

## 厦门赛尔特电子有限公司 Xiamen SET Electronics Co., Ltd.

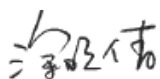

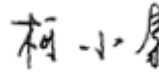
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# 规格书

## SPECIFICATION FOR APPROVAL

|                    |  |
|--------------------|--|
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|  |  |
|--|--|
| 产品名称 Product Name  | 抑制浪涌电流 NTC 热敏电阻器<br>Inrush Current Limiting NTC Thermistor |
| 产品型号 Product Model   | SCL5D-11   |
| 产品编码 Product Code  | 1100000003282  |
| 产品描述 Product Description                                     | SCL5D-11_MSDBN0_5 Ω_F7.5                                   |
| 标称零功率电阻值 Nominal Zero-power Resistance at 25 °C ( $R_{25}$ ) | $R_{25}: 5 \Omega$   |
| 认证 Agency Approval   | UL/CUL/TUV/CQC   |
| 制造商 Manufacturer   | 厦门赛尔特电子有限公司 Xiamen SET Electronics Co.,Ltd.                |
| 产地 Country of Origin   | 中国 China   |

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|---|--------------|---|--------------|---|--------------|
|  | May 16, 2022 |  | May 16, 2022 |  | May 16, 2022 |
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| 拟制 Prepared By | 技术审核 Reviewed By | 品保核准 Approved By |
|----------------|------------------|------------------|

## 客户批准 CUSTOMER APPROVAL

|                     |  |
|---------------------|--|
| 客户名称 Customer Name  |  |
| 客户料号 Customer P/N   |  |
| 结论 Conclusion       | <input type="checkbox"/> 合格 (承认) Qualified<br><input type="checkbox"/> 不合格 Unqualified<br>不合格原因: Root Cause: |
| 生效日期 Effective Date | 年 YY 月 MM 日 DD<br>Name: Date: Name: Date: Name: Date:  |
| 经办 Prepared By      | 审核 Reviewed By<br>核准 Approved By   |

- 如果本规格获得你们的批准, 请签名并拷贝一份副本给我们。  
 IF YOU APPROVE THIS SPECIFICATION, PLEASE SIGN AND RETURN ONE COPY TO SETsafe | SETfuse.
- 给赛尔特下订单时, 请在订单中列出上述表格中的: 产品型号、产品编码对应的内容。  
 PLEASE WRITE THE RELATED PRODUCT MODEL, PRODUCT CODE SHOWN IN THE ABOVE SPECIFICATION INTO THE PURCHASING ORDER(PO) THAT YOU PROVIDE TO SETsafe | SETfuse.

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## 1. 适用范围 Scope

本规格书适用于抑制浪涌电流 NTC 热敏电阻器 SCL 系列。

The specifications is applicable for Inrush Current Limiting NTC Thermistor SCL Series.

## 2. 术语 Glossary

### 2.1 负温度系数热敏电阻器 NTC Thermistor

电阻值随温度升高而降低的热敏电阻器。

Thermistor in which the resistance decreases with increasing temperature.

### 2.2 抑制浪涌电流热敏电阻器 Inrush Current Limiting Thermistor

用于抑制电源开机浪涌电流的热敏电阻器。

Thermistor which limits the inrush current just after switching on the power.

### 2.3 最大允许电容量 Maximum Permissible Capacitance ( $C_{max}$ )

加负载时可与热敏电阻器连接的电容器的最大允许电容值。

Maximum permissible capacitance value of a capacitor which can be connected to a thermistor under loading.

### 2.4 零功率电阻值 Zero-power Resistance ( $R_T$ )

当在规定温度下测量时，热敏电阻器的直流电阻值，在这样的条件下，由于内部产生热量而引起的电阻变化相对于测量的总误差可以忽略不计。

Value of the d.c. resistance of a thermistor, when measured at a specified temperature, under such conditions that the change in resistance due to the internal generation of heat is negligible with respect to the total error of measurement.

