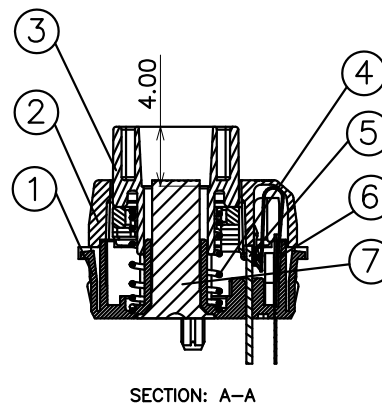
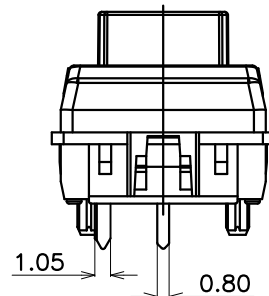
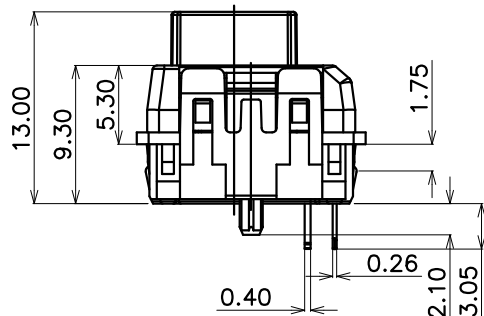
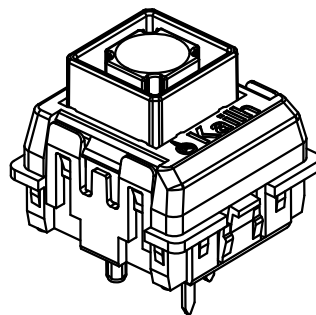
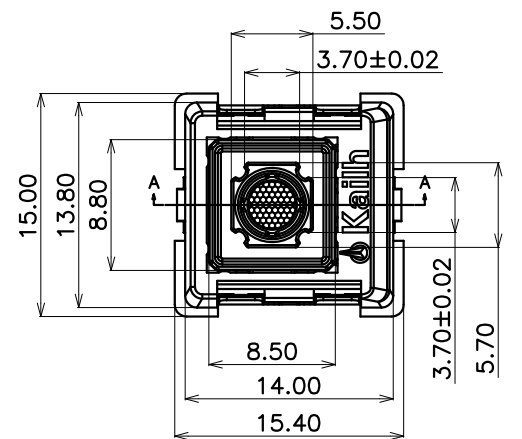
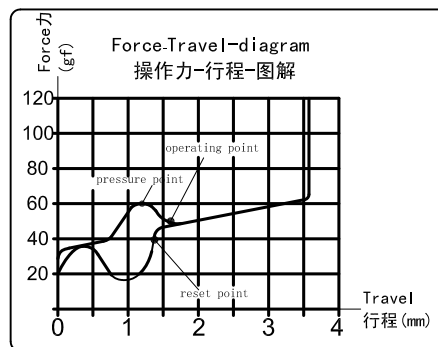
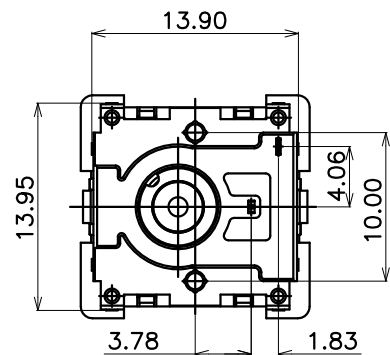


