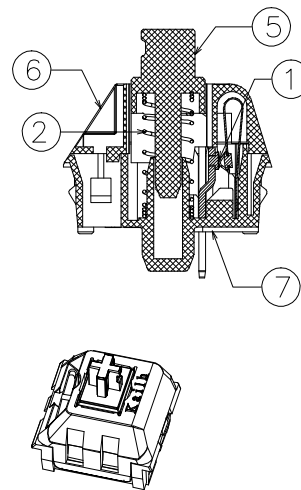
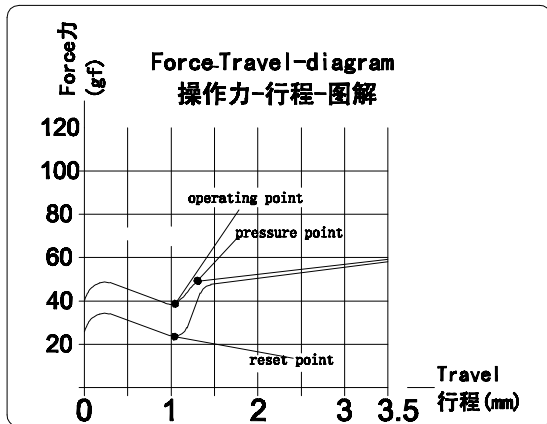
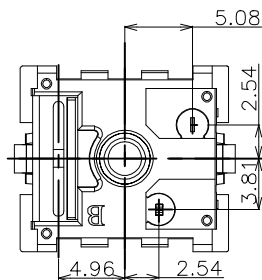
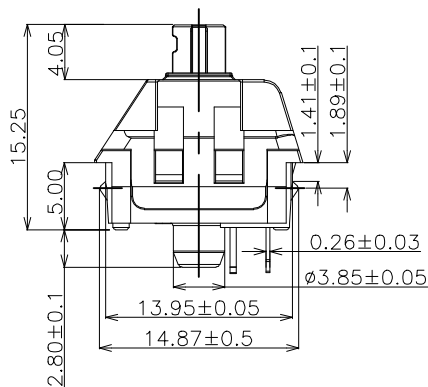
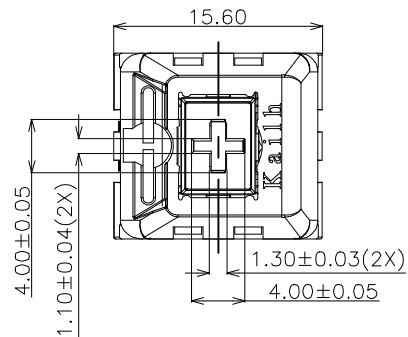


成品检验图面

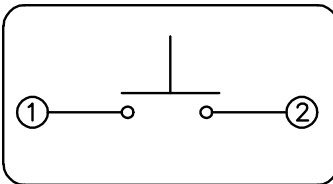
铜轴



产品规格:

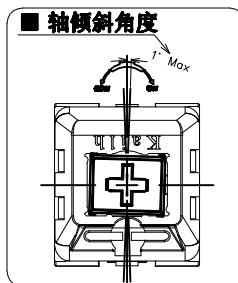
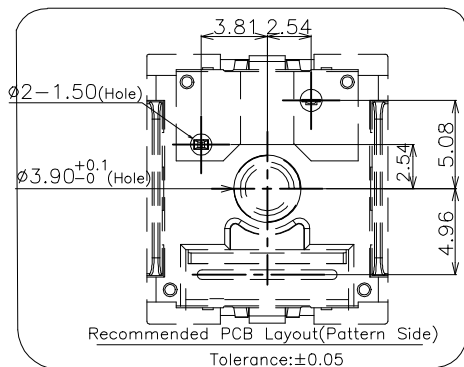
- 1. 额定值: 12V AC/DC max. 2V DC min.
10mA AC/DC max. 10µA DC min.
- 2. 接触阻抗: 100毫欧 最大
- 3. 绝缘阻抗: 100兆欧 最小 (DC500V)
- 4. 耐高压: 交流100伏 (50-60赫兹) 持续 1 分钟
- 5. 抖动时间: < 5msec (3-4次/秒. 按压速度)
- 6. 回弹力 ≥ 12gf
- 7. 操作力: 40 ± 10gf
- 8. 导通行程: 1.1^{+0.1}_{-0.2}mm (PT) $\frac{3}{B}$
- 9. 全行程: 3.5 ± 0.4mm
- 10. 操作寿命: 7000万次以上
- 11. 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	BSPG1518-02001	8#基座	—	1	Nylon	白色	—
⑥	BSPG1511-04007	5#透明盖子	—	1	PC	透明	—
⑤	BSPG1511-05023	铜导芯	—	1	poM	深紫色	—
④	BZPG1511-01026	9#动片	—	1	Copper Alloy	—	—
③	BZPG1511-01017	3#静片	—	1	Brass	—	—
②	BWPG1511-03010	A-4款弹簧	—	1	Stainless Steel	—	—
①	BWPG1511-08010	焊点金线	—	2	—	—	—



