

客户 (Customer): \_\_\_\_\_

发行编号: 2020121901

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发行区分:  新规  改定

## 规格承认书

SPECIFICATION FOR APPROVAL

产品名称: 轻触开关

贵司型号: \_\_\_\_\_

敝司型号: TVFF15-PU-R

接受印

ACKNOWLEDGEMENT

兹证明此份材料已经收到。

WE ACKNOWLEDGE RECEIVING THIS DOCUMENT.

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G. MGR	LEADER	CHECKED	SIGNED

厦门宏端电子科技有限公司

<b>规格承认书</b>				规格书编号 2020121901
品名	轻触开关	型号	TVFF15-PU-R	1/10

### 1. General Specification 基本说明

1.1 Scope 范围 This specification covers the requirements for single key switches which have no Key top(TACT SWITCHES:MECHANICAL CONTACT).此规范含盖单推柄和无推柄的轻触开关要求

1.2 Operating Temperature Range 使用温度范围  
-40 to+90°C(normal humidity, normal press.) 正常湿度, 标准压力

1.3 Storage Temperature Range 保存温度范围  
-40 to+95°C(normal humidity, normal press.)

#### 1.4 Test Conditions 测试条件

Tests and measurements shall be made in the following standard conditions unless otherwise specified: 测试和计量按下列标准条件除非特殊说明

Normal temperature (temperature 5 to 35°C) 标准温度

Normal humidity (relative humidity 45 to85%) 正常湿气

Normal pressure (pressure 860 to 1060 mbars) 标准压力

In case any question arises from the judgment made, tests shall be conducted in the following conditions:

Temperature (20±2°C) 温度

Relative humidity (65±5%) 相对湿度

Pressure (860 to 1060 mbars) 压力

### 2. Type Of Actuation 动作类型

    Tactile feedback     轻触返回

### 3. Contact Arrangement   1   poles   1   throws 接触形式 1 接点 1 回路

(Details of contact arrangement are given in the assembly drawings.)  
细接点形式在装配图中

