



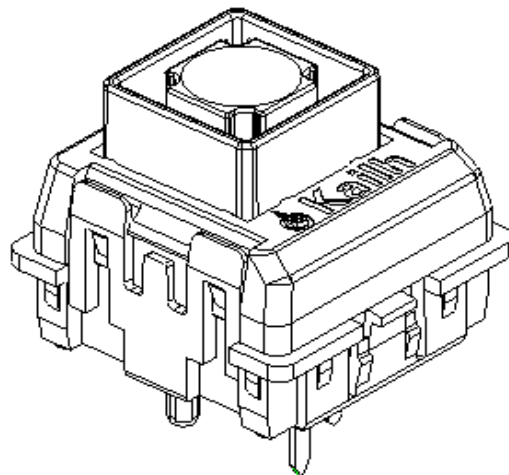
凱華電子
KAIHUA EEELETRONICS

Document Number:

KH-PS1703-40

产品规格书

Product Specification



P/N: **CPG159301S10**

Title : **PG1593 keyboardSwitch**

Rev.	ECN	Release and Revision Description:	PreparedBy/Date:	Checked By/Date:	Approved By/Date:
A	_____	New releasing 初版发行	汤佳 2017-3-21	胡远锋 2017-3-21	易平 2017-3-21



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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 equipment and Man-Machine interface.

主要适用于电脑，收银机，工业设备和人机界面

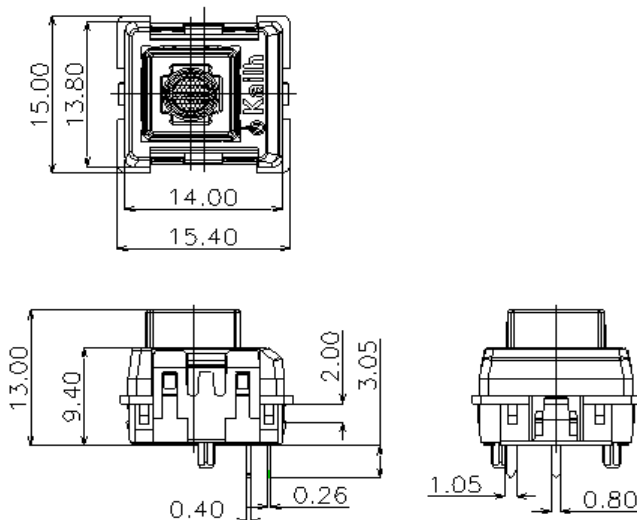
3. Technology Parameters/技术参数

Ambient Humidity 工作湿度:	45~95% R.H.;
Operating Temperature Range 使用温度范围:	-10°C ~ +60°C;
Storage Temperature Range 保存温度范围:	-20°C ~ +70°C;
Normal Condition:	
Ambient temperature 环境温度:	20 ± 2°C
Relative humidity 相对湿度:	85% ± 5% R.H.;
Air pressure 气压:	86~101KPa;
Contact Resistance 接触阻抗:	100 mΩ Max;
Operation Force 操作力:	60 ± 10gf;
Solder Ability 可焊性:	245 ± 5°C, 3 ± 0.5s;
Withstand Soldering Temperature 耐焊接热:	260 ± 5°C, 5 ± 1s;

4. Ratings/额定性能要求

Rating 额定负荷:	DC12V / 10mA;
Insulation Resistance 绝缘电阻:	≥ 100MΩ / DC 500V;
Withstand Voltage 耐电压:	AC 100V 1 Minute;
Mechanical Life 机械寿命:	50,000,000 Cycles.

5. Profile Dimensions /外形尺寸



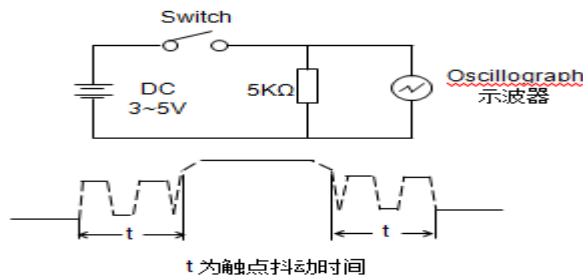


6. Electrical Performance/电气性能

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 AC 100 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>Slightly push the center of stem by 3~4 times/s, to test the bounce at "ON" and "OFF" 以每秒 3~4 次的速度，轻轻在手柄中心加力，在"导通"与"瞬断"间测试。</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>