ABIDE BY ROHS



SECTION: A-A

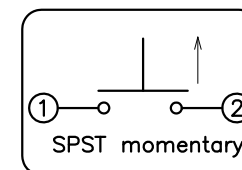
Click Tactile feel





### Specification :

1. Rating:  
Voltage : 12V AC/DC max., 2V DC min.  
Current: 10mA AC/DC max., 10 $\mu$ A DC min.
2. Contact Resistance : 100m $\Omega$  Max
3. Insulation Resistance : 100M $\Omega$  at DC500V
4. Withstand Voltage : AC100V (50-60Hz) for 1 minute
5. Bounce Time:  $\leq$ 5msec (at 16 in/sec. actuation speed)
6. Operation Force : 55  $\pm$  10gf
7. Pretravel: 1.6  $\pm$  0.5mm
8. Total travel: 3.6  $\pm$  0.3mm
9. Operating Life : 50,000,000 Cycles

### SWITCH FUNCTION



⑦	Light pipe	——	1	PC	——	——
⑥	Terminal B	——	1	Copper Alloy	——	——
⑤	Terminal A	——	1	Brass	——	——
④	Spring	——	1	Stainless Steel	——	——
③	Keystroke	——	1	POM	Nature	——
②	Cover	——	1	PA	Black	——
①	Base	——	1	PA	Black	——
ITEM	PART NAME	TER'NO.	QTY.	MATERIAL	FINISHING	REMARK
APPROVALS			DATE	 DONGGUAN CITY KAIHUA ELECTRONICS CO.,LTD Kaih		
DRAWN		汤佳	2017.1.5			
CHECKED				TITLE:	PG1593 KeySwitches with LED	
APPROVALS				PART NO.	PG159301S10	
TOLERANCES ARE	30<L	±0.30	ANGLE	UNIT: mm	SCALE: 1:1	PROJ: 
	10<L≤30	±0.20				
	5<L≤10	±0.15				
	L≤5	±0.10				
		±2'	DRAWING NO.	KHA-PG1593-018EN	SHEET 2 OF	

—	A	—	NEW	—	—	—
ECN NO.	REV.	DATE.	DESCRIPTION.	CHANGE.	CHECK.	APPRO.



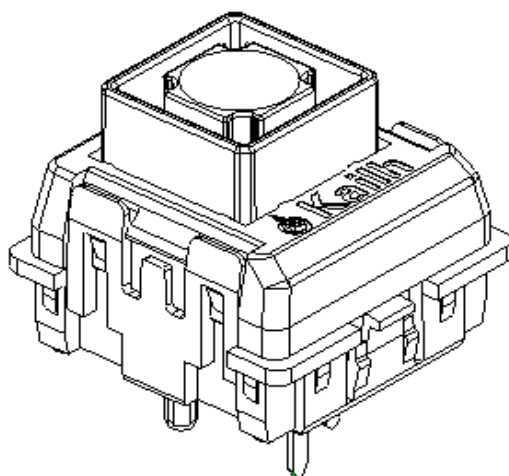
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KAIHUA EEELETRONICS

Document Number:

KH-PS1703-40

# 产品规格书

## Product Specification



P/N: \_\_\_\_\_

CPG159301S10

Title :

**PG1593keyboardSwitch**

Rev.	ECN	Release and Revision Description:	PreparedBy/Date:	Checked By/Date:	Approved By/Date:
A	_____	New releasing 初版发行	吴川东 2018-05-05	胡远锋 2018-05-05	王锋 2018-05-05



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## Product Specification

P/N:	DOC. No.:	Rev.:	Page:
CPG159301S10	KH-PS-1703-40	A	2/11

## Content

### 目录

1. Scope/范围:	3
2. Product Application/产品应用:	3
3. Technology Parameters/技术参数	3
4. Ratings/额定性能要求	3
5. Profile Dimensions /外形尺寸	3
6. Electrical Performance/电气性能	4
7. Mechanical Performance/机械性能	5
8. Environmental Performance/环境性能	7
9. Recommended PCB Layout/推荐的 PCB 安装焊盘规格	8
10. Loading Parameter Specification/荷重参数规格	9
11. Packaging/包装	11
12. Precaution/注意事项	11

