

# 产品规格书

## PRODUCT SPECIFICATION

客户名称:

CUSTOMER: \_\_\_\_\_

产品名称:

PRODUCT NAME: 自控制保护器 Self Control Protector

型号规格:

MODEL DETAIL: SCPXXAXJ

料号:

PART NO.: \_\_\_\_\_

供应商:

东莞市安伏特电子有限公司

SUPPLIER: DONGGUAN AMPFORT ELECTRONICS CO., LTD.

地址:

东莞市石龙镇西湖李屋园工业区一巷 1 号

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CUSTOMER:

日期:

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### 1.适用范围 Scope

本规范适用于东莞市安伏特电子有限公司生产的自控制保护器。

This Specification applies to the fuse linked with heater which made by DONGGUAN AMPFORT ELECTRONICS CO LTD.

### 2.适用安全标准 Applicable Safety Standards

UL248-1, UI248-14。

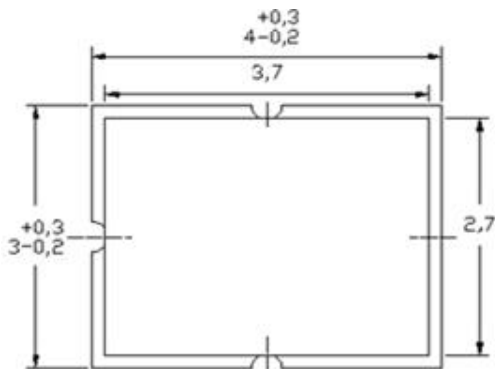
### 3.UL 认证 UL File Number

申请中 Application in progress.

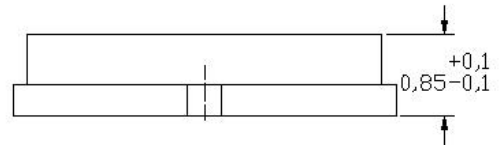
### 4.外形与回路图 Dimensions and Circuit Chart

#### 4.1 外形图 Dimensions

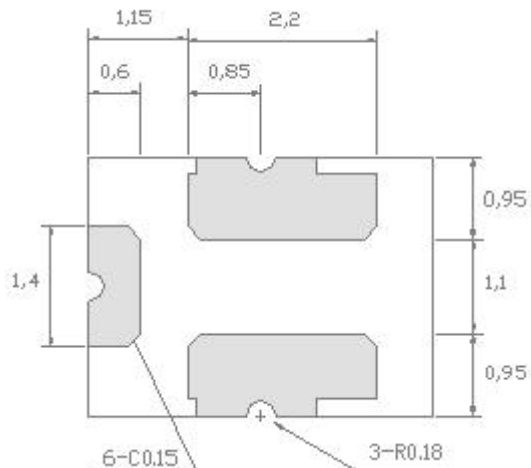
表面图 Top view



侧面图 Side view



背面图 Bottom view



表面外壳为 LCP 材料，底部基板为氧化铝陶瓷

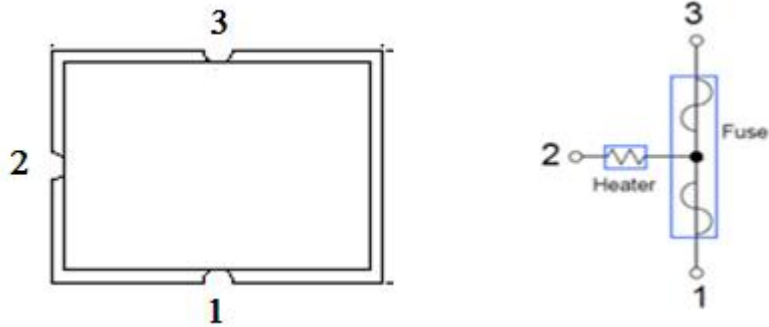
The surface shell is made of LCP material, and the bottom substrate is made of alumina ceramics

除非另有指定，外部尺寸公差为:  $\pm 0.2\text{mm}$ 。

Tolerances Unless Otherwise Specified:  $\pm 0.2\text{mm}$ .