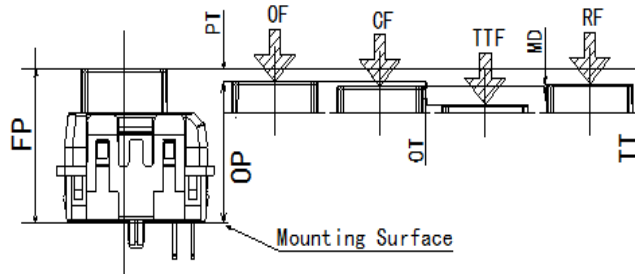


触点抖动用图:



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>	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

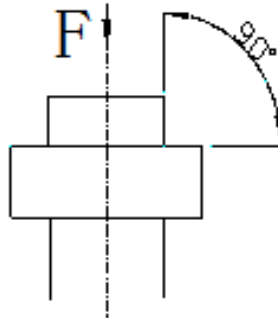


7.3

Static Strength
静止强度

A static load of 3 Kgf 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。



No damage (Electrical and mechanical)
电气和机械性能正常。

Contact resistance
接触电阻:200mΩ Max

Contact force 接触力:
30gf Min

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。

500gf Min

7.5

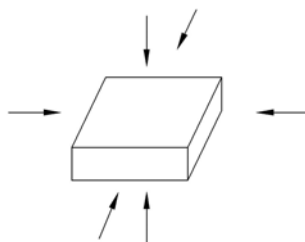
Shock
机械冲击

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。

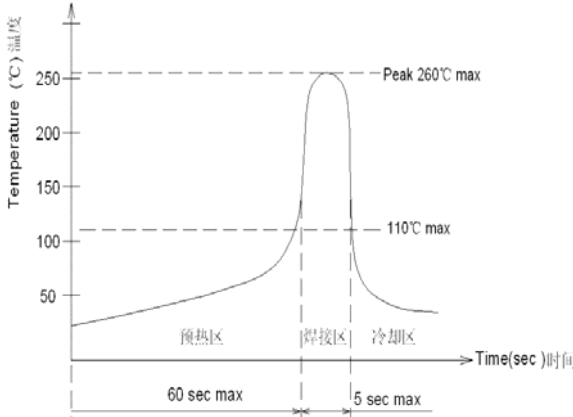


7.6	Life Test 寿命测试	<p>(1) No load 无负载 (2) Operation speed: 5~6cycles/s 操作速度: 5~6 次/秒 (3) Push force: Maximum value of operation force. 按压力: 操作力规格值的上限. (4) Cycles: 50,000,000 times Min 操作次数: 5000 万次以上</p>	<p>Contact resistance: 200 mΩ Max 接触电阻: 200 毫欧以下 Bouncing: 10ms Max 触点抖动: 10 毫秒以下 Operation force: Variation rate within ±30% 操作力的变化范围在初始值的±30%以内.</p>
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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	<p>(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</p>	<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</p>														
8.2	Heat test 耐热性	<p>(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</p>	<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</p>														
8.3	Temperature cycle 温度循环	<p>(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</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Temperature 温度</th> <th>Duration of test 持续时间</th> </tr> </thead> <tbody> <tr> <td rowspan="5" style="text-align: center; vertical-align: middle;">1 cycle 一次循环</td> <td style="text-align: center;">20±5℃</td> <td style="text-align: center;">1h</td> </tr> <tr> <td style="text-align: center;">-20±5℃</td> <td style="text-align: center;">1h</td> </tr> <tr> <td style="text-align: center;">20±5℃</td> <td style="text-align: center;">1h</td> </tr> <tr> <td style="text-align: center;">60±5℃</td> <td style="text-align: center;">1h</td> </tr> <tr> <td style="text-align: center;">70±5℃</td> <td style="text-align: center;">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±5℃	1h	20±5℃	1h	60±5℃	1h	70±5℃	1h	<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</p>
	Temperature 温度	Duration of test 持续时间															
1 cycle 一次循环	20±5℃	1h															
	-20±5℃	1h															
	20±5℃	1h															
	60±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°C 焊接温度: 260±5°C</p> <p>Soldering time: 3±0.5s 焊接时间: 3±0.5 秒</p>	Appearance: No abnormality. 外观无异常
8.5	Solderability 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 (3) Capacity of soldering iron: ≤20w 电烙铁功率: 20 瓦以下</p> <p>2. Automatic PIPsoldering 自动波峰焊接: For the product of T/H, according to below condition:</p> 	At least 90% of surface area of immersed portion shall be covered by solder. 侵焊面积大于 90%以上.
8.6	Humidity test 耐湿性	<p>(1) Temperature : 60±2°C 温度: 60±2°C</p> <p>(2) relative humidity: 90~95% R.H. 相对湿度:90~95% R.H.</p> <p>(3) Duration of test: 48h 持续时间: 48 小时</p> <p>(4) Take off a drop water 去掉水珠</p> <p>(5) Standard conditions after test: 1h 试验后的放置条件: 1 小</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

