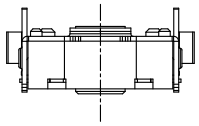
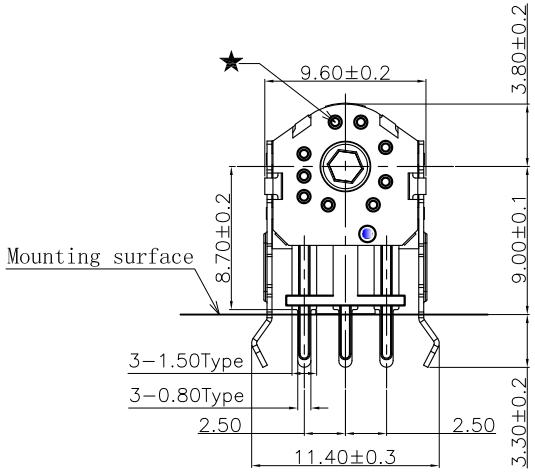
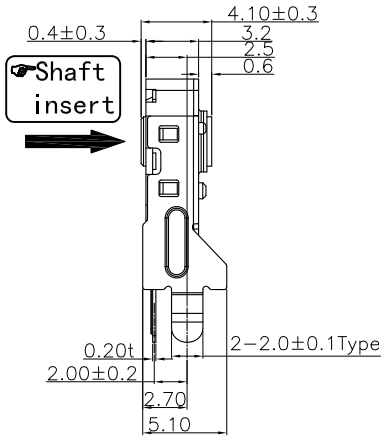
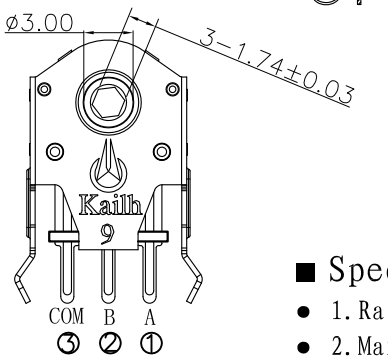
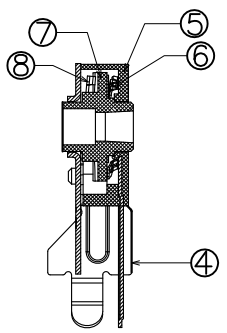
ABIDE BY ROHS