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#### 4.2 回路图 Circuit Chart



等效电路图

#### 4.3 重量 Weight

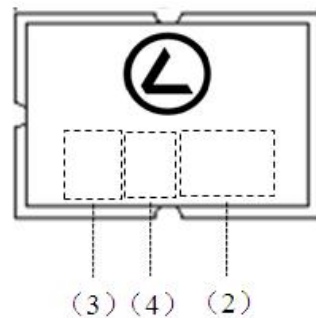
0.021 g/pc, (典型值 Typical weight)

#### 4.4 型号与标识 Model and mark

产品的型号命名与产品外壳表面打印符号的意义解释如下，已 SCP12A4J 为例说明。

The meaning of product model designation and printed symbols on the surface of product shell is explained as follows, which has been illustrated by taking SCP12A4J as an example.

SCP □□ A □ □<sup>+</sup>  
 (1) (2) (3) (4)<sup>+</sup>



(1) 产品名称-自控制保护器的英文首字母缩写。Acronym of self-control protector.

(2) 产品额定电流数值，常见有 12、15、22、30 等。

The rated current of the product usually includes 12A, 15A, 22A, 30A, etc.

(3) 产品适用于电芯数目，常见有 1、2、3、4 等。

The product is applicable to the number of electric cores, including 1 string, 2 strings, 3 strings, 4 strings, etc

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(4) 产品的尺寸代码, J 表示 4.0mm×3.0mm×0.85mm, H 表示 5.4mm×3.2mm×1.35mm, K 表示 9.5mm×5.0mm×2.0mm 等。

Dimension code of the product, J means 4.0mm × 3.0mm × 0.85mm, H means 5.4mm × 3.2mm × 1.35mm, K means 9.5mm × 5.0mm × 2.0mm, etc.

### 5.规格 Rating

型号 Part number	额定电流 Current Rating	额定电压★ Voltage Rating	最大阻断电流 Max. Breaking capacity	保险丝电阻 Fuse DCR	适用电芯数 Cells in series	动作电压范围 Operating Voltage
	A	VDC	A	m Ω	cell	V
SCP12A1J	12	36	50	1.0-3.5	1	3.0-4.5
SCP12A2J					2	4.0~9.0
SCP12A3J					3	7.4~13.8
SCP12A4J					4	10.5~19.6
SCP15A1J	15	36	50	1.0-3.0	1	3.0~5.0
SCP15A2J					2	5.0~9.0
SCP15A3J					3	7.4~13.8
SCP15A4J					4	10.5~19.6
SCP15A5J					5	13.0~23.5
SCP15A6J					6	14.1~28.0
SCP15A7J					7	16.5~31.5
SCP15A8J					8	18.8~36.0
SCP15A9J					9~10	25.0~47.0
SCP15A11J					11~12	32.0~56.4
SCP15A13J					13~14	35.0~62.0

★额定电压是保险丝组件可以安全阻断的最大电压值, 不是发热器组件的动作电压。

★Rated voltage is the maximum voltage that the fuse can block, not the action voltage of the heater assembly.

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## 6.环境性能 Environmental Characteristics

(1) 产品中使用的各种材料的卤素含量如下表所示。

Contents of halogens used in each material for the product are as follows.

卤素 Halogen substance	含有量 Content
氯 (CL) Chlorine (CL)	≤ 900ppm (0.09%)
溴 (Br) Bromine (Br)	≤ 900ppm (0.09%)
总和 (氯(CL)+溴(Br)) Total concentration of chlorine (CL) + bromine (Br)	≤ 1500ppm (0.15%)

(2) 本规范中描述的产品符合 ROHS 指令。BOM 表中的合金、焊料、一些电子浆料含有铅，但都符合 ROHS 指令的高铅豁免相关规定。。

The product described in this specification complies with the ROHS Directive. BOM table contains the alloy, solder, some electronic slurry, including lead, but these are exempted from ROHS requirements.

## 7.性能 Characteristics

### 7.1. 测试一般条件 General Conditions of Measurement

除非特别指定，否则按以下环境条件进行测量。

In the absence of additional test environmental standards, the test environmental standards are as follows;

环境温度：5~35℃；	Ambient temperature: 5 to 35℃.
相对湿度：45~85%RH；	Relative humidity: 45 to 85%RH.
气压：86~106KPa。	Air pressure: 86 to 106kPa.

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如果在判定产生疑义的情况下，按照以下条件进行测定。

If you have any questions about the test results, please follow the following environmental standards.

环境温度：20±2℃；

Ambient temperature: 20±2℃.

相对湿度：60~70%RH；

Relative humidity: 60 to 70%RH.