### 4. Maximum Ratings DC   12   V   50   mA 额定值

# 规格承认书

规格书编号  
2020121901

品名

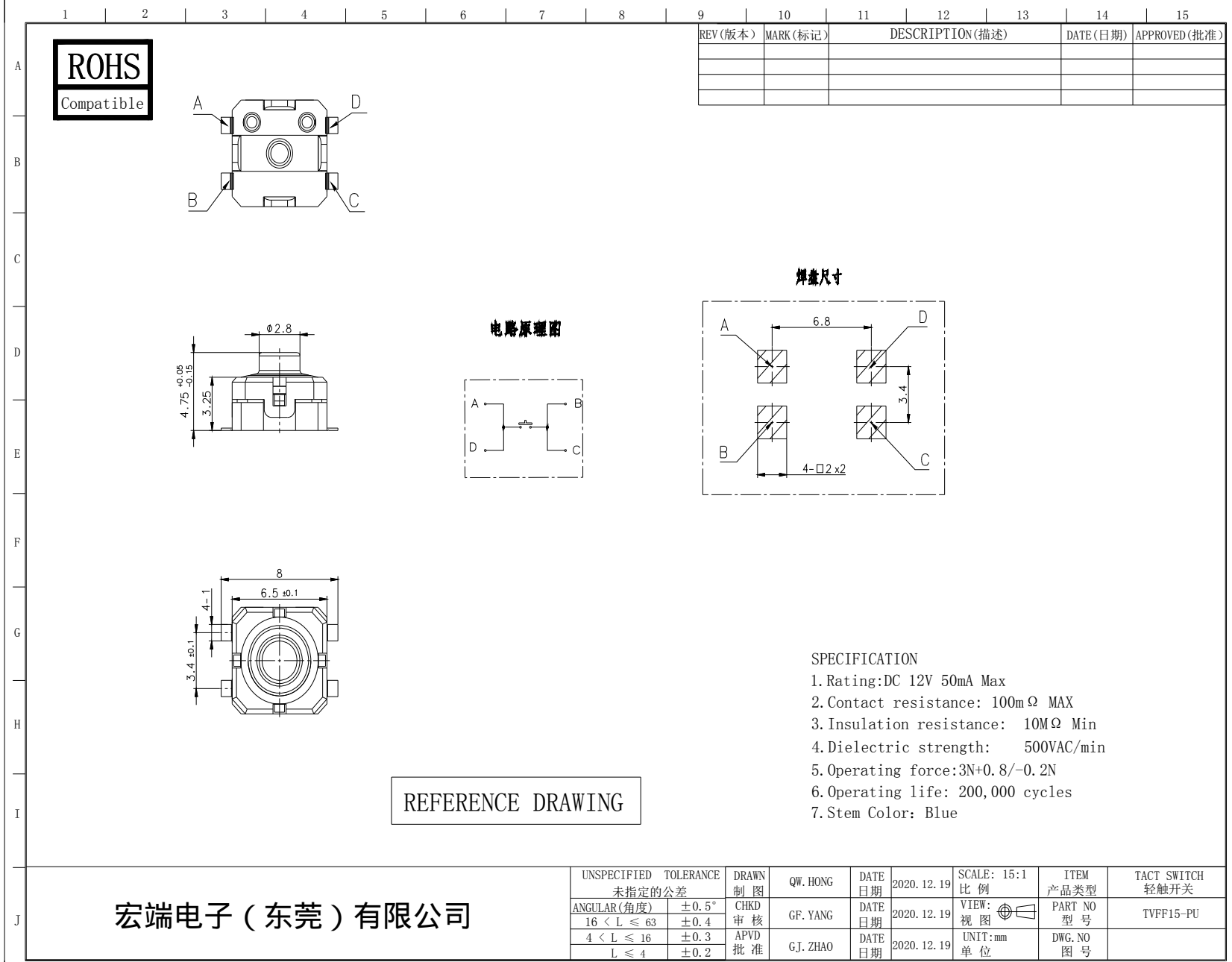
轻触开关

型号

TVFF15-PU-R

2/10

## 5. 外形、结构: 5.1 外形图:



# 规格承认书

规格书编号  
2020121901

品名

轻触开关

型号

TVFF15-PU-R

4/10

## 6. General Specification 性能

### 6.1 电气的性能

Item 项目	Test Condition 测试条件	Requirements 要求
6.1.1	<p>Applying static load twice the actuating force to the center of the stem, measurements shall be made with a 1 kHz small-current contact resistance meter.</p> <p>用两倍的动作用力作静负载施加于按钮的中心,并用 1 千赫小电流接触电阻仪测量</p>	100mΩ 以下
6.1.2	<p>Measurements shall be made following application of DC500V potential between terminals and between individual terminals and frame for one minute.在端子与端子之间,端子与外壳之间施加 DC500V, 一分钟</p>	10MΩ 以上
6.1.3	<p>AC 500 V (50Hz or60Hz) shall be applied between terminals and between individual terminals and frame for one minute. 在端子与端子之间,端子与外壳之间施加 AC500V(50HZ-60HZ)</p>	There shall be no breakdown. 无击穿、闪烁现象
6.1.4	<p>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”.</p> <p>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</p> <div style="text-align: center;"> </div> <div style="text-align: center;"> </div> <p style="text-align: center;">t 为触点抖动时间</p>	5mS 以下

# 规格承认书

规格书编号  
2020121901

品名

轻触开关

型号

TVFF15-PU-R

5/10

## 6.2 机械的性能

Item 项目		Test Condition 测试条件	Requirements 要求
6.2.1	Actuating Force 动作力	Place the switch such that the direction of switch operation is vertical and then gradually increase the load applied to the center of the stem, the maximum load required for the stem to come to a stop shall be measured. 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	$\underline{3} + \underline{0.8} / - \underline{0.2} \text{N}$
6.2.2	Travel 行程	Place the switch such that the direction of switch operation is vertical and then apply a static load twice the actuating force to the center of the stem, the travel distance for the stem to come to a stop shall be measured. 开关的动作方向为垂直放置开关,并以双倍动作力的静负荷作用推柄中心,测量推柄从开始到停止的行程距离	$\underline{0.7} \pm \underline{0.15} \text{ mm}$
6.2.3	Return Force 返回力	The sample switch is installed such that the direction of switch operation is vertical and, upon depression of the stem in its center the whole travel distance, the force of the stem to return to its free position shall be measured. 开关的动作方向为垂直放置开关,在已有行程的推柄中心向上减小压力,推柄回到自由位置时所测到的力	$\underline{1} \text{N min}$
6.2.4	极限按压力 Limit press pressure	放置好开关,对开关按钮柄沿动作方向施加按压力 Placing the switch such that the direction of switch operation is vertical and then a below static load shall be applied in the direction of stem operation 1). 按压力: 100 N Pressure: 100 N 2). 时间: 60 s Time: 60s 3). 按压次数: 1 次 Number of presses: 1	动作力: 条款6.2.1 ± 30% Operating force: Item 6.2.1 ± 30%