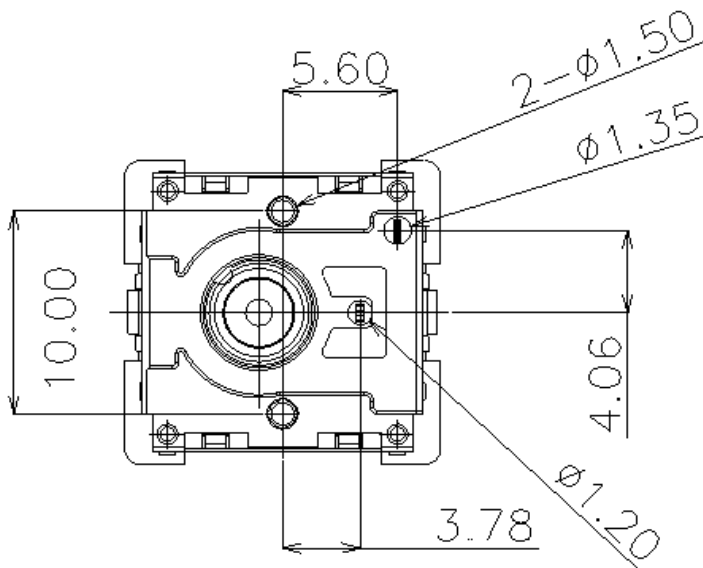


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8.7	Salt Spray 盐雾测试	<p>Apply the following environment to test: 根据下列条件进行测试:</p> <p>(1) Temperature : $35 \pm 5^{\circ}\text{C}$ 温度: $35 \pm 5^{\circ}\text{C}$;</p> <p>(2) Salt water density: $5 \pm 1\%$ 盐水浓度: $5 \pm 1\%$;</p> <p>(3) Duration: 12 hours 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	Withstand K ₂ S 硫化测试	<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: $35 \pm 5^{\circ}\text{C}$</p> <p>(2) K₂S Density: 2%; 硫化钾浓度: 2%</p> <p>(3) Duration: 2 minute. 持续时间: 2 分钟</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: 500 mΩ Max 接触电阻: 500 毫欧以下</p>

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

(Top View)
(Single face board T=1.6mm)





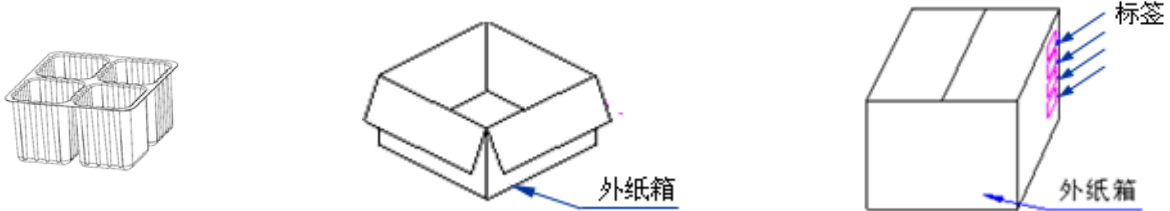
10. Loading Parameter (FP/OP/PT/OT/MD/OF/CF)Specification 荷重参数规格：

Parameter	Unit	Specification	Remark
FP(自由行程高)	mm	13±0.5	
OP (行程终止高度)	mm	11.4±1.0	
PT (导通行程)	mm	1.6±0.5	
OF (操作力)	gf	60±10	
OT(过行程)	mm	1.6	Min
MD (差动行程)	mm	0.5	Max
CF(接触力)	gf	50±10	
RF 回弹力	gf	13	Min
TT(总行程)	mm	3.6±0.3	

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 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.



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(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温高湿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