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规格书

SPECIFICATION
FOR APPROVAL

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类别 Classification	☐ 参考阶段 Reference ☐ 样品阶段 Sample ☒ 正式承认 Qualified ☐ 工程变更 Changed

产品名称 Product Name		压敏电阻 Metal Oxide Varistor(MOV)			
产品型号 Product Model		SFV10D471K			
产品编码 Product Code		1000500006009			
产品描述 Product Description		SFV10D471K_直脚_F7.5_Lmin20_d0.8_85°C SFV10D471K_Straight Lead_F7.5_Lmin20_d0.8_85°C			
标称压敏电压 Nominal Varistor Voltage		470 V			
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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客户批准 CUSTOMER APPROVAL

客户名称 Customer Name						
客户料号 Customer P/N						
结论 Conclusion			☐合格（承认）Qualified ☐不合格 Unqualified 不合格原因：Root Cause:			
生效日期 Effective Date			年 YY		月 MM	日 DD
Name:	Date:	Name:	Date:	Name:	Date:	
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1. 适用范围 Scope

本规格书适用于压敏电阻 SFV10D471K。
The specifications is applicable for MOV of SFV10D471K.

2. 术语 Glossary

2.1 压敏电压 Nominal Varistor Voltage (V_N)

在规定持续时间的脉冲电流下测得 MOV 两端的电压。

注：由 MOV 制造商规定电流值，否则通常采用 1 mA。除非另有规定，脉冲持续时间应小于 400 ms。
通常制造商规定的标称值范围为 $\pm 10\%$ 。

Voltage, at specified d.c. current used as a reference point in the component characteristic

2.2 漏电流 Leakage Current (I_L)

在 25 °C 或规定的其它温度下，施加最大直流电压时，通过压敏电阻器中的电流。

Current passing through the varistor at the max. d.c. voltage, and at a temp. of 25 °C, or any other specified temp.

2.3 最大峰值电流（通流容量） Maximum Peak Current

在环境温度 25 °C 时，对于规定的脉冲次数而言，压敏电阻器中允许通过的每个规定脉冲的最大电流值。

Max. current per pulse, which may be passed by a varistor at an ambient temp. of 25 °C, for a given number of pulses.

2.4 箝制电压 Clamping Voltage (V_C)

规定脉冲峰值电流(I_p)及规定波形下测得 MOV 两端的电压峰值。

Peak voltage developed across the varistor terminations under standard atmospheric conditions, when passing an 8/20 μ s class current pulse.

2.5 最大连续交流电压 Maximum Continuous a.c. Voltage ($V_{R.M.S.}$)

在环境温度 25 °C 时，可以施加在元件上连续工作的、波形基本上是正弦波（总谐波畸变小于 5%）的最大交流电压有效值。当温度高于 25 °C 时，详细规范应给出降额曲线。

Max. a.c. r.m.s. voltage of a substantially sinusoidal waveform (less than 5% total harmonic distortion) which can be applied to the component under continuous operating conditions at 25 °C.

2.6 最大连续直流电压 Maximum Continuous d.c. Voltage (V_{dc})

在环境温度 25 °C 时，可以施加在元件上连续工作的最大直流电压（纹波小于 5%）。当温度高于 25 °C 时，详细规范应给出降额曲线。

Max. d.c. voltage (with less than 5% ripple) which can be applied to the component under continuous operating conditions at an ambient temp. of 25 °C.

2.7 能量耐量 Single Pulse Transient Energy

用 2 ms、10/1000 μ s 波形或 8/20 μ s 波形的脉冲电流，作用于压敏电阻器后压敏电阻的变化率小于 $\pm 10\%$ 时，压敏电阻器所能承受的最大能量。

Energy which may be dissipated for a single 2 ms square wave or 10/1000 μ s pulse or 8/20 μ s pulse of a max. rated current, without causing device failure and the change ratio of varistor voltage is within $\pm 10\%$.

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2.8 电容量 Capacitance (C_V)

MOV 两端间的电容量，其测量应在规定的正弦频率和电压以及规定的温度下进行。除非另有规定，推荐采用 25 °C 下、1 V r.m.s.、1 kHz 的信号。

Capacitance across the MOV measured at a specified frequency and voltage.