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## Product Specification

P/N:	DOC. No.:	Rev.:	Page:
CPG159301S10	KH-PS-1703-40	A	3/11

### 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

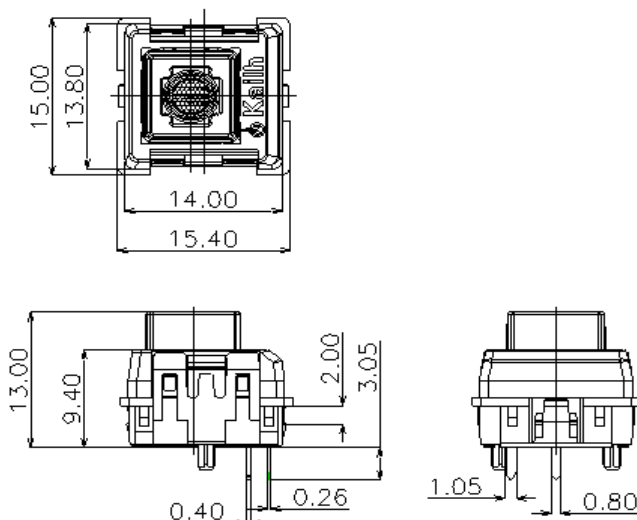
### 3. Technology Parameters/技术参数

Ambient Humidity 工作湿度:	45~95% R.H.;
Operating Temperature Range 使用温度范围:	-10℃~+60℃;
Storage Temperature Range 保存温度范围:	-20℃~+70℃;
Normal Condition:	
Ambient temperature 环境温度:	20±2℃
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:	55±10gf;
Solder Ability 可焊性:	245±5℃, 3±0.5s;
Withstand Soldering Temperature 耐焊接热:	260±5℃, 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



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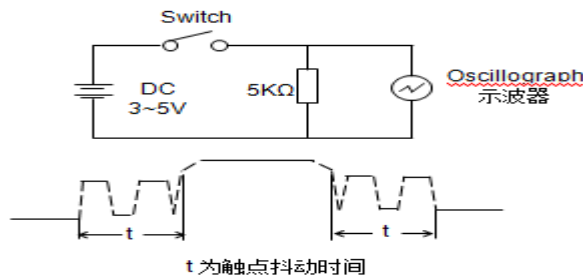


## 6. Electrical Performance/电气性能

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	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.  Measurement tool: Contact resistance Meter. 测量工具: 微电流接触电阻计(1KHz, 20mV,5~50mA)  在低电流 ( $\leq 100\text{mA}$ ) 条件下测试. Measured at low current (100mA or less).	100m $\Omega$ Max 100m $\Omega$ 以下
6.2	Insulation Resistance 绝缘电阻	Apply a Voltage of DC 500 V for 1 minute, according to the below method. (1) Between terminals. (2) Between terminal and Body.  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.	100M $\Omega$ Min 100 兆欧以上
6.3	Dielectric withstanding voltage 耐电压	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.  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.	No evidence of breakdown 无瞬断、击穿等破坏.
6.4	Bouncing 触点抖动	Operation speed: 3~4 times/s 操作速度: 每秒 3~4 次  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.  Oscillo scope 示波器 Switch Bouncing Test Circuit 抖动测定回路.	Before Life cycle: On:5ms MAX,5 毫秒以下 Off: 5ms MAX,5 毫秒以下  After Life cycle: On:10ms MAX,10 毫秒以下 Off: 10ms MAX,10 毫秒以下

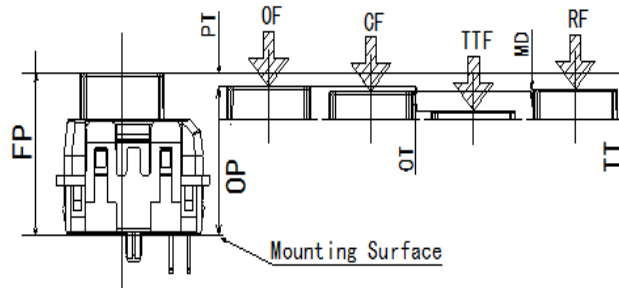


触点抖动用图:



