



产品承认书

SPECIFICATION FOR APPROVAL

客户名称 CUSTOMER	_____
客户料号 PART NO	_____
规格描述 DESCRIPTION	见第 5-6 页
弗瑞鑫料号 FRX P/N	见第 5-6 页
日期 DATE	_____

Huizhou Jingqin Electronic Components Co., Ltd		
Made By	Checked By	Approval By

Customer Approval		
Prepared By	Checked By	Approval By

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贴片氧化锌压敏电阻规格 SMD zinc oxide varistor specification

1、特点 Feature

1.1 先进的封装工艺，封装材料满足 UL94-V0

Advanced packaging technology, packaging materials meet UL94-V0

1.2 结构紧凑，体积小，节省空间

Compact structure, small size, space saving

1.3 优越的高温高湿性能

Superior high temperature and high humidity performance

1.4 强大的抑制高浪涌强电流能力

Strong ability to suppress high surge and high 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 placement

1.6 符合 RoSH ， REACH ， H.F 无卤

Comply with RoSH, REACH, H.F

1.7 安规认证： Safety certification:



小体积 大浪涌
车规级品质

CUL (NO:E523420)



CQC (NO:CQC21001319729, NO:CQC21001320392)

TUV (NO:B 112025 0001 Rev.00 , B 112025 0002 Rev.00)

1.8 管理体系认证： ISO9001:2015 质量管理体系

ISO9001:2015 Quality Management System

ISO14001:2015 环境管理体系

ISO14001:2015 Environmental Management System

IAFT16949 汽车行业质量管理体系

IAFT16949 Automotive Quality Management System

2、应用 Application

2.1 LED circuit protection LED 电路保护



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- 2.2 Industrial equipment 工业设备
- 2.3 Communication equipment 通讯设备
- 2.4 Automotive Electronics 汽车电子

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、品名说明 Part No. Explain

FRX® 贴片尺寸: SMD Size: 3225≈8.2×6.3mm 4032≈11.0×8.2mm	F 3225 4032	K 471	G2	15寸料盘卷装: 15" Reel packing: 3225: 1820PCS/reel 4032: 1500PCS/reel
压敏电压公差: ±10% Varistor voltage tolerance: ±10%		压敏电压 (V _{1mA}): 47×10 ¹ =470V Varistor voltage (V _{1mA}): 47×10 ¹ =470V		

5、通用参数 General Technical data

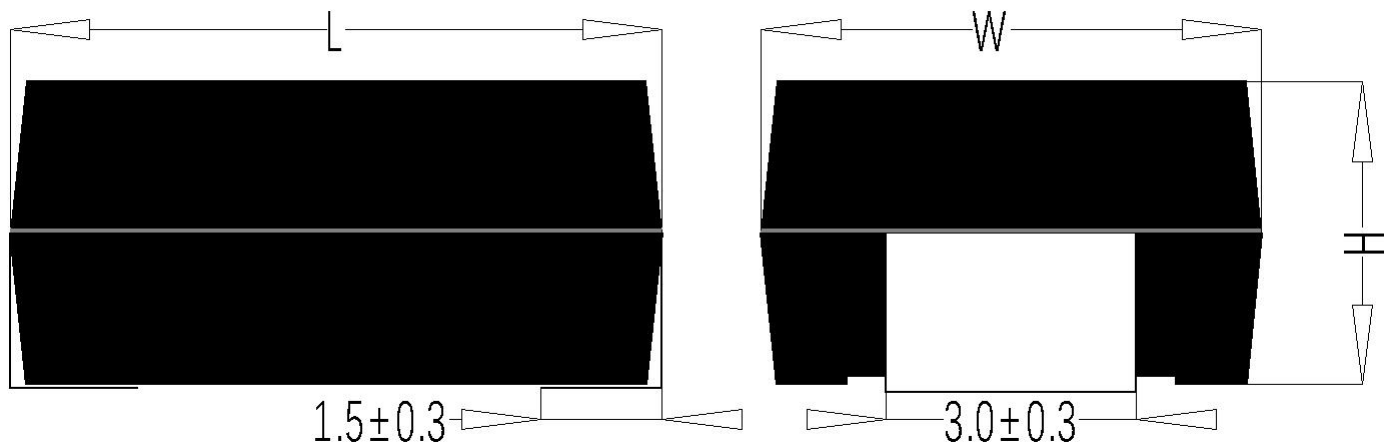
参数名称 Parameter Name	参数值 Parameter value	单位 Unit
工作温度 Operating temperature	-40 — +125	°C
储存温度 Storage temperature	-40 — +125	°C
耐电压	≥2.5	KV _{RMS}



