

## 1、特点 Features

### 1.1 先进的封装工艺，封装材料满足 UL94-V0

Advanced encapsulation technology, Coating materials conforming to UL94V-0 standard.

### 1.2 结构紧凑，体积小，节省空间

Compact structure, small volume and space saving

### 1.3 优越的高温高湿性能

Superior high temperature and humidity performance.

### 1.4 强大的抑制高浪涌强电流能力

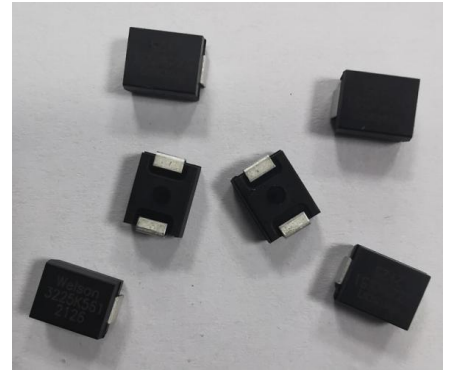
Strong ability to suppress high surge and strong current

### 1.5 SMD 料盘包装，适用于无铅回流焊/波峰焊自动贴装

SMD tray packaging, suitable for lead-free reflow soldering / wave soldering automatic mounting.

### 1.6 符合 RoHS、REACH

Comply with RoHS and REACH



## 2、应用 Applications

2.1 LED 电路保护 LED circuit protection

2.2 工业设备 Industrial equipment

2.3 通讯设备 Communication equipment

2.4 汽车电子 Automotive electronics

## 3、适用标准 Applicable standards

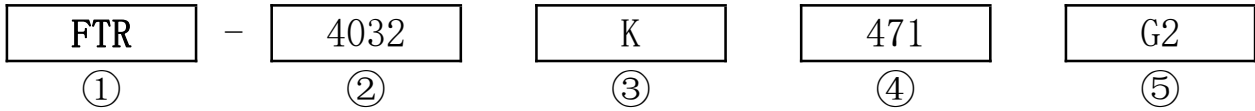
3.1 UL1449

3.2 IEC61051-1, -2, -2-2, IEC60950-1 Annex Q

3.3 GB/T10193, GB/T10194, GB4943.1, GB8898

3.4 IEC61000-4-5

**4、 编码规则 Part Number Code**



①品牌标志 Brand logo: FTR

②贴片尺寸 SMD Size:

4032≈11x8.2mm

③压敏电压公差 Varistor voltage tolerance: ±10%

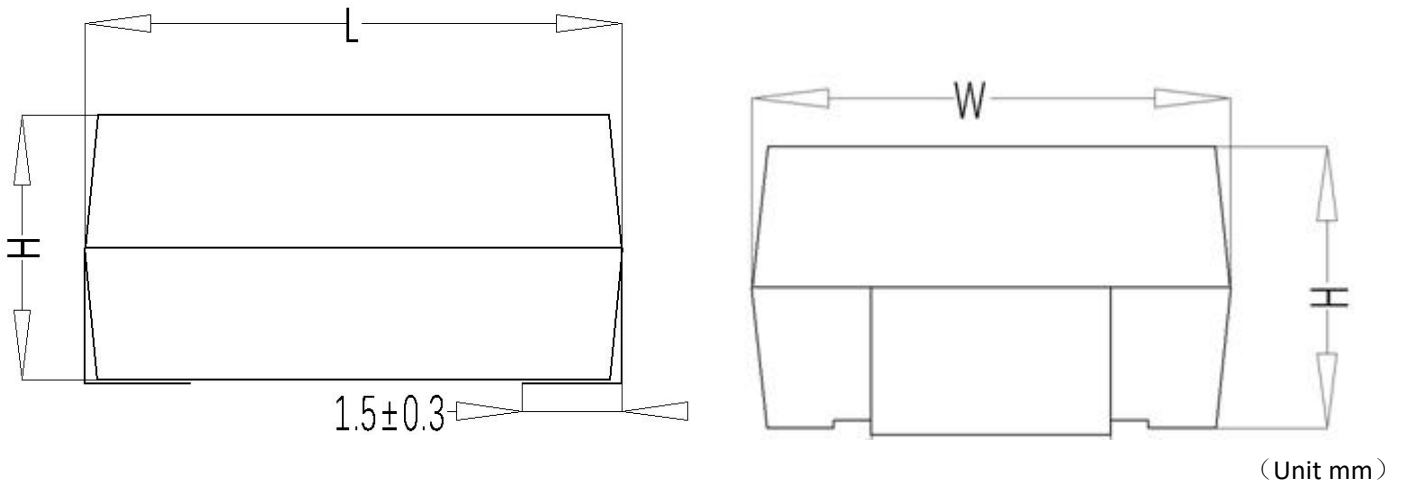
④压敏电压 Varistor voltage (V1mA) :47x10<sup>1</sup>=470V