气压：86~106KPa。

Air pressure: 86 to 106kPa

## 7.2. 电气的性能 Electrical Characteristics

No.	项目 Items	测定条件 Conditions	技术规格 Specifications
1	熔断时间 Clearing time	产品参照《电压动作特性测试方法》连线，向加热器组件（2-1 端或者 2-3 端）施加对应规格的动作电压 Apply the operating voltage to the heater. For other procedures, refer to 《Voltage action characteristic test method》.	保险丝组件一分钟内熔断。 The fuse shall be melt Within 1 min.
		产品参照《电流动作特性测试方法》连线，向保险丝组件（1-3 端）施加两倍额定电流。 Energize both ends of the fuse with twice the rated current. For other procedures, refer to 《Current action characteristic test method》.	
2	通电容量 Current carrying capacity	产品参照《温升测定方法》连线，向保险丝组件（1-3 端）施加额定电流。 Energize the rated current at both ends of the fuse. For other procedures, refer to 《Temperature Rise characteristic test method》.	保险丝组件 1 小时内没有熔断。 No melting within 1 hour

注：

电气性能受基板热容量、零件、图案宽度等条件的影响。因此，请将产品安装在客户实际使用的基板上确认特性。

Electrical Characteristics is influenced by thermal capacity of PCB, parts, pattern width, and so on. Therefore you should check it on your PCB.



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### 7.3. 机械的性能 Mechanical Characteristics

NO	項目 Items	測定条件 Conditions	規格 Specifications
1	上盖粘合强度。 Tensile Strength between base and cap.	给产品上盖侧面中央使用推力计，垂直推盖子。 The fuse shall be sustained, and the cap is vertically thrust.	破坏所需推力强度为 3N及以上。 Destruction strength shall be 3N or more.
2	基体强度 Core body strength	如下图1，在箭头的方向给产品外壳表面中央使用R0.5的加压棒，以10N的静负荷保持10秒。 A static load of 10N using a R0.5 pressure rod shall be applied to the center in the direction of the arrow and held for 10s.	无破损等机械损伤， 满足电气性能。 Without mechanical damage such as breaks. Electrical characteristics shall be satisfied.
3	电极附着力 Adhesion	如下图2，在箭头方向给产品基体侧面中央使用R0.5的加压棒，以5N的静负荷保持10秒。产品焊板参考《温升测试方法》。 A static load of 5N using a R0.5 pressure rod shall be applied on the core of the component and in the direction of the arrow and held for 10s. For making the sample, refer to 《Temperature Rise characteristic test method》	电极没有剥离， 满足电气性能。 Without electrode peeling. Electrical characteristics shall be satisfied.
4	抗弯曲性 Board bending test	如下图3，在箭头方向给产品对应的PCB板中央位置使用R340加压棒，加压使PCB板弯曲深度0.5mm，保持30秒。产品焊板参考《温升测试方法》。Apply pressure in the direction of the arrow until bent width reaches 0.5mm and hold for 30s. For making the sample, refer to 《Current carrying capacity characteristic test method》.	无破损等机械损伤， 满足电气性能。 Without mechanical damage such as breaks. Electrical characteristics shall be satisfied.

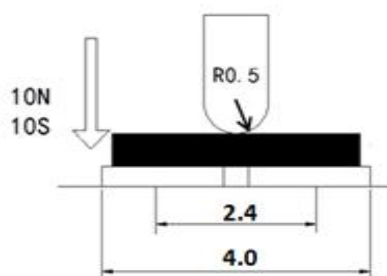


图 1

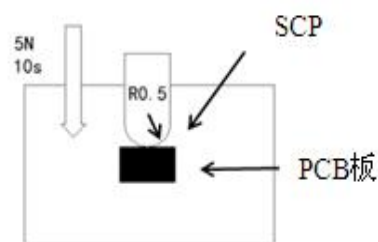


图 2

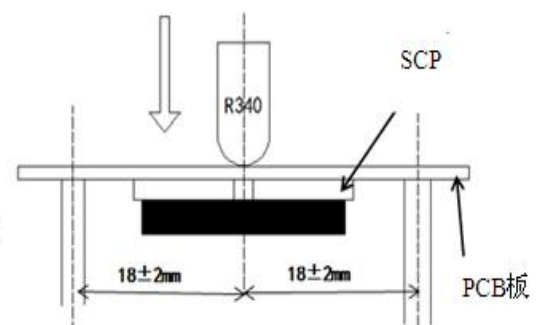


图 3

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7.4. 耐久性能 Endurance Characteristics

