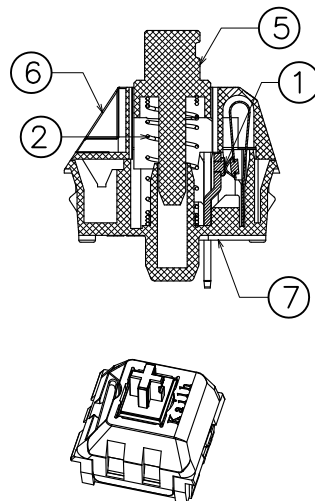
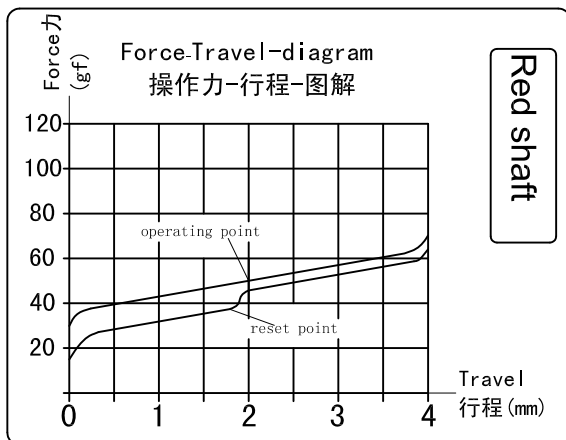
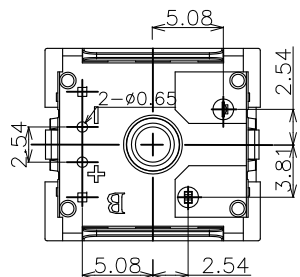
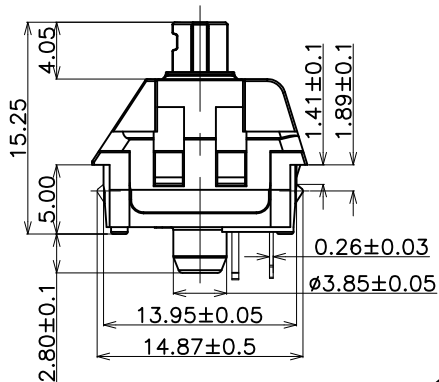
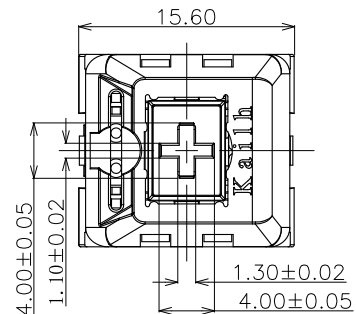


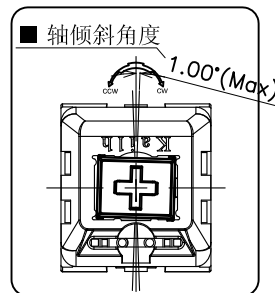
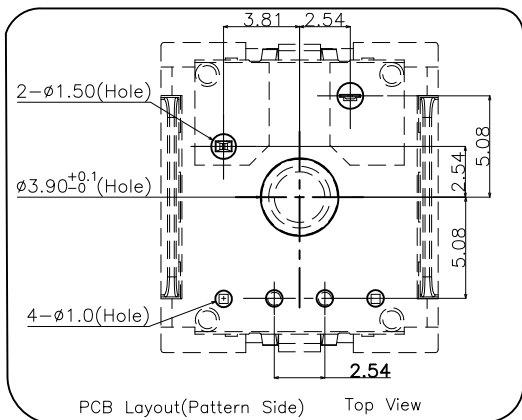
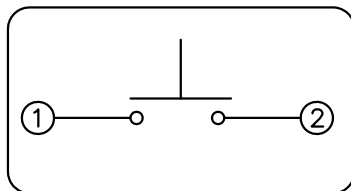
ABIDE BY ROHS & REACH