备注:

- ◇: 表示重点管控尺寸, 一般为功能尺寸, 首检及巡检时需量测。
- △: 表示次重点管控尺寸, 一般为装配尺寸, 首检时需量测。
- 1) 重点及次重点管控尺寸中的序号不可重复, 需依次往后增加。若其中有某个尺寸在变更或其它状况下, 尺寸消失或不要求管控时, 原序号不可再用。有其它尺寸需要增加管控时, 序号往后增加。
- 2) 版次定义: 新开发而未转量产之产品图面版次为A1, A2, A3... 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	
设计	易金平	2017/04/13	名称	PG1511 按键开关 (铜轴)
审核			料号	CPG151101D213
核准			单位	mm
未注尺寸公差		30<L ±0.30 10<L ≤30 ±0.20 5<L ≤10 ±0.15 L ≤5 ±0.10	角度	±2'
图号:		KHA-PG1511-167	比例	1:1
页次		1 OF 1	视角	

ECN-1806-08	B	2018. 6. 12	①依产品实际修正图面。②导通行程加严管控到1.1 ^{+0.1} _{-0.2}	吴川东		
工程变更单号	版次	日期	说明	修改	审核	核准



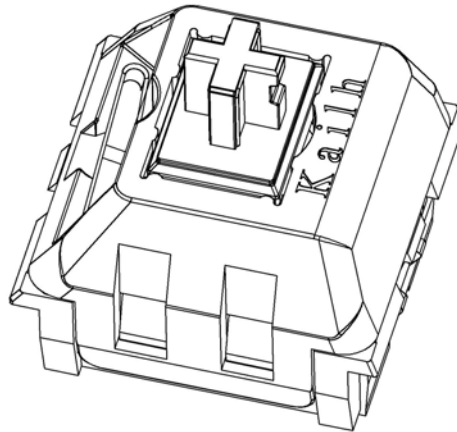
凱華電子
KAIHUA EEELETRONICS

Document Number:

KH-PS1705-23

产品规格书

Product Specification



P/N: CPG151101D213			Title : PG1511 Keyboard Switch		
Rev.	ECN	Release and Revision Description:	Prepared By /Date:	Checked By/Date:	Approved By/Date:
B	ECN-1806-08	修正公差	吴川东 2018-06-13	易平 2018-06-13	王锋 2018-06-13



P/N: CPG151101D213	DOC. No.: KH-PS1705-23	Rev.: B	Page: 2/12
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P/N: CPG151101D213	DOC. No.: KH-PS1705-23	Rev.: B	Page: 3/12
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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℃~+70℃;

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

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℃

Relative humidity 相对湿度: 65%±5% R.H.;

Air pressure 气压: 86~101KPa;

4. Ratings/额定性能要求

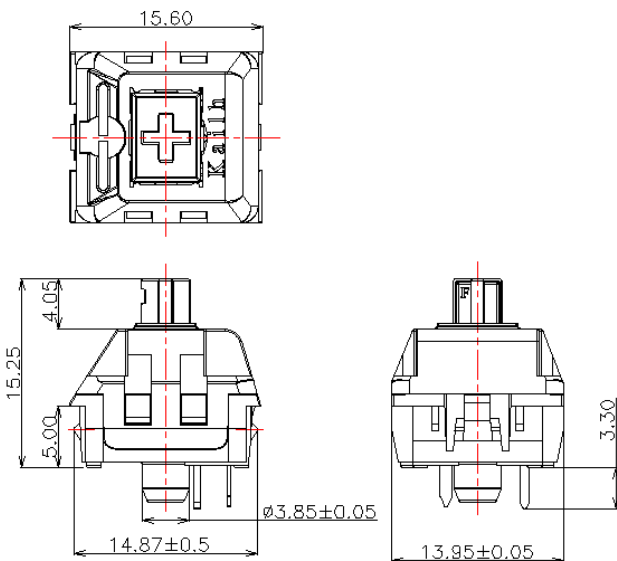
Rating 额定负荷: 12V AC/DC max.2V DC min.
10mA AC/DC max.10μA DC min.;

