





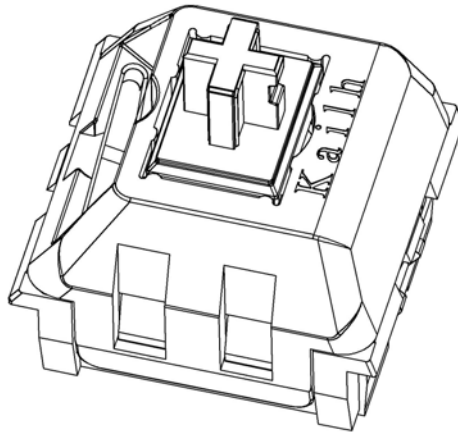
**凱華電子**  
KAIHUA EEELETRONICS

Document Number:

**KH-PS1801-02**

# 产品规格书

## Product Specification



P/N:		<b>CPG151101D234</b>		Title :		<b>PG1511 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		易金平 2018-1-2	胡远锋 2018-1-2	David 2018-1-2	



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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**

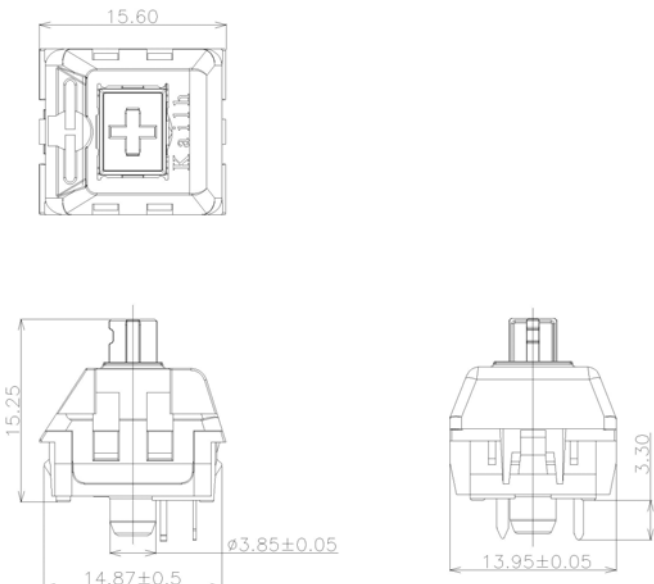
**Parameters/技术参数**

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.10 μ A DC min.;
Insulation Resistance 绝缘电阻:	≥100M Ω /DC 500V;
Withstand Voltage 耐电压:	100V AC 1 Minute;
Mechanical Life 机械寿命:	50,000,000 Cycles (Without load).

**5. Profile Dimensions /外形尺寸**

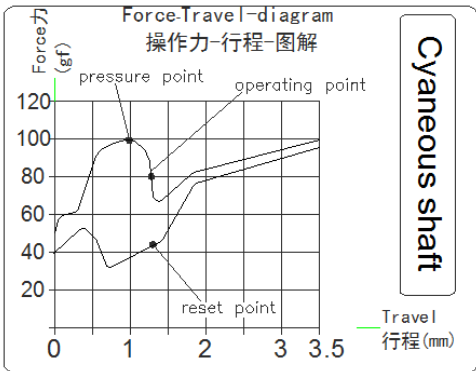
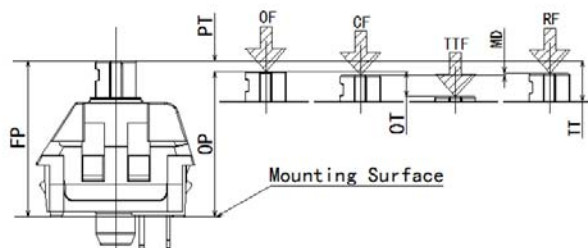


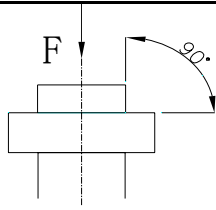


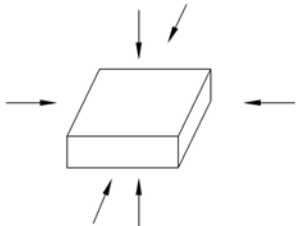
**6. Electrical Performance/电气性能**

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> 	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> 	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>	No damage (Electrical) And mechanical) 电气和机械性能正常.