⑤料盘卷装 Reel packing: 15 寸料盘 1500pcs/盘 15” Reel 1500pcs/reel

**5、 通用参数 General specifications**

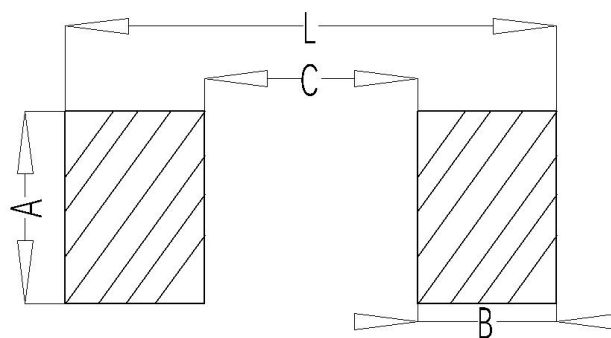
参数名称 Parameter Name	参数值 value	单位 Unit
工作温度 Operating temperature	-55 ~ +125	°C
储存温度 Storage Temperature	-55 ~ +125	°C
耐电压 Voltage Proof	≥2.5	KVRMS
绝缘电阻 Insulation Resistance	≥100	M Ω

**6、结构与尺寸 Structures and Dimensions**



尺寸 SIZE	压敏电压范围 (V) Varistor Voltage Range (V)	L	W	H
4032	V <sub>1ma</sub> =201—681	11.0±0.3	8.2±0.1	4.8±0.3
	V <sub>1ma</sub> =751—821			5.5±0.3

**7、焊盘尺寸 Soldering Pads Size**



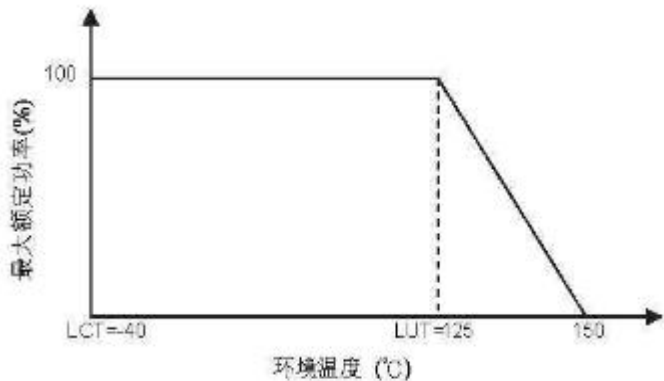
(Unit mm)