NO	項目 Items	測定条件 Conditions	規格 Specifications
1	高温 Dry heat	在100±5℃环境保持6小时后，常温常湿条件下放置1小时后进行测量。 The fuse shall be stored at a temperature of 100 ± 5 °C for 6h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	没有外形变形，上盖脱落等异常，满足电气性能。 Without deformation of case or excessive looseness of caps. Electrical characteristics shall be satisfied.
2	低温 Cold	在-20±3℃环境保持500小时后，常温常湿条件下放置1小时后进行测量。 The fuse shall be stored at a temperature of -20±3℃ for 500h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	
3	湿热 Damp heat	在40±2℃、相对湿度90~95%RH环境保持250小时后，常温常湿条件下放置1小时后进行测量。 The fuse shall be stored at a temperature of 40±2℃ with relative humidity of 90 to 95%RH for 250h. And then it shall be subjected to standard atmospheric conditions for 1h, after which its measurement shall be made.	
4	耐久测试 Endurance test	给产品通电五倍额定电流5ms，断开995ms为一个周期，一起循环十万个周期。 5×In shall be carried for a period of 5ms. The current is there switched off for a period of 995ms.this cycle is repeated 100,000 times.	外形无明显变形、破损，保险丝组件没有熔断。内部电阻与初始值相比变化应在110%及以下。 Without damage such as deformation or disconnection of fuse element. Internal resistance shall be relative to the value before test 110% or less.

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7.5. 安装性能 Mounting Characteristics

NO	項目 Items	測定条件 Conditions	規格 Specifications
1	耐焊接热 Resistance to soldering heat	<p>①回流焊法</p> <p>峰值温度: 255°C±5°C@5s, 230°C±5°C@30s          通过上述温度曲线的回流炉 2 次后, 在常温常湿中放置 24 小时后进行测定。</p> <p>①Reflow soldering method          Peak temp : 255°C±5°C 5s, 230°C±5°C 30s.          The specimen shall be passed through the reflow furnace for 2times.          The specimen shall be stored at standard atmospheric conditions for 24h after which the measurement shall be made.</p> <p>②烙铁法          烙铁焊接温度 300±5°C, 3±1s 焊接好产品电极后, 在常温常湿中放置 24 小时后进行测定。</p> <p>②Soldering iron method          Bit temperature : 300±5°C          Application of soldering iron : 3 ± 1 s          Apply the soldering iron to the electrode.          The specimen shall be stored at standard atmospheric condition for 24h, after which the measurements shall be made.</p>	<p>上盖无变形、无过度松动, 应满足电气特性。          Without deformation of case or excessive looseness of caps.          Electrical characteristics shall be satisfied.</p>

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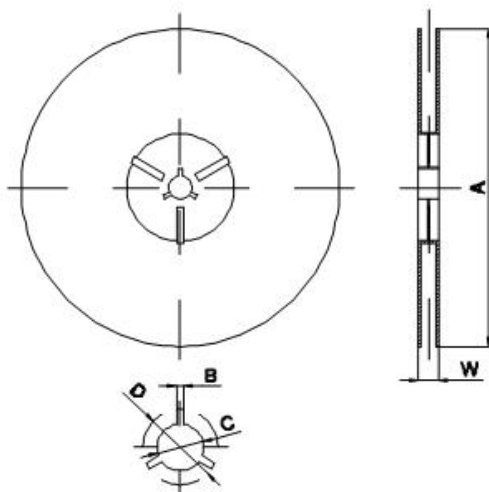
2	可焊性 Solder ability	焊料：无铅 (Sn96.5Ag3Cu0.5%) 助焊剂： 25%松香乙醇溶液 浸入深度： 2~2.5mm 焊接温度： 235±5℃ 浸入时间： 2±0.5 秒 浸拉速度： 25±2.5mm/秒 Solder : Pb-free (Sn96.5Ag3Cu0.5%) Flux : 25wt%Rosin Ethanol solution Dipping depth : 2~2.5mm Temperature : 235±5℃ Dipping time : 2±0.5S Dipping and drawing speed : 25±2.5mm/S	焊料覆盖电极面积占比 95%以上。 A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.
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## 8. 包装形式 Package Form

包装形式为压印纹载带编带。

Package form is embossed tape packing.

