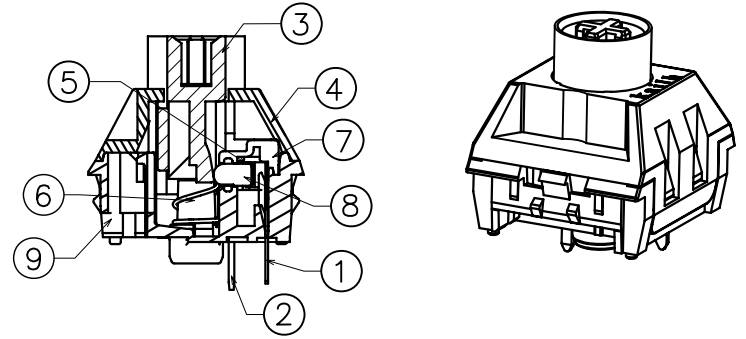
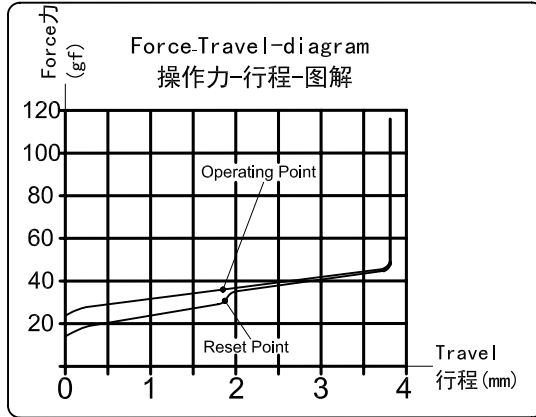
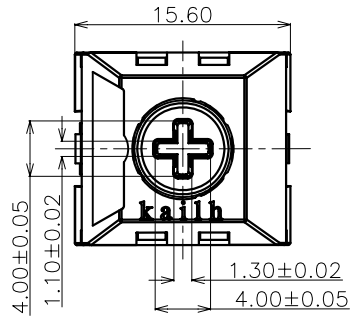


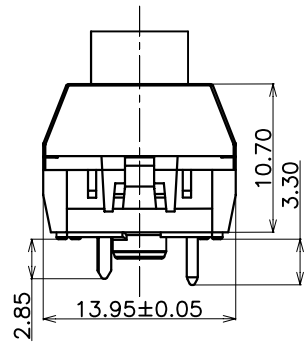
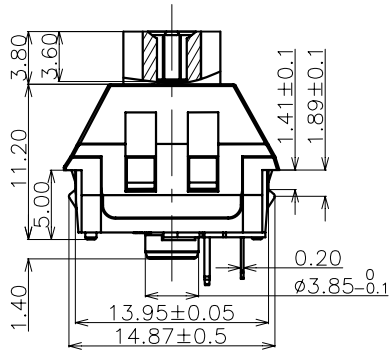
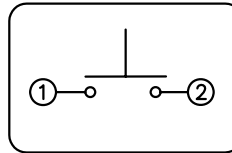
ABIDE BY ROHS

linear Silent Shaft

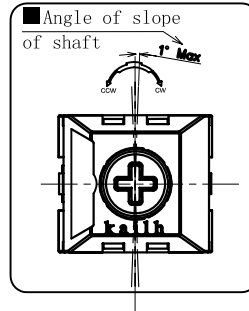
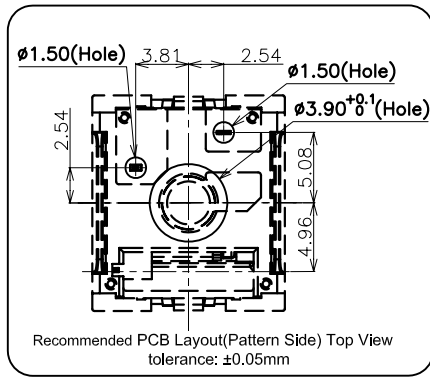
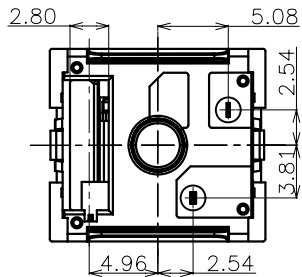