### 2.5 标称零功率电阻值 Nominal Zero-power Resistance ( $R_{25}$ )

25 °C 标准参考温度下零功率电阻的标称值，除非另有规定。

Nominal value of zero-power resistance at the standard reference temperature of 25 °C, unless otherwise specified.

### 2.6 电阻值-温度特性 Resistance-temperature Characteristic (R/T Characteristic)

热敏电阻器零功率电阻值与与本体温度的关系。

Relationship between the zero-power resistance and the body temperature of a thermistor.

### 2.7 电阻值比 Resistance Ratio ( $R_{25}/R_{85}$ )

在 25 °C 基准温度下测得的热敏电阻的零功率电阻与在 85 °C 或在详细规范中可能规定的其他温度下测得的电阻的比值。

Ratio of the zero-power resistance of a thermistor measured at the reference temperature of 25 °C to that measured at 85 °C, or at such other pairs of temperatures as may be prescribed in the detail specification.

### 2.8 材料常数 B 值 B-value

用公式 B 表示的热灵敏度指数  $B = [(T_a \times T_b)/(T_b - T_a)] \times \ln(R_a/R_b)$ 。

Index of the thermal sensitivity expressed by the formula  $B = [(T_a \times T_b)/(T_b - T_a)] \times \ln(R_a/R_b)$  式中

Where

B --- 常数 (单位为 K)

B is the B-value (K);

R<sub>a</sub> --- 在温度 T<sub>a</sub> (单位为 K) 下测定的零功率电阻值 (单位为 Ω)

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R<sub>a</sub> is the zero-power resistance (Ω) at temperature T<sub>a</sub> (K);

R<sub>b</sub> ---在温度 T<sub>b</sub> (单位为 K) 下测定的零功率电阻值 (单位为Ω)

R<sub>b</sub> is the zero-power resistance (Ω) at temperature T<sub>b</sub> (K).

## 2.9 25 °C 和 85 °C 的 B 值 ( $B_{25/85}$ )

T<sub>a</sub> 和 T<sub>b</sub> 的首选值分别为 298.15k 和 358.15k。这些值分别等于+25 °C 和+85 °C。

The preferred values for T<sub>a</sub> and T<sub>b</sub> are 298.15 K and 358.15 K, respectively. These values are equivalent to +25 °C and +85 °C, respectively.

$$B_{25/85} = \ln(R_{25}/R_{85}) / (1/298.15 - 1/358.15) = 1779.707042 * \ln(R_{25}/R_{85})$$

## 2.10 上限类别温度 Upper Category Temperature ( $T_{max}$ )

热敏电阻器设计为在零功率下连续工作的最高环境温度。

Maximum ambient temperature for which a thermistor has been designed to operate continuously at zero-power.

## 2.11 下限类别温度 Lower Category Temperature ( $T_{min}$ )

热敏电阻器设计为在零功率下连续工作的最低环境温度。

Minimum ambient temperature for which a thermistor has been designed to operate continuously at zero-power.

## 2.12 环境温度 25 °C 时的最大电流 Maximum Current at Ambient Temperature of 25 °C ( $I_{max25}$ )

可在 25 °C 的环境温度下连续施加到热敏电阻器上的最大电流值 (直流或交流正弦波的有效值)。

Maximum value of current (d.c. or r.m.s. values for Sine wave shaped a.c.) which can be continuously applied to the thermistor at an ambient temperature of 25 °C.

## 2.13 环境温度 T 下的最大电流 Maximum Current at Ambient Temperature ( $I_{maxT}$ )

在环境温度 T 下连续通过热敏电阻器的最大电流值。

Maximum value of the current which can pass continuously through the thermistor at an ambient temperature T.

## 2.14 耗散系数 Dissipation Factor ( $\delta$ )

热敏电阻器将其温度升高 1K 所需的功耗, 通常是在规定的环境温度下, 功耗变化与热敏电阻器本体温度变化的比值。

Power dissipation required for a thermistor to raise its temperature by 1 K and which is generally the ratio of the power dissipation change to the resulting thermistor body temperature change at a specified ambient temperature.