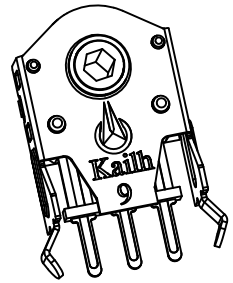


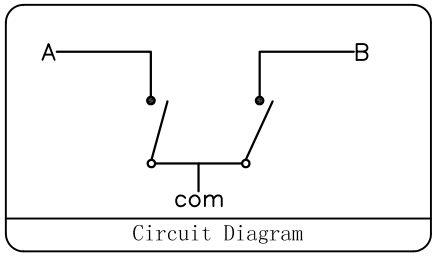






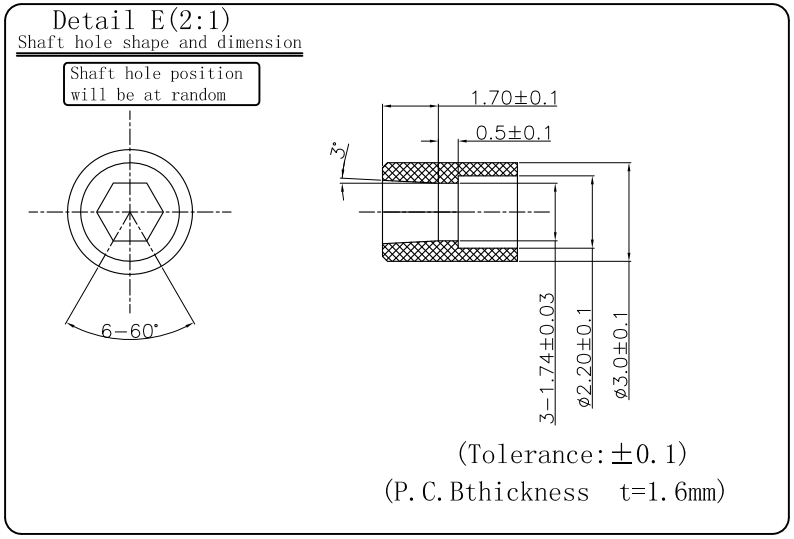




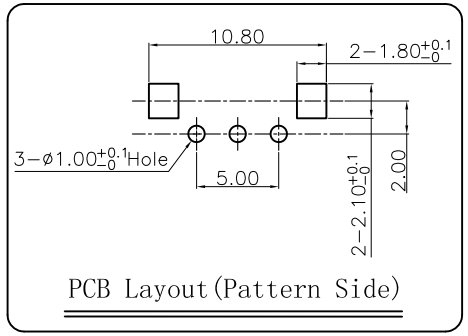


■ Specification :

- 1. Rated voltage: D.C. 5V
- 2. Maximum operating current (resistive load)
  Each lead : 1mA
- 3. Resolution: 12 pulses/360° for each phase
- 4. Contact Resistance: 5Ω (Max)
- 5. Insulation resistance: 50MΩ (Min) DC50V
- 6. Dielectric strength: AC50V (50-60Hz) for 1 minute
- 7. Detent torque: 20-40gf.cm
- 8. Life Test : 500,000 Cycles (min)



A:Output signal A
B:Output signal B



备注：底座背面的压针孔★是根据产品模具成型要求而定的，其规格的大小与数量的多少对产品结构、功能及使用无任何影响。

ITEM	PART NAME	TER'NO.	QTY.	MATERIAL	FINISHING	REMARK
⑧	Fixed Plate	——	1	Stainless Steel	——	——
⑦	Revolving Wheel	——	1	POM	Black	UL 94HB
⑥	Contact	——	1	Copper Alloy	——	——
⑤	Base	——	1	PA66	Gray	UL 94HB
④	Shell	——	1	Iron	Plating Nickel	
③	Terminal	3	1	Copper Alloy	Plating Silver	——
②	Terminal	2	1	Copper Alloy	Plating Silver	——
①	Terminal	1	1	Copper Alloy	Plating Silver	——

APPROVALS		DATE	东莞市凯华电子有限公司 DONGGUAN CITY KAIHUA ELECTRONICS CO.,LTD
DRAWN	章辉军	2016.05.30	
CHECKED			TITLE: EN9890 B Type Encoder
APPROVALS			PART NO. CEN989012R46

TOLERANCES ARE			ANGLE	UNIT: mm	SCALE: 1:1	PROJ:
	30<L	±0.30				
	10<L≦30	±0.20				
	5<L≦10	±0.15	±2°	DRAWING NO.	KHA-EN9890-015EN	SHEET 1 OF 1
	L≦5	±0.10				

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

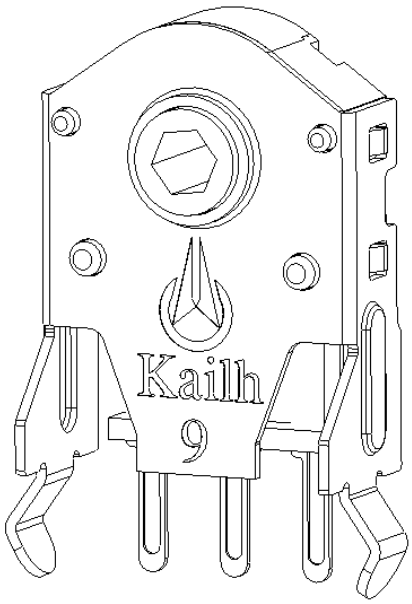
凱華電子
KAIHUA EELETRONICS

Document Number:

KH-PS1608-43

产品规格书

Product Specification



P/N: CEN989012R46			Title : Encoder Switch		
Rev.	ECN	Release and Revision Description:	Prepared By/Date:	Checked By/Date:	Approved By/Date:
A	---	New releasing 初版发行	章辉军 2016/9/27	吕攀豪 2016/9/27	马忠军 2016/9/27

Content

目录

1. Scope/范围:

This Product Specification covers the requirement of Encoder switch on product performance, test methods and quality assurance provisions.
本规格书内容涵盖编码器产品的要求，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：