红轴



- 产品规格:
- 1. 额定值: 12V AC/DC max. 2V DC min. 10mA AC/DC max. 10µA DC min.
 - 2. 接触阻抗: 100毫欧 最大
 - 3. 绝缘阻抗: 100兆欧 最小 (DC500V)
 - 4. 耐高压: 交流100伏 (50-60赫兹) 持续 1 分钟
 - 5. 抖动时间: ≤5msec (3-4次/秒. 按压速度)
 - 6. 操作力: 50 ± 10gf
 - 7. 导通行程: 1.9mm ± 0.5 (PT)
 - 8. 全行程: 4.0^{+0.10}_{-0.4mm} (E)
 - 9. 操作寿命: 7000万次以上
 - 10. 该产品需符合凯华环境有害物质管制标准

■ SWITCH FUNCTION



明细表:

序号	物料料号	零件名称	端子料号	用量	材料	镀层/颜色	备注
7	BSPG1511-02005	4#基座	—	1	Nylon	黑色	—
6	BSPG1511-04005	5#盖子	—	1	Nylon	黑色	—
5	BSPG1511-05003	红导芯	—	1	poM	红色	—
4	BZPG1511-01020	6#动片	—	1	Copper Alloy	—	—
3	BZPG1511-01017	3#静片	—	1	Brass	—	—
2	BWPG1511-03002	B款弹簧	—	1	Stainless Steel	—	—
1	BWPG1511-09010	焊点金线	—	2	—	—	—

NOTE:

- ◇: CPK重点管控尺寸, 一般1到3个, 最多不超过5个, 每次进料及生产均需量测
 - △: 重点管控尺寸, 序列号排列不得超过17个, 每次进料及生产时均需量测
 - △: 一般尺寸, 个数不限, 每次模具变动时才需量测
- 版次定义: 新开发而未转量产之产品图面版次为A₀、A₁、A₂……
已转量产之产品图面版次为A、B、C……

承认	日期	东莞市凯华电子有限公司 DONGGUAN CITY KAIHUA ELECTRONICS CO.,LTD	名称	PG1511 按键开关 (红轴)										
设计	汤佳		2016.11.02	料号	CPG151101D93									
审核			单位	mm										
核准			比例	1:1										
			视角											
工程变更单号	版次	日期	说明	修改										
				核准										
			未注尺寸公差	<table border="1"> <tr> <td>30<L</td> <td>±0.30</td> <td rowspan="2">角度</td> </tr> <tr> <td>10<L≤30</td> <td>±0.20</td> </tr> <tr> <td>5<L≤10</td> <td>±0.15</td> <td rowspan="2">±2'</td> </tr> <tr> <td>L≤5</td> <td>±0.10</td> </tr> </table>	30<L	±0.30	角度	10<L≤30	±0.20	5<L≤10	±0.15	±2'	L≤5	±0.10
30<L	±0.30	角度												
10<L≤30	±0.20													
5<L≤10	±0.15	±2'												
L≤5	±0.10													
			图号:	KHA-PG1511-045										
			页次	1 OF 1										

