

	产品规格书 Product Specification			编号 No: QR-SPC0012-1
	产品编码 Product No.	F512-0001	产品型号 Model	TM-1603

1. 通则 General Characteristics:

1.1 应用范围 Application range:

此产品规格书适用于五向轻触开关 TM-1603

This product specification is applied to the TM-1603 5-dir tact switch.

1.2 使用环境条件 Acclimatization:

使用温度范围 Operating Temperature range: -20°C~70°C

保存温度范围 Preservative Temperature range: -30°C~80°C

1.3 测试条件 Test Conditions:

若没有特别说明,则试验条件如下:

Unless otherwise specified, the atmospheric conditions for making measurements and tests are as follows:

温度 Temperature: 5~35°C

相对湿度 Relative Humidity:45~85%

气压 Air pressure:86~106Kpa

如对判定产生疑义, 则试验按以下条件进行 :

However, if doubt arises on the decision based on the measured values under the above mentioned conditions, the following conditions shall be employed:

温度 Temperature:20±2°C

相对湿度 Relative Humidity:65±5%

气压 Air pressure:86~106Kpa

2. 外观和安装尺寸 Appearance & Mounting Dimensions:

2.1 外观 Appearance:

产品外观良好,无破损、锈蚀、裂纹和镀层缺陷。

The switch shall have good finishing, and no rust, crack or plating defects.

2.2 安装尺寸 Mounting dimensions:

应符合产品外形图 F512-0001 的要求。

Refer to product appearance drawing No.:F512-0001.

3. 驱动方式 Operate Mode:

按钮式:中间方向和边上四个方向(如成品图 F512-0001 所示).

Push Button: Center and 4-directional (as assembly drawing F512-0001).

4. 回路方式 Circuit Mode:

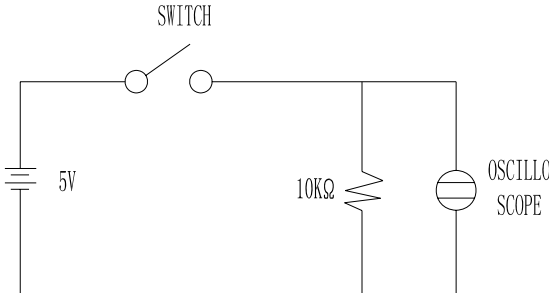
如成品图 F512-0001 所示(as assembly drawing F512-0001).

5. 额定负荷及寿命 Rating and Operating life.

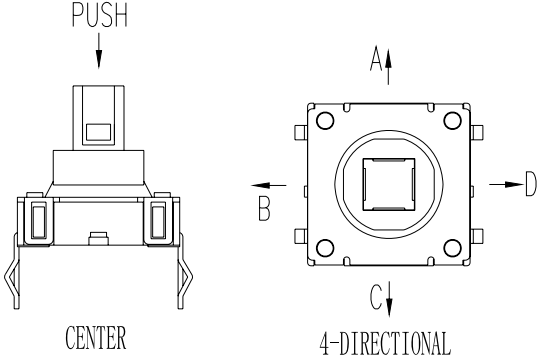
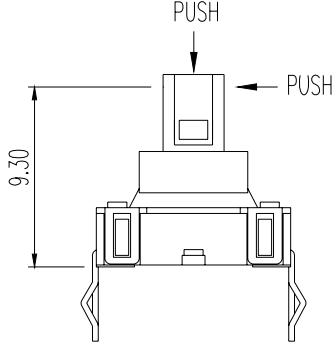
额定负荷 Rating : DC 12V, 50mA Max.

机械寿命 Operating life without load : 每方向 on each direction: 100,000 次.