- Specification :
- 1. Rating: 12 VAC/DC max. 2 VDC min.  
10mA AC/DC max. 10  $\mu$ A DC min.
  - 2. Contact Resistance: 200m $\Omega$  Max
  - 3. Insulation Resistance: 100M $\Omega$  Min. (DC100V)
  - 4. Withstand Voltage: AC100V(50-60Hz) for 1 minute
  - 5. Operation Force: 35 $\pm$ 10gf
  - 6. Return Force:  $\geq$ 15gf
  - 7. Conduction travel: 1.80 $\pm$ 0.4mm
  - 8. Total travel: 3.60 $\pm$ 0.4mm
  - 9. Electrical Life: 80,000,000 Cycles(min).
  - 10. Degree of protection: IP52(excluding the terminals, samples should be applied to products that meet the corresponding protection level)  
<Feel is allowed to have difference before and after life test>

■ SWITCH FUNCTION



B



⑨	Base	—	1	PA66	White	—
⑧	Slider	—	1	POM	Green	—
⑦	Protecting Cover	—	1	PA66	Nature	—
⑥	Spring	—	1	Stainless Steel	Nature	—
⑤	Contact	—	2	Composite gold	—	—
④	Cover	—	1	PC	Nature	—
③	Keystroke	—	1	POM/TPE	Pink	—
②	Static Plate	—	1	Copper Alloy	Nature	—
①	Movable Plate	—	1	Copper Alloy	Nature	—
ITEM	PART NAME	TER'NO.	QTY.	MATERIAL	FINISHING	REMARK

APPROVALS		DATE		DONGGUAN CITY KAIHUA ELECTRONICS CO.,LTD Kailh		
DRAWN	L.Zhang	2019.12.17				
CHECKED				TITLE:	PG1511F Linear Silent Keystroke Switch	
APPROVALS				PART NO.	CPG1511F01S37	
TOLERANCES ARE				ANGLE	UNIT: mm	SCALE: 1:1
30<L 30 ±0.30 10<L 30 ±0.20 5<L 10 ±0.15 L≤5 ±0.10				±2'	DRAWING NO.	PROJ:
						SHEET 1 OF 1

ECN NO.	REV.	DATE.
	A	2020.03.19

NEW			L.Zhang		
DESCRIPTION.			CHANGE.	CHECK.	APPRO.

4

3

2

1

D

C

B

A

D

C

B

A



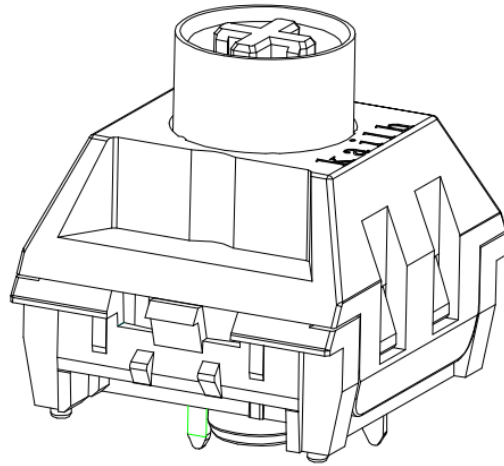
**凱華電子**  
KAIHUA EEELETRONICS

Document Number:

**KH-PS1912-19**

# 产品规格书

## Product Specification



**Linear Silent Shaft**  
(线性静音轴 35gf)

P/N: <b>CPG1511F01S37</b>			Title : <b>PG1511F Keyboard Switch</b>		
Rev.	ECN	Release and Revision Description:	Prepared By /Date:	Checked By/Date:	Approved By/Date:
<b>A</b>	— —	New releasing 初版发行	张林/2019.12.17	张林/2020.03.20	吕攀豪/2020.03.20



P/N: CPG1511F01S37	DOC. No.: KH-PS1912-19	Rev.: A	Page: 2/11
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**1. Scope/范围:**

This Product Specification covers the requirement of Mechanical Keyboard switch on product performance, test methods and quality assurance provisions.