2.9 耐电压 Voltage Proof

连续可施加在压敏电阻器引出端和导电性安装之间的最大峰值电压。

Max. peak voltage, which may be applied under continuous operating conditions between the varistor terminations and any conducting mounting surface. (Applicable only to insulated varistors).

2.10 上限类别温度 Upper Category Temperature (UCT)

压敏电阻器设计所确定的能够连续工作的最高环境温度。

Max. ambient temp. for which a varistor has been designed to operate continuously.

2.11 下限类别温度 Lower Category Temperature (LCT)

压敏电阻器设计所确定的能够连续工作的最低环境温度。

Minimum ambient temp. at which a varistor has been designed to operate continuously.

2.12 类别温度范围 Category Temperature Range

压敏电阻器设计所确定的能够连续工作的环境温度范围，它由相应类别的温度极限来表示。

Range of ambient temp. for which the varistor is designed to operate continuously, this is defined by the temp. limits of its appropriate climatic category.

2.13 标称放电电流 Nominal Discharge Current (I_n)

流过 SPD 具有 8/20 μ s 波形的电流峰值，用于 II 级试验的 SPD 分级以及 I 级、II 级试验的 SPD 的预处理试验。

Crest value of the current through the SPD having a current waveshape of 8/20 μ s.

2.14 最大放电电流 Maximum Discharge Current (I_{max})

流过 SPD，具有 8/20 μ s 波形电流的峰值，其值按 II 级动作负载的程序确定。 I_{max} 大于 I_n 。

Crest value of a current through the SPD having an 8/20 μ s waveshape and magnitude according to the manufacturers specification. I_{max} is equal to or greater than I_n .

2.15 非线性 Non-linearity

非线性可以用非线性指数或者冲击电流下的电压来限定。

Non-linearity is defined by the non-linearity index or the voltage under the pulse current.

$$\text{电流指数 Current Index } \beta = \frac{\lg(U_1/U_2)}{\lg(I_1/I_2)}$$

β 总是小于 1 的 β is always less than 1.

$$\text{电压指数 Voltage Index } \gamma = \frac{\lg(I_1/I_2)}{\lg(U_1/U_2)}$$

γ 总是大于 1 的 γ is always greater than 1.