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Voltage Proof		
绝缘电阻 Insulation Resistance	≥100	MΩ

6、结构与尺寸 Structure and Dimensions



(单位 Unit: mm)

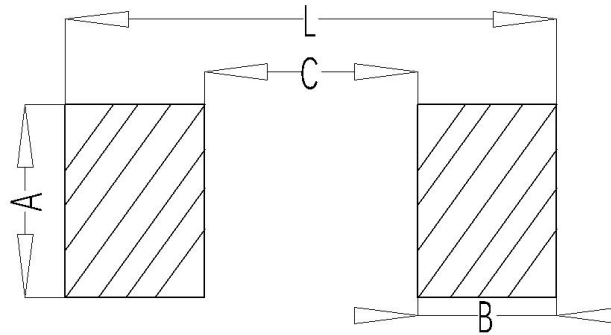
尺寸 Size Code	压敏电压范围 (V) Varistor Voltage (V)	L	W	H
3225	V _{1mA} =201—681	8.2±0.3	6.3±0.3	4.3±0.3
	V _{1mA} =751—821			5.2±0.3
4032	V _{1mA} =201—681	11.0±0.3	8.2±0.3	4.8±0.3
	V _{1mA} =751—821			5.5±0.3

7、焊盘尺寸 Dimensions



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(单位 unit: mm)

尺寸 Model number	A	B	C	L
3225	3.5	2.8	4.5	10.1
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 (8/20 μ s)		最大 冲击电流 Max. Impulse Current (8/20 μ s)	最大 通流能量 Max. fiow Circulation Energy (40 Times)	最大能量 Max. Energy (10/1000 μ s)	额定 功率 Rated Power	参考电容 Typical capacitance Reference @1KHZ
	V _{1mA} (V)	V _{AC} (V)	V _{DC} (V)	V _p (V)	I _p (A)	I max (A)	(KV) (KA)	W max (J)	P (W)	C(pF)
3225K201	200(180-220)	130	170	340	10	1200/175 0	2KV/1KA	11.0	0.25	200
3225K221	220(198-242)	140	180	360	10	1200/175 0	2KV/1KA	12.0	0.25	180
3225K241	240(216-264)	150	200	395	10	1200/175 0	2KV/1KA	13.0	0.25	170
3225K271	270(243-297)	175	225	455	10	1200/175 0	2KV/1KA	15.0	0.25	150
3225K301	300(270-330)	195	250	500	10	1200/175 0	2KV/1KA	17.0	0.25	150
3225K331	330(297-363)	210	275	550	10	1200/175 0	2KV/1KA	18.0	0.25	150