本规格书内容涵盖机械键盘开关产品的要求，包括性能指标、测试方法及质量保证方面等。

**2. Product Application/产品应用:**

Mainly applied on computer keyboards, cash registers, industrial equipment and Man-Machine interface.

主要适用于电脑键盘，收银机、工业设备和人机界面。

**3. Technology Parameters/技术参数**

Ambient Humidity 工作湿度: 45~85% R.H.;

Operating Temperature Range 使用温度范围: -10°C ~ +70°C;

Storage Temperature Range 保存温度范围: -20°C ~ +70°C;

Suggested storage period 贮存期限: about 6 months 最多 6 个月

Require the tin part on the switch terminals should keep good after storage guarantee date  
要求贮存期后开关端子部分上锡仍然良好。

Normal Condition:

Ambient temperature 环境温度: 20±2°C

Relative humidity 相对湿度: 65%±5% R.H.;

Air pressure 气压: 86~101KPa;

**4. Ratings/额定性能要求**

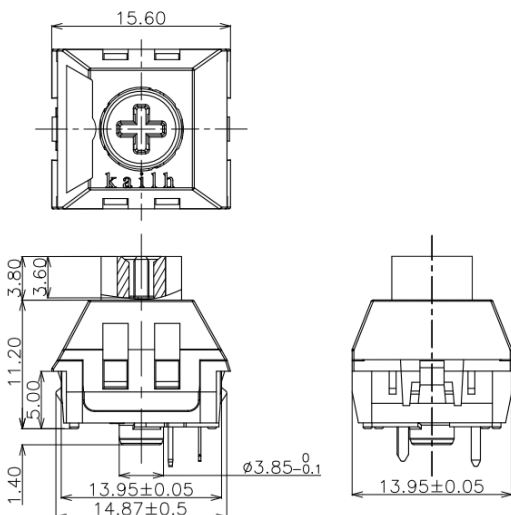
Rating 额定负荷: 12V AC/DC max. 2V DC min.  
10mA AC/DC max. 10 μ A DC min.;

Insulation Resistance 绝缘电阻: ≥100MΩ/DC 100V;

Withstand Voltage 耐电压: 100 AC 1 Minute;

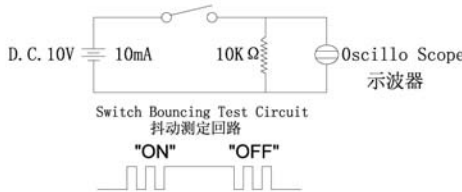
Mechanical Life 机械寿命: 80,000,000 Cycles.

**5. Profile Dimensions /外形尺寸**



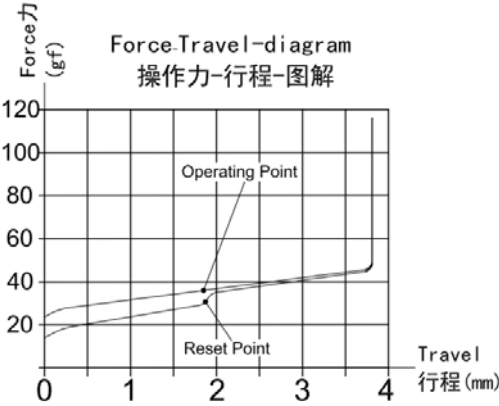
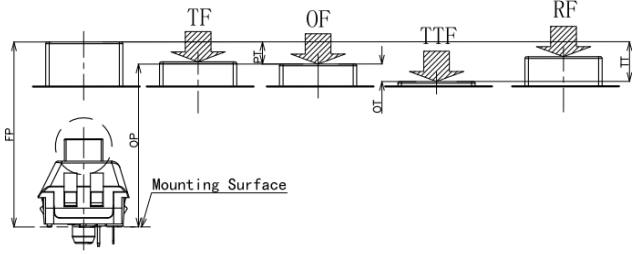
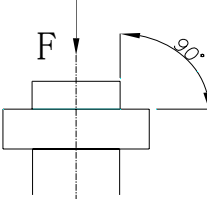