## 2.15 环境温度变化时的热时间常数 Thermal Time Constant by Ambient Temperature Change ( $\tau_a$ )

热敏电阻器对规定介质中环境温度 63.2% 的外部阶跃变化作出响应所需的时间。

Time required for a thermistor to respond to 63.2 % of an external step change in ambient temperature in a defined medium.

## 2.16 自热后冷却的热时间常数 Thermal Time Constant by Cooling after Self-heating ( $\tau_c$ )

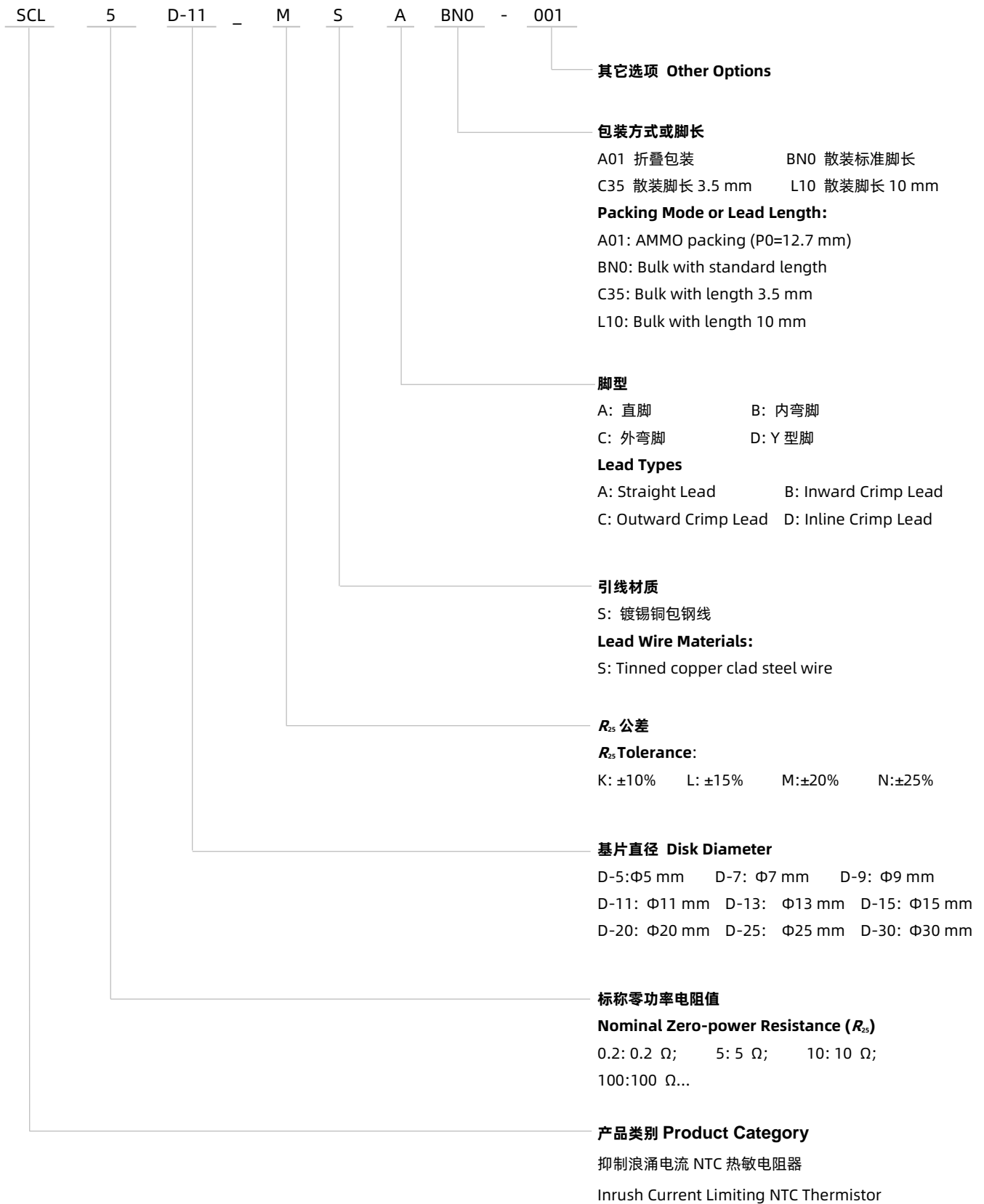
在规定的介质中, 热敏电阻器自热冷却 63.2% 的温度所需的时间。

Time required for a thermistor to cool by 63.2 % of its temperature excess induced by self-heating, in a defined medium.