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3225K361	360(324-396)	230	300	595	10	1200/175 0	2KV/1KA	20.0	0.25	115
3225K391	390(351-429)	250	320	650	10	1200/175 0	2KV/1KA	21.0	0.25	105
3225K431	430(387-473)	275	350	710	10	1200/175 0	2KV/1KA	23.0	0.25	95
3225K471	470(423-517)	300	385	775	10	1200/175 0	2KV/1KA	25.0	0.25	90
3225K511	510(459-561)	320	410	845	10	1200/175 0	2KV/1KA	25.0	0.25	85
3225K561	560(504-616)	350	450	930	10	1200/175 0	2KV/1KA	26.0	0.25	80
3225K621	620(558-682)	395	510	1020	10	1200/175 0	2KV/1KA	28.0	0.25	78
3225K681	680(612-748)	420	560	1120	10	1200/175 0	2KV/1KA	30.0	0.25	75
4032K201	200(180-220)	130	170	340	25	2500/350 0	4KV/2KA	25.0	0.4	500
4032K221	220(198-242)	140	180	360	25	2500/350 0	4KV/2KA	27.0	0.4	450
4032K241	240(216-264)	150	200	395	25	2500/350 0	4KV/2KA	30.0	0.4	420
4032K271	270(243-297)	175	225	455	25	2500/350 0	4KV/2KA	35.0	0.4	370
4032K301	300(270-330)	195	250	500	25	2500/350 0	4KV/2KA	40.0	0.4	330
4032K331	330(297-363)	210	275	550	25	2500/350 0	4KV/2KA	42.0	0.4	300
4032K361	360(324-396)	230	300	595	25	2500/350 0	4KV/2KA	45.0	0.4	280
4032K391	390(351-429)	250	320	650	25	2500/350 0	4KV/2KA	50.0	0.4	260

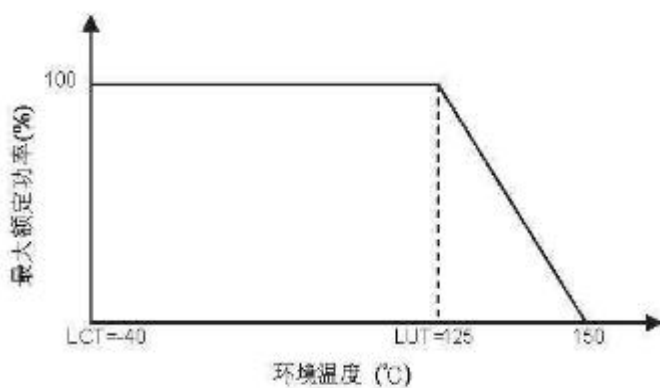


贴片氧化锌压敏电阻规格

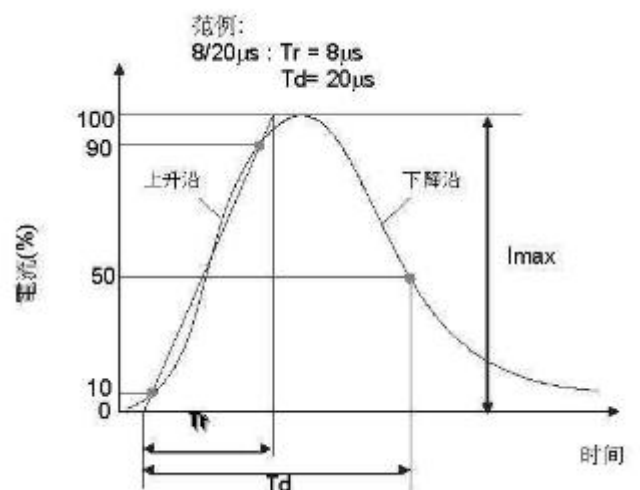
SMD zinc oxide varistor specification

4032K431	430(387-473)	275	350	710	25	2500/350 0	4KV/2KA	55.0	0.4	230
4032K471	470(423-517)	300	385	775	25	2500/350 0	4KV/2KA	60.0	0.4	210
4032K511	510(459-561)	320	410	845	25	2500/350 0	4KV/2KA	67.0	0.4	200
4032K561	560(504-616)	350	450	930	25	2500/350 0	4KV/2KA	69.0	0.4	180
4032K621	620(558-682)	395	510	1020	25	2500/350 0	4KV/2KA	70.0	0.4	160
4032K681	680(612-748)	420	560	1120	25	2500/350 0	4KV/2KA	72.0	0.4	150