**6. Electrical Performance/电气性能**

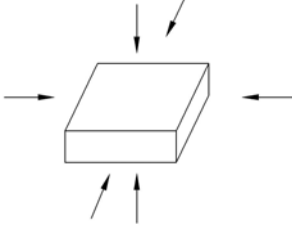
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
6.1	Contact Resistance 接触电阻	<p>Static load: (Operation force)x2, which is applied on the center of Switch stem. Be measured when the switch contact stabilization. 静态负载: 动作力的 2 倍, 施加在手柄中心. 开关接触稳定时量测.</p> <p>Measurement tool: Contact resistance Meter. 测量工具: 微电流接触电阻计(1KHz, 20mV, 5~50mA)</p> <p>Measured at low current (100mA or less). 在低电流 (≤100mA) 条件下测试.</p>	<p>200mΩ Max 200mΩ 以下</p>
6.2	Insulation Resistance 绝缘电阻	<p>Apply a Voltage of DC 100 V for 1 minute, according to the below method. (1) Between terminals. (2) Between terminal and Body.</p> <p>输入 100V DC 电压 1 分钟, 按如下接触方法测试: (1) 端子与端子之间. (2) 端子与外壳之间.</p>	<p>100MΩ Min 100 兆欧以上</p>
6.3	Dielectric withstanding voltage 耐电压	<p>Apply a Voltage of AC100 V (50~60Hz) for 1 minute, according to the below method. (1) Between terminals. (2) Between terminal and Body.</p> <p>输入 100V AC 电压 1 分钟, 按如下接触方法测试: (1) 端子与端子之间. (2) 端子与外壳之间.</p>	<p>No evidence of breakdown 无瞬断、击穿等破坏.</p>
6.4	Bouncing 触点抖动	<p>Operation speed: 3~4 times/s 操作速度: 每秒 3~4 次</p> <p>Oscillo scope 示波器 Switch Bouncing Test Circuit 抖动测定回路.</p> 	<p>Before Life cycle: On: 5ms MAX, 5 毫秒以下 Off: 5ms MAX, 5 毫秒以下</p> <p>After Life cycle: On: 10ms MAX, 10 毫秒以下 Off: 10ms MAX, 10 毫秒以下</p>

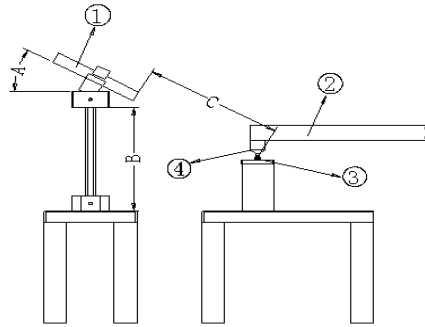


**7. Mechanical Performance/机械性能**

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
7.1	Load Curve 荷重曲线	<p>Place the vertical direction of switch operation and gradually increase the load applied to the center of the stem until it stop. 开关的动作方向为垂直放置，向手柄中心逐渐施加负荷直到停止。</p>  <p style="text-align: center;">Force-Travel-diagram 操作力-行程-图解</p>	See page 10 见第 10 页
7.2	Loading parameter 荷重参数	<p>Place the vertical direction of switch operation and gradually increase the load applied to the center of the stem until it stop. 开关的动作方向为垂直放置，向手柄中心逐渐施加负荷直到停止。</p> 	See page 10 见第 10 页
7.3	Static Strength 静止强度	<p>A static load of 3kgf shall be applied in the direction of button operation for a period of 60 seconds. 在手柄动作方向施加 3kgf 的静负荷 60 秒，然后测试参数。</p> 	No damage (Electrical) And mechanical) 电气和机械性能正常。