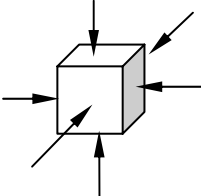
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6 电气性能 Electrical Characteristics		
项目 Item	测试条件 Test Method	标准 Criteria
6.1 接触电阻 Contact Resistance	以 <u>1A 5VDC</u> 或 <u>1KHZ±200HZ(20mv max. 50mA max)</u> 采用电压降法测量 Shall be measure at <u>1KHZ±200Hz</u> (20Mv Max, 50mA Max)or <u>1A,5V DC</u> by voltage drop method	常态 Normal <u>500mΩ</u> max 气候及寿命试验后 after weather and life proof: <u>1Ω</u> max
6.2 绝缘电阻 Insulation resistance	在相互绝缘的所有端子之间及各接线端子与外露的非载流金属零件之间加载 <u>100VDC</u> ，持续时间 <u>60±5 S</u> 。 100VDC Voltage is applied between each pair of terminals and between the terminal and the metal frame for <u>60±5S</u> .	常态 Normal <u>50MΩ</u> min 气候及寿命试验后 after weather and life proof: <u>5MΩ</u> min
6.3 抗电强度 Dielectric strength	在相互绝缘的所有接线端子之间加载 <u>100V 50~60HZ</u> 泄漏电流 10mA) 的交流电，各接线端子与外壳或非载流金属零件之间加载 <u>100V (50~60HZ 泄漏电流 10mA)</u> 交流电，持续时间 <u>60±5 S</u> <u>100V(50-60HZ)</u> 10mA alternate current load is applied between open terminals connected with wires or <u>100V(50-60HZ)</u> , 10mA alternate current load is applied between frame &terminal or between metal parts, for <u>60±5S</u> .	无击穿和飞弧现象 No dielectric breakdown shall occur.
6.4 弹跳 Bounce	开关在正常的操作条件下 (3~4 次/秒)，测试通断弹跳时间。 Lightly striking the center of the stem at a rate encountered in normal use (3 to 4 operations per sec.) bounce shall be tested at 'ON' and 'OFF'. 	10 ms max.

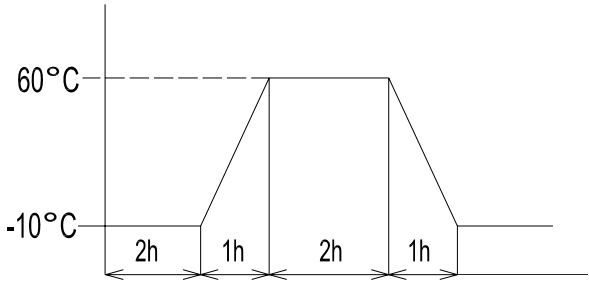
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7 机械性能 Mechanical Characteristics		
项目 Item	测试条件 Test Method	标准 Criteria
7.1 操作力 Operating Force	<p>按规定的操作方法给操作柄施加压力 Push by recommended operating condition.</p> 	中间方向 center: 320±100 gf 边上四个方向 4-directional:160±50gf
7.2 行程 Travels	<p>开关发生转换后,操作元件末端与初始位置之间的距离。 Distance from the end of operating component to the start position when switch is being transformed .</p> 	中心正按 Center push: 0.15±0.10 mm 四边侧按 4-dir leaning: 0.25±0.10 mm
7.3 操作件强度 Operating Part Strength	<p>置开关于正常安装位置,在操作件中心施加与操作件动作相同方向的 <u>5</u>kgf 静负荷,时间为 <u>60</u> S。 Put the switch in the normal gearing position, Bring <u>5</u> kgf pressure which direction is similar to the actuator operates direction in the tip of the actuator center, time is <u>60</u>S.</p>	无机械和电气损伤。 The switch shall be free from abnormalities in electric and mechanism.
7.4 接线端强度 Terminal Strength	<p>以 500gf 作用力在轴向方向逐渐施加于接线端末端,作用力方向为离开开关向外指向,时间为 <u>60</u> S,每个接线端测量一次。 A static load of 500gf shall be applied to the tip of terminal in a desired direction for 60Ssec,The test shall be done once per terminal.</p>	无机械和电气损伤。 The switch shall be free from abnormalities in electric and mechanism.