7.4	Stem Pull Strength 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	Shock 机械冲击	<p>Measured by according to the below condition:</p> <p>(1) Acceleration: 80g 加速度</p> <p>(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.</p> <p>满足 6, 7.1, 7.2 要求.</p>
7.6	Life Test 寿命测试	<p>1) D.C. 12V 10mA resistance load D.C 12V 10mA 电阻负荷</p> <p>2) Operation speed : 5-6 times / s 动作速度: 5-6 次/ 秒</p> <p>3) Push force : 150gf 按力: 150gf</p> <p>5) Push travel : 3.5mm 按压行程: 3.5mm</p> <p>6) Operation number: 50,000,000cycles 动作次数: 50, 000, 000 次</p>	<p>Contact resistance: 1000 mΩ Max 接触电阻: 1000 毫欧以下</p> <p>Bouncing: 10ms Max 触点抖动: 10 毫秒以下</p> <p>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**

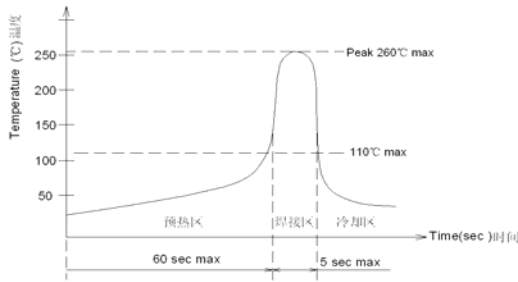
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
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8.1	Cold test 耐寒性	<p>(1) Temperature : - 20±2℃ 温度： - 20±2℃</p> <p>(2) Duration of test: 48h 持续时间： 48 小时</p> <p>(3) Take off a drop water 去掉水珠</p> <p>(4) Standard conditions after test : 1h 试验后的放置条件： 1 小时</p>	<p>Contact resistance: 200mΩ Max</p> <p>Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2</p> <p>接触电阻 200mΩ 以下 满足:</p> <p>No. 6.2 to 6.4 No. 7.1 to 7.2</p>												
8.2	Heat test 耐热性	<p>(1) Temperature : 70±2℃ 温度： 70±2℃</p> <p>(2) Duration of test: 48h 持续时间： 48 小时</p> <p>(3) Take off a drop water 去掉水珠</p> <p>(4) Standard conditions after test : 1h 试验后的放置条件： 1 小时</p>	<p>Contact resistance: 200mΩ Max</p> <p>Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2</p> <p>接触电阻 200mΩ 以下 满足:</p> <p>No. 6.2 to 6.4 No. 7.1 to 7.2</p>												
8.3	Temperature cycle 温度循环	<p>(1) Test cycles: 5 cycles 试验周期： 5 个周期</p> <p>(2) Standard condition after test:1h 试验后的放置条件： 1 小时</p> <table border="1"> <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	<p>Contact resistance: 200mΩ Max</p> <p>Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2</p> <p>接触电阻 200mΩ 以下 满足:</p> <p>No. 6.2 to 6.4 No. 7.1 to 7.2</p>
	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	<p>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</p> <p>Soldering temperature: 260±5℃ 焊接温度： 260±5℃</p> <p>Soldering time: 5±0.5s 焊接时间： 5±0.5 秒</p>	<p>Appearance: No abnormality. 外观无异常</p>												