Insulation Resistance 绝缘电阻: ≥100MΩ/DC 500V;

Withstand Voltage 耐电压: 100 AC 1 Minute;

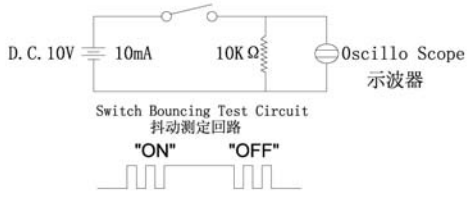
Mechanical Life 机械寿命: 70,000,000 Cycles

5. Profile Dimensions /外形尺寸



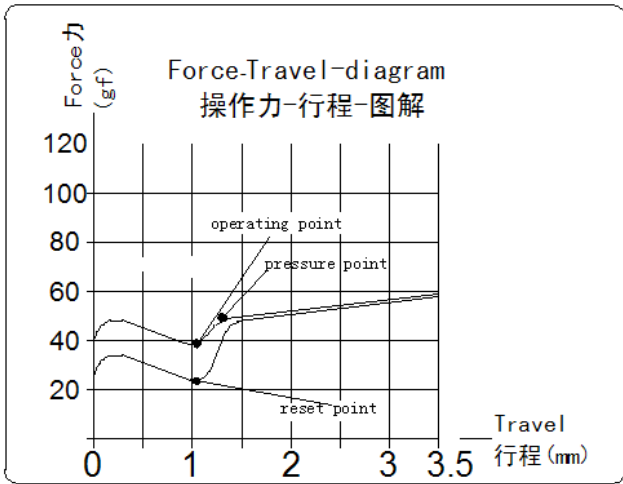
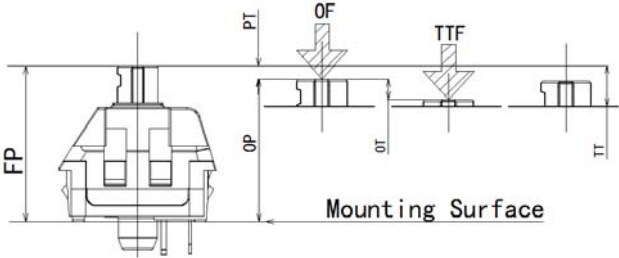


6. Electrical Performance/电气性能

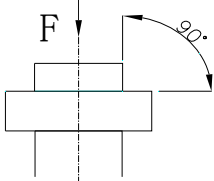
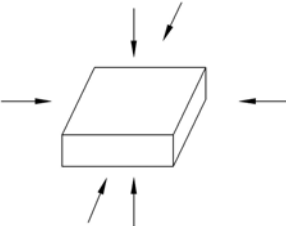
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
6.1	Contact Resistance 接触电阻	<p>Static load: (Operation force)x2, which is applied on the center of Switch stem. 静态负载：动作力的 2 倍，施加在手柄中心.</p> <p>Measurement tool: Contact resistance Meter. 测量工具：微电流接触电阻计(1KHz, 20mV,5~50mA)</p> <p>在低电流 (≤100mA) 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>
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</p> <p>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-Travel-diagram 操作力-行程-图解</p> <p>The graph plots Force (gf) on the y-axis (0 to 120) against Travel (mm) on the x-axis (0 to 3.5). It shows three curves: 'operating point' (highest force), 'pressure point' (middle force), and 'reset point' (lowest force). All curves show an initial increase in force, followed by a dip, and then a final increase as travel increases.</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>The diagram shows a cross-section of the switch mechanism. Key parameters are labeled: FP (Force Point), OF (Operating Force), TTF (Total Travel Force), and Mounting Surface. Dimensions b1 and b2 are also indicated.</p>	See page 11 见第 11 页