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<p>7.5 振动 Vibration Proof</p>	<p>开关采用常规安装方法牢固地安装在试验设备上，按下述参数进行试验：</p> <ol style="list-style-type: none"> 1) 振频:10~55HZ 2) 振幅:1.5 mm 3) 振动变化速率:10~55~10HZ 大约 1 分钟 4) 变频方法:线形方式 5) 振动方向:三个互相垂直的方向，其中一个方向为操作元件运动的方向。 <p>Switch shall be secured to a testing machine by a normal mounting device and method, Switch shall be measured after following test:</p> <ol style="list-style-type: none"> 1) Vibration frequency range:10~5HZ 2) Total amplitude:1.5mm 3) Sweep ratio:10~55~10Hz,Approx 1 minute 4) Method of changing the sweep vibration frequency : linear 5) Direction of vibration : Three perpendicular directions including actuating direction. 	<p>符合第 6.1、6.2、6.3 第 7.1 条要求。 According to item 6.1、6.2、6.3 and 7.1 to examine.</p>
<p>7.6 冲击 Impact shock test</p>	<ol style="list-style-type: none"> 1) 加速度 Acceleration: 80G 2) 冲击次数：六个方向 3 次，共 18 次 Cycle of test: 3 cycles each in 6 directions, for a total 18 cycles. 	<p>符合第 6.1、6.2、6.3 第 7.1 条要求。 According to item 6.1、6.2、6.3 and 7.1 to examine.</p>
<p>7.7 耐焊接热 Solder Heat Resistance</p>	<p>试件在下述条件下进行试验： 焊槽试验：</p> <ol style="list-style-type: none"> 1) 焊接温度:300±5℃； 2) 焊接时间:5±1 S； 3) 熔锡面积：PCB 板厚度的一半 PCB: t=1.6)。 <p>Switch shall be checked after following test: Solder trough test:</p> <ol style="list-style-type: none"> 1) Soldering temperature: 300±5℃； 2) Soldering time:5±1S； 3) Soldering area, t/2 of PCB thickness (PCB: t=1.6) 	<p>无机械和电气损伤。 The switch shall be free from abnormalities in electric and mechanism.</p>
<p>7.8 可焊性 Solder Ability</p>	<ol style="list-style-type: none"> 1) 涂上助焊剂 2) 温度：260±5℃ 3) 焊接时间：2±0.5S <ol style="list-style-type: none"> 1) Spread on flux 2) Soldering temperature: 260±5℃ 3) Soldering time: 2±0.5S 	<p>超过 90%的焊锡面积被焊料覆盖。 More than 90% of surface area of the portion immersed shall be covered with solder.</p>

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8 耐候试验 Weather Proof Characteristics		
项目 Item	测试条件 Test method	标准 Criteria
8.1 低温 Cold Proof	<p>试件在 $-30\pm 2^{\circ}\text{C}$ 的温控箱内保持 96 小时，然后在正常温度和湿度下恢复 1 小时，并在此后的 1 小时内对试件进行测量，水滴应消失。</p> <p>After testing at $-30\pm 2^{\circ}\text{C}$ for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made with 1 hour after that, water drops shall be eliminated.</p>	<p>符合第 6.1、6.2、6.3 和第 7.1 条要求。</p> <p>According to item 6.1、6.2、6.3 and 7.1 to examine.</p>
8.2 高温 Hot Proof	<p>试件在 $80\pm 2^{\circ}\text{C}$ 的温控箱内保持 96 小时，然后在正常温度和湿度下恢复 1 小时，并在此后的 1 小时内对试件进行测量，水滴应消失。</p> <p>After testing at $80\pm 2^{\circ}\text{C}$ for 96 hours the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour and measurement shall be made with 1 hour after that, water drops shall be eliminated.</p>	
8.3 恒定湿热 Moisture Resistance	<p>试件在 $60\pm 2^{\circ}\text{C}$, 90~95%RH 的温控箱内保持 96 小时，然后在正常温度和湿度下恢复 1 小时，并在此后的 1 小时内对试件进行测量，水滴应消失。</p> <p>After testing at $60\pm 2^{\circ}\text{C}$, 90-95%RH for 96 hours ,the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that .Water drops shall be eliminated.</p>	
8.4 温度转换 Temperature Cycling	<p>试件按下述试验条件试验 5 个循环，然后在正常温度和湿度下恢复 1 小时，并在此后的 1 小时内对试件进行测量，水滴应消失。</p> <p>After 5 cycles of following conditions, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour after that .Water drops shall be eliminated.</p> 	