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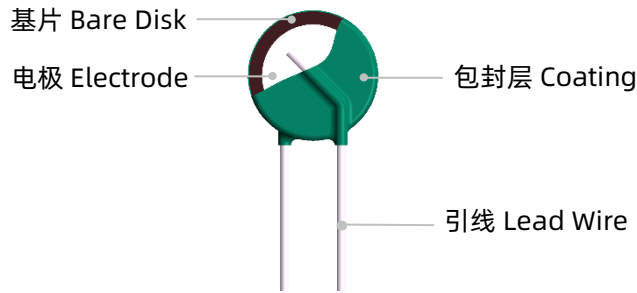
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### 3. 编码规则 Part Numbering System



## 4. 结构 Structure

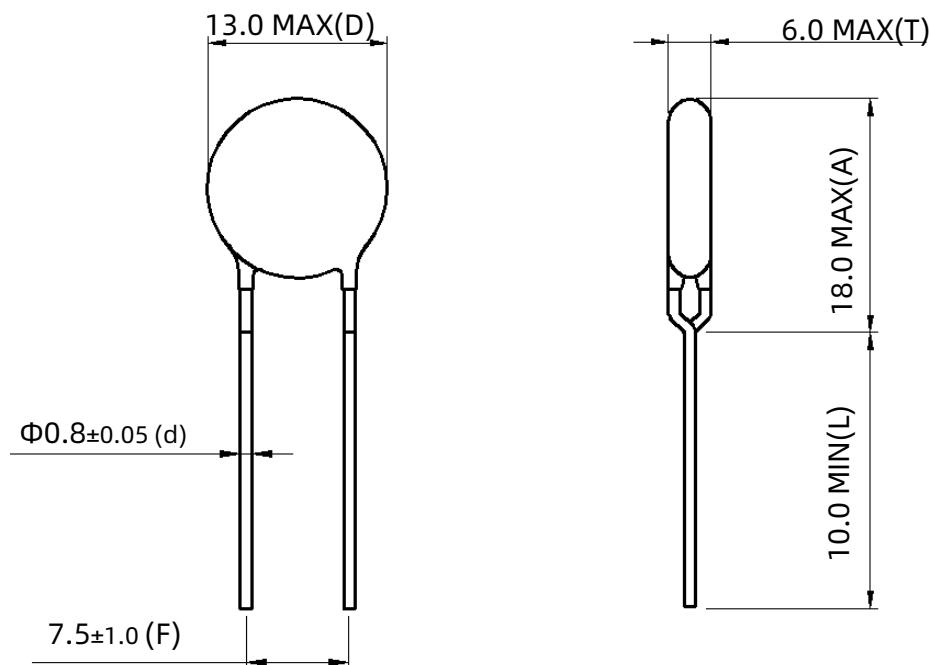
### 4.1 结构图 Structure







### 4.2 主要原材料明细 Main Material List

| 编号<br>NO. | 零件名<br>Part Name | 材质<br>Materials                      |
|-----------|------------------|--------------------------------------|
| 1         | 热敏电阻 Thermistor  | 金属氧化物 Metallic oxide                 |
| 2         | 包封层 Coating      | 硅树脂 Silicon resin                    |
| 3         | 引线 Lead Wire     | 镀锡铜包钢线 Tinned copper clad steel wire |