The Switch is applied in all types of Computer mouse. Please let us know before using any of the products in the application not described above.
该编码器产品适用于所有类型的电脑鼠标，如果用于本文中未提及的领域请在使用前告知。

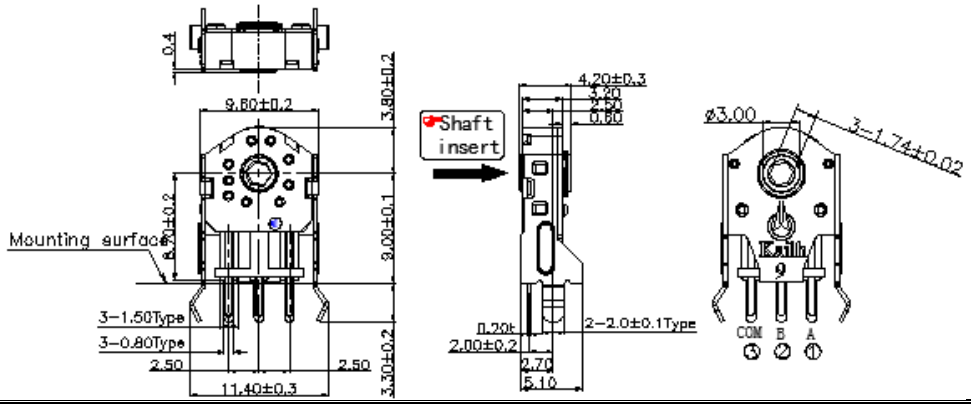
3. Technology Parameters/技术参数

Ambient Humidity 工作湿度：	≤85% R.H.；
Operating Temperature Range 使用温度范围：	-15℃～+70℃；
Storage Temperature Range 保存温度范围：	-20℃～+80℃；
Normal Condition：	
Ambient temperature 环境温度：	20±5℃
Relative humidity 相对湿度：	85%±5% R.H.；
Air pressure 气压：	86~101KPa;
Contact Resistance 接触阻抗：	5Ω Max；
Torque Force 扭矩：	20-40gf.cm；
Solder Ability 可焊性：	245±5℃,3±1s；
Withstand Soldering Temperature 耐焊接热：	260±5℃,3±1s；
Pulse/Rotation 脉冲数	12Pulse/360°
Numbers of detent 制动数	24

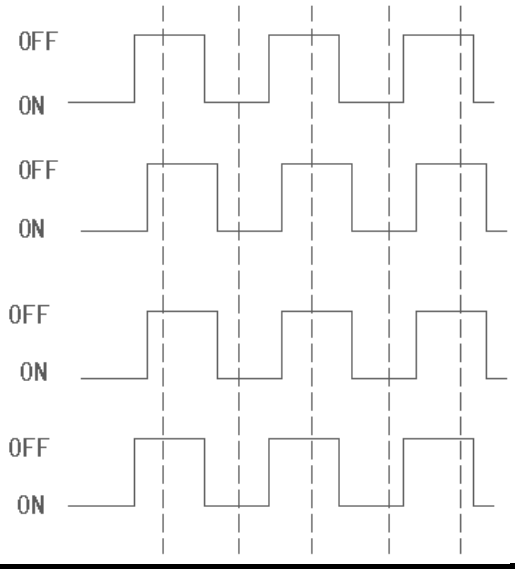
4. Ratings/额定性能要求

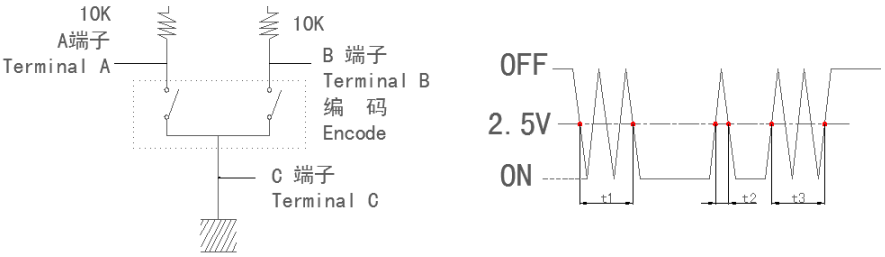
Rating 额定负荷：	DC5V / 各导线 1mA；
Insulation Resistance 绝缘电阻：	≥50MΩ/ DC 50V;
Withstand Voltage 耐电压：	50V AC 1 Minute;
Mechanical Life 机械寿命：	500,000 Cycles .