7.4	<b>Stem Pull Strength</b> 手柄拉拔强度	Break by a pull force applied opposite to the direction of stem operation. 在推柄动作方向反向垂直施加拉力，使其破坏的程度。	5kgf Min
7.5	<b>Shock</b> 机械冲击	Measured by according to the below condition: (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。 	Shall meet No.6, 7.1, 7.2. 满足 6, 7.1, 7.2 要求。
7.6	<b>Life Test</b> 寿命测试	1) D.C. 12V 10mA resistance load D.C 12V 10mA 电阻负荷 2) Operation speed: 5-6 times / s 动作速度: 5-6 次/ 秒 3) Push force: 150gf 按力: 150gf 5) Push travel: 3.6mm 按压行程: 3.6mm 6) Operation number: 80,000,000cycles 动作次数: 80,000,000 次	Contact resistance: 1Ω Max 接触电阻: 1 欧以下 Bouncing: 10ms Max 触点抖动: 10 毫秒以下 Operation force: Variation rate within ±30% 操作力的变化范围在初始值的±30%以内。
7.7	<b>Noise Test</b> 噪音测试	1、Decibel meter model : BK2250-L 分贝仪型号: BK2250-L 2、background noise: 10 dB Max 背景噪音: 10 dB Max 3、Metal strip to click product 3 times per second for 10 seconds, to maximize the noise test results by dB 金属头按击产品每秒 3 次持续 10 秒，测试结果取噪音最大值 dB	40 分贝 MAX



A=麦克风角度: 30°  
 B=麦克风摆放高度: 135mm  
 C=麦克风与产品距离: 150mm

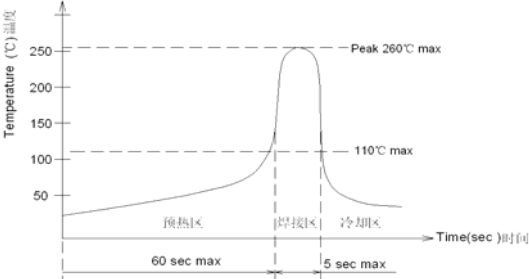
①: 麦克风  
 ②: 按压传动杆  
 ③: 测试产品  
 ④: 金属按压头

**8. Environmental Performance/环境性能**

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求												
8.1	Cold test 耐寒性	(1) Temperature : $-20 \pm 2^{\circ}\text{C}$ 温度: $-20 \pm 2^{\circ}\text{C}$ (2) Duration of test: 48h 持续时间: 48 小时 (3) Take off a drop water 去掉水珠 (4) Standard conditions after test : 1h 试验后的放置条件: 1 小时	Contact resistance: 200mΩ Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200mΩ 以下 满足: No. 6.2 to 6.4 No. 7.1 to 7.2												
8.2	Heat test 耐热性	(1) Temperature : $70 \pm 2^{\circ}\text{C}$ 温度: $70 \pm 2^{\circ}\text{C}$ (2) Duration of test: 48h 持续时间: 48 小时 (3) Take off a drop water 去掉水珠 (4) Standard conditions after test : 1h 试验后的放置条件: 1 小时	Contact resistance: 200mΩ Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200mΩ 以下 满足: No. 6.2 to 6.4 No. 7.1 to 7.2												
8.3	Temperature cycle 温度循环	(1) Test cycles: 5 cycles 试验周期: 5 个周期 (2) Standard condition after test: 1h 试验后的放置条件: 1 小时 <table border="1" style="margin-top: 10px;"> <thead> <tr> <th></th> <th>Temperature 温度</th> <th>Duration of test 持续时间</th> </tr> </thead> <tbody> <tr> <td rowspan="4">1 cycle 一次循环</td> <td><math>20 \pm 5^{\circ}\text{C}</math></td> <td>1h</td> </tr> <tr> <td><math>-20 \pm 5^{\circ}\text{C}</math></td> <td>1h</td> </tr> <tr> <td><math>20 \pm 5^{\circ}\text{C}</math></td> <td>1h</td> </tr> <tr> <td><math>70 \pm 5^{\circ}\text{C}</math></td> <td>1h</td> </tr> </tbody> </table>		Temperature 温度	Duration of test 持续时间	1 cycle 一次循环	$20 \pm 5^{\circ}\text{C}$	1h	$-20 \pm 5^{\circ}\text{C}$	1h	$20 \pm 5^{\circ}\text{C}$	1h	$70 \pm 5^{\circ}\text{C}$	1h	Contact resistance: 200mΩ Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200mΩ 以下 满足: No. 6.2 to 6.4 No. 7.1 to 7.2
	Temperature 温度	Duration of test 持续时间													
1 cycle 一次循环	$20 \pm 5^{\circ}\text{C}$	1h													
	$-20 \pm 5^{\circ}\text{C}$	1h													
	$20 \pm 5^{\circ}\text{C}$	1h													
	$70 \pm 5^{\circ}\text{C}$	1h													