8.5	Solder ability 可焊性	<p>1. Hand soldering 手工焊接: Please practice according to below condition: (1) Soldering Temperature : <math>350 \pm 5^{\circ}\text{C}</math> 焊接温度: <math>350 \pm 5^{\circ}\text{C}</math> (2) Continual soldering time: <math>3 \pm 0.5\text{s}</math> 连续焊接时间: <math>3 \pm 0.5</math> 秒 (1) Capacity of soldering iron: <math>\leq 20\text{w}</math> 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;"><b>波峰焊温度曲线图(单波峰)</b></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 : <math>60 \pm 2^{\circ}\text{C}</math> 温度: <math>60 \pm 2^{\circ}\text{C}</math> (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: <math>200\text{m}\Omega</math> Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 <math>200\text{m}\Omega</math> 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 : <math>35 \pm 5^{\circ}\text{C}</math> 温度: <math>35 \pm 5^{\circ}\text{C}</math>; (2) Salt water density: <math>5 \pm 1\%</math> 盐水浓度: <math>5 \pm 1\%</math>; (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: <math>200\text{m}\Omega</math> Max 接触电阻: 200 毫欧以下</p>



8.8

Withstand  
K<sub>2</sub>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<sub>2</sub>S Density: 2%;  
硫化钾浓度: 2%
- (3) Duration: 2 minute.  
持续时间: 2 分钟

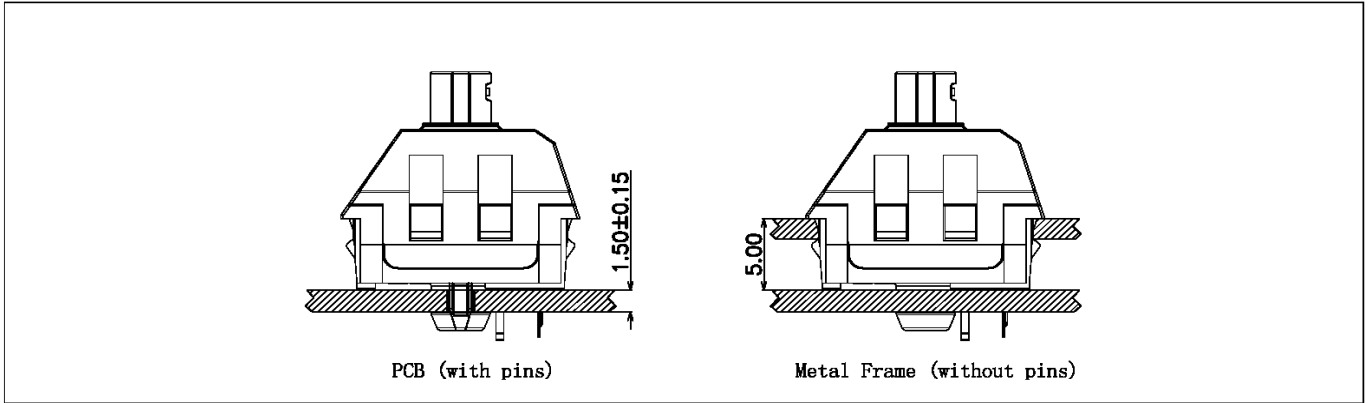
Appearance:  
No corrosion spot, no crack, no base plate naked.  
外观: 无腐蚀点, 无裂纹, 无裸露基材.