3. 产品简介 Product Introduction

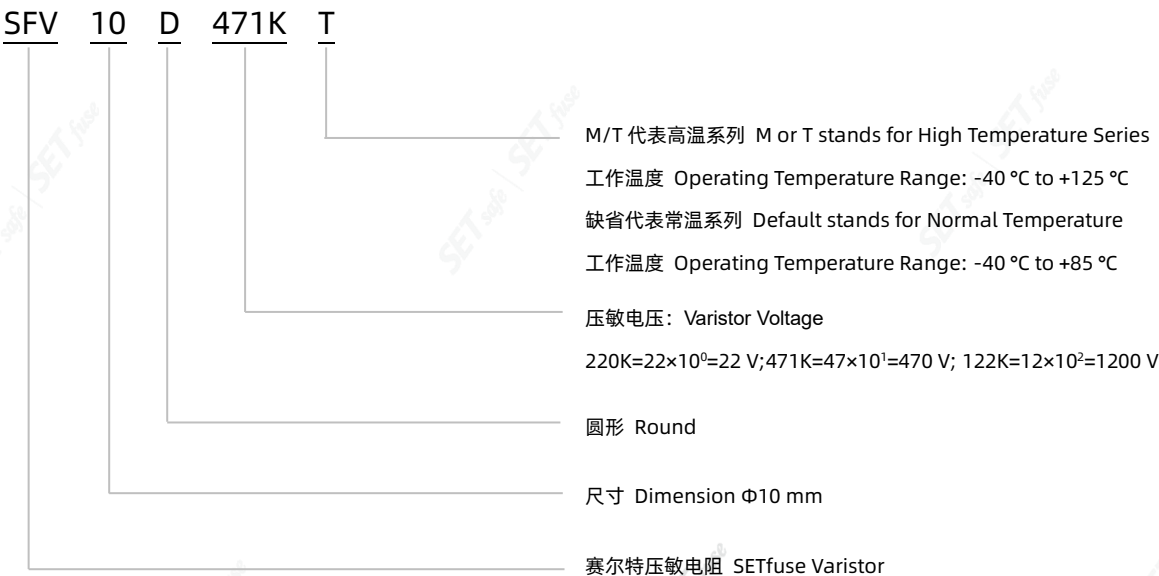
3.1 特点 Features

- 径向引线环氧树脂包封 Radial Lead and Epoxy Resin Coating
- 优良的限压比 Excellent Voltage Clamping Ratio
- 低泄漏电流 Low Leakage Current
- 无极性，对称的伏安特性 Bidirectional And Symmetrical V/I Characteristics
- 工作温度范围 Operating Temperature Range: -40 °C to +85 °C
- 存储温度范围 Storage Temperature Range: -40 °C to +125 °C

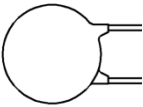
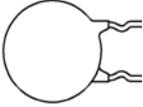
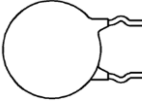
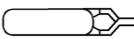
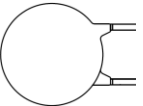
3.2 应用 Applications

- 电源 Power Supplies
- 家用电器 Home Electrical Appliances
- 工业设备 Industrial Devices
- 防雷插座 Surge Protectors
- 通讯设备 Telecom Devices

3.3 型号说明 Model Description

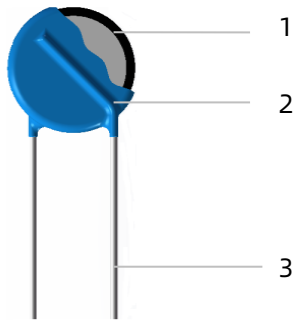


3.4 引线类型 Lead Wire Types

引线类型 Lead Wire Types		代码 Codes
	直型引线 Straight Lead	A
	内弯型引线 Inward Crimp	B
	外弯型引线 Outward Crimp	C
	Y 型引线 Inline Crimp	D
	微直型引线 Little Straight Lead	I

4. 结构尺寸 Structure and Dimension

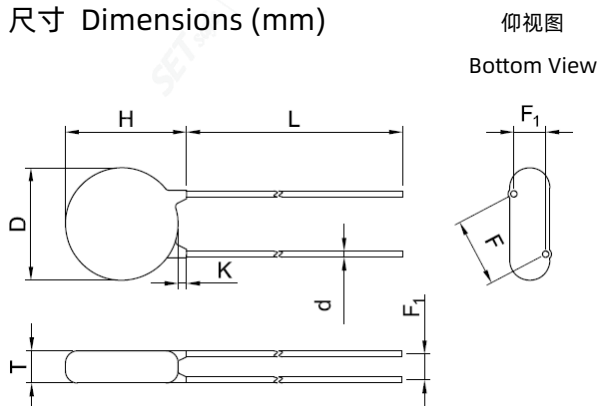
4.1 结构图 Structure



4.2 主要原材料明细 Main Material List

编号 No.	零件名 Part Name	材质 Materials
1	压敏电阻 Varistor Bare Chip	氧化锌 ZnO
2	包封层 Coating	环氧树脂 Epoxy Resin
3	引线 Lead	CP 线 Tin-plated Copper Clad Steel Wire

4.3 尺寸 Dimensions (mm)



芯片尺寸 Chip Size	L (min.)	H (max.)	T (max.)	D (max.)
Φ10.0	20.0	15.5	6.1	12.5
d	F	F ₁	K (max.)	/
Φ0.80±0.05	7.5±1.0	2.3 - 4.3	2.0	/

备注：阻燃环氧树脂满足 UL94V-0 要求。

Remark: Flame retardant epoxy resin meets UL94V-0 requirements.