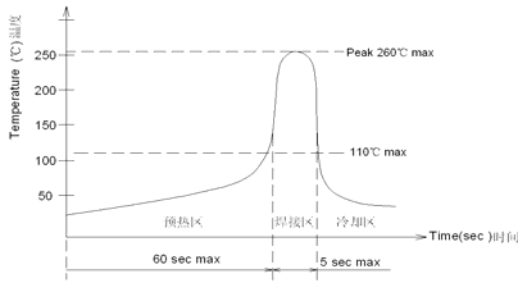
7.3	<p>Static Strength 静止强度</p>	<p>A static load of 3kgf shall be applied in the direction of button operation for a period of 60 seconds. 在手柄动作方向施加 3kgf 的静负荷 60 秒, 然后测试参数.</p> 	<p>No damage (Electrical) And mechanical) 电气和机械性能正常.</p>
7.4	<p>Stem Pull Strength 手柄拉拔强度</p>	<p>Break by a pull force applied 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	<p>Shock 机械冲击</p>	<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	<p>Life Test 寿命测试</p>	<p>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 : 3.5mm 按压行程: 3.5mm 6) Operation number: 70,000,000cycles 动作次数: 70, 000, 000 次</p>	<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	Cold 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 1368 1037 1559"> <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>20±5℃</td> <td>1h</td> </tr> <tr> <td>-20±2℃</td> <td>1h</td> </tr> <tr> <td>20±5℃</td> <td>1h</td> </tr> <tr> <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 PIP soldering 自动插板焊接: 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: (1) Temperature : $35 \pm 5^{\circ}\text{C}$ 温度: $35 \pm 5^{\circ}\text{C}$; (2) Salt water density: $5 \pm 1\%$ 盐水浓度: $5 \pm 1\%$; (3) Duration: 24hours 持续时间: 24 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
K₂S
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) K₂S 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.