Contact Resistance:  
1000 m Ω Max  
接触电阻: 1000 毫欧以下



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

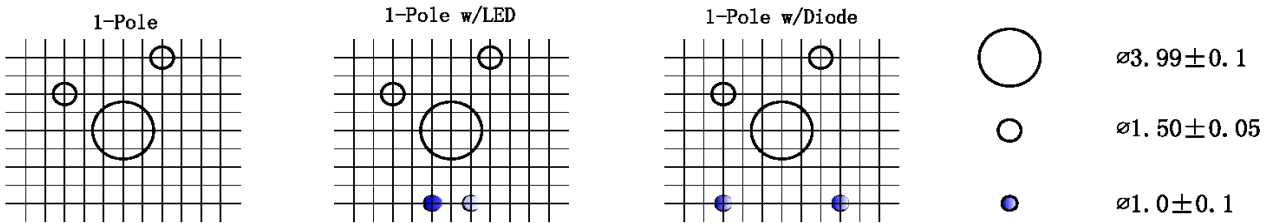
Mounting Options 安装选项



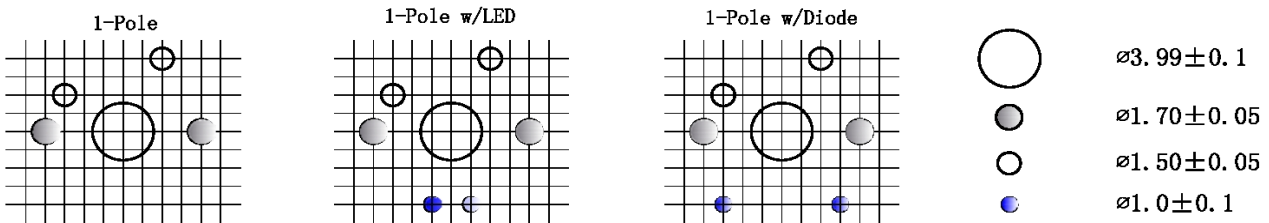
Circuit Board Layouts 电路板布局

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

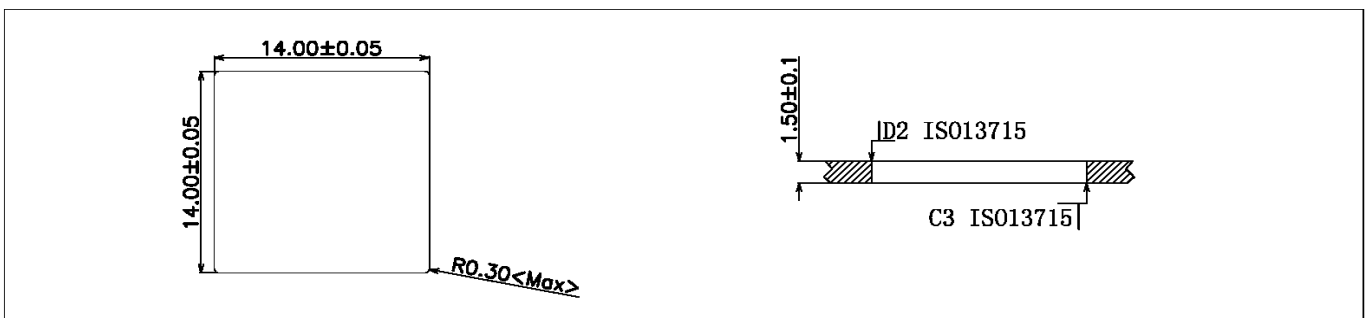
Keyswitch without fixation pins  
按键开关不带定位柱



Keyswitch with fixation pins  
按键开关带定位柱



Metal Frame Cutout Dimensions





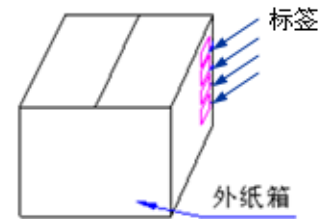
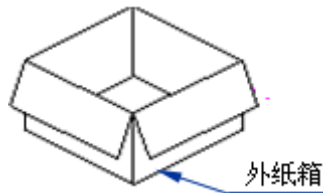
10. Loading Parameter (FP/OP/PT/OT /MD/CF/OF) Specification 荷重参数规格:

Parameter	Unit	Specification	Remark
FP(自由行程)	mm	15.25±0.2	
OP(动作位置)	mm	14.05±0.7	
PT(导通行程)	mm	1.20±0.50	
OF(操作力)	gf	70±20	
TF(触感力)	gf	95±20	
OT(过行程)	mm	1.8	Min
MD(差动行程)	mm	0.6	Max
TT(全行程)	mm	3.5±0.50	

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