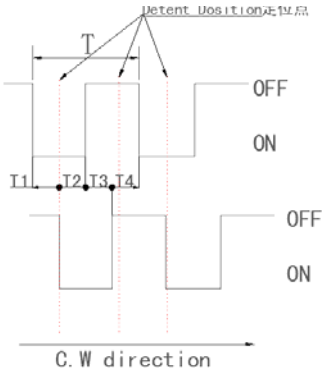
5. Profile Dimensions /外形尺寸



6. Electrical Performance/电气性能

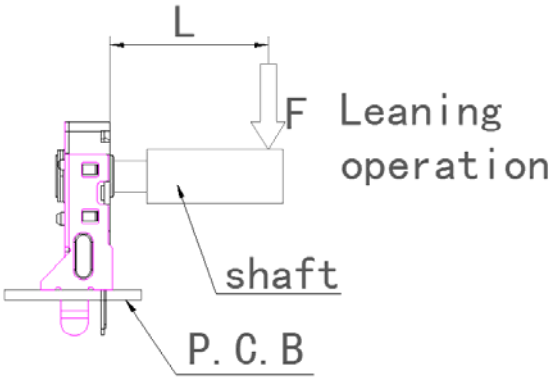
<table>
<tr><th>Item
项目</th><th>Description
项目描述</th><th colspan="2">Test Condition 测试条件</th><th>Requirement 规格要求</th></tr>
<tr><td>6.1</td><td>Contact Resistance
接触电阻</td><td colspan="2">Measured by a Voltage drop method at 1A , 5VDC. Any equipment with error not more than 5% can be used. Resistance after test in the average of 5 successive measurements(To measure after operated 5 to 10 times)
以1A,5V直流电，采用误差不超过5%的仪器测量,实验后的电阻取5次测量的平均值。（转动5-10次测量）</td><td>5Ω Max
5Ω 以下</td></tr>
<tr><td>6.2</td><td>Insulation Resistance
绝缘电阻</td><td colspan="2">Apply a Voltage of DC 50 V for 1 minute, according to the below method.
(1) Between terminals.
(2) Between terminal and Body.
输入 50V 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.</td><td>50MΩ Min
50 兆欧以上</td></tr>
<tr><td rowspan="3">6.3</td><td rowspan="3">输出信号
Output signal Format</td><td>Shaft rotational Derection
轴的回转方向</td><td>Signal
信号</td><td>Output
输出波形</td></tr>
<tr><td>C.W
顺时针方向</td><td>A(A-C 端子间
A(TerminalA-C
B(B-C 端子间）
B(TerminalB-C</td><td rowspan="2">  </td></tr>
<tr><td>C.C.W
逆时针方向</td><td>A(A-C 端子间
A(TerminalA-C
B(B-C 端子间）
B(TerminalB-C</td></tr>
</table>

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
6.4	Resolution 分析能力	Number of pulses in 360° rotation 回转一周的输出脉动数	12 pulses/360° for each phase 每 12 个脉动/360°
6.5	Switching Characteristics 开关特性	Measurement shall be made under the condition as follows. Shaft rotational speed :360° /S 下图所示回路，轴以360° /S的速度回转测定.  （NOTE) Code-ON area : The area which the voltage is 2.5V or less Code-OFF area : The area which the voltage is 2.5V or more （注）编码器 ON 指输出电压2.5V以下的状态。 编码器 OFF 指输出电压2.5V以上的状态。	
6.6	Chattering 振荡	Specified by the signal's passage time from 2.5V of each switching position(code OFF→ON 或 ON→OFF) 编码器 OFF→ON 或 ON→OFF 时，输出 2.5V 的通过时间应符合规定。	t1.t3≤3ms
6.7	Bounce 突跳	Specified by the time of voltage change exceed 2.5V in code-ON area. When the bounce has code-ON time less than 1ms between chattering(t1 or t3),the voltage change shall be regarded as a part of chattering. When the code-ON time between 2 bounces is less than 1ms. They are regarded as 1 linked bounce. 编码 ON 部分的 2.5V 以上的电压变动时间在振荡 t1.t3 之间会产生 1ms 以上 2.5V 以下的 ON 部分，另外，如果各突跳间 2.5V 以下的范围在 1ms 以上时，则判定为另一个突跳。	t2≤2ms

