

客户 (Customer): \_\_\_\_\_

发行编号: 2024062802

发行日期: 2024.06.28

发行区分:  新规  改定

## 规格承认书

SPECIFICATION FOR APPROVAL

产品名称: 四向拨动开关总成

贵司型号: \_\_\_\_\_

敝司型号: SVDXA-02

接受印

兹证明此份材料已经收到。

ACKNOWLEDGEMENT

WE ACKNOWLEDGE RECEIVING THIS DOCUMENT.

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# JIANFU

<b>规格承认书</b>			规格书编号 2024062802
品名	四向拨动开关总成	型号	SVDXA-02
			1/13

**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+85°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**

Momentary

**3.CONTACT ARRANGEMENT** 4 poles 4 throws 接触形式 4 接点 4 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 12V 20mA

(The maximum allowable working current 允许最大工作电流: 100m A 30min)



## 规格承认书

规格书编号  
2024062802

品名

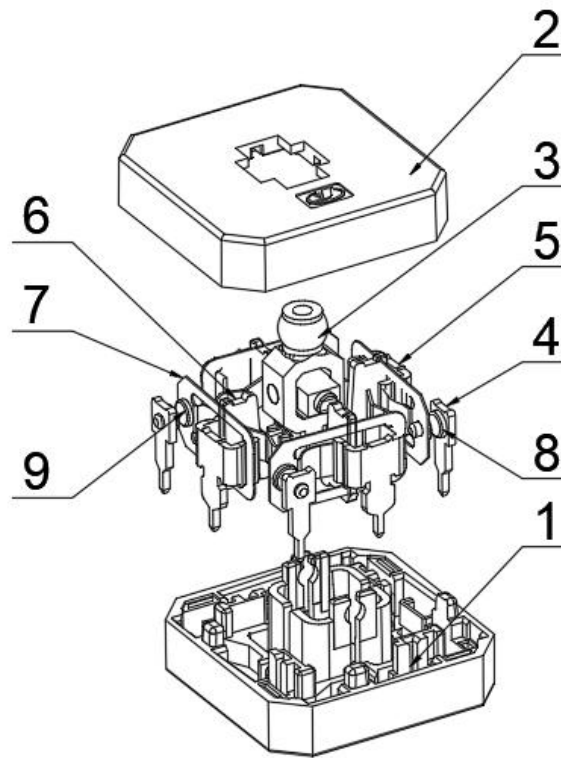
四向拨动开关总成

型号

SVDXA-02

3/13

## 5.2 构造:



序号	零部件名称	数量	材料名称	表面处理	备注
1	四向底座	1	PA66-GF30	黑色	UL94 HB
2	四向上盖	1	PA66-GF30	黑色	UL94 HB
3	四向短拨杆	1	PA66-GF30	黑色	UL94 HB
4	NO 插片	4	黄铜	镀银	
5	COM 支架	4	黄铜	镀银	
6	推环	1	PA66-GF30	黑色	
7	动弹片	4	铍青铜	热处理	
8	动触点	4	紫铜	镀金	
9	静触点	4	紫铜	镀金	

# 规格承认书

规格书编号  
2024062802

品名

四向拨动开关总成

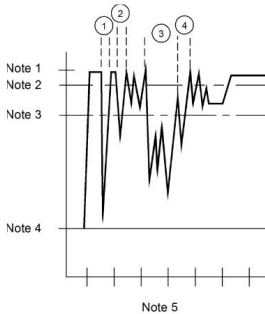
型号

SVDXA-02

4/13

## 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>Voltage: DC12V; Current: 6.5A. Measure voltage drop for the two ends of the switch by multimeter. 电压 DC12V, 负载: 6.5A, 用万用表测量开关两端压降</p>	≤80mV Max.
6.1.2	<p>Between the casing and each conductive part, as well as between conductive parts that are not in contact with each other (test voltage: DC 500V), Duration: 60±5 seconds. 外壳与每一导电部分之间以及各不相接触的导电部分之间 (试验电压为 DC 500V), 持续时间 60±5 秒。</p>	≥100MΩ.
6.1.3	<p>A voltage of AC500V(50-60HZ) and 10mA leakage current shall be applied between open terminals, and between the metal frame and the terminals for 60±5 seconds. 在相互绝缘的所有接线端子之间及各接线端子与金属外壳之间加载 AC500V(50-60Hz), 泄漏电流 10mA, 持续时间 60±5 秒</p>	There shall be no breakdown. 无击穿、闪烁现象
6.1.4	<p>Assemble the samples according to the normal position with the actual load. Record the contact status, quantity and duration of contact bounce with the oscilloscope which has the minimum storage precision of 40MHz. Define note 3 as 90% of open circuit voltage. 将样品按照正常的安装位置和实际的负载安装, 以储存率精确度至少达到 40MHz 的示波器记录接触情况, 记录接触点跳跃的数量和时间。定义注 3 为开路电压的 90%。</p> <div style="text-align: center;">  <p style="font-size: small;">Note 1: Zero Volts Note 2: Voltage Drop Limit Note 3: Percent (%) Open Circuit Volts Note 4: Open Circuit Volts Note 5: Time: millisecond (ms)</p> </div>	10ms Max.