### 4.3 尺寸 Dimensions (mm)



## 5. 安规认证 Agency Approvals

| 认证标志<br>Agency  | 标准<br>Standards | 认证号<br>File No. | 类别<br>Category |
|---|-----------------|-----------------|----------------|
|  | UL1434          | E519784         | XGPU2          |
|  | UL1434          | E519784         | XGPU8          |
|  | IEC 60539-1     | R 50514002      | N/A            |
|  | GB/T 6663.1     | CQC21001308813  | N/A            |

## 6. 环保 Environment

| 环保<br>Environment | 指令号<br>Order No. | 指令<br>Order                   |
|-------------------|------------------|-------------------------------|
| RoHS              | 2015/863/EU      | 满足 RoHS 指令<br>Meet the RoHS   |
| REACH             | 2006/1907/EC     | 满足 REACH 法规<br>Meet the REACH |

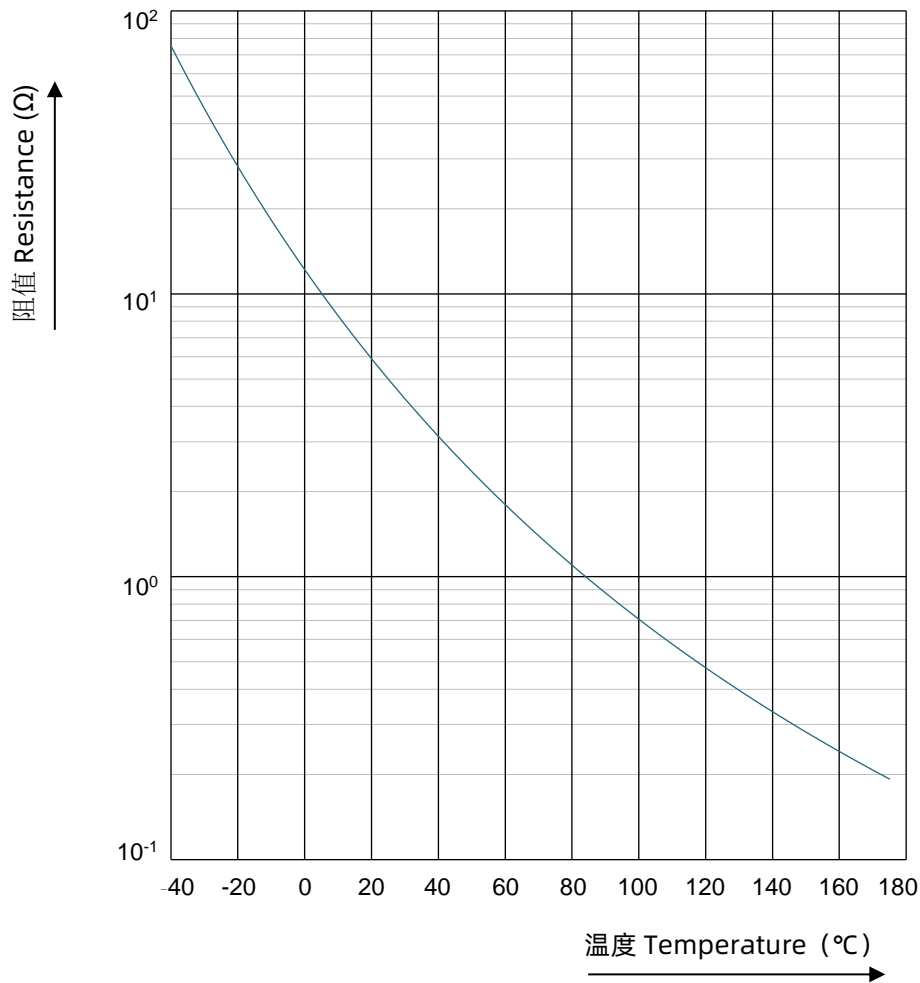
## 7. 技术参数 Specifications

| 技术术语<br>Glossary of Terms  | 技术参数<br>Specifications |
|--|------------------------|
| 标称零功率电阻值<br>Nominal Zero-power Resistance <sub>3</sub> at 25 °C ( $R_{25}$ )         | 5 Ω                    |
| 标称零功率电阻值误差<br>Nominal Zero-power Resistance Tolerance at 25 °C                       | ±20%                   |
| 环境温度 25 °C 时的最大电流<br>Maximum Current at Ambient Temperature of 25 °C ( $I_{max25}$ ) | 5 A                    |
| 环境温度 55 °C 时的最大电流<br>Maximum Current at Ambient Temperature of 55 °C ( $I_{maxT}$ )  | 4 A                    |
| 环境温度变化时的热时间常数<br>Thermal Time Constant by Ambient Temperature Change ( $\tau_a$ )    | ≤70 s                  |
| 耗散系数<br>Dissipation Factor ( $\delta$ )  | ≥13 mW/K               |
| 120 VAC 时最大允许电容量<br>Maximum Permissible Capacitance ( $C_{max}$ ) at 120 VAC         | 1320 μF                |
| 240 VAC 时最大允许电容量<br>Maximum Permissible Capacitance ( $C_{max}$ ) at 240 VAC         | 330 μF                 |
| 工作温度范围<br>Operating Temperature Range  | (-40 °C to 175 °C)     |

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## 8. 电阻-温度特性曲线 R-T Characteristic Curves



## 9. 检验方法和标准 Inspection Method & Standards

### 9.1 常规检验项目 Routine Inspection Items

| 序号 No. | 项目 Items      | 检验要求 Inspection Requirement  | 参考标准 Reference Standards |
|--------|---------------|--|--------------------------|