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
6.8	Phase-Difference 相位差	Measurement shaft be made under the Condition which the shaft is rotated in constant speed. 以固定的速度操作轴进行回转.(360°/S) 顺时针方向CW A信号（A-C间） Signal A B信号（B-C间） Signal B 	T1、T2、T3、T4≥5ms
6.9	Dielectric withstanding voltage 耐电压	Apply a Voltage of AC 50 V (50~60Hz) for 1 minute, according to the below method. (1) Between terminals. (2) Between terminal and Body. 输入 50V 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

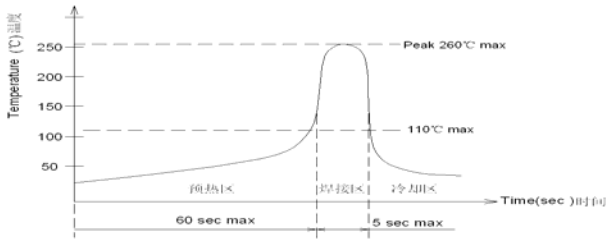
7. Mechanical Performance/机械性能

7.1	Detent torque 卡点扭力矩	Account the test with the torque within the scope of at 5℃-35℃ temperature. 在 5℃-35℃温度范围内用扭力计测试	20-40gf.cm 手感率≥70% 手感率= $\frac{\text{扭力最大值-最小值}}{\text{最大值}}$

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
7.2	Number and position of detent 定位点数及位置	N/A 不应用	24 detents(Step angle: 15° ±3°) 24 点定位 (间隔角度：15° ±3°)
7.3	Push-pull strength of shaft 轴的推拉强度	Mount the product to P.C.B and apply static force(F) of 50mN.m/5s as shown in the (fig5) 制品焊接于 P.C.B(图 5)沿轴垂直方向施加 FXL=50mN.m/5s 荷重的压力。 	Without damage to or excessive play in shaft no excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied 端子不得有明显松动 及接触不良，电气性能异常.
7.4	Rotational life 回转寿命	The shaft of encoder shall be rotated to 500,000 cycles at a speed of 30 cycles per minute without electrical load after which measurements shall be made. 在无负荷条件下轴以 30 次/分钟的速度回转 500，000 次.	实验后 Please difference T1、T2、T3、T4≥ 2.5ms Detent change 30%(Max) 相位差 T1、T2、T3、T4≥2.5ms 扭力变化最大 30%

8. Environmental Performance/环境性能

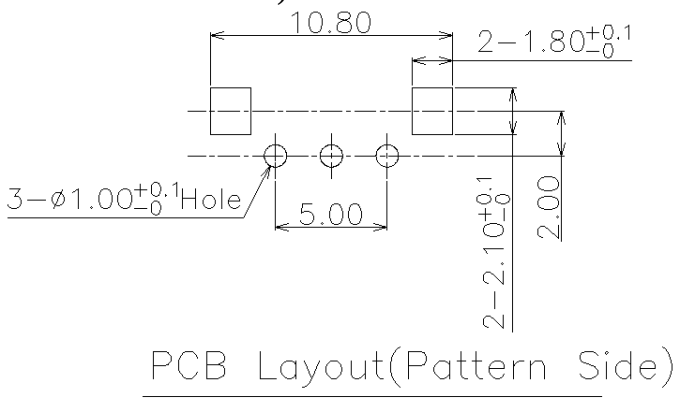
Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
8.1	Cold test 耐寒性	(1) Temperature : - 20±2℃ 温度：- 20±2℃ (2) Duration of test: 96h 持续时间：96 小时 (3) Take off a drop water 去掉水珠 (4) Standard conditions after test : 1h 试验后的放置条件：1 小时	Contact resistance: 5Ω Max Shall meet : No. 6.1 to 6.9 No. 7.1 to 7.3 接触电阻 5Ω以下 满足: No. 6.1 to 6.9 No. 7.1 to 7.3
8.2	Heat test 耐热性	(1) Temperature : 80±2℃ 温度：80±2℃ (2) Duration of test: 96h 持续时间：96 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: 5Ω Max Shall meet : No. 6.1 to 6.9 No. 7.1 to 7.3 接触电阻 5Ω以下 满足: No. 6.1 to 6.9 No. 7.1 to 7.3
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 1 cycle 一次循环: 20±5℃ 1h; -20±2℃ 1h; 20±5℃ 1h; 80±5℃ 1h (Temperature 温度 / Duration of test 持续时间)	Contact resistance: 5Ω Max Shall meet : No. 6.1 to 6.9 No. 7.1 to 7.3 接触电阻 5Ω以下 满足: No. 6.1 to 6.9 No. 7.1 to 7.3
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: 3±1s 焊接温度：260±5℃ 焊接时间：3±1 秒	Appearance: No abnormality. 外观无异常