# 规格承认书

规格书编号  
2024062802

品名

四向拨动开关总成

型号

SVDXA-02

5/13

## 6.2 机械的性能

Item 项目	Test Condition 测试条件	Requirements 要求
6.2.1  Operating Force 操作力	<p>在操作元件顶端沿操作方向均匀施加载荷,使操作元件转换到动作位置 Uniform load is applied along the direction of operation at the top of the operating element, so that the operating element can be converted to the action position.</p> <p style="text-align: center;">Kraft-/ Weg-Diagramm/ Force-travel-diagram</p>	6±1.5N
6.2.2  Travel for electrical contact 接触行程	<p>从自由位置到动作位置的距离 The distance from free position to operating Position</p>	0.8±0.2mm
6.2.3  Return Force 返回力	<p>在操作元件顶端沿操作反方向均匀释放载荷,使操作元件转换到初始位置 Uniform release of load along the opposite direction of operation at the top of the operating element, so that the operating element can be converted to the initial position.</p>	0.8N Min.

# 规格承认书

规格书编号  
2024062802

品名

四向拨动开关总成

型号

SVDXA-02

6/13

## 6.2 机械的性能

Item 项目		Test Condition 测试条件	Requirements 要求
6.2.4	Haptic feeling 手感值	The feeling ratio: $100\% \times (F1-F2)/F1$ 手感值: $100\% \times (F1-F2)/F1$	45%±15%
6.2.5	Force difference for four ways 四向力值差	(max. actual measurement - min. actual measurement) ÷ (max. actual measurement) × 100% (实测最大值 - 实测最小值) ÷ (最大实测值) × 100%	≤25%
6.2.6	Vibration Resistance 耐振动性	Standard 标准: IEC60068-2-6 Test method: effective value for acceleration speed=19.6m/2 <sup>2</sup> =2.0GRMS; frequency 10-1000Hz; test voltage: DC12V switch with rated load. 16H each for X, Y, Z axis. Abnormal sound should be evaluated before and after vibration Resistance test. 方法: 加速度有效值=19.6m/2 <sup>2</sup> =2.0GRMS; 频率 10-1000Hz; 试验电压 DC12V, 开关带额定负载; X 轴、Y 轴、Z 轴各 16H。 耐振动试验前后都要做一次异响评估。 测试过程中需要监测开关接触瞬断现象	实验后 After test: 1、Contact Resistance 接触电阻: 15m Ω Max. 2、Insulation resistance 绝缘电阻: 100M Ω Min. 3、Insulation resistance 抗电强度: AC 500V 60±5s 4、Operating force 操作力: 4±1N 5、Travel 行程: 0.4±0.15mm 6、No deformation, no operation issue and no abnormal sound. Component shall not have loose damage issues 表面无变形且操作无异常, 零部件不得有松动损坏现象, 无异响