### 8.1. 圆盘尺寸 Dimension of Reels



Code	(mm)
A	330±1.0
B	2+0.5/-0
C	13±0.2
D	21±0.2
W	15.4±0.5

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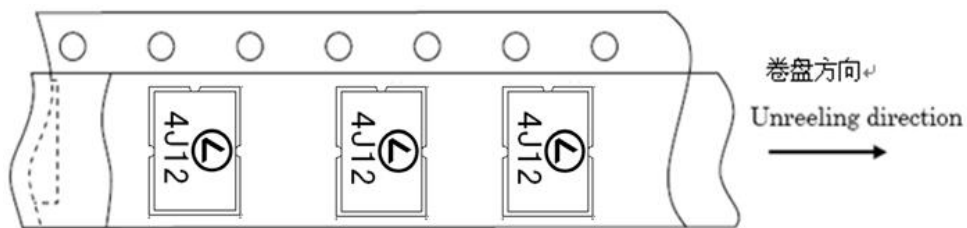
### 8.2. 包装数量 Packing Quant

5000pcs/卷 5000pcs/reel

### 8.3. 编带方向 Direction of Taping

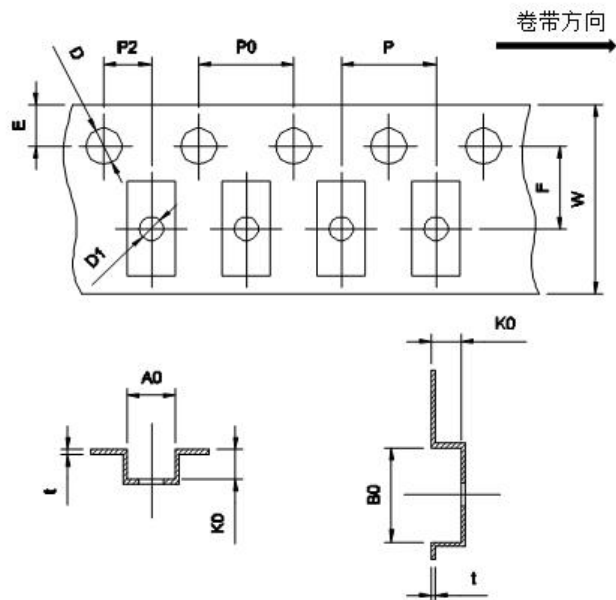
从面带上方方向观察。

The direction shall be seen from the top cover tape side.



### 8.4. 载带尺寸 Dimension of Tape

Code	(mm)
E	1.75±0.10
F	5.50±0.10
P2	2.00±0.05
D	1.55±0.05
D1	1.5±0.1
P0	4.00±0.10
10P0	40.0±0.20
W	12.00±0.30
P	8.00±0.10
A0	3.30±0.10
B0	4.30±0.10
K0	1.15±0.10
t	0.30±0.05



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#### 9.存储条件 Storage Condition

本产品应保存在温度不超过 40℃，相对湿度不超过 60%的阴暗环境。在上述条件下，保存期为 6 个月。

This product should be kept shaded and in a temperature 40℃ or less and in a relative humidity 60%RH or less. The preservation period when it is kept on the above condition is 6 month.

应避免储存在可能产生腐蚀性气体的环境，如盐雾、氯气、硫化氢、铵气、氯化氢等

Should avoid to store at where there is possibility of generating corrosive gas, such as salt mist, chlorine, hydrogen sulfide, ammonium, hydrogen chloride, etc.

#### 10.出库检查项目 OQC

每批出货随机抽查以下项目，并发布测试单。

Inspect the following items each lot:

- |           |               |
|-----------|---------------|
| (1) 外形尺寸  | Dimensions    |
| (2) 发热电阻  | Heater DCR    |
| (3) 保险丝电阻 | Fuse DCR      |
| (5) 熔断时间  | Clearing Time |

#### 11.使用上注意事项 Precaution

在使用 SCP 的时候，请注意以下几点。

Please note the following respects when you use the SCP

(1) 通电容量和熔断时间受基板热容量等条件的变化而变动。因此，请在实际使用的基板上焊接产品再确认特性。一般来说，基板层数越多、铺铜越宽越厚、基材越厚等热容量增加的因素，会导致通电容量变大，熔断时间变长。

It is necessary to foresee there are possibilities that “Current-Carrying Capacity” and “Heater Operation Characteristic” may be varied along with the condition change in the substrate thermal capacity, etc. Therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current-carrying capacity will increase accordingly and Clearing-time will be longer.