5. 安规认证 Agency Approvals

认证标志 Agency	标准 Standards	认证号 File No.	类别 Category
	UL 1449 4 th Edition	E322662	VZCA2
	CSA C22.2 No.269.5-17	E322662	VZCA8
	EN 61051-1:2008; IEC 61051-1:2007 IEC 61051-2:1991+A1; IEC 61051-2-2:1991	J 50254627	N/A
	GB/T 10193-1997; GB/T 10194-1997 GB 4943.1-2011; GB 8898-2011	CQC12001084353	N/A

6. 环保 Environment

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

7. 技术参数 Specifications

7.1 电气特性 Electrical Characteristics

项目 Item		性能 Performance	测试条件 Test Conditions
电气特性 Electrical Parameter	2.1	最大连续工作电压 Maximum Continuous Operating Voltage	AC: 300 V r.m.s. DC: 385 V 能够承受的最大连续交流电压或直流电压 Maximum continuous sine wave (R.M.S.) or DC voltage which may be applied
	2.2	压敏电压 Varistor Voltage	423 V - 517 V 在直流参考电流 1 mA 下测试 Measuring Current at 1 mA DC
	2.3	漏电流 Leakage Current	≤20 μA 在 75% 的压敏电压条件下测试 Measuring at 75% of varistor voltage
	2.4	箝制电压 Clamping Voltage	775 V @ 25 A 规定脉冲峰值电流(I _p)及规定波形下测得 MOV 两端的电压峰值 Peak voltage developed across the varistor terminations under standard atmospheric conditions, when passing an 8/20 μs class current pulse
	2.5	最大峰值电流 Maximum Peak Currunt	2.5 kA 能够经受1次8/20 μs 电流冲击压敏电压变化率不超过10 % 的最大冲击电流 The max. current within the varistor voltage change of less than ±10 % when one impulse current(8/20 μs) applied
	2.6	最大能量 Maximum Energy (Reference)	70 Joule 施加一个 10/1000 μs 电流波冲击下压敏电压变化率不超过 ±10%能够吸收的最大能量 The max. energy absorbed with a varistor voltage change of less than ±10% when one impulse(10/1000 μs) is applied
	2.7	静态电容量 Typical Capacitance (Reference)	210 pF 在(25±2) °C 1 kHz 1 V r.m.s. 0 V 偏置的条件下测试的电容 Capacitance shall be measured at 1 kHz±10%, 1 V r.m.s. max. 0 V bias and (25±2) °C