功率减额曲线 Power derating curve



冲击电流标准波形 Standard Waveform of Impulse Current

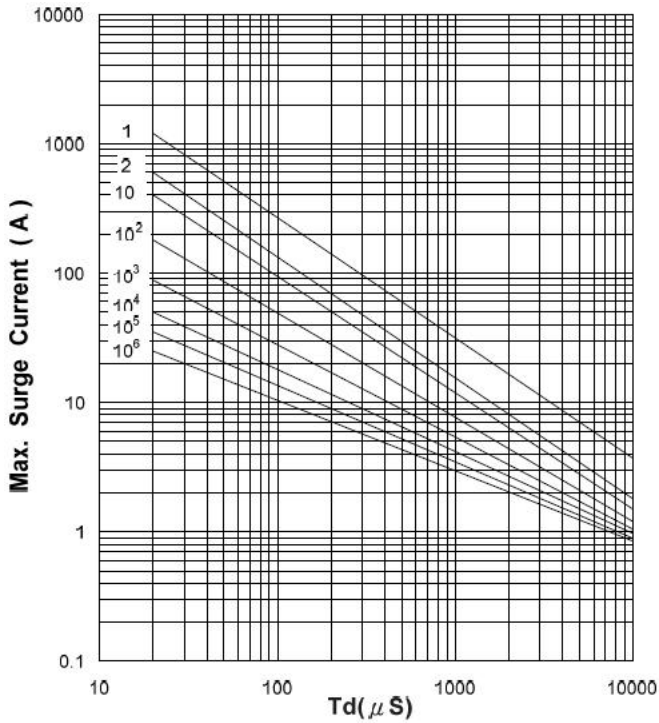


最大冲击电流减额曲线 Maximum impulse current derating curve

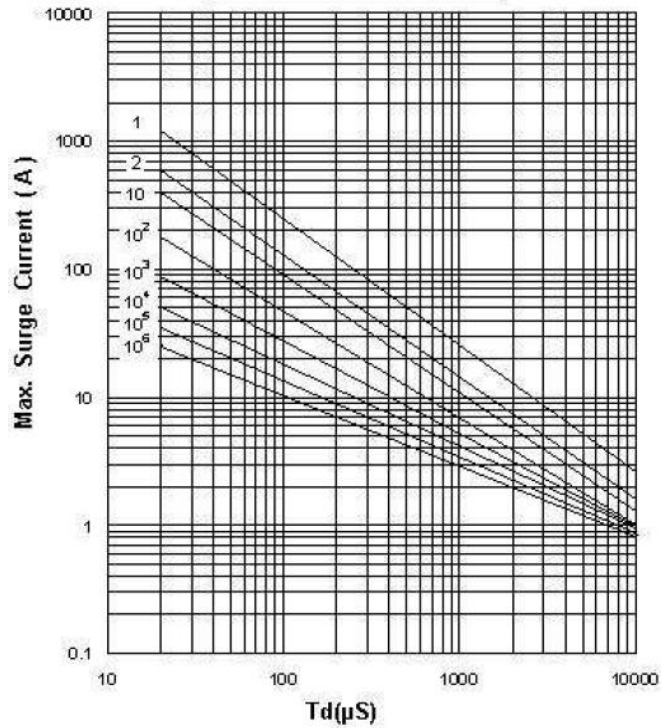


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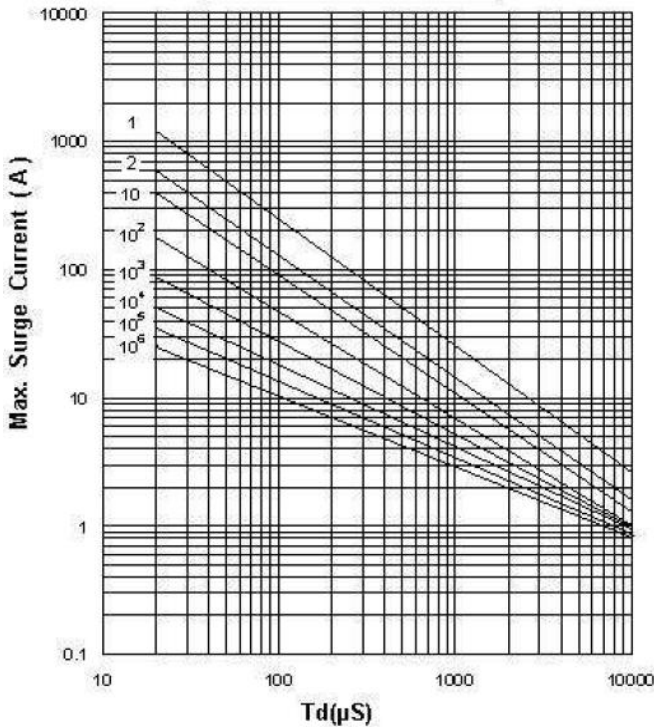
3225K201 – 3225K471