8.4	Soldering heat test 耐焊接热	Soldering area: T/2 of PWB thickness. (PWB: T=1.6mm) 焊接面积: 印刷基板的 1/2 厚度处 Soldering temperature: 260±5°C Soldering time: 3±0.5s 焊接温度: 260±5°C 焊接时间: 3±0.5 秒	Appearance: No abnormality. 外观无异常
8.5	Solder ability 可焊性	<p>1. Hand soldering 手工焊接: Please practice according to below condition: (1) Soldering Temperature : 350±5°C 焊接温度: 350±5°C (2) Continual soldering time: 3±0.5s 连续焊接时间: 3±0.5 秒 (1) Capacity of soldering iron: ≤20w 电烙铁功率: 20 瓦以下</p> <p>2. Automatic PIP soldering 自动插板焊接: For the product of T/H according to below condition: <b>波峰焊温度曲线图(单波峰)</b></p> 	At least 95% of surface area of immersed portion shall be covered by solder. 浸焊面积大于 95%以上.
8.6	Humidity test 耐湿性	<p>(1) Temperature : 60±2°C 温度: 60±2°C (2) relative humidity: 90~95% R.H. 相对湿度:90~95% R.H. (3) Duration of test: 48h 持续时间: 48 小时 (4) Take off a drop water 去掉水珠 (5) Standard conditions after test: 1h 试验后的放置条件: 1 小时</p>	Contact resistance: 200mΩ Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200mΩ 以下 满足: No. 6.2 to 6.4 No. 7.1 to 7.2