# 规格承认书

规格书编号  
2024062802

品名

四向拨动开关总成

型号

SVDXA-02

7/13

## 6.2 机械的性能

Item 项目		Test Condition 测试条件	Requirements 要求																
6.2.7	Solder Heat Resistance 耐焊性	<p>Switch shall be measured after following test: 开关在下述参数条件下进行试验:</p> <p>(1). Solder 焊料:Sn-3Ag-0.5Cu (2). Flux 焊剂:Rosin Flux JIS K 5902 (3).Soldering temperature and immersing time: 焊接温度及时间:</p> <table border="1"> <tr> <td>量产时自动焊接 Automatic soldering during mass production 推荐波峰焊条件 Wave soldering is recommended</td> <td>预热温度 Pre heat &lt; 110°C</td> <td>时间 Pre heat &lt; 60 sec.</td> </tr> <tr> <td></td> <td>焊接温度 Solder temperature ≤ 300°C</td> <td>焊接时间 Solder time &lt; 5sec 单面铜基板厚度 Thickness of board: T=1.6mm</td> </tr> </table>	量产时自动焊接 Automatic soldering during mass production 推荐波峰焊条件 Wave soldering is recommended	预热温度 Pre heat < 110°C	时间 Pre heat < 60 sec.		焊接温度 Solder temperature ≤ 300°C	焊接时间 Solder time < 5sec 单面铜基板厚度 Thickness of board: T=1.6mm	<p>After test 实验后:</p> <p>1、Operating force and travel:±20% of the specification value. 操作力,行程变化范围:规格值±20%.</p> <p>2、Contact Resistance 接触电阻: 15m Ω Max.</p> <p>3、Appearance no sol, terminal loose phenomenon. 外观无溶胶,端子松动现象</p>										
量产时自动焊接 Automatic soldering during mass production 推荐波峰焊条件 Wave soldering is recommended	预热温度 Pre heat < 110°C	时间 Pre heat < 60 sec.																	
	焊接温度 Solder temperature ≤ 300°C	焊接时间 Solder time < 5sec 单面铜基板厚度 Thickness of board: T=1.6mm																	
6.2.8	Solderability 可焊性	<p>Switch shall be checked after the following test: 开关在下述参数条件下进行试验:</p> <p>(1) Solder 焊料 Solder: Sn-3Ag-0.5Cu (2) Flux 焊剂: Rosin: JIS K 5902. (3).PCB 厚度 thickness:1.60mm. (4). Soldering Temperature 焊接温度: 245 ± 3°C Immersing Time 时间: 3 ± 0.5sec</p>	<p>More than 90% of immersed part shall be covered with solder 超过 90%的焊锡面积被焊料所覆盖</p>																
6.2.9	Mechanical Overload 机械过载	<p>Test method: T= 23°C, pressure and speed per the value in the Table below. Actuation force of F=110N should be applied along the moving direction of the way. 方法: T= 23°C, 压力, 速度等增量按下表中规定, 沿档位运动方向施加 F=110N 的驱动力, 如图</p> <table border="1"> <thead> <tr> <th>Mode of Actuation</th> <th>Rate of Actuation</th> </tr> </thead> <tbody> <tr> <td>Air Temperature</td> <td>(3 ± 1) °C per minute</td> </tr> <tr> <td>Pressure</td> <td>(2500 ± 500) mm Hg per second</td> </tr> <tr> <td>Vacuum</td> <td>(40 ± 10) mm per second</td> </tr> <tr> <td>Fluid Level</td> <td>(25.0 ± 5) mm per minute</td> </tr> <tr> <td>Angular Displacement</td> <td>(5.0 ± 1) degrees per second</td> </tr> <tr> <td>Linear Displacement</td> <td>(20.0 ± 5) mm per second</td> </tr> <tr> <td>Fluid Temperature</td> <td>(10 ± 3) °C per minute</td> </tr> </tbody> </table>	Mode of Actuation	Rate of Actuation	Air Temperature	(3 ± 1) °C per minute	Pressure	(2500 ± 500) mm Hg per second	Vacuum	(40 ± 10) mm per second	Fluid Level	(25.0 ± 5) mm per minute	Angular Displacement	(5.0 ± 1) degrees per second	Linear Displacement	(20.0 ± 5) mm per second	Fluid Temperature	(10 ± 3) °C per minute	<p>After test 实验后:</p> <p>1. Appearance and structure for switch should not be damaged. Housing and knob not be fracture. 外观结构不损伤, 开关壳体, 胶柄不能断裂。</p> <p>2. Switch operation normal 开关操作正常</p> <p>3、Switch conduction normal.开关导通正常</p>
Mode of Actuation	Rate of Actuation																		
Air Temperature	(3 ± 1) °C per minute																		
Pressure	(2500 ± 500) mm Hg per second																		
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规格书编号  
2024062802