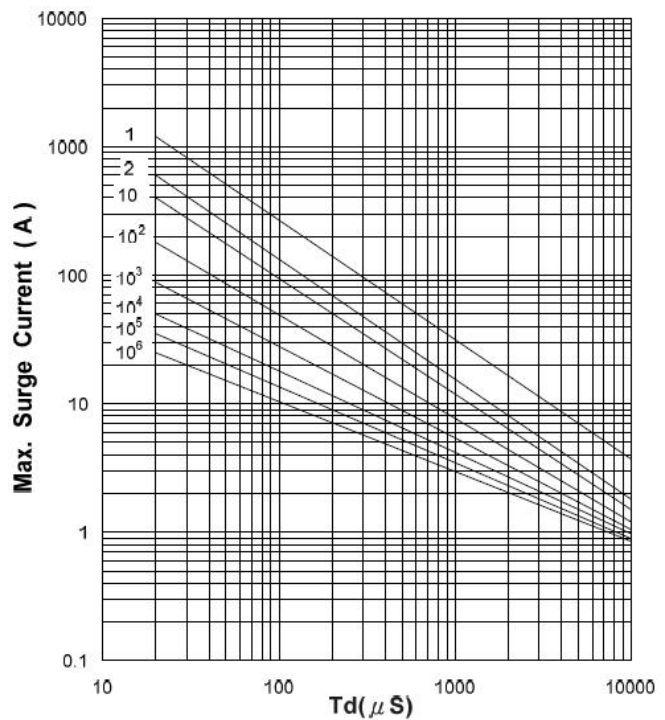
3225K511 – 3225K681



4032K201 – 4032K471



4032K511 – 4032K681

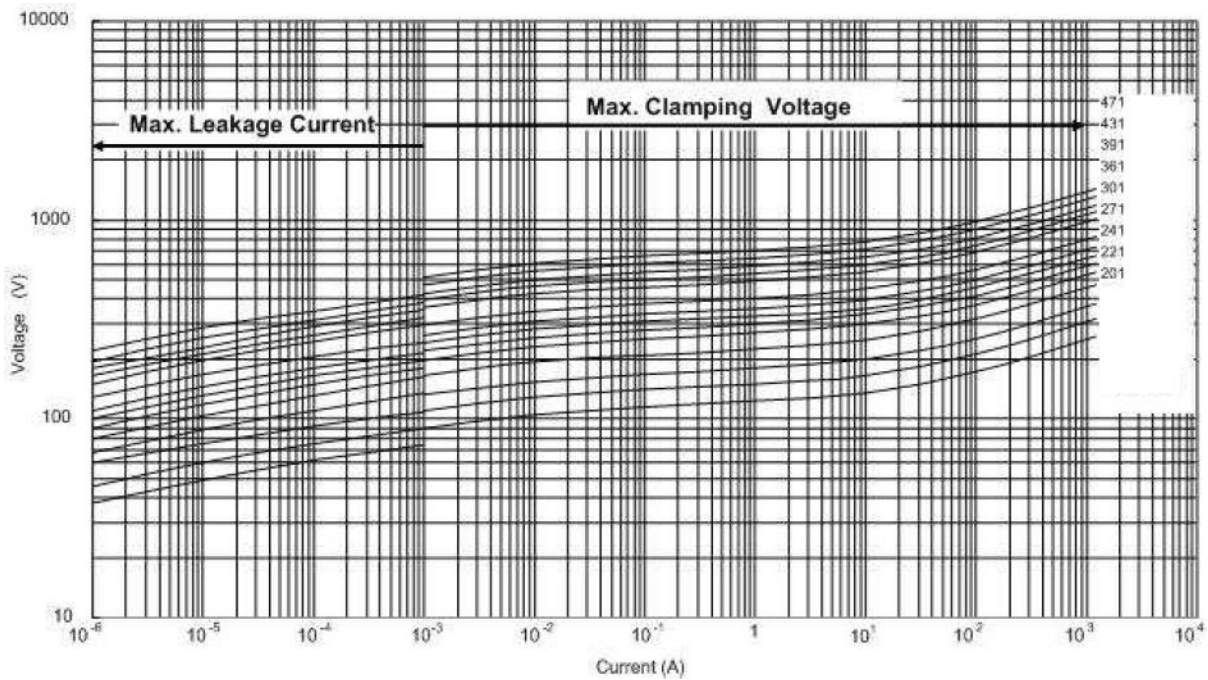