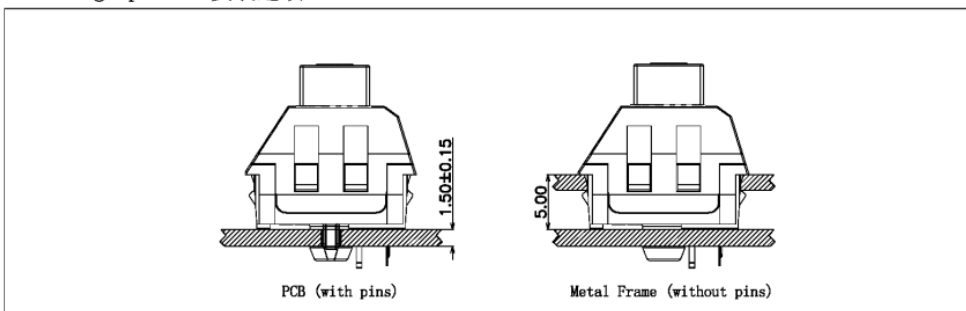


<b>P/N:</b> CPG1511F01S37	<b>DOC. No.:</b> KH-PS1912-19	<b>Rev.:</b> A	<b>Page:</b> 9/11
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8.7	Salt Spray 盐雾测试	<p>Apply the following environment to test(Only for contact test) : 根据下列条件进行测试(仅针对触点测试):</p> <p>(1) Temperature : 35±5°C 温度: 35±5°C;</p> <p>(2) Salt water density: 5±1% 盐水浓度: 5±1%;</p> <p>(3) Duration: 12hours 持续时间: 12 小时;</p> <p>(4) After test, the salt deposit shall be removed by running water. 实验后将盐沉积物用水冲掉</p>	<p>Appearance: No corrosion spot, no crack, no base plate naked. 外观: 无腐蚀点,无裂纹,无裸露基材.</p> <p>Contact Resistance: 200 mΩ Max 接触电阻: 200 毫欧以下</p>
8.8	Protection Against ingress of dust(IP5X) 防尘	<p>The switches are placed in a position of normal use inside the test chamber. The test is carried out according to the second enclosure of IEC60529/GB4208. The test shall be continued for a period of 8h.</p> <p>测试样品以正常使用位置在防尘箱中安装; 按 IEC60529 或 GB4208 防护标准测试条件进行试验; 试验应持续 8 小时;</p>	<p>After test: Operating is normal Between terminals, terminal and surface of the crust, Dielectric withstand in voltage ≥100V</p> <p>动作正常; 端子之间及端子与外壳表面耐电压强度≥100V</p>
8.9	Protection against ingress of water(IPX2) 防水	<p>The switches are placed in a position of normal use inside the test table. The test is carried out according to the second enclosure of IEC60529/GB4208.</p> <p>测试样品以正常使用位置在防尘箱中安装; 按 IEC60529 或 GB4208 防护标准测试条件进行试验;</p>	<p>After test: Operating is normal. Water don't enter electric parts of the switch inside. Between terminals, terminal and surface of the crust, Dielectric withstand in voltage ≥100V</p> <p>动作正常; 水不能进入开关内带电部份 端子之间及端子与外壳表面耐电压强度≥100V</p>