# 规格承认书

规格书编号  
2020121901

品名

轻触开关

型号

TVFF15-PU-R

6/10

## 6.3 使用耐久性能

Item 项目		Test Condition 测试条件	Requirements 要求
6.3.1	Operating Life 动作寿命	<p>按照以下条件试验后进行检测</p> <p>Following the test below, measurements shall be made</p> <p>1).电阻负荷 DC 14V50mA resistive load DC 14V 50mA</p> <p>2).动作速度: 0.3 秒“ON”, 0.2 秒“OFF” Rate of operation: 0.3 s“ON”, 0.2 s“OFF”</p> <p>3).按压力 4.5 N Pressure 4.5 N 4).按压次数 200,000 次 Cycles of operation: 200,000</p>	<p>接触电阻小于 200 mΩ</p> <p>Contact resistance (Item6.1) 200 mΩ Max</p> <p>绝缘阻抗不小于 10 MΩ</p> <p>Insulation resistance (10MΩ Min</p> <p>操作力: ±30% Operating force:Item7.1±30%</p> <p>Item 6.1.3</p> <p>Item 6. 2.2</p>
6.3.2	Moisture Resistance 耐潮湿	<p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made: 样品按下列条件进行耐潮湿试验,试验后在正常温度和湿度条件下放置 1 小时后测定</p> <p>(1) Temperature: 60±2℃ 温度</p> <p>(2) Relative humidity: 90 to 95% 相对湿度</p> <p>(3) Time: 48 hours 时间</p> <p>Water drops shall be removed. 擦除水</p>	<p>Contact resistance: <u>200</u> mΩ Max. 接触电阻</p> <p>Insulation resistance : <u>10</u> MΩ Min. 绝缘电阻</p> <p>Item 6.1.3、6.1.4</p> <p>Item 6. 2.1~6.2.3</p>
6.3.3	Low Temperature Resistance 耐低温	<p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made:</p> <p>样品按下列条件进行耐低温试验,试验后在正常温度和湿度条件下放置 1 小时后测定</p> <p>(1)Temperature: -40±2℃ 温度</p> <p>(2) Time: 48 hours 时间</p> <p>Water drops shall be removed. 擦除水珠</p>	<p>Contact resistance: <u>200</u> mΩ Max. 接触电阻</p> <p>Insulation resistance : <u>10</u> MΩ Min. 绝缘电阻</p> <p>Item 6.1.3、6.1.4</p> <p>Item 6. 2.1~6.2.3</p>
6.3.4	Heat Resistance 耐热	<p>Following the test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made: 样品按下列条件进行耐热试验,试验后在正常温度和湿度条件下放置 1 小时后测定</p> <p>(1)Temperature: 95±2℃ 温度</p> <p>(2) Time: 48 hours 时间</p>	<p>Contact resistance: <u>200</u> mΩ Max. 接触电阻</p> <p>Insulation resistance : <u>10</u> MΩ Min. 绝缘电阻</p> <p>Item 6.1.3、6.1.4</p> <p>Item 6. 2.1~6.2.3</p>