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(2) 本规范中记载的规格是在 UL 标准基板(0.6mm 厚度的单面覆铜玻璃环氧基板)上安装并确认的。由于所使用的基板的热容量不同,特性也会发生变化,使用时请在贵公司产品所使用的基板上确认。

The data on this specification is measured with UL standard PCB (0.6t Glass Epoxy single-sided copper laminated). The characteristics are influenced by thermal capacity of PCB, so it is recommended checking it on actual PCB.

(3) 本产品在安装前和安装后,如果进行清洗(如超声波及浸渍清洗等),合金上的助焊剂会流动,可能不满足规格要求。另外,本产品与清洗液接触也会产生同样的症状。请避免清洗本产品。请注意,清洗后的产品不属于品质保证对象。

Ultrasonic-cleaning or immersion-cleaning and so on must not be done to SC-Protector before and after mounted. When cleaning is done, flux on element would flow, and it would not be satisfied its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.

(4) 如果对本产品进行树脂密封,树脂会进入产品内部,可能不满足规格要求,请避免树脂密封。请注意,树脂密封后的产品不属于品质保证对象。

Please avoid contacting SC-Protector and resin-mold. The resin might infiltrate into the product, and it doesn't meet the specification when the resin-mold is done to this product. These products after resin-mold will not be guaranteed.

(5) 请不要再次使用因焊接修正而取下的产品。

Please do not re-use of the product removed by the solder correction.

(6) 关于本产品在基板上的安装,请确认端子是否正确连接在焊盘上,端子在②-①之间以及②-③之间的直流电阻为加热器的电阻值。

Make sure that the terminals of this product are connected property on the land of circuit board, and the value falls in the rated heater resistance between Terminal 2-1 and 2-3.

(7) 本产品是为了一般电子设备的标准用途而设计制造的。因此,不要在可能危及生命或财产的用途(如军事、医疗用途等)中使用。

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This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the applications [Military, Medical and so on] which may cause direct damages on life, bodies or properties of third party.

(8) 本承认书需要变更或产生疑义时，应事先联系，在双方协商后进行修改。

It is amended in conference with the supplier and the customer when the necessity of the change or doubt occurs in this specification.



《电压动作特性测试方法》

《Voltage action characteristic test method》

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1.适用范围 Scope

本测试标准适用于深圳良胜电子有限公司生产的 SCP 电压动作时间测试的方法。

This test standard is applicable to the SCP voltage action time test method produced by DONGGUAN AMPFORT ELECTRONICS CO.,LTD.

2.定义 Definition

SCP 的发热体组件施加规定的动作电压或功率，直到保护丝组件因发热体的焦耳热熔断为止的时间。

The clearing-time when a rated voltage or electricity loaded into the heater of fuse links with heater.

3.测定方法 Method of Measurement

3.1 连线 Wiring

样品的制作参照《温升测试方法》里 3.1 条。如图 1 所示，样品与恒定电压电源连接，连线电阻在  $0.1\ \Omega$  以下。

Refer to Article 3.1 of < temperature rise measurement method > for sample preparation. Wiring is shown in Fig 1. The resistance of the wiring shall be less than  $0.1\ \Omega$ .

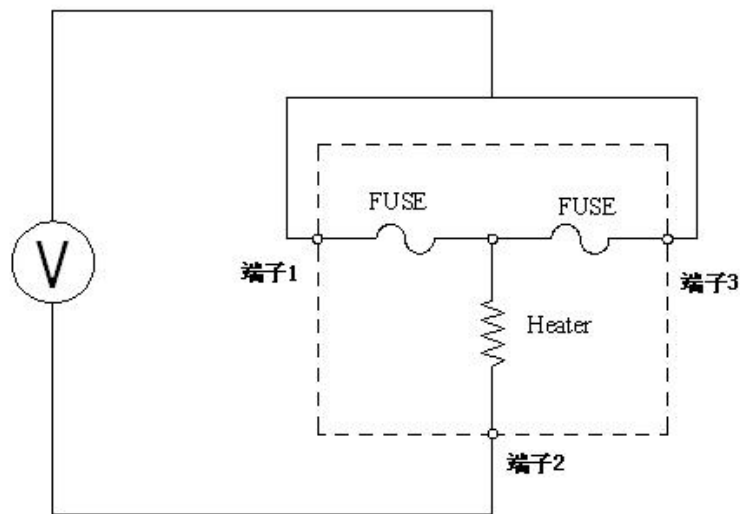


图 1 Fig1

# 《电压动作特性测试方法》

## 《Voltage action characteristic test method》

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### 3.2 测定方法 Method

#### 3.2.1 定电压测定 Measurement in rated voltage

如图 1 所示连线产品，给产品通电压，测量电路电流因为保险丝组件熔断而锐减为止的时间。使用输出电压误差为±2%，电流输出额定高，可以监测电流值的恒压电源。测量采用的计时器精度至少为小数点 1 位。

The Fuse links is wired as Fig.1 , and measure the time until both of the fuse cleared. Using the constant voltage power souse ,and its tolerance ±2%,has enough capacity of the current and it can be monitored. It is measured by using a chronograph at least decimal point one-digit precision.