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
8.5	Solderability 可焊性	1. Hand soldering 手工焊接： Please practice according to below condition: (1) Soldering Temperature : 350±5℃ 焊接温度：350±5℃ (2) Continual soldering time: 3±1s 连续焊接时间：3±1 秒 (1) Capacity of soldering iron: ≤20w 电烙铁功率：20 瓦以下 2. Automatic PIP soldering 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±2℃ 温度：60±2℃ (2) relative humidity: 90~95% R.H. 相对湿度: 90~95% R.H. (3) Duration of test: 96h 持续时间：96 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	Contact resistance: 5Ω Max Shall meet : No. 6.1 to 6.9 No. 7.1 to 7.3 接触电阻 5Ω以下 满足: No. 6.1 to 6.9 No. 7.1 to 7.3
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: 8 hours 持续时间: 8 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: 5Ω Max 接触电阻：5 欧以下

Item 项目	Description 项目描述	Test Condition 测试条件	Requirement 规格要求
8.8	Withstand K_2S 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_2S 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: 5Ω Max 接触电阻：5 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)

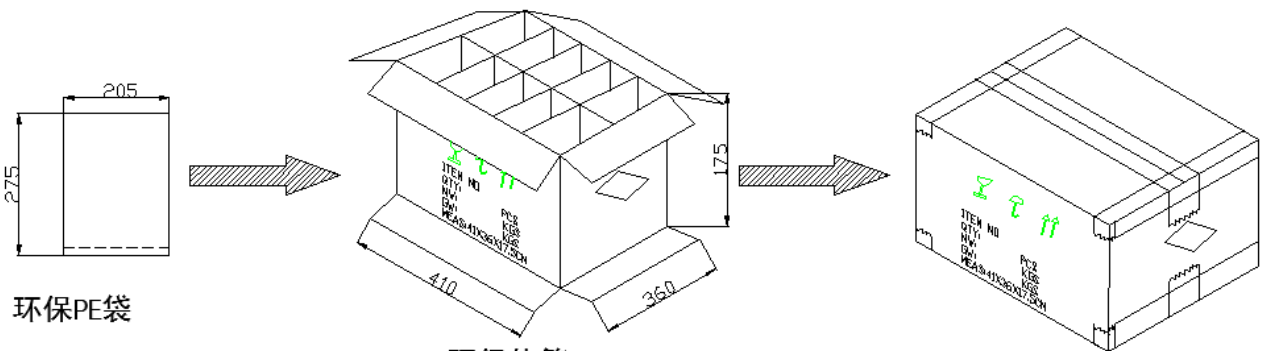


PCB Layout(Pattern Side)

10. Packaging 包装

Packaging type: PE Bag, 1000Pcs/Bag, 1000*10Pcs/Carton.

包装方式: PE 袋, 1000Pcs/袋. 1000*10Pcs/箱



环保PE袋

环保外箱
材质：K=K

11.Precaution 注意事项

11.1 Immersion 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.

(2) Under the condition of using soldering iron, soldering temperature shall be 350℃ max within 3 sec.

在使用铬铁的情况下，焊锡温度应在350℃以下，焊接时间3秒以内.

11.2 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