| 1      | 外观 Appearance | 包封层完整、无脏污，标志清晰；引脚镀层良好，无氧化、发黑等现象。<br>The coating is complete and free of dirt, and the mark is clear; the lead wire coating is good without oxidation and blackening. | 企业标准<br>SET Standard     |
| 2      | 尺寸 Dimension  | 用游标卡尺测量产品各尺寸，尺寸符合要求。<br>Use vernier caliper to measure the dimensions, The dimensions meet the requirements.   | 企业标准<br>SET Standard     |



|   |   |   |                      |
|---|---|---|----------------------|
| 3 | 标称零功率电阻值<br>Nominal Zero-power Resistance at 25 °C (R <sub>25</sub> ) | 25 °C 标准参考温度下零功率电阻的标称值, 需在公差 ±20% 范围内。<br>Nominal value of zero-power resistance at the standard reference temperature of 25 °C, should be within ± 20% of the tolerance. | 企业标准<br>SET Standard |
|---|---|---|----------------------|

## 9.2 可靠性试验 Reliability Test

| 序号<br>No. | 项目<br>Items                                | 标准<br>Standard | 测试条件<br>Test conditions   | 性能要求<br>Performance Requirements   |
|-----------|--|----------------|---|--|
| 1         | 干热存储<br>Storage in dry heat                | IEC60068-2-2   | 上限类别温度存储<br>Storage at upper category temperature<br>T:175 °C<br>t: 1000 h  | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |
| 2         | 稳态湿热<br>Storage in damp heat, steady state | IEC60068-2-78  | 空气温度 Temperature of air:40 °C<br>相对湿度 Relative humidity of air:93%<br>持续时间: 21 天<br>Duration:21 days                            | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |
| 3         | 快速温度循环<br>Rapid temperature cycling        | IEC60068-2-14  | 下限试验温度: -40 °C<br>Lower test temperature:-40 °C<br>上限试验温度: 175 °C<br>Upper test temperature: 175 °C<br>循环次数 Number of cycles:10 | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |
| 4         | 耐久性<br>Endurance                           | IEC 60539-1    | $I=I_{max}$<br>t=1000 h   | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |
| 5         | 循环耐久性<br>Cyclic endurance                  | IEC 60539-1    | $I=I_{max}$ , 1000 循环 cycles<br>保持时间 On-time=1 min<br>冷却时间 Cooling time=5 min   | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |
| 6         | 瞬时负荷<br>Transient load                     | IEC 60539-1    | 电容 Capacitance= $C_{max}$<br>循环次数 Number of cycles:1000   | 1. $\Delta R_{25}/R_{25} \leq 20\%$ ;<br>2. 没有可见的损坏<br>No visible damage |