尺寸 Size	A	B	C	L
4032	3.5	2.8	6.5	12.1

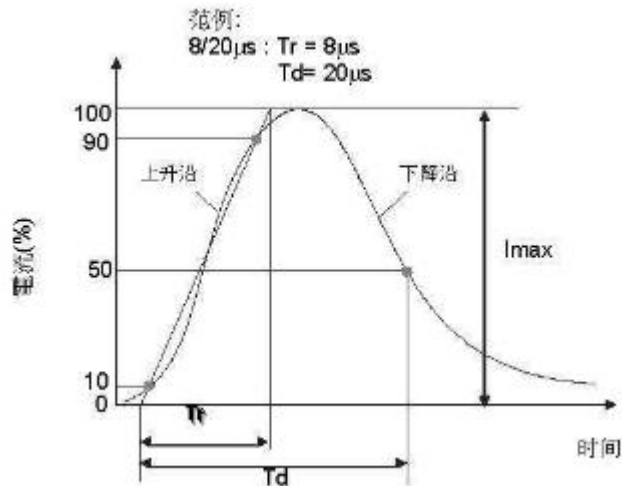
**8、电气特性 Electrical Characteristics**

型号 Part No.	压敏电压 Varistor Voltage (@1mA DC)	最大连续 工作电压 Max. Allowable Voltage		最大 限制电压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max. Impulse Current (8/20μs)	最大 通流能量 Max. flow energy (40 次)	最大 能量 Max. Energy (10/1000μs)	额定 功率 Rate Power	参考 电容 Capacitance @1KHZ
	V <sub>1mA</sub> (V)	V <sub>AC</sub> (V)	V <sub>DC</sub> (V)	V <sub>p</sub> (V)	I <sub>p</sub> (A)	I max (A)	(KV) (KA)	W max (J)	P (W)	C(pF)
4032K201	200(180-220)	130	170	340	25	2500	3.5KV / 1.75KA	25.0	0.4	500
4032K221	220(198-242)	140	180	360	25	2500	3.5KV / 1.75KA	27.0	0.4	450
4032K241	240(216-264)	150	200	395	25	2500	3.5KV / 1.75KA	30.0	0.4	420
4032K271	270(243-297)	175	225	455	25	2500	3.5KV / 1.75KA	35.0	0.4	370
4032K301	300(270-330)	195	250	500	25	2500	3.5KV / 1.75KA	40.0	0.4	330
4032K331	330(297-363)	210	275	550	25	2500	3.5KV / 1.75KA	42.0	0.4	300
4032K361	360(324-396)	230	300	595	25	2500	3.5KV / 1.75KA	45.0	0.4	280
4032K391	390(351-429)	250	320	650	25	2500	3.5KV / 1.75KA	50.0	0.4	260
4032K431	430(387-473)	275	350	710	25	2500	3.5KV / 1.75KA	55.0	0.4	230
4032K471	470(423-517)	300	385	775	25	2500	3.5KV / 1.75KA	60.0	0.4	210
4032K511	510(459-561)	320	410	845	25	2500	3.5KV / 1.75KA	67.0	0.4	200
4032K561	560(504-616)	350	450	930	25	2500	3.5KV / 1.75KA	69.0	0.4	180
4032K621	620(558-682)	395	510	1020	25	2500	3.5KV / 1.75KA	70.0	0.4	160
4032K681	680(612-748)	420	560	1120	25	2500	3.5KV / 1.75KA	72.0	0.4	150
4032K751	750(675-825)	460	615	1235	25	2500	3.5KV / 1.75KA	75.0	0.4	130

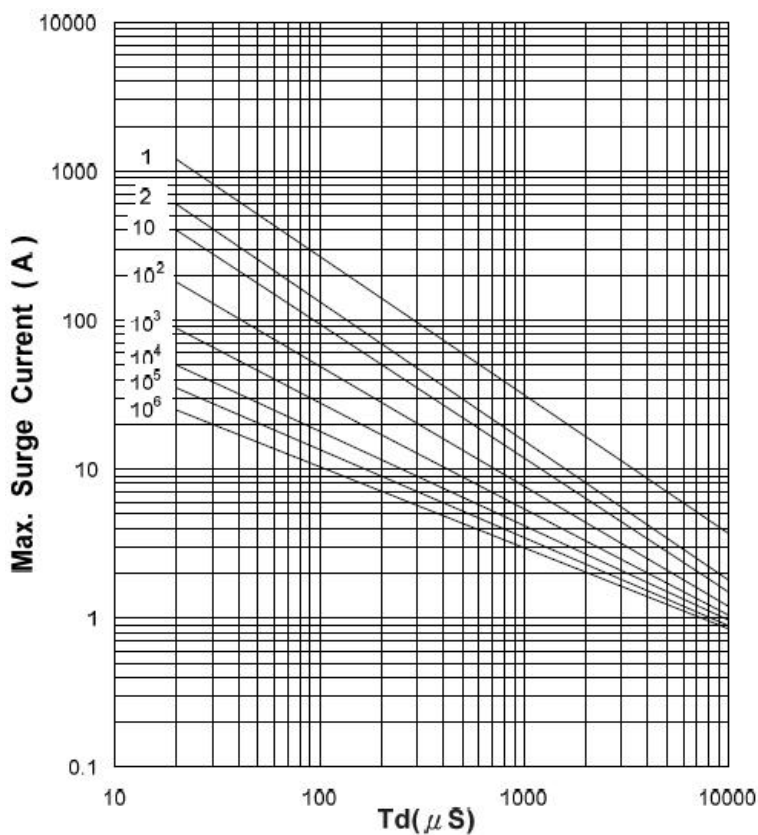
功率减额曲线  
Power Derating Curve



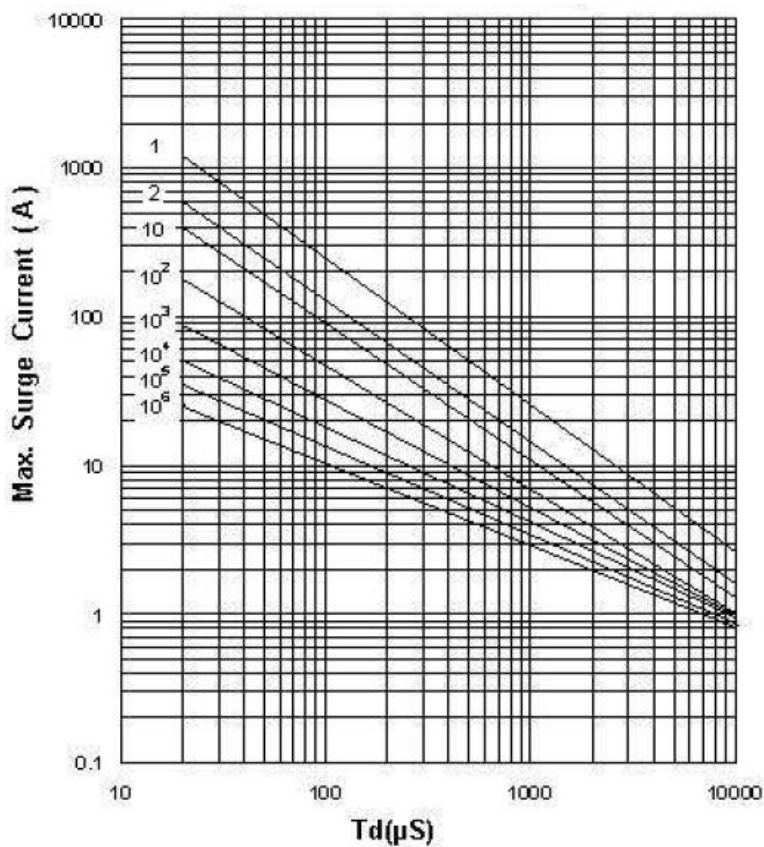
冲击电流标准波形  
Surge Current Standard Waveform