## 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

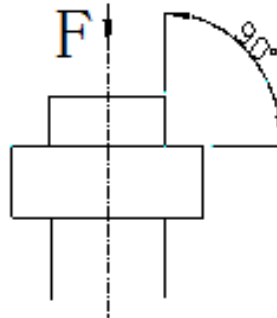


7.3

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

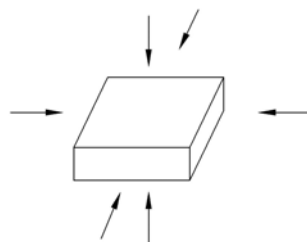
Shock  
机械冲击

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。

 <b>凱華電子</b> KAIHUA EEELETRONICS	<b>Product Specification</b>			
	P/N:	DOC. No.:	Rev.:	Page:
	CPG159301S10	KH-PS-1703-40	A	7/11

7.6	Life Test 寿命测试	(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	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.
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## 8. Environmental Performance/环境性能

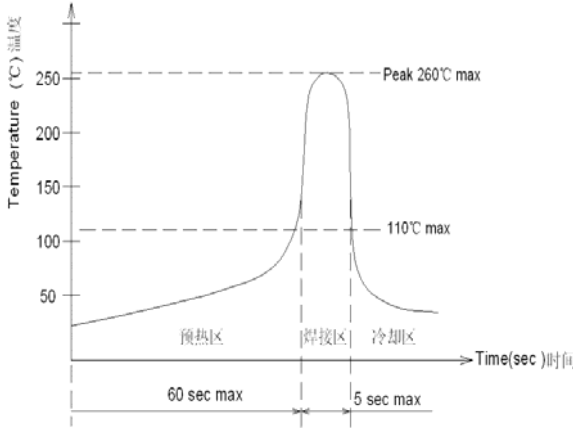
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求														
8.1	Cold test 耐寒性	(1) Temperature : - 20±2℃ 温度: - 20±2℃ (2) Duration of test: 48h 持续时间: 48 小时 (3) Take off a drop water 去掉水珠 (4) Standard conditions after test : 1h 试验后的放置条件: 1 小时	Contact resistance: 200m Ω Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200m Ω 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: 200m Ω Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200m Ω 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><tr><td></td><td>Temperature 温度</td><td>Duration of test 持续时间</td></tr><tr><td rowspan="5">1 cycle 一次循环</td><td>20±5℃</td><td>1h</td></tr><tr><td>-20±5℃</td><td>1h</td></tr><tr><td>20±5℃</td><td>1h</td></tr><tr><td>60±5℃</td><td>1h</td></tr><tr><td>70±5℃</td><td>1h</td></tr></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	Contact resistance: 200m Ω Max Shall meet : No. 6.2 to 6.4 No. 7.1 to 7.2 接触电阻 200m Ω 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±5℃	1h															
	20±5℃	1h															
	60±5℃	1h															
	70±5℃	1h															