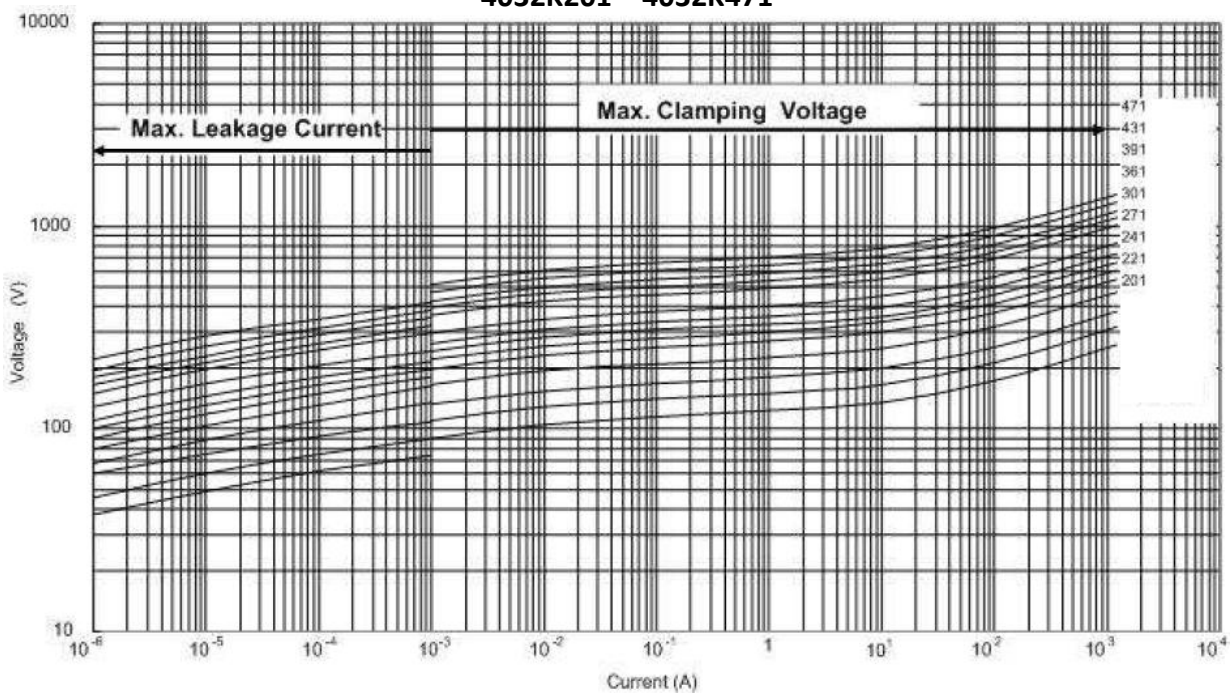
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最大漏电流与最大限制电压曲线 Maximum leakage current and maximum allowable voltage 3225K201 – 3225K471