# 规格承认书

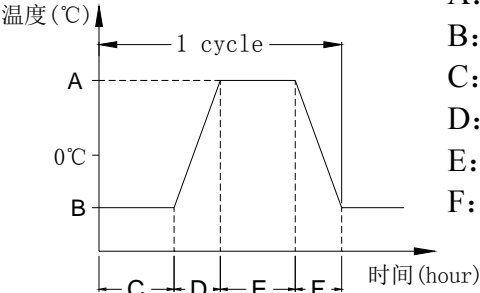
规格书编号  
2020121901

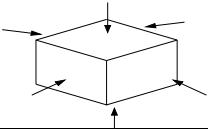
品名 轻触开关

型号

TVFF15-PU-R

7/10

Item 项目	Test Condition 测试条件	Requirements 要求
<p>6.3.5</p> <p>Change of Temperature 温度循环</p>	<p>Following ten cycles of high temperature test .The Sample shall be Placed in Normal temperature and humidity Conditions for one hour before measurements are made. During this test, water drops shall be removed.</p> <p>样品按下列条件进行高低温循环试验,试验后在正常温度和湿度条件下放置 1 小时后测定</p>  <p style="text-align: center;">温度(°C)</p> <p style="text-align: center;">时间(hour)</p> <p style="text-align: center;">Cycling: Five cycles 周期: 6 次</p> <p>A: <math>+90 \pm 2^\circ\text{C}</math> B: <math>-40 \pm 2^\circ\text{C}</math> C: 2 小时 D: 1 小时 E: 2 小时 F: 1 小时</p>	<p>Contact resistance: <u>200</u> mΩ Max. 接触电阻 Insulation resistance : <u>10</u> MΩ Min. 绝缘电阻 Item 6.1.3、6.1.4 Item 6. 2.1~6.2.3</p>
<p>6.3.6</p> <p>Salt Spray Test 盐雾试验</p>	<p>按下列条件试验后置于常温常湿环境中 1 小时后完成检测 Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements shall be made</p> <p>1).温度 <math>35 \pm 2^\circ\text{C}</math> Temperature <math>35 \pm 2^\circ\text{C}</math> 2).盐水浓度 <math>5 \pm 1\%</math> (质量比) Salt solution <math>5 \pm 1\%</math> (Solids by mass)</p> <p>3).试验时间 48 小时 Duration 48 h 4).试验后用清水洗掉盐水并擦干水滴 After the test,salt deposit shall be removed in water. And Drops of water shall be removed</p>	<p>触点响应时间不大于 20 毫秒 ON bounce:20ms Max 操作力: <math>\pm 30\%</math> Operating force:<math>\pm 30\%</math></p> <p>金属件无发黄、生锈</p>
<p>6.3.7</p> <p>浸水试验 Water resistance</p>	<p>按下列条件试验后置于常温常湿环境中 1 小时后完成 检测 Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 h before measurements shall be made</p> <p>1).温度 <math>60 \pm 2^\circ\text{C}</math> Temperature <math>60 \pm 2^\circ\text{C}</math> 2).深度 20cm 以上 Depth 20cm Min 3).试验时间 0.5 小时 Duration 0.5h</p>	<p>进水量不应使产品受到损害 The amount of water intake should not cause damage to the product</p>

6.3.8	<p>Vibration Resistance 耐振动</p>	<p>开关采用常规的安装方法牢固地安装在试验设备上，并在下述参数条件下进行试验： Install the switch to the test equipment with conventional installation methods, do test under the following specification conditions: 1). 振动频率 10 - 1000 Hz Vibration frequency: 10 - 1000 Hz 2). 扫描比率 10-1000-10 Hz 约 1 分钟 Sweep ratio: 10-1000-10 Hz Approx. 1 min 3). 改变振动频率的方法: 随机震动 Method of changing the vibration frequency: Random vibration 4). 振动方向: 三个互相垂直方向，包括按钮动作方向 Direction of vibration: Three mutually perpendicular directions, including the direction of the travel 5). 振动时间: 各 8 小时，共 24 小时 Duration : 8 h each (24h in total) 6). 加速度: 27.8m/s<sup>2</sup> Acceleration: 27.8m/s<sup>2</sup></p>	<p>Item 6.1 Item 6. 2.1、6.2.2</p>
6.3.9	<p>Impact Shock Resistance 抗冲击</p>	<p>Measurements shall be made following the test set forth below: 按下列条件进行冲击试验 (1) Acceleration: 80g 加速度 (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</p> 	<p>Item 6.1 Item 6. 2.1、6.2.2</p>