最大冲击电流减额曲线  
Max. Surge Current Derating Curves  
4032K201 – 4032K471



4032K511 – 4032K751

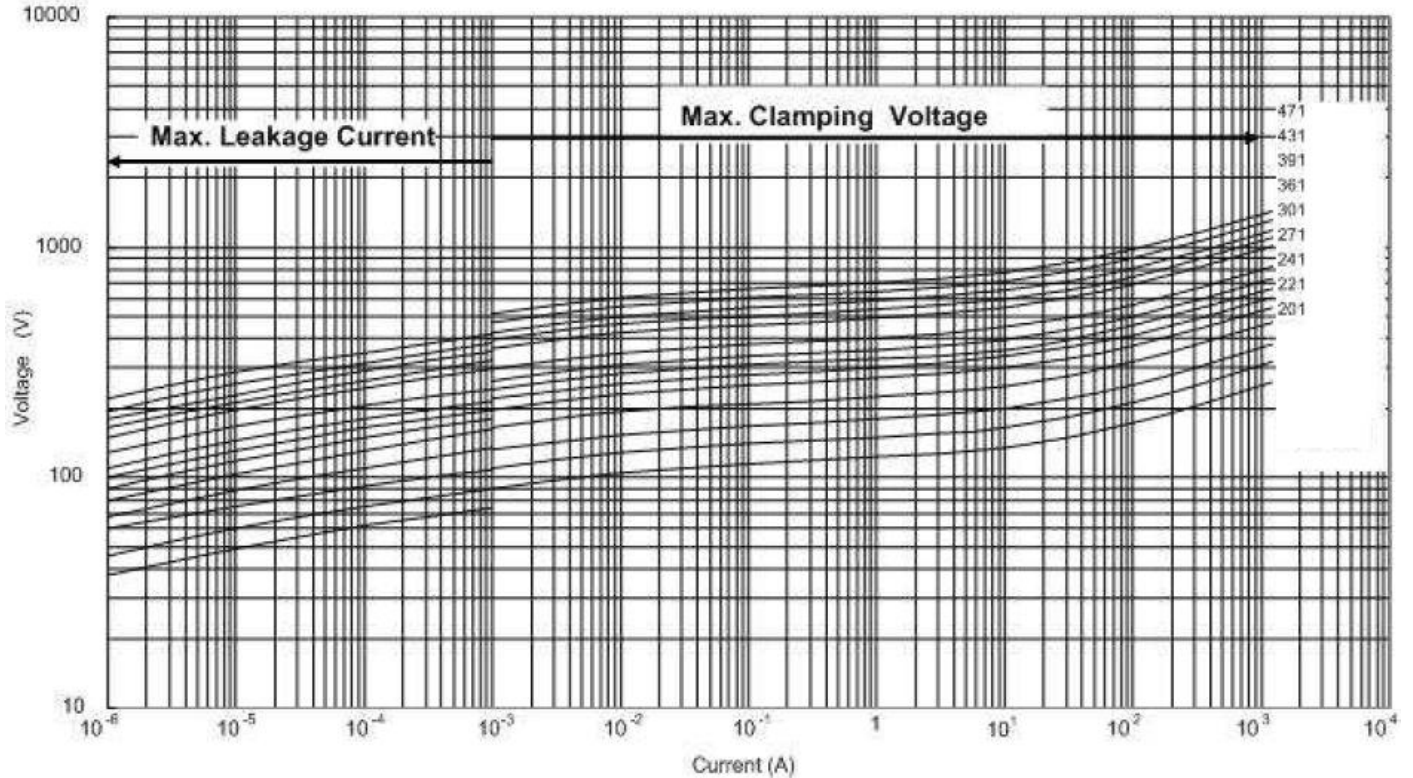




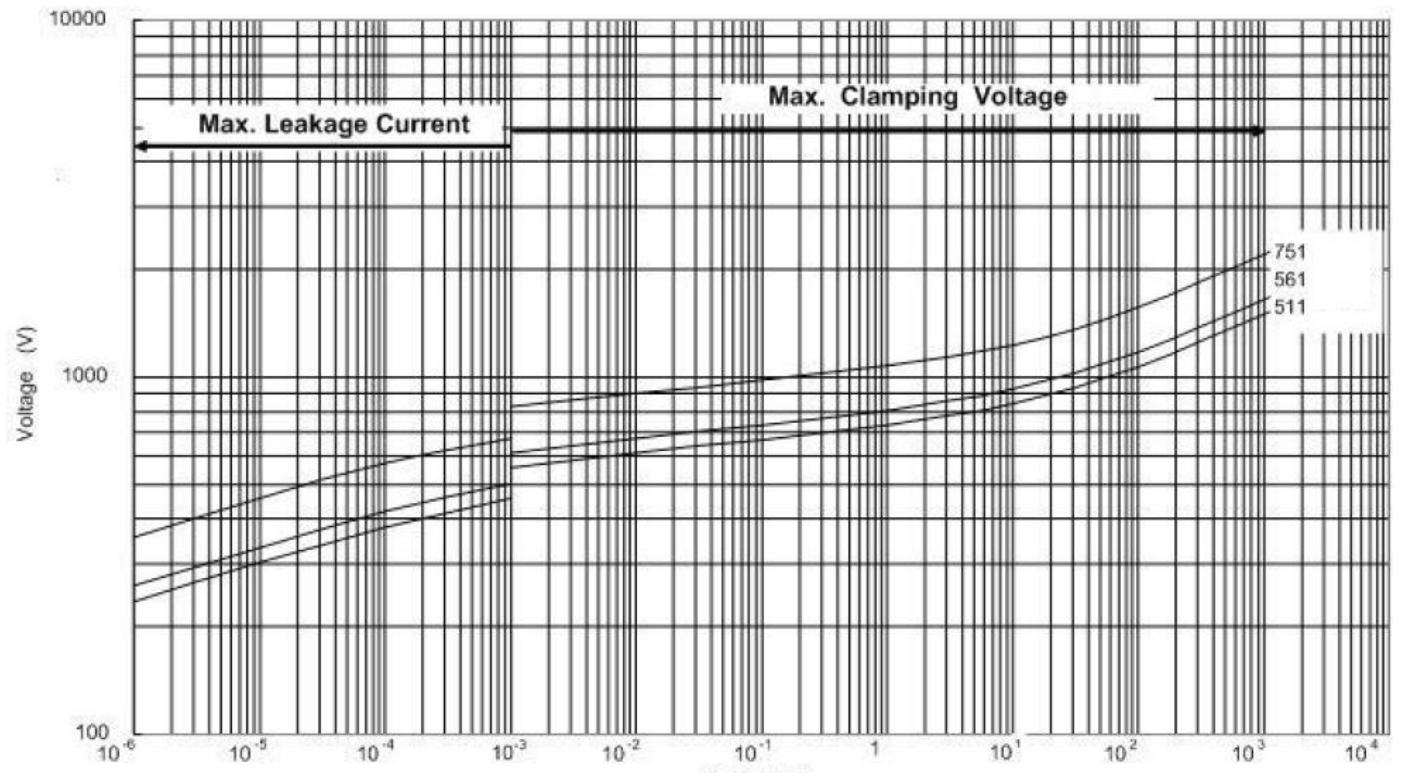
最大漏电流与最大限制电压曲线

Max. Leakage Current and Max. Clamping Voltage Curves