#### 3.2.2 定功率测定 Measurement in Rated Electricity

根据加热器组件的电阻，通过以下公式换算成电压值，其它测定要求同 3.2.1 条内容。

From the heater's resistance, the voltage calculated by the formula below is loaded in the same way 3-2-1.

$$V = \sqrt{(W \times R)}$$

V: 产品电压值 Voltage

W: 功率值 Operating electricity

R: 加热器电阻值 Heater resistance

### 3.3 测定环境 Environment

测试应在 23±5℃ 的环境下进行，如果在其他温度下进行测量，则在结果中明确记载。

The measurements shall be done in 23±5℃. It is specified in the result when it is measured in outside of the range.

# 《电流动作特性测试方法》

## 《current action characteristic test method》

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### 1.适用 Scope

本测试标准规定了电流动作特性测定方法。

This standard is prescribed about the method of measuring clearing-time of fuse links.

### 2.定义 Definition

给保险丝组件通电流，保险丝组件依靠自身电阻的焦耳热使保险丝组件熔断的时间。

The clearing -time by the fever of  $I^2R$  when a rated current loaded into the fuse links.

### 3.测定方法 Method of Measurement

#### 3.1 样品 Sample

样品的制作参照《温升测试方法》第 3.1 条。

Refer to Article 3.1 of< temperature rise measurement method> for sample preparation.

#### 3.2 测定方法 Method

将样品连接到电源，连接方法和电源精度参考《温升测试方法》里 3.2 条。向样品通电流，并测量电流被截止或急剧减小之前的时间。使用误差为 5%或更少的计时表测量或数字示波器。

Connect the sample to the power supply. The method of the connection and power supply's error are based on article 3.2 of< temperature rise measurement method>. A prescribed current is energized to the sample, and time until the current is intercepted or decreased sharply is measured. It is measurement by using a chronograph of 5% or less of the errors or a digital oscilloscope

#### 3.3 测定环境 Environment

测试应在  $23 \pm 5^\circ\text{C}$  的环境下进行，如果在其他温度下进行测量，则在结果中明确记载。

The measurements shall be done in  $23 \pm 5^\circ\text{C}$ . It is specified in the result when it is measured in outside of the range.

# 《温升测试方法》

## 《Temperature Rise characteristic test method》

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### 1 适用 Scope

本测试标准规定了产品在通电额定电流下测量温升的方法。

This standard is prescribed about the method of measuring temperature rise carrying the rated current.

### 2 定义 Definition

产品通额定电流，保险丝发热与向周围环境辐射散热处于平衡状态时的温度。

The temperature rise when carrying the rated current, the fever of the element and thermal radiation is in balance condition.

### 3 测定方法 Method of Measurement

#### 3.1 样品 Sample

使用无铅焊料 (Sn96.5/Ag3/Cu0.5 [%]) 将产品焊接到规定的测试板子 (Fig 1) 上, 使用包覆线 (L=15cm) 分别连接测试板的 1、3 端与电源的输出端。

Fuse links are soldered to the prescribed circuit board (Fig 1) with Pb-free solder (Sn96.5/Ag3/Cu0.5 [%]).

Covered wires(L=15cm) that provides to Table.1 are soldered to the board's Terminal①,③ by the solder above.