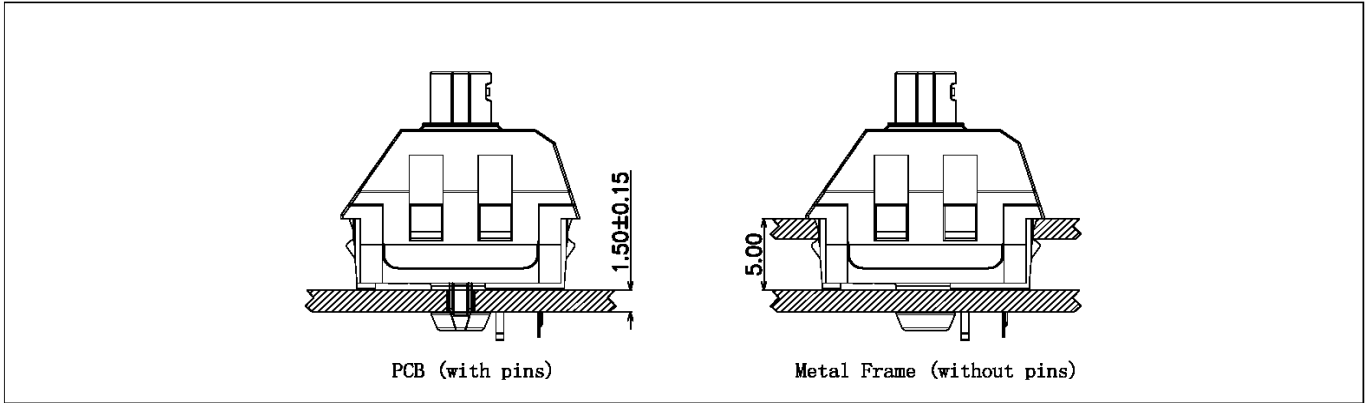
Contact Resistance:
1000 m Ω Max

接触电阻: 1000 毫欧以
下



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

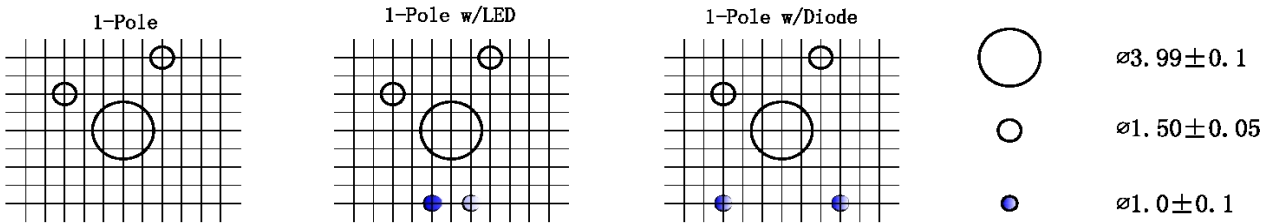
Mounting Options 安装选项



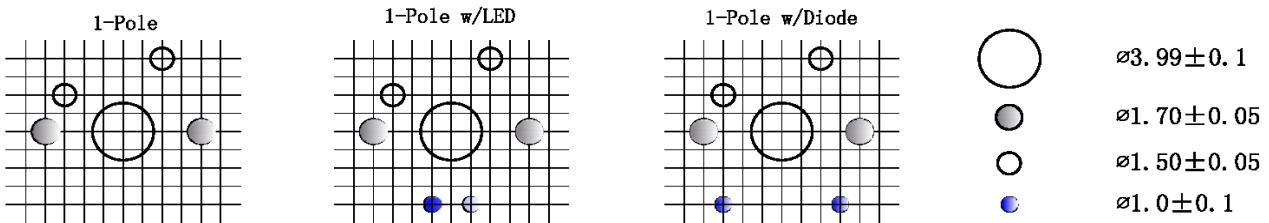
Circuit Board Layouts 电路板布局

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

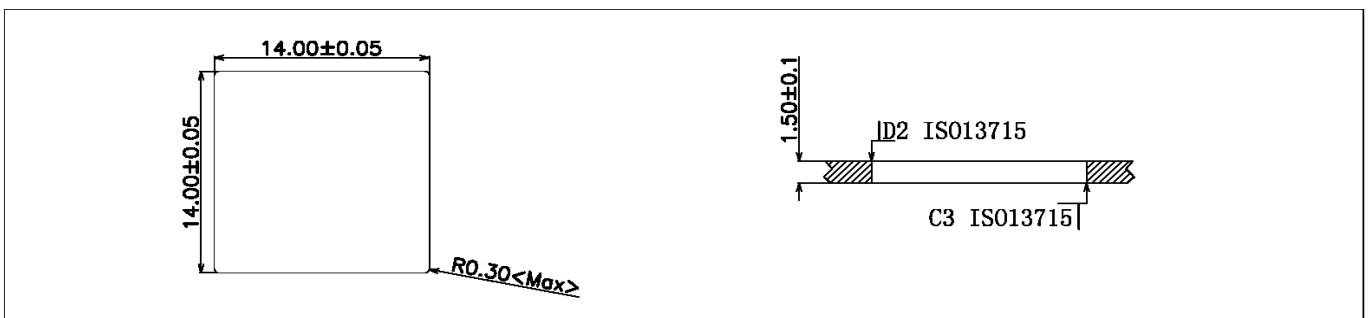
Keyswitch without fixation pins
按键开关不带定位柱



Keyswitch with fixation pins
按键开关带定位柱



Metal Frame Cutout Dimensions





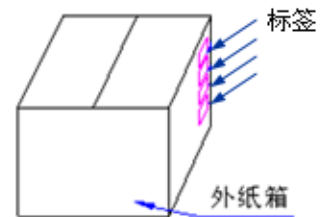
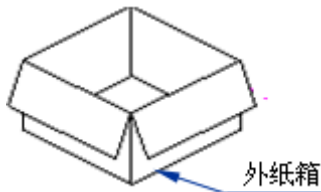
10. Loading Parameter (FP/OP/PT/OT /MD/CF/OF) Specification 荷重参数规格：

Parameter	Unit	Specification	Remark
FP(自由行程)	mm	15.25±0.2	
OP(动作位置)	mm	14.15±0.6	
PT(导通行程)	mm	1.1 ^{+0.4} _{-0.2}	
OF(操作力)	gf	40±10	
OT(过行程)	mm	2.0	Min
MD(差动行程)	mm	0.6	Max
TT (总行程)	mm	3.5±0.4	

11. Packaging 包装

(1). 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.

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