## 10. 安全预防措施 Safety Precautions

### 10.1

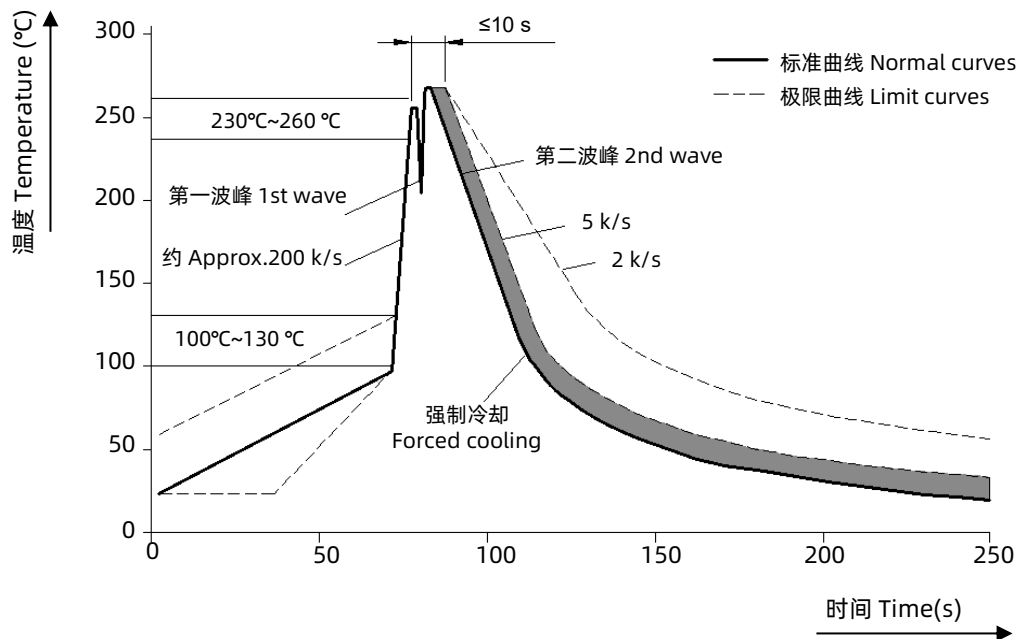
本产品适用于带滤波电容器的开关电源。将本品用于其他用途可能会导致着火。

This product is designed for the Switching Power Supply with smoothing capacitors. Other application of this product may result to catch fire in the worst case.

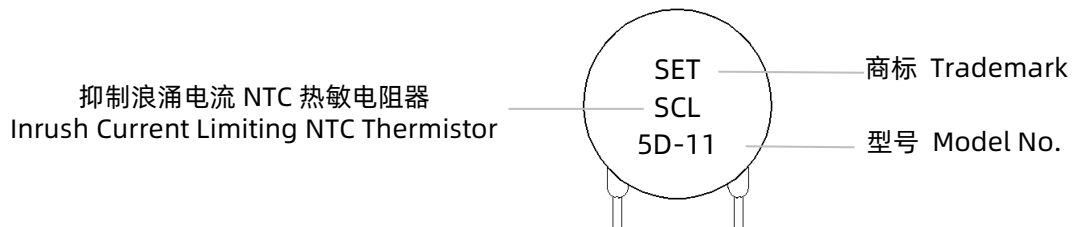
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- 10.2** 在规定的最大电流范围内使用本产品。否则在最坏的情况下可能会着火。  
Use this product within the specified maximum current. Otherwise it may catch fire in the worst case.
- 10.3** 在规定的最大电容值范围内使用本产品。否则在最坏的情况下可能会着火。  
Use this product with smoothing capacitor within the specified maximum capacitance value. Otherwise it may catch fire in the worst case.
- 10.4** 本产品无防水构造。溅出的水可能会导致故障特性恶化或电流泄漏等模式。  
This product does not have waterproof construction. A splashed water may cause failure mode such as deterioration of characteristic or current leak. So, Do NOT apply cleaning to immerse it into water or any solvent.
- 10.5** 焊接条件 Soldering Conditions (仅供参考 Reference)  
波峰焊 Wave soldering