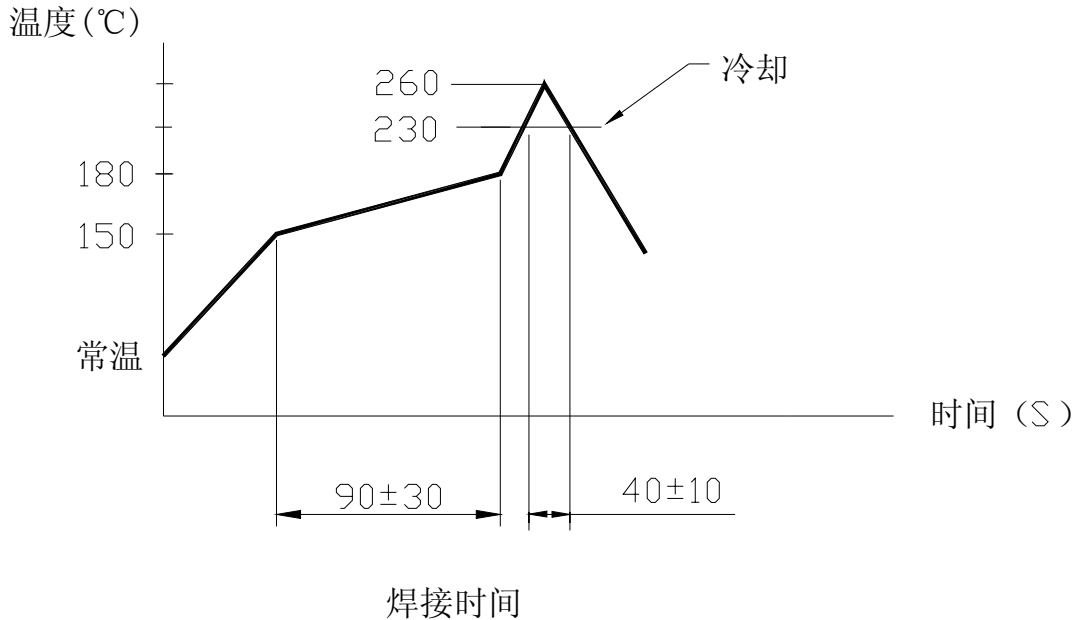
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9 耐久性试验 Durability Characteristics

项目 Item	测试条件 Test method	标准 Criteria
9.1 寿命试验 Operating Life	1) 在不带负荷的条件下, 在寿命测试设备上连续转换 <u>100,000</u> 次, 频率:60 次/分钟。操作力为规格值的最大值 1) <u>100,000</u> cycles of operation shall be performed continuously cycles without load at a rate of 60 cycles per minute. Push force: Maximum value of operation force.	动作力: 初始值的±30%。 Operating force : within <u>±30%</u> initialization value. 弹跳 10 ms max Bounce 10 m sec max 其余符合第 6.1、6.2、6.3、7.1 条 Etceteras according to item 6.1、6.2、6.3 and 7.1 to examine.

10. 焊接条件 Soldering conditions

10.1 推荐的回流焊温度曲线 Recommended temperature curve for reflow process. (2cycles)



10.2 手动焊接条件 manual soldering conditions:

- 1) 焊接温度 temperature : 350±5°C
- 2) 焊接时间 time: 3sec max