7.2 可靠性试验 Reliability Test

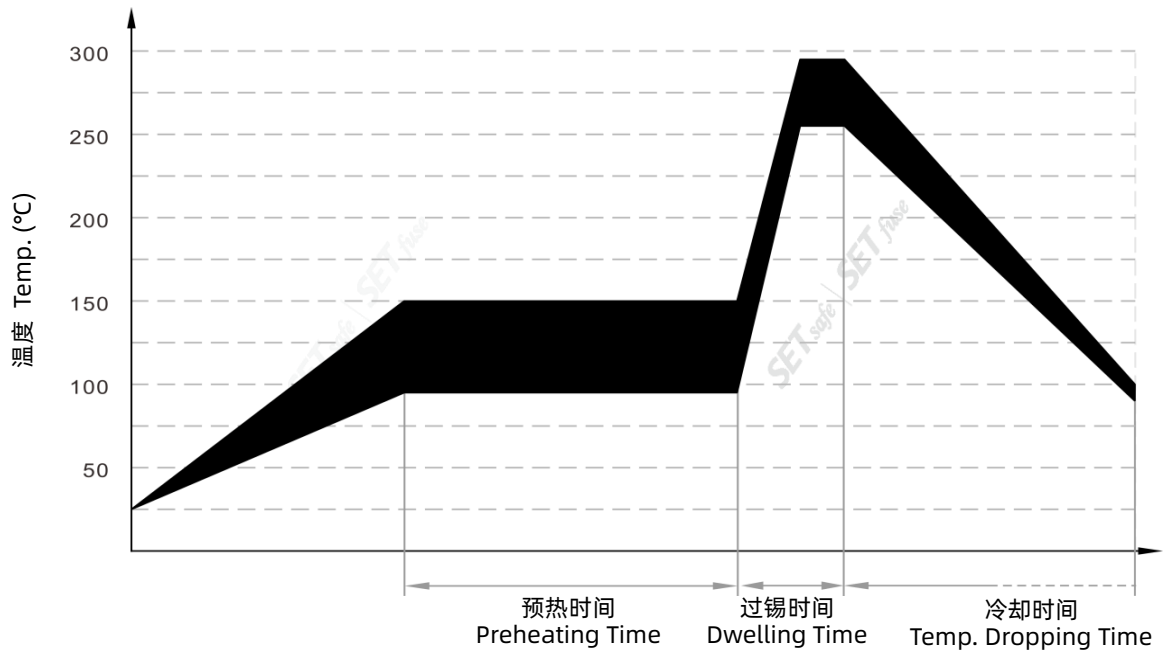
试验条款 Test Items	试验条件 / 参考标准 Test Conditions / Reference Standards	检测项目 Inspection Items	性能要求 Performance Requirements
最大脉冲电流 (1 次) Max. Peak Current (1 time)	指定标准脉冲电流 (8/20 μs) 的条件下, 压敏电阻承受 1 次最大脉冲电流 The maximum current a varistor can withstand 1 time when one pulse of 8/20 μs is applied IEC 61051-1	压敏电压 Varistor Voltage	$ \Delta V_{1\text{mA}}/V_{1\text{mA}} \leq 10\%$
气候顺序 Climatic Sequence	1、干热, 上限类别温度 (Dry heat, UCT) 16 h 2、湿热循环 (单次循环) Damp Heat Cycle (1 Cycle) (55±2) °C, (93±3)% RH / (25±3) °C, ≥95% RH, 24 h 3、低温, 下限类别温度 (Low Temp. LCT) 2 h 4、湿热循环 Damp Heat Cycle (5 个循环) (55±2) °C, (93±3)% RH / (25±3) °C, ≥95% RH, 24 h/cycle (5 Cycles) GB/T 10193 Test 4.17	压敏电压 Varistor Voltage 外观 Appearance	$ \Delta V_{1\text{mA}} / V_{1\text{mA}} \leq 10\%$ 无可见损伤 No Visible Damage 标志清晰 Mark Distinct
温度快速变化 Rapid Change of Temp.	步骤 温度 驻留时间 Step Temp. (°C) Holding Time 1 上限类别温度(UCT) 30 min 2 转移时间 Transfer time <10 s 3 下限类别温度(LCT) 30 min 循环次数 Cycles: 5 GB/T 10193 Test 4.13	压敏电压 Varistor Voltage 外观 Appearance	$ \Delta V_{1\text{mA}} / V_{1\text{mA}} \leq 5\%$ 无可见损伤 No Visible Damage 标志清晰 Mark Distinct
稳态湿热 Damp Heat, Steady State	(40±2) °C, (93 ⁺² / ₋₃)% RH, 21 天 Days GB/T 10193 Test 4.18	压敏电压 Varistor Voltage	$ \Delta V_{1\text{mA}} / V_{1\text{mA}} \leq 10\%$
上限类别温度耐久 性 (寿命测试) Endurance at Upper Category Temp.	在上限类别温度和最大连续交流电压下试验(1000±24) h Test for (1000±24) h at Max. a.c. Voltage at UCT GB/T 10193 Test 4.20	压敏电压 Varistor Voltage 外观 Appearance	$ \Delta V_{1\text{mA}} / V_{1\text{mA}} \leq 10\%$ 无可见损伤 No Visible Damage 标志清晰 Mark Distinct
耐电压 Voltage Proof	金属球法 Metal Ball Method 交流电压 Alternating Voltage 频率 Frequency:(40 - 60) Hz 常温系列 Normal Temp. Series:≥2500 V, (60±5) s GB/T 10193 Test 4.8	外观 Appearance	不应有击穿或闪络 No Breakdown or Flashover
可焊性 Solderability	焊槽法 Solder Bath Method: (255±5) °C, (2.0±0.5) s IEC 61051-1 Test 4.13	引出端外观 Terminal Appearance	引线焊锡面积覆盖率 ≥95% Soldering Area≥95%