# 规格承认书

规格书编号  
2020121901

品名

轻触开关

型号

TVFF15-PU-R

8/10

## 7. 焊接条件:

Item 项目	Recommended conditions 推荐条件	Requirements 要求
<p><b>7.1</b></p> <p>Solderability 可焊性</p>	<p>端子在 260℃ ±5℃ 的焊锡槽内浸锡 5 ± 1 秒 The terminals at 260 °C ± 5°C slot in the solder dip tin for 5 seconds</p>	<p>浸渍面须有 75% 以上面积附有焊锡 More than 75% of the Impregnated Surface must Supported by solder</p>
<p><b>7.2</b></p> <p>Hand soldering 手工焊接</p>	<p>Please practice according to bellow conditions: (1)Soldering temperature : ≤ 350°C (2)Continuous soldering time: ≤ 3 S (3)Capacity of soldering iron: ≤ 60 W 请按以下条件进行焊接: (1)焊锡温度: ≤ 350°C (2)连续焊接时间: ≤ 3 S (3)电烙铁的功率: ≤ 60 W</p>	
<p><b>7.3</b></p> <p>Automatic flow soldering 自动焊接</p>	<p>For the product of SMT , type solder according to the following conditions 对于 SMT 产品, 请按以下条件进行焊接 surface of product temperature 部品表面温度 (°C)</p> <p>time inside soldering equipment 炉内通过时间</p> <p>Caution: the condition mentioned above is a temperature on the PWB surface on which parts are mounted. There are cases where PWB temperature greatly differs from switch's surface temperature depending on PWB material, size, thickness, etc. The switch's surface temperature shall not allowed to exceed 260°C 注意: 以上提及的条件是零部件上 PWB 表面的温度, 由于 PWB 的材料、尺寸、厚度等不同, PWB 从开关表面获得的温度也会有很大不同, 因此, 千万小心不要让开关表面温度超过 260°C</p>	

## 8、使用注意事项

### Precautions for use

#### A. 一般事项

##### General

A1.本产品主要用于汽车电子电器以及家用电器上

This product is mainly used in automotive electronic appliances and household appliances

#### B.焊锡和组装到 PCB 板过程

##### Soldering and assembly to PCB process

B1.在端子负载的情况下焊接会引起扭曲变形和损坏产品性能

Please note that if the terminal is under load during the welding process, it may cause distortion and damage to the product performance.

B2.依据本公司规格书焊接条件进行焊锡。若有特别要求，请与本公司联系

The welding condition please according to the company's specification of solder conditions, if there are special requirements, please contact the company

B3.开关安装到 PCB 板上时，将产品插入指定的固定平面并将其固定，使其达到水平位置。如果不是水平固定，有可能影响产品性能

When the switch is mounted on the PCB board, insert the product into the specified fixed plane and secure it to a horizontal position. If not horizontal fixed, it may affect product performance

B4.按压按钮柄中心以外的地方，会影响开关功能和损坏开关

If you press the stem outside the center of the stem, it may affect the function of the switch and damage the switch

B5.热固性烤箱条件 由于焊有其他元器件的原因，需要进入烤箱烘烤时，温度不要超过 160℃，时间不超过 2 分钟。

Thermosetting oven condition when welded PCB board with switch due to other components, need to enter the oven baking temperature should not exceed 160 degrees, time does not exceed 2 minutes

B6.波峰焊时，会产生很多泡沫。要特别注意，防止泡沫进入开关。When you do automatic wave soldering, it can sometimes produce a lot of foam. Be especially careful to prevent flux from entering the switch

#### C.清洁

##### Cleaning process

C1.在焊锡的时候，不要用清洁剂或类似溶剂去清洁开关。

Do not clean the switch with a detergent or similar solvent during the solder process

#### D. 机构设计

##### Institutional design (switch layout)

D1.安装 PCB 板的孔的尺寸和工艺条件应参照外形图中推荐的尺寸。

The size and process conditions of the hole where the PCB board is installed should refer to the dimensions recommended in the outline drawing

D2.施加的外力不能大于指定的按压力，这样会损坏开关

If the applied external force is greater than the specified pressured, the switch will be broken

E. 使用环境

Use environment

E1.开关不能在高湿度或者结露的环境中使用 The switch cannot be used in a high humidity or condensation environment

F. 贮存

Storage

F1.没拆封且不立即使用的产品，请妥善存放在没有阳光直射、没有腐蚀性气体的常温(22~28℃)常湿(30-70%)环境中

Unsealed products that are not immediately used should be properly stored in a normal temperature(22~28℃)and normal humidity(30-70%) environment without direct sunlight or corrosive gases

F2.已拆封没用完的产品要用密封袋装好存放于上述储存环境中

Has opened unused product to use good seal bags, stored in the storage environment

F3.存放期超过六个月的产品，在使用前必须复检，功能完好的产品才能使用

Storage for more than 6 months of the product, before use must recheck, function in good product to use

G. 其他

Others

G1.在更新版本之前，此规格书长期有效。

This specification is valid for a long time before the version is updated

G2.超出额定值范围,不能使用本产品

Do not exceed the rated range of the product.