A

A

B

B

C

C

D

D

5

4

3

2

1

4

3

2

1



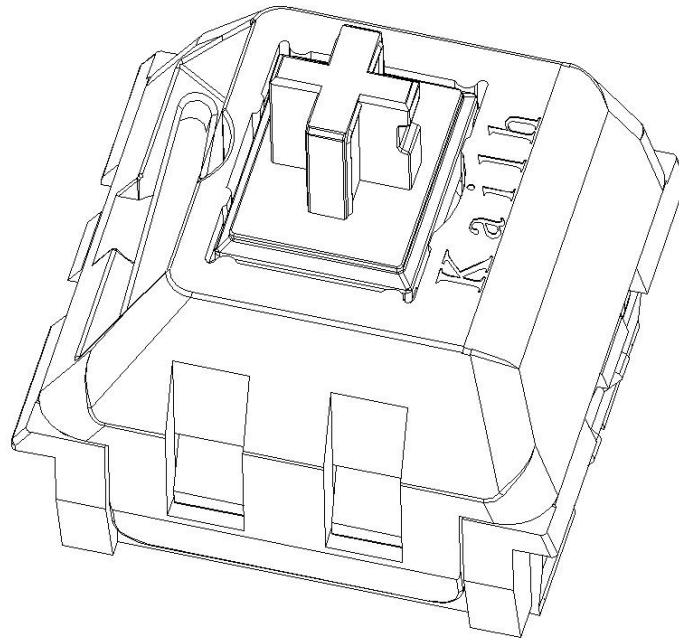
凱華電子
KAIHUA ELETRONICS

Document Number:

KH-PS1609-77

产品规格书

Product Specification



P/N: CPG151101D93			Title : PG1511 Keyboard Switch		
Rev.	ECN	Release and Revision Description:	Prepared By /Date:	Checked By/Date:	Approved By/Date:
A	— —	New releasing 初版发行	汤佳 2016/11/10	胡远锋 2016/11/10	易平 2016/11/10



P/N: CPG151101D93	DOC. No.: KH-PS1609-77	Rev.: A	Page: 2/12
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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。

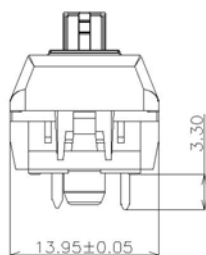
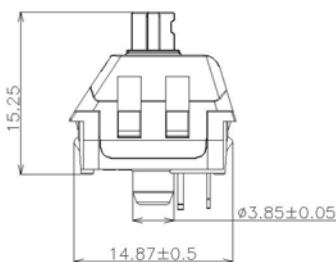
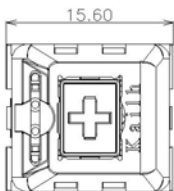
3. Technology Parameters/技术参数

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

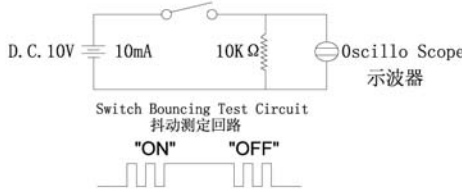
Rating 额定负荷:	12V AC/DC max.2V DC min. 10mA AC/DC max.10 μ A DC min;
Insulation Resistance 绝缘电阻:	≥100MΩ/DC 500V;
Withstand Voltage 耐电压:	100V AC 1 Minute;
Mechanical Life 机械寿命:	70,000,000 Cycles.

5. Profile Dimensions /外形尺寸





6. Electrical Performance/电气性能

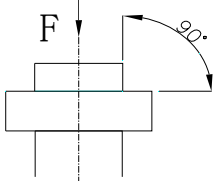
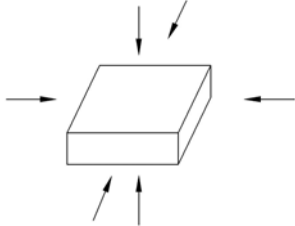
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
6.1	Contact Resistance 接触电阻	<p>Static load: (Operation force)x2, which is applied on the center of Switch stem. 静态负载: 动作力的 2 倍, 施加在手柄中心.</p> <p>Measurement tool: Contact resistance Meter. 测量工具: 微电流接触电阻计(1KHz, 20mV,5~50mA)</p> <p>在低电流 (≤100mA) 条件下测试. Measured at low current (100mA or less).</p>	<p>100mΩ Max 100mΩ 以下</p>
6.2	Insulation Resistance 绝缘电阻	<p>Apply a Voltage of DC 500 V for 1 minute, according to the below method. (1) Between terminals. (2) Between terminal and Body.</p> <p>输入 500V 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>
.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>Switch Bouncing Test Circuit 抖动测定回路</p> <p>"ON" "OFF"</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>Force (gf)</p> <p>Force-Travel-diagram 操作力-行程-图解</p> <p>operating point</p> <p>reset point</p> <p>Travel 行程 (mm)</p> <p>Red shaft</p>	See page 11 见第 11 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> <p>FP</p> <p>OP</p> <p>OT</p> <p>TT</p> <p>OF</p> <p>TTF</p> <p>Mounting Surface</p>	See page 11 见第 11 页