品名

四向拨动开关总成

型号

SVDXA-02

8/13

## 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 with Load 负荷寿命	<p>Voltage: DC12V, Load: 20mA                      Operating speed: 20mm/s                      Test force: 13.5N                      switch on 1s and off 1s is one cycle. 60000 cycles in total.                      60% of the life cycle (36000) should be done at the room temperature. 30% (18000 cycles) at the Max. temperature 70°C. 10% (6000) at the Min. temperature -40°C. (Loop connected based on actual application: one loop contains one normally open and one normally close. One loop needs one pin, such as 1、5、4、2)                      电压：DC12V，负载：20mA，操作速度：20mm/秒。                      测试力度：13.5N                      开关通1秒，断1秒为一次，共操作60000次。                      开关60%的寿命次数(即36000次)在室温下进行，30%的寿命次数(即18000次)在上限工作温度70°C下进行，10%的寿命次数(即6000次)在下限工作温度-40°C下进行。                      (按实际应用情况接线，一个回路包括一长通和一常闭，即1个回路要接4个引脚，如：1、5、4、2)</p>	<p>After test 实验后：                      1、Operating force and travel:±30% of the specification value.                      操作力，行程变化范围：                      规格值±30%。                      2、Contact Resistance                      接触电阻：300mΩ Max.                      3、Range for the change of appearance and structure for switch should not be damaged.                      开关外观及结构应无损坏</p>
6.3.2 跳动启动 Jump start	<p>DC26V supplied to the switch for 1 min through auto battery connected to current without operation at the room temperature. Current connected for 1 min with operation.                      (Loop connected based on actual application: one loop contains one normally open and one normally close. One loop needs one pin, such as 1、5、4、2)                      室温下，通电不工作情况下，用车用电池给开关的进出线供给DC26V，通电1分钟；转到通电工作情况下，通电1分钟；                      (按实际应用情况接线，一个回路包括一长通和一常闭，即1个回路要接4个引脚，如：1、5、4、2)</p>	<p>Electrical and mechanical performance should meet the requirement after the test                      试验后电气性能及机械性能符合要求</p>

# 规格承认书

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2024062802

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四向拨动开关总成

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SVDXA-02

9/13

## 6.3 使用耐久性能

Item 项目	Test Condition 测试条件	Requirements 要求											
6.3.3 High and Low temperature Storage 高低温存放	Low temperature test method: Put the part in chamber at $-40 \pm 2^{\circ}\text{C}$ for 24H. 低温测试方法：将产品放置在 $-40 \pm 2^{\circ}\text{C}$ 的低温箱内 24 小时 High temperature test methods: the product was placed in a high temperature box at $95 \pm 2^{\circ}\text{C}$ for 48 hours 高温测试方法：将产品放置在 $95 \pm 2^{\circ}\text{C}$ 的高温箱内 48 小时	After test 实验后: 1、Operating force and travel: $\pm 15\%$ of the specification value. 操作力, 行程变化范围: 规格值 $\pm 15\%$ . 2、Contact Resistance 接触电阻: $15\text{m } \Omega$ Max. 3、Range for the change of appearance and structure for switch should not be damaged. 外观结构不能有损坏现象											
6.3.4 Steady damp-heat 湿热恒定	Standard 标准: IEC60068-2-78 Temperature and humidity 温湿度: $40^{\circ}\text{C}$ , 93%RH; Test time 试验时间: 21 days; 工作模式: 最后 1h 工作模式 3.2, 其余时间 2.1; Working mode: 3.2 for the last 1H, 2.1 for the rest;  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">工作模式</th> <th style="width: 90%;">电气状态</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>1.1 DUT未连接到线束。</td> </tr> <tr> <td>1.2 DUT模拟在车辆上的安装位置, 连接到线束。</td> </tr> <tr> <td rowspan="2">2</td> <td>当车辆发动机关闭, 且所有电气连接完好, DUT以电压<math>U_0</math>带电运行。</td> </tr> <tr> <td>2.1 系统/组件不被激活 (如休眠模式)。 2.2 系统/组件带电运行并控制在典型运行模式。</td> </tr> <tr> <td rowspan="2">3</td> <td>所有电气件连接完好, DUT以电压<math>U_0</math>带电运行。</td> </tr> <tr> <td>3.1 系统/组件功能不被激活。 3.2 系统/组件带电运行并控制在典型运行模式。</td> </tr> </tbody> </table> <p style="font-size: small;">注: 在工作模式2.2或工作模式3.2是DUT的典型运行模式, 间歇性工作的电气零部件 (开关类) 按10次/h的频次操作 (或双方协商操作频次), 长时工作的电气零部件 (模块类) 按各模式转换一直工作。</p>	工作模式	电气状态	1	1.1 DUT未连接到线束。	1.2 DUT模拟在车辆上的安装位置, 连接到线束。	2	当车辆发动机关闭, 且所有电气连接完好, DUT以电压 $U_0$ 带电运行。	2.1 系统/组件不被激活 (如休眠模式)。 2.2 系统/组件带电运行并控制在典型运行模式。	3	所有电气件连接完好, DUT以电压 $U_0$ 带电运行。	3.1 系统/组件功能不被激活。 3.2 系统/组件带电运行并控制在典型运行模式。	After test 实验后: 1、Operating force and travel: $\pm 30\%$ of the specification value. 操作力, 行程变化范围: 规格值 $\pm 30\%$ . 2、Contact Resistance 接触电阻: $30\text{m } \Omega$ Max. 3、Range for the change of appearance and structure for switch should not be damaged. 开关外观及结构应无损坏
工作模式	电气状态												
1	1.1 DUT未连接到线束。												
	1.2 DUT模拟在车辆上的安装位置, 连接到线束。												
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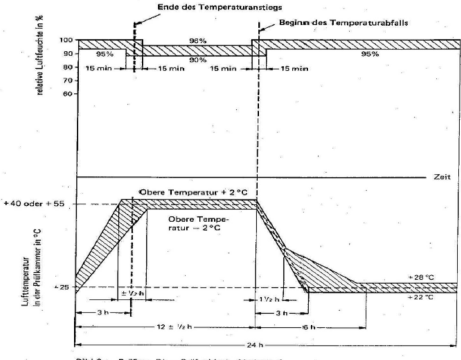
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10/13