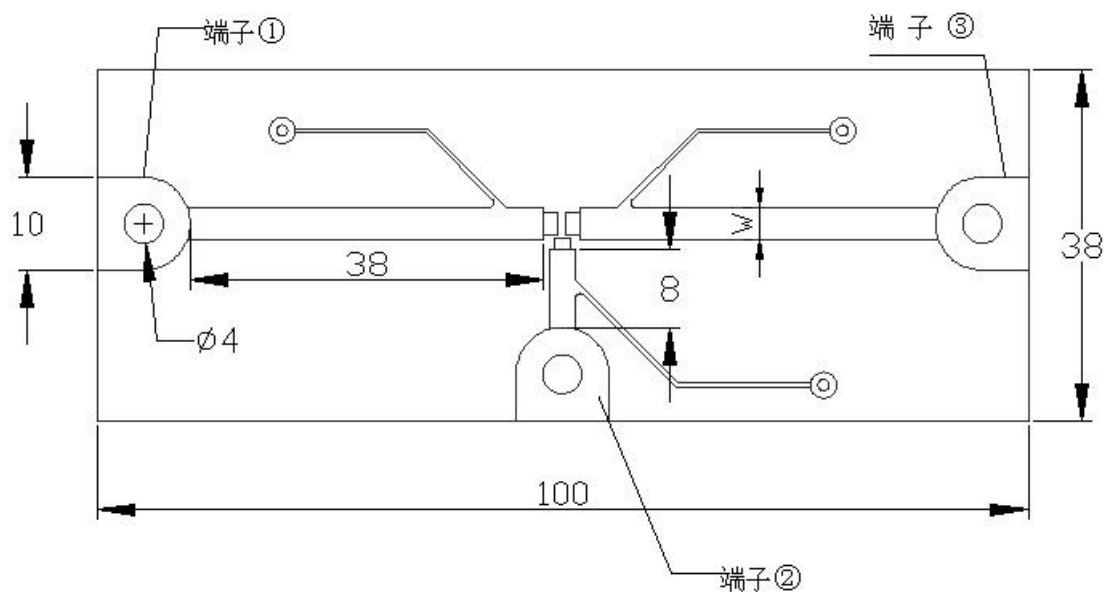


Fig 1

## 《温升测试方法》

### 《Temperature Rise characteristic test method》

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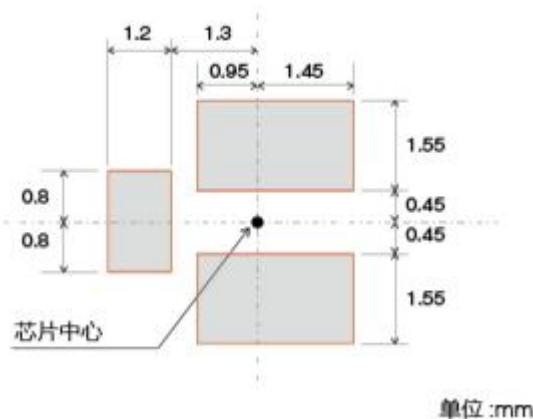


Fig 2

注:

这仅是建议的焊盘尺寸，并不保证贴装质量。请结合贵公司的设计指南进行验证。

This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.

Table.1

额定电流 Rated Current	材质 Materials	基板厚度 Base thickness	铜箔宽度 W Copper width W	铜箔厚度 Copper thickness	包覆线型号 Covered wires
12A	环氧玻璃印制线路板 Glass Epoxy PWBs.	0.6-0.66mm	2.0mm	2.0OZ	AWG18
15A	环氧玻璃印制线路板 Glass Epoxy PWBs.	0.6-0.66mm	3.5mm	2.0OZ	AWG14

### 3.2 温升测定方法 Method of Measuring Temperature Rise

使用厚度小于 200 μm 的硅胶粘带将 φ0.2 以下的铁—康铜热电偶固定在元件上，同时热电偶另一端连接到误差小于等于 0.5℃ 的数字温度计上。使用误差小于等于 2% 的电源设备连接到元件样品的电线上。将额定电流加载到保险丝并测量温升。每 3 分钟测量一次温度，并读取达到平衡的温度。电源设备的最大输出应大于 5V。

## 《温升测试方法》

### 《Temperature Rise characteristic test method》

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Iron—Constantan thermo couple less than  $\phi 0.2$  is contacted and fixed on the element. The thermo couple is fixed by silicone-adhesive tape less than  $200\mu\text{m}$  thickness. The thermo couple is connected to the digital thermometer of  $0.5^{\circ}\text{C}$  or less of errors. Power supply device of 2% or less of the errors is connected to the sample's wires. Load rated current to the Fuse links and measures temperature rise. The temperature is measured in every 3 minutes, and read the temperature which reached a balance. The maximum output of the power supply device should be more than 5V.

#### 3.3 测定环境 Environment

测试应在  $23\pm 5^{\circ}\text{C}$  的环境下进行，如果在其他温度下进行测量，则在结果中明确记载。

The measurements shall be done in  $23\pm 5^{\circ}\text{C}$ . It is specified in the result when it is measured in outside of the range.