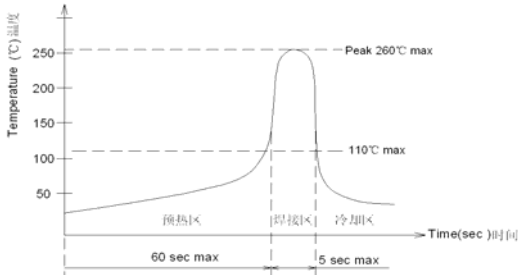
7.3	Static Strength 静止强度	<p>A static load of 3kgf shall be applied in the direction of button operation for a period of 60 seconds. 在手柄动作方向施加 3kgf 的静负荷 60 秒, 然后测试参数.</p> 	<p>No damage (Electrical) And mechanical) 电气和机械性能正常.</p>
7.4	Stem Pull Strength 手柄拉拔强度	<p>Break by a pull force applied opposite to 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.</p>	<p>5kgf Min</p>
7.5	Shock 机械冲击	<p>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.</p> 	<p>Shall meet No.6, 7.1, 7.2. 满足 6, 7.1, 7.2 要求.</p>
7.6	Life Test 寿命测试	<ol style="list-style-type: none"> 1) D.C.12V 10mA resistance load D.C 12V 10mA 电阻负荷 2) Operation speed : 1 times / s 动作速度: 5-6 次/ 秒 3) Push force : 150gf 按力: 150gf 5) Push travel : 4.0mm 按压行程: 4.0mm 6) Operation number: 70,000,000cycles 动作次数: 70, 000, 000 次 	<p>Contact resistance: 1000 mΩ Max 接触电阻: 1000 毫欧以下 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.</p>



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	test 耐寒性	(1) Temperature : - 20±2℃ 温度: - 20±2℃ (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±2℃ 温度: 70±2℃ (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" data-bbox="432 1330 1038 1520"> <thead> <tr> <th></th> <th>Temperature 温度</th> <th>Duration of test 持续时间</th> </tr> </thead> <tbody> <tr> <td>1 cycle 一次循环</td> <td>20±5℃</td> <td>1h</td> </tr> <tr> <td></td> <td>-20±2℃</td> <td>1h</td> </tr> <tr> <td></td> <td>20±5℃</td> <td>1h</td> </tr> <tr> <td></td> <td>70±5℃</td> <td>1h</td> </tr> </tbody> </table>		Temperature 温度	Duration of test 持续时间	1 cycle 一次循环	20±5℃	1h		-20±2℃	1h		20±5℃	1h		70±5℃	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±5℃	1h																
	-20±2℃	1h																
	20±5℃	1h																
	70±5℃	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℃ Soldering time: 5±0.5s 焊接温度: 260±5℃ 焊接时间: 5±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 : $350 \pm 5^{\circ}\text{C}$ 焊接温度: $350 \pm 5^{\circ}\text{C}$ (2) Continual soldering time: $3 \pm 0.5\text{s}$ 连续焊接时间: 3 ± 0.5 秒 (1) Capacity of soldering iron: $\leq 20\text{w}$ 电烙铁功率: 20 瓦以下</p> <p>2. Automatic Reflow soldering 自动焊接: For the product of T/H according to below condition:</p> <p style="text-align: center;">波峰焊温度曲线图(单波峰)</p> 	<p>At least 95% of surface area of immersed portion shall be covered by solder. 侵焊面积大于 95%以上.</p>
8.6	Humidity test 耐湿性	<p>(1) Temperature : $60 \pm 2^{\circ}\text{C}$ 温度: $60 \pm 2^{\circ}\text{C}$ (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>	<p>Contact resistance: $200\text{m}\Omega$ Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 $200\text{m}\Omega$ 以下 满足: No. 6.2 to 6.4 No. 7.1 to 7.2</p>
8.7	Salt Spray 盐雾测试	<p>Apply the following environment to test: 根据下列条件进行测试:</p> <p>(1) Temperature : $35 \pm 5^{\circ}\text{C}$ 温度: $35 \pm 2^{\circ}\text{C}$; (2) Salt water density: $5 \pm 1\%$ 盐水浓度: $5 \pm 1\%$; (3) Duration: 12hours 持续时间: 12 小时; (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: $200\text{m}\Omega$ Max 接触电阻: 200 毫欧以下</p>