## 6.3 使用耐久性能

Item 项目	Test Condition 测试条件	Requirements 要求
<p>6.3.5 Damp heat cycle 湿热循环</p>	<p>Standard 标准: IEC60068-2-30</p> <p>Voltage: <math>14 \pm 0.1V</math>. With testing load. One cycle: Increase the temperature in the test chamber evenly to <math>55 \pm 2</math> within <math>3H \pm 0.5H</math>. The relative humidity should not be lower than 90% except in the last 30min. In the period of temperature increase, the relative humidity should not be lowered than 95% (switch should not be actuated during the temperature increase).</p> <p>Keep the temperature within <math>55 \pm 2^\circ C</math>. From the beginning of the cycle to <math>12H \pm 0.5H</math>, the relative humidity should be <math>(93 \pm 3)\%</math> (please refer to the below for the period of stable temperature).</p> <p>Decrease from <math>55 \pm 2^\circ C</math> to <math>25 \pm 3^\circ C</math> within 3~6H. The humidity during this period should not be lower than 95% except within the first 30min (switch should not be actuated during temperature decrease). Finally, storage switch at <math>25 \pm 3^\circ C</math>, 95% relative humidity for 6H (switch not actuated). Test 6 cycles.</p> <p>方法: 电压 <math>14 \pm 0.1V</math>, 开关带试验负载, 在 <math>3H \pm 0.5H</math> 的时间内, 将试验箱内温度均匀连续升至 <math>55 \pm 2^\circ C</math>, 除最后 30min 内相对湿度不可以低于 90% 外, 升温阶段相对湿度应不低于 95% (升温期间不操作开关)。然后温度保持 <math>55 \pm 2^\circ C</math> 范围内, 直至从循环开始算起至 <math>12H \pm 0.5H</math> 为止, 相对湿度均为 <math>(93 \pm 3)\%</math>, (恒温期间, 操作如下)。再用 3 至 6H 的时间将温度从 <math>55 \pm 2^\circ C</math> 降至 <math>25 \pm 3^\circ C</math>, 这期间相对湿度除最初 30min 应不低于 90% 外, 其余阶段相对湿度应不低于 95% (降温期间不操作开关)。最后在 <math>25 \pm 3^\circ C</math>, 相对湿度应不低于 95% 的环境下, 存放 6H (不操作开关), 上述过程构成一个循环, 共计 6 次循环。</p>  <p>Bild 2s. Prüfung Dc - Prüfzyklus - Variante 1</p>	<p>After test 实验后:</p> <ol style="list-style-type: none"> <li>Operating force and travel: <math>\pm 30\%</math> of the specification value. 操作力, 行程变化范围: 规格值 <math>\pm 30\%</math>.</li> <li>Contact Resistance 接触电阻: <math>30m \Omega</math> Max.</li> <li>Range for the change of appearance and structure for switch should not be damaged. 开关外观及结构应无损坏</li> </ol>

操作要求:

每循环各档位停留 2s,  $55^\circ C$  时, 每隔 10 分钟工作 1 次, 每小时操作 6 次

Each position stops for 2s in each cycle. At  $55^\circ C$ , operate one time every 10min. Operate 6 times/H