耐焊接热 Resistance to Soldering Heat	(260±5) °C, 5 s or 10 s IEC 61051-1 Test 4.12			压敏电压 Varistor Voltage 外观 Appearance	$ \Delta V_{1\text{ mA}} / V_{1\text{ mA}} \leq 5\%$ 无可见损伤 No Visible Damage
引线抗拉强度 Tensile				压敏电压 Varistor Voltage 引出端外观 Terminal Appearance	$ \Delta V_{1\text{ mA}} / V_{1\text{ mA}} \leq 5\%$ 焊点没有分离 引线没有断开 Soldering Point and Leads not broken
	引出端截面积 Nominal Cross Sectional Area (mm²)	直径 Corresponding Diameter for Circular Section Wires (mm)	力 Force (N)		
	$S \leq 0.05$	$d \leq 0.25$	1		
	$0.05 < S \leq 0.07$	$0.25 < d \leq 0.3$	2.5		
	$0.07 < S \leq 0.2$	$0.3 < d \leq 0.5$	5		
	$0.2 < S \leq 0.5$	$0.5 < d \leq 0.8$	10		
	$0.5 < S \leq 1.2$	$0.8 < d \leq 1.25$	20		
	$1.2 < S$	$1.25 < d$	40		
IEC 61051-1 ,Test Ua1					

8. 注意事项 Important Information

8.1 焊接参数 Soldering Parameters (Reference)

8.1.1 波峰焊参数 Wave-soldering Parameters



波峰焊曲线 Wave-soldering Curve

项目 Items	温度 Temp. (°C)	时间 Time (s)
预热 Preheating	90 - 150	<150
过锡 Dwelling	255 - 290	3 - 10

8.1.2 推荐的手工焊参数 Recommended Hand-solder Parameters

项目 Items	条件 Conditions
烙铁头部温度 Temp. of Soldering Iron-tip	350 °C (max.)
焊接时间 Soldering Time	4 s (max.)

8.2 使用 Usage

请不要强烈的振动、冲击或施加压力，以免压敏电阻表面树脂或元件产生裂痕。

Please do not apply severe vibration, shock or pressure to MOV, to avoid surface resin or element cracking.

对引线进行弯曲加工或切断加工时，请固定元件端引线。折弯距离引线绝缘覆盖部分至少 2 mm。

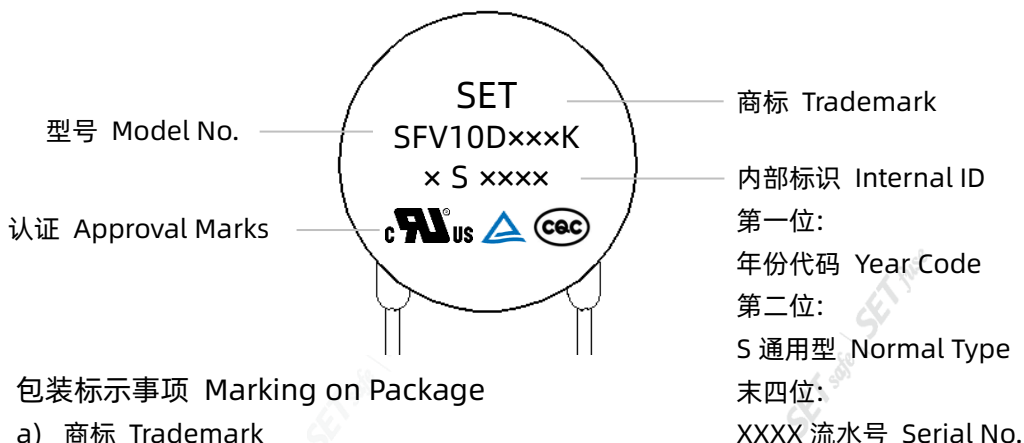
Please fix lead wires when bending or cutting. The distance between the bending point and the sealing of MOV shall be greater than 2 mm

此规格长期应用在直流电源环境时应考虑直流偏压对产品的极化影响，请评估后再使用。

Please evaluate before using the product in DC power supply, as the influence of long duration DC bias on product polarization should be considered.

9. 标示及包装 Marks and Package

9.1 产品本体标示 Marking on Product



9.2 包装标示事项 Marking on Package

- 商标 Trademark
- 产品名称 Product Name
- 产品型号 Model No.
- 产品编码 Product Code
- 最大连续工作电压 Maximum Continuous A.C. Voltage (MCOV)
- 上限类别温度 Upper Category Temp.(UCT)
- 数量 Q'TY
- 批号 Lot No.
- RoHS & REACH 标志 Mark
- 认证标志 Approval Marks
- 追溯号 Tracking No.
- 生产日期 Product Date
- 客户料号 Customer P/N
- 制造商及网址 Manufacturer and Website