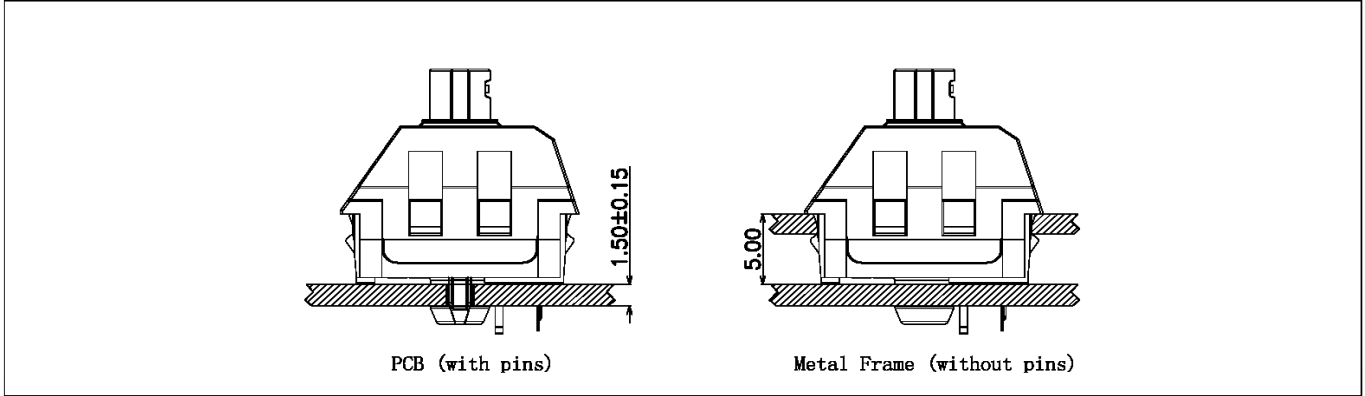
8.8	Withstand K ₂ S 硫化测试	Apply the following environment to test: 根据下列条件进行测试 (1) Temperature: 35 ± 5 °C 温度: 35 ± 5 °C (2) K ₂ S Density: 2%; 硫化钾浓度: 2% (3) Duration: 2 minute. 持续时间: 2 分钟	Appearance: No corrosion spot, no crack, no base plate naked. 外观: 无腐蚀点, 无裂纹, 无裸露基材. Contact Resistance: 1000 m Ω Max 接触电阻: 1000 毫欧以下
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P/N: CPG151101D93	DOC. No.: KH-PS1609-77	Rev.: A	Page: 10/12
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9. Recommended PCB Layout 推荐的 PCB 安装焊盘规格