# 规格承认书

规格书编号  
2024062802

品名

四向拨动开关总成

型号

SVDXA-02

11/13

## 6.3 使用耐久性能

Item 项目	Test Condition 测试条件	Requirements 要求
6.3.6 Thermo cyclin 温度交变测试	<p>Standard: ISO16750-4 5.3.1 Voltage DC12V and rated load connected to the switch;</p> <p>(1) 20℃→-40℃, 1 hour; -40℃, 1.5 hour; (2) -40℃→20℃, 1 hour; (3) 20℃→80℃, 1.5 hour; 80℃, 2 hour; (4) 80℃→20℃, 1 hour;</p> <p>The above process is one cycle. 30 cycles in total. (Loop connected based on actual application: one loop contains one normally open and one normally close. One loop needs four pins, such as 1、5、4、2)</p> <p>标准: IEC60068-2-14 开关接通电压 DC12V, 额定负载;</p> <p>(1) 20℃→-40℃, 1 小时; -40℃, 1.5 小时; (2) -40℃→20℃, 1 小时; (3) 20℃→80℃, 1.5 小时; 80℃, 2 小时; (4) 80℃→20℃, 1 小时;</p> <p>上述为 1 个循环, 共计 30 个循环。 (按实际应用情况接线, 一个回路包括一长通和一常闭, 即 1 个回路要接 4 个引脚, 如: 1、5、4、2)</p>	<p>After test 实验后:</p> <p>1、Operating force and travel:±30% of the specification value. 操作力, 行程变化范围: 规格值±30%.</p> <p>2、Contact Resistance 接触电阻: 30m Ω Max.</p> <p>3、Range for the change of appearance and structure for switch should not be damaged. 开关外观及结构应无损坏</p>
6.3.7 Salt spray test 盐雾试验	<p>Test method: per IEC60068-2-52, Test, Salt Mist and Thermo Cycling, put samples to salt mist chamber. A gap of Min. 10cm between each two samples. Start the chamber and spray mist for a continuous 2 hours. Stop spraying and put the samples in humid environment for 22 hours. The above process is one cycle. A continuous 3 cycles are needed. Take out the switch after the test and dry in ambient Environment. Test within one hour after air dry.</p> <p>方法: 根据《IEC60068-2-52, 试验 Kb, 盐雾, 交变》使用测试装置, 将试验样件放在盐雾试验箱中, 每只样品间隔应大于 10cm, 启动试验箱, 连续喷雾 2 个小时, 停止喷雾放置在潮湿环境中 22 个小时, 上述过程为一个循环, 连续 3 个循环。 试验后从试验箱中拿出开关在自然通风状态下风干, 风干后在 1 个小时内测试完成。</p>	<p>Pass function check during and after the test. No rust or other defects which affect soldering and function. 测试中和测试后, 产品需通过功能检查, 无生锈或其它影响焊接及性能的不良</p>

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12/13

## 6.4 其它

Item 项目	Test Condition 测试条件	Requirements 要求
6.4.1	Degree of Protection 防护等级  The single switch is only used for dustproof, with dustproof grade of IP5X Waterproof test needs to be tested together with customer's shell 单体开关只作防尘，防尘等级 IP5X 防水测试需要配合客户外壳一起实验	Electrical and mechanical performance should meet the requirement after the test 试验后电气性能及机械性能符合要求
6.4.2	ELV  IEC62321: 2008 Electronic and Electrical Product-Test Six Restricted Substances (Pb, Hg, Cd, Cr6+ PBBs,PBDEs) IEC62321: 2008《电子电气产品-测定六种限值物质（铅、汞、镉、六价铬、多溴联苯、多溴二苯醚）的浓度》	铅 Pb<1000mg/kg; 镉 Cd<100mg/kg; 汞 Hg<1000mg/kg; 六价铬 Cr6+<1000mg/kg; 多溴联苯 PBBs<1000mg/kg; 多溴二苯醚 PBDEs<1000mg/kg
6.4.3	Flame resistance 阻燃  Refer to GB/T 8410-2006 参考 GB/T 8410-2006	燃烧速度需≤ 100mm/min Combustion speed≤ 100mm/min

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13/13

## 7. Other precautions 其他注意事项:

- (1) Following the soldering process, do not try to clean the switch with a solvent or the like.  
进行焊接过程中，不可以用溶剂或类似品清洗开关
- (2) Safeguard the switch assembly against flux penetration from its topside.  
防止助焊剂从开关的顶端渗入
- (3) Please have the products keep in close status and the storage time is 90 days guaranty after delivering the goods at most.  
交货后保证开关处于封密状态并库存时间 90 天以下