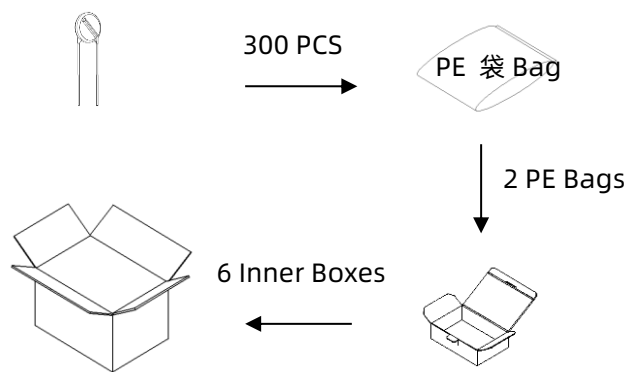
**11. 标示 Marks**  
**11.1 产品本体标示 Marking on Product**



## 12. 包装 Package

|                         |                |                            |
|-------------------------|----------------|----------------------------|
| 包装尺寸<br>Dimensions (mm) | 内盒 Inner Box   | 外箱 Carton(Outer Dimension) |
|                         | 245 × 165 × 67 | 365 × 265 × 245            |

|                      |              |           |
|----------------------|--------------|-----------|
| 数量<br>Quantity (PCS) | 内袋 Inner Bag | 外箱 Carton |
|                      | 300          | 3600      |



### 13. 产品批号&追溯号识别 Lot No. & Tracking No. System

#### 13.1 产品批号识别 Lot No. System

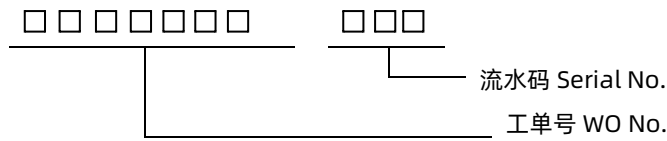


图 Fig. W 产品批号识别 Lot No. System

#### 13.2 产品追溯号识别 Tracking No. System

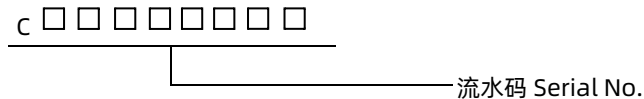


图 Fig. Y 外包装追溯号 Tracking No. on the Outer Package

### 14. 储存条件和有效日期 Storage Conditions and Effective Date

- 仅在原包装中储存热敏电阻。储存前不要打开包装。 Storage thermistor only in original packaging. Do not open the package before storage.
- 储存温度范围：-25 至 45°C。 Storage Temp. Range: -25 to 45 °C.
- 相对湿度：≤75%RH 年平均值, 最大 95%, 不允许有结露。 Relative Humidity : ≤75% RH annual mean, maximum 95%, dew precipitation is inadmissible.
- 请勿将产品存放在腐蚀性气体或阳光直射的环境中。 Please don't store products in the environments of corrosive gas or direct sunlight.
- 储存期：≤1 年。 Period of Storage: ≤1 Year.

### 15. 有效性 Validity

#### 15.1 修订协议 Agreement of Revision

本规格书的内容若有不充分或有必要修订时，得由两公司协议后再行修订。

If the content of these specifications is inadequate or need revising, it will be revised after both parties' agreement.

#### 15.2 有效性 Validity

本规格书提出后，于贵公司承认期间，可暂时使用，若经过 1 个月后贵公司无异议或无签回承认时，则视同有效文件运用,如有变更另行通知。

The specifications can be used temporarily during the period of approval. If you have no any objection or not return one hardcopy to us within one month, these specifications will be operated as a valid document. If any change, we will inform you.

-以下无正文 END-