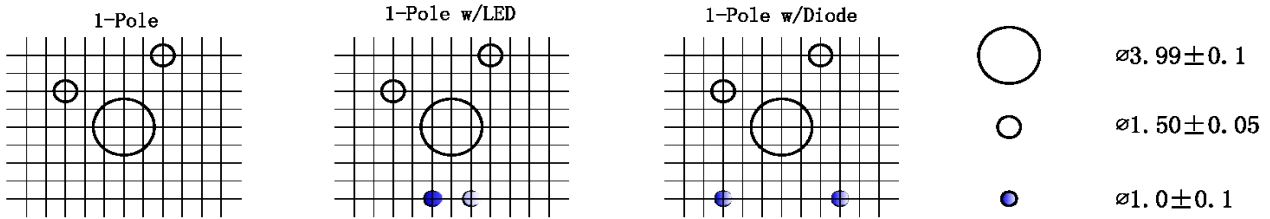
Mounting Options 安装选项



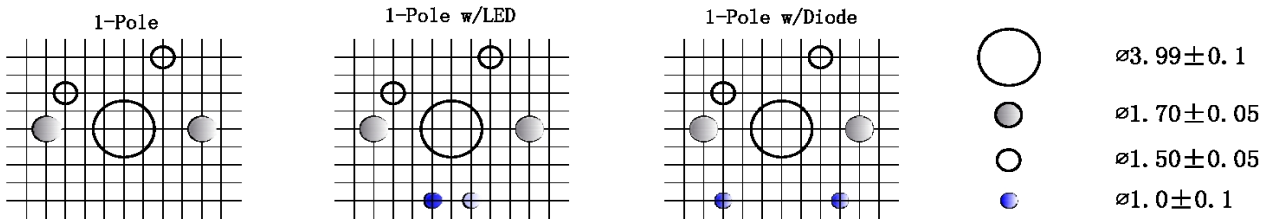
Circuit Board Layouts 电路板布局

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

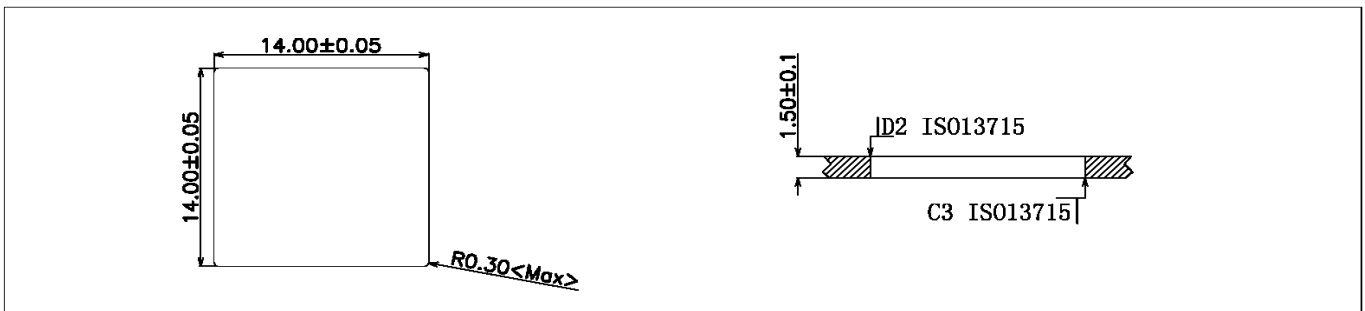
Keyswitch without fixation pins
按键开关不带定位柱



Keyswitch with fixation pins
按键开关带定位柱



Metal Frame Cutout Dimensions





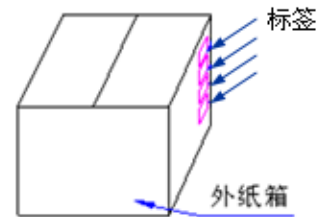
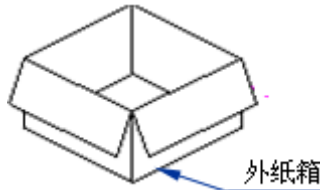
10. Loading Parameter (FP/OP/PT/OF / OT/TT) Specification 荷重参数规格：

Parameter	Unit	Specification	Remark
FP(自由行程)	mm	15.25±0.2	
OP(动作行程)	mm	13.35±0.7	
PT(导通行程)	mm	1.9±0.5	
OF(操作力)	gf	50±10	
OT(过行程)	mm	1.2	Min
TT(总行程)	mm	4.00 ⁺⁰ _{-0.4}	

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	Within 5s 5 秒以内
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 max within 3 sec.
在使用烙铁的情况下,焊锡温度应在350°C以下,焊接时间3秒以内.



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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