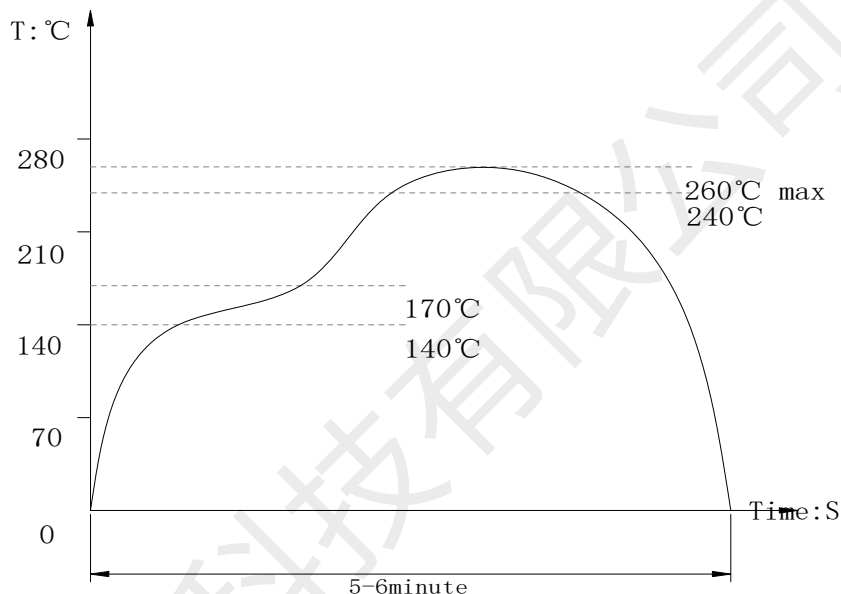
Preheat ----- 150°C ~ 175°C, 40 ~ 80 sec

(2) 峰值温度 ----- 260°C (max)

Peak temperature ----- 260°C (max)

(3) 焊接区温度 ----- 260°C, 1 ~ 4 sec, 2 times (max)

Soldering area temperature ----- 260°C, 1 ~ 4 sec, 2 times (max)



8、 Other precautions 其他注意事项

8.1 印刷基板的安装孔尺寸参见产品图。

Follow recommended P.W.B. piercing plan in outside drawing page.

8.2 注意不要施加超负荷的压力或晃动开关。

Please be cautions not to give excessive static load or shock to swiches.

8.3 进行焊接过程中，不可以用溶剂或类似品清洗开关

Following the soldering process, do not try to clean the switch with a solvent or the like.

8.4 防止助焊剂从开关的顶端渗入

Safeguard the switch assembly against flux penetration from its topside.

8.5 保管时尤其应注意避开高湿高温和有腐蚀性气体的环境。如需要长时间保存，请不要打开包装箱。

Preservation under high temperature and high high humidity or corrosive gas should be

avoided Especially . When you need to preserve for a long period ,do not open the carton.