4032K201 – 4032K471

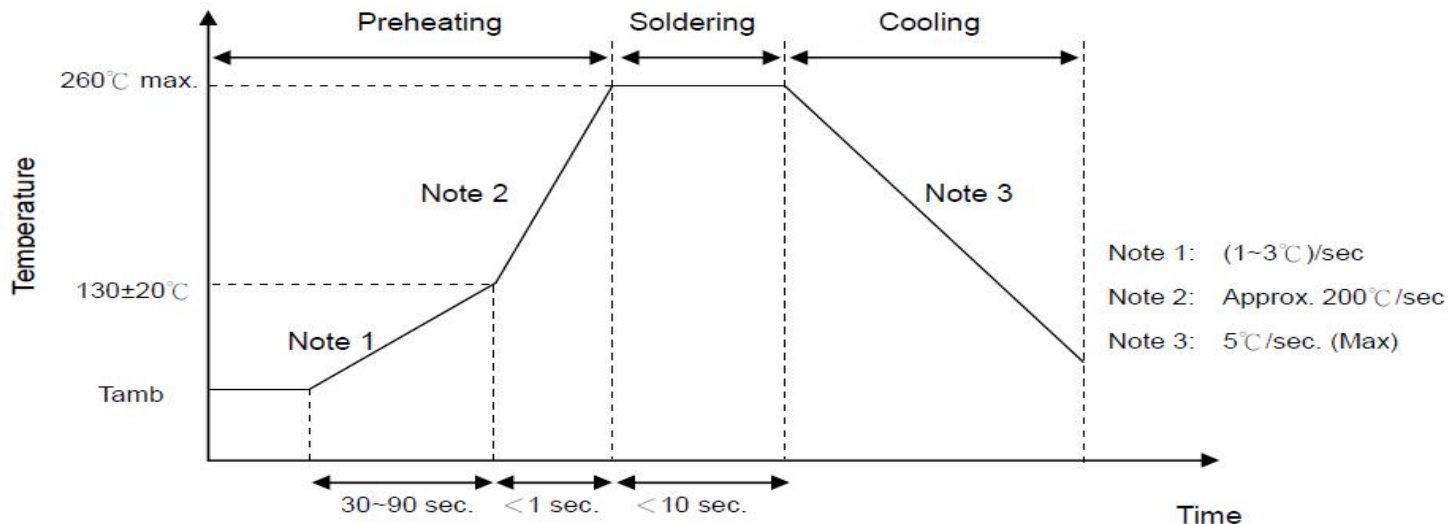


4032K511 – 4032K751

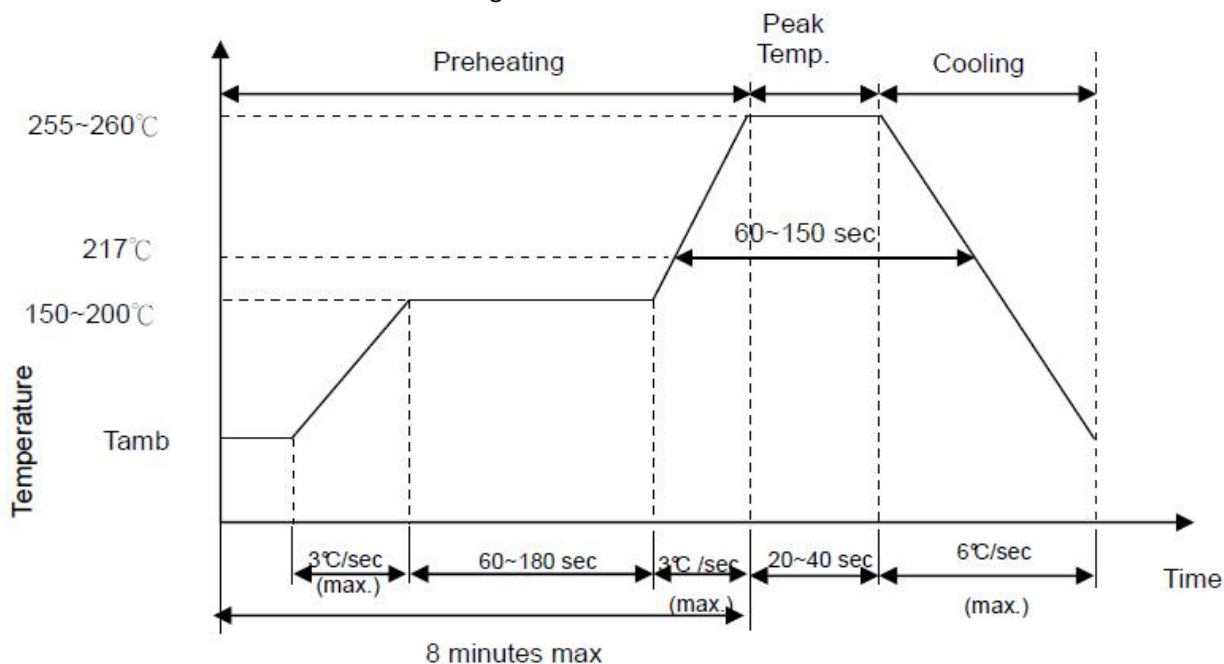


## 9、推荐焊接条件 Soldering Recommendation

### 9.1 波峰焊曲线 Wave Soldering Profile



### 9.2 无铅回流焊曲线 Lead-free reflow soldering Profile



### 9.3 烙铁重工焊接条件 Recommended Reworking Conditions with Soldering Iron

项目 Item	条件 Conditions
烙铁头部温度 Temperature of Soldering Iron-tip	360°C (max)
焊接时间 Soldering Time	3s(max)
烙铁头直径 Diameter of Soldering Iron-tip	Φ3mm(max)