**9. Recommended PCB Layout 推荐的 PCB 安装焊盘规格**

Mounting Options 安装选项

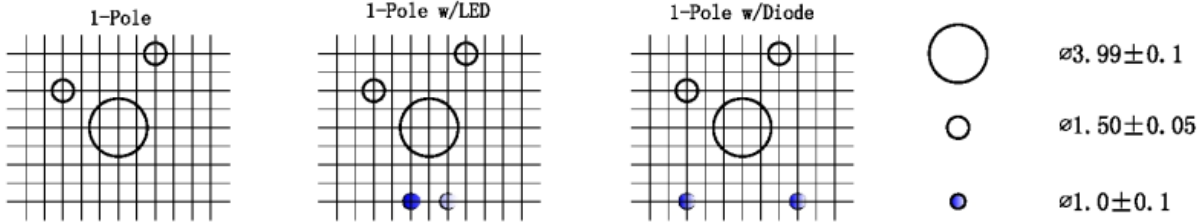




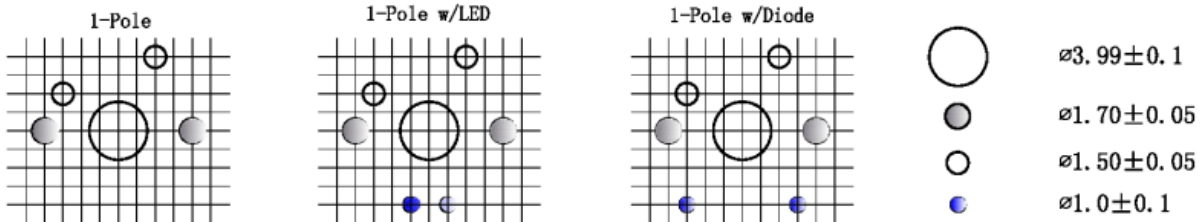
**Circuit Board Layouts 电路板布局**

Grid line spacing = 1.27mm 网格线间距= 1.27毫米

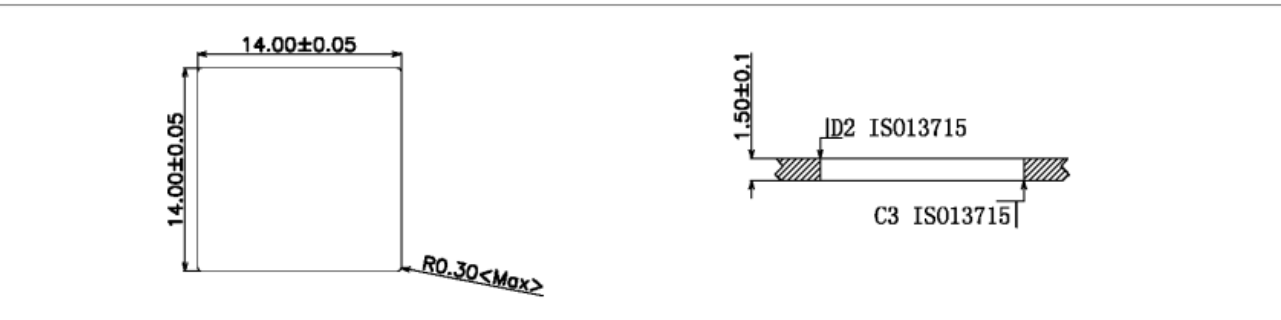
Keyswitch without fixation pins  
按键开关不带定位柱



Keyswitch with fixation pins  
按键开关带定位柱



**Metal Frame Cutout Dimensions**



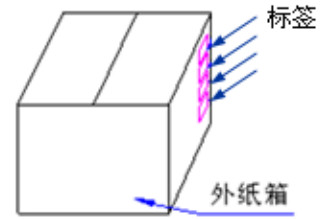
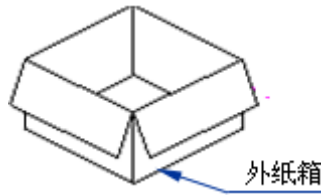
**10. Loading Parameter (TT/PT/OT /OF/TF/RF) Specification 荷重参数规格：**

Parameter	Unit	Specification	Remark
TT(总行程)	mm	3.60±0.3	
PT(导通行程)	mm	1.80±0.4	
OT(过行程)	mm	1.30	Min.
OF(动作力)	gf	35±10	
RF(回弹力)	gf	15	Min.

**11. Packaging 包装**

**Packaging type: Tray, 1000Pcs/Tray, 4000Pcs/Carton.**

**包装方式: Tray 盘,1000Pcs/盘, 4000Pcs/箱.**



**12.Precaution 注意事项**

**12.1 Immersion Soldering condition 浸焊条件**

ITEM 项目	CONDITION 条件
Preheat temperature 预热温度	110°C Max (Ambient temperature of soldering surface of P.W.B) 110°C 以下(印刷基板焊锡面周围的温度)
Preheat time 预热时间	60s, Max 60 秒以内
Area of flux 助焊剂面积	1/2 Max of PWB Thickness 印刷基板厚度的 1/2 以内
Temperature of solder 焊锡温度	260±5°C 260±5°C
Time of immersion 浸焊时间	3s±0.5s 3s±0.5s
Number of soldering 焊接次数	2time Max (But should down heat of the first soldering) 2 次以内
Printed wiring board 印刷基板	Single side copper-clad laminates 单面铜箔

- (1) After switches were soldered, please be careful not to clean switches with solvent  
开关浸焊后,注意不要用溶剂清洗.
- (2) Under the condition of using soldering iron, soldering temperature shall be 350°C±5°C with 3±0.5s.  
在使用烙铁的情况下,焊锡温度应在350°C±5°C,焊接时间3±0.5秒.

**12.2 Notes 注意点**

- (1) Please be cautious not to give excessive static load or shock to switches.  
注意不要施加超负荷的压力或晃动开关.
- (2) Please be careful not to stack up P. W. B. after switches were soldered.  
开关焊接以后,印刷基板注意不要叠放.
- (3) Preservation under high temperature and high humidity or corrosive gas should be avoided  
Especially. When you need to preserve for a long period, do not open the carton.  
保管时尤其应注意避开高湿高温和有腐蚀性气体的环境.如需长时间保存,请不要打开包装箱.
- (4) Products meet the ROHS & REACH environmental management substances control standards  
产品满足 **ROHS & REACH** 环境管理物质管制标准