SET 压敏电阻 Metal Oxide Varistor	
产品型号 Model No.	
产品编码 Product Code	XXXXXXXXXX
最大连续工作电压 MCOV	
上限类别温度 UCT	
数量 Q'TY	kPCS
批号 Lot No.	XXXXXXXXXX
追溯号 Tracking No.	XXXXXXXXXX
生产日期 Mfg. Date	
客户料号 Customer P/N	
厦门赛尔特电子有限公司 Xiamen SET Electronics Co., Ltd.	
www.SETsafe.com www.SETfuse.com	

仅供参考 Just for Reference

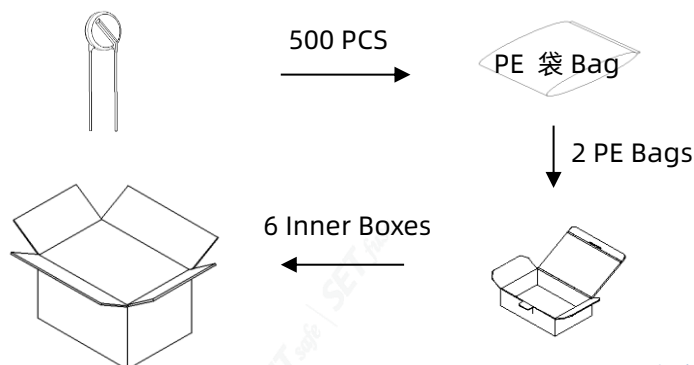
9.3 包装 Packaging

项目 Item	塑料袋 PE Bag	内盒 Inner Box	外箱 Carton
尺寸 Dimensions (mm)	200*210	245*165*67	365*265*245
数量 Quantity (PCS)	500	1000	6000

备注: 包装尺寸及数量仅供参考

Remark: The dimensions and quantity of packaging is for reference only.

包装示意图 Packaging Drawing:



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

10.1 产品批号识别 Lot No. System

以下图 X 所示产品批号的规则自 2016 年 7 月 11 日号开始执行。

This Lot No. rule will apply from July 11, 2016 in Fig.X.

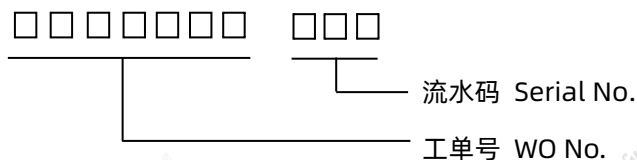


图 Fig. X 产品批号识别 Lot No. System

10.2 产品追溯号识别 Tracking No. System

以下图 Y 所示产品追溯号规则自 2016 年 7 月 11 日号开始执行。

This Tracking No. rule will apply from July 11, 2016 in Fig.Y

大包装追溯号:

Tracking No. on the Outer Package:

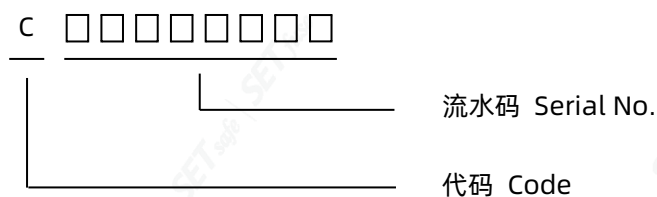


图 Fig. Y 大包装追溯号 Tracking No. on the Outer Package

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

仓储温度 Warehouse Storage Temperature: -10 °C to +40 °C

相对湿度 Relative Humidity: ≤ 75% RH

压敏电阻的存储应避免高温、高湿、日光直射和腐蚀性气体的场合，以免影响引脚可焊性，产品购入后请于 1 年内使用完毕。

Please store the MOV without high temperature, high humidity or corrosive gas. To avoid reducing the solder-ability of the lead wire, please use them up within 1 year after receiving the goods.

12. 有效性 Validity

12.1 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 this specification is inadequate or need revising, it will be revised after both parties' agreement

12.2 有效性 Validity

本规格书提出后，在贵公司承认期间，可暂时使用，若经过 1 个月后贵公司无异议或无签回承认本时，则视同有效文件运用。

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, this specification will be operated as a valid document.

-以下无正文 END-