**10、可靠性试验 Reliability**

项目 Item	测试项目标准 Standard	测试方法 Test conditions / Methods	规格值 Specifications															
耐振性 Vibration	IEC 1051-1	将成品置于振动机上，施与一单谐振动（振幅：0.75mm）和振幅 1.5mm，振动频率周期为 10Hz—55Hz—10Hz，对三个垂直方向各试验 2 个小时，然后检测成品外在损伤。 Frequency range: 10~55Hz Amplitude: 0.75mm or 98m/s2 Direction: 3 mutually perpendicular directions, 2 hrs each.	$\Delta V/V_{1mA}$   ≤ 5% 无外在损伤 No visible damage															
可焊性 Solderability	IEC 60068-2-20	将成品引脚浸入 235℃±5℃的焊锡液中 2±0.5 秒取出 245±3℃, 3±0.3 sec	上锡均匀且面积≥95%															
耐焊接热性 Resistance to Soldering Heat	IEC 60068-2-20	将成品引脚浸入 350℃±10℃的焊锡液中 10±1 秒取出 350±10℃, 10±1 sec	$\Delta V/V_{1mA}$   ≤ 5%															
高温储存 High Temperature Storage	IEC 60068-2-2	将成品置于 125±5℃烤箱中 1000 小时，取出后置于常温 1-2 个小时，然后测量压敏电压 125±5℃ x 1000 ±24 hrs	$\Delta V/V_{1mA}$   ≤ 5%															
耐湿性 Damp Heat, Steady State	IEC60068-2-3	1、将成品置于温度 40±2℃湿度 95%环境中 1000 个小时 2、将成品置于温度 40±2℃湿度 95%环境中，且施加最大允许工作电压 1000 个小时 1. 40±2℃, 90 ~ 95 % RH, 1000hrs. 2. 40±2℃, 90 ~ 95 % RH, at MAV, 1000hrs	无外在损伤 No visible damage   $\Delta V/V_{1mA}$   ≤ 10% 绝缘电阻≥100M Ω IR≥100M Ω															
冷热冲击 Rapid Change of Temperature	IEC 60068-2-14	以如下表的温度周期加于成品 5 次，然后置于室温 1-2 小时测量压敏电压 The conditions shown below shall be repeated 5 cycles <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Period(minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5±3</td> </tr> <tr> <td>3</td> <td>+125±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5±3</td> </tr> </tbody> </table>	Step	Temperature(°C)	Period(minutes)	1	-40±3	30±3	2	Room temperature	5±3	3	+125±2	30±3	4	Room temperature	5±3	无外在损伤 No visible damage   $\Delta V/V_{1mA}$   ≤ 5%
Step	Temperature(°C)	Period(minutes)																
1	-40±3	30±3																
2	Room temperature	5±3																
3	+125±2	30±3																
4	Room temperature	5±3																