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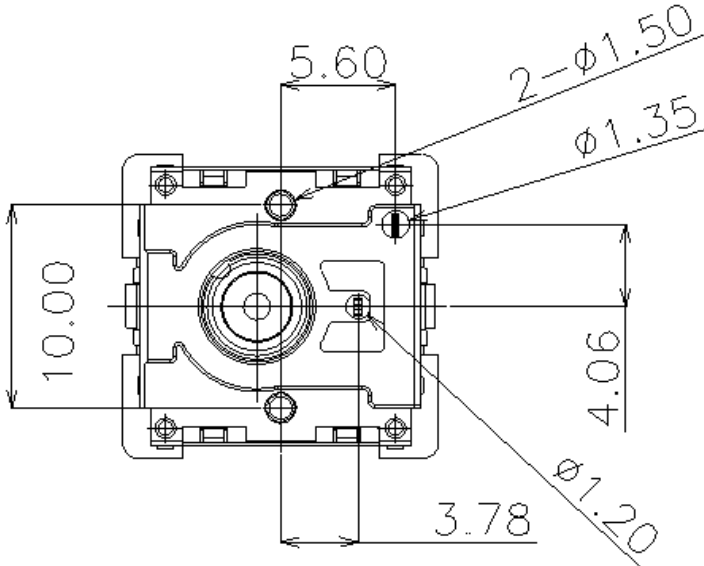
8.4	Soldering heat test 耐焊接热	Soldering area: T/2 of PWB thickness. (PWB: T=1.6mm) 焊接面积: 印刷基板的 1/2 厚度处 Soldering temperature: $260 \pm 5^{\circ}\text{C}$ Soldering time: $3 \pm 0.5\text{s}$ 焊接温度: $260 \pm 5^{\circ}\text{C}$ 焊接时间: $3 \pm 0.5$ 秒	Appearance: No abnormality. 外观无异常
8.5	Solderability 可焊性	1. 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: $3 \pm 0.5$ 秒 (3) Capacity of soldering iron: $\leq 20\text{w}$ 电烙铁功率: 20 瓦以下  2. Automatic PIPsoldering 自动波峰焊接: For the product of T/H, according to below condition: 	At least 95% of surface area of immersed portion shall be covered by solder. 侵焊面积大于 95%以上.
8.6	Humidity test 耐湿性	(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	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

 <b>凱華電子</b> KAIHUA EEELETRONICS	<b>Product Specification</b>			
	P/N:	DOC. No.:	Rev.:	Page:
	CPG159301S10	KH-PS-1703-40	A	9/11

8.7	Salt Spray 盐雾测试	Apply the following environment to test: 根据下列条件进行测试:  (1) Temperature : 35±5℃ 温度: 35±5℃; (2) Salt water density: 5±1% 盐水浓度: 5±1%; (3) Duration: 12 hours 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	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: 200 mΩ Max 接触电阻: 200 毫欧以下
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℃ 温度: 35±5℃ (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: 500 mΩ Max 接触电阻: 500 毫欧以下

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

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





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## Product Specification

P/N:	DOC. No.:	Rev.:	Page:
CPG159301S10	KH-PS-1703-40	A	10/11

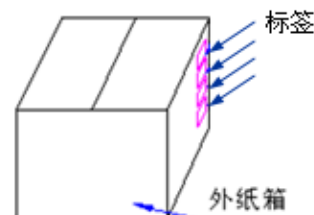
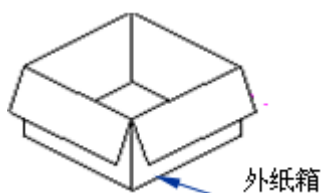
### 10. Loading Parameter (FP/OP/PT/OF/OT/MD/TF/RF/TT)Specification 荷重参数规格：

Parameter	Unit	Specification	Remark
FP(自由行程高)	mm	$13 \pm 0.5$	
OP (行程终止高度)	mm	$11.4 \pm 1.0$	
PT (导通行程)	mm	$1.6 \pm 0.5$	
OF (操作力)	gf	$55 \pm 10$	
OT(过行程)	mm	1.0	Min
MD (差动行程)	mm	0.5	Max
TF(接触力)	gf	$65 \pm 10$	
RF 回弹力	gf	13	Min
TT(总行程)	mm	$3.6 \pm 0.5$	

### 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℃ Max (Ambient temperature of soldering surface of P.W.B) 110℃ 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℃ 260±5℃
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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## Product Specification

P/N:	DOC. No.:	Rev.:	Page:
CPG159301S10	KH-PS-1703-40	A	11/11

- (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