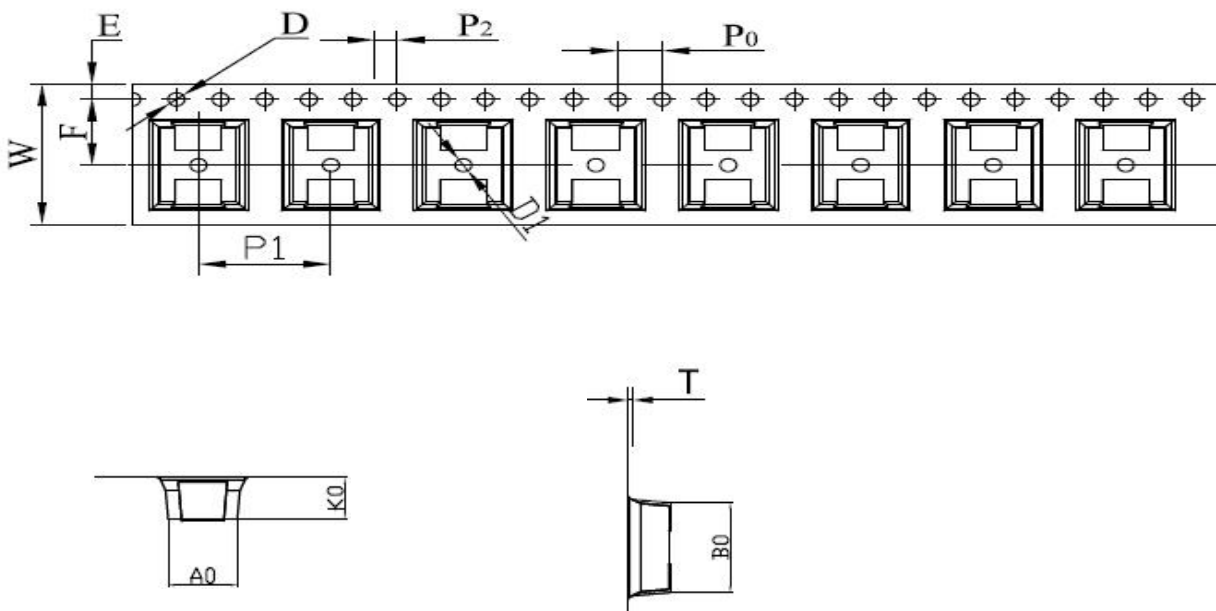


项目 Item	测试项目标准 Standard	测试方法 Test conditions / Methods	规格值 Specifications
高温负荷 High Temp. Load	IEC61051-4.20	将成品施加最大允许电压置于温度 $125 \pm 2^\circ\text{C}$ 烤箱中 1000 小时, 然后置于室温 1-2 小时测量压敏电压 $85 \pm 2^\circ\text{C}$ , $1000 \pm 24$ hrs at VDC or Vrms (Max. Continuous Voltage)	$ \Delta V/V_{1\text{mA}}  \leq 10\%$
电压温度系数 Voltage temperature coefficient	规格标准 Specification Standard	$\frac{V_{1\text{mA at } 125^\circ\text{C}} - V_{1\text{mA at } 25^\circ\text{C}}}{V_{1\text{mA at } 25^\circ\text{C}}} \times \frac{1}{100} \times 100 (\%/^\circ\text{C})$	$-0.05 \leq T_c \leq 0 (\%/^\circ\text{C})$
耐电压 Voltage Proof	IEC61051-4.8	将成品表面封装体, 以金属线绕成紧密线圈状, 于线圈出头端与引脚端输入电压 AC2500V 施加 1 分钟 Metal balls method, 2500 Vac 1 min	无外在损伤 No visible damage

## 11、包装 Packaging

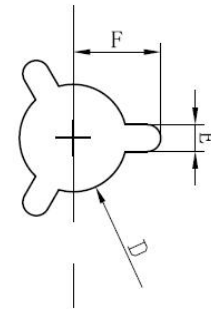
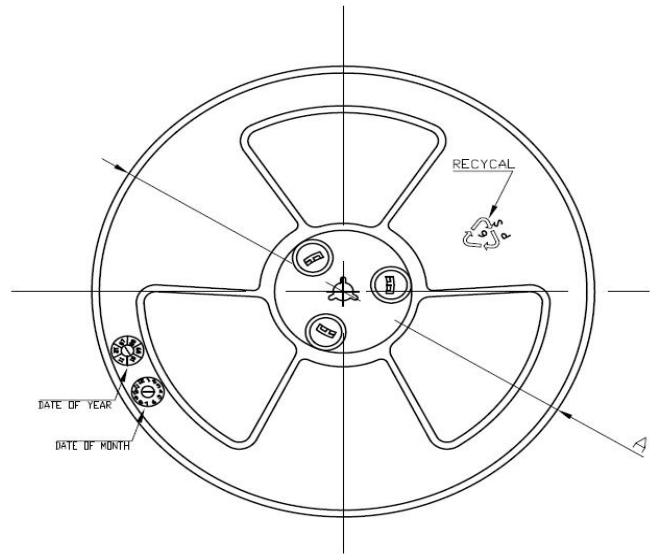
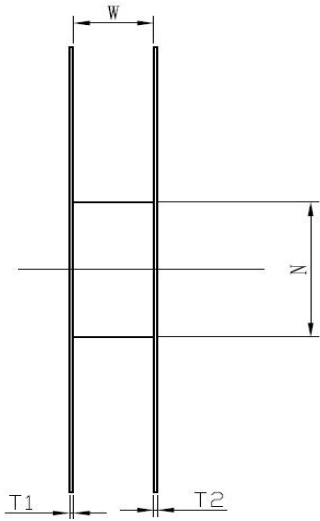
### 11.1 编带包装方式说明 Taping Packaging Specification

24mm 载带尺寸 24mm plastic embossed



symbol	AO	BO	KO	PO	P1	P2	长度/盘
Spec	$8.50 \pm 0.1$	$11.50 \pm 0.1$	$5.30 \pm 0.1$	$4.00 \pm 0.10$	$12.0 \pm 0.10$	$2.00 \pm 0.10$	18300mm
symbol	W	T	E	F	DO	D1	元件/盘
Spec	$24.0 \pm 0.3$	$0.40 \pm 0.05$	$1.75 \pm 0.10$	$11.50 \pm 0.1$	$1.50^{+0.1}_{-0}$	$1.50 \pm 0.10$	1500 PCS

**11.2 15 寸胶盘尺寸 15" rubber plate Size**



SPEC	24
E±0.5	2.3
F±0.5	10.75
W±0.2	24.4
T1±0.3	2.2
T2±0.3	2.2
A $\begin{matrix} +0 \\ -2 \end{matrix}$	∅380
N±3.0	∅100
D±0.3	13.3

**11.3 包装纸箱 Packaging Box**