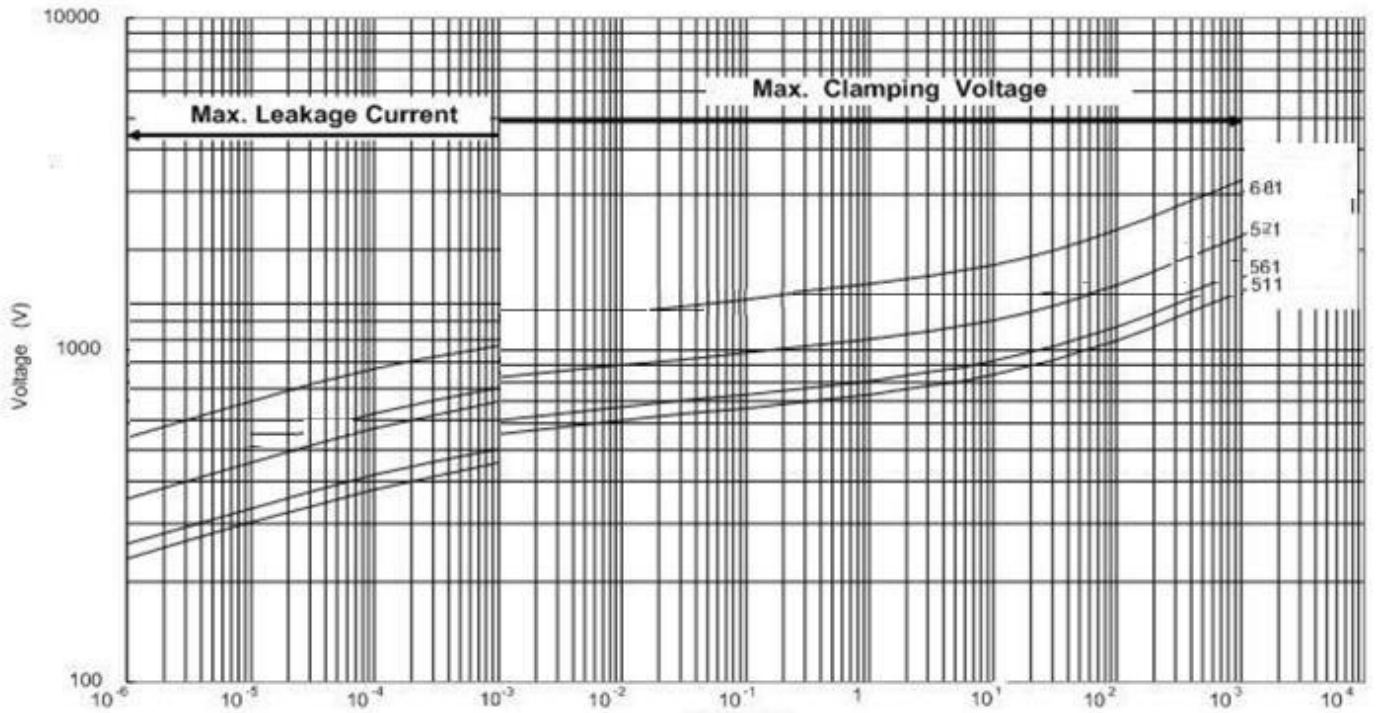
4032K201 – 4032K471





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3225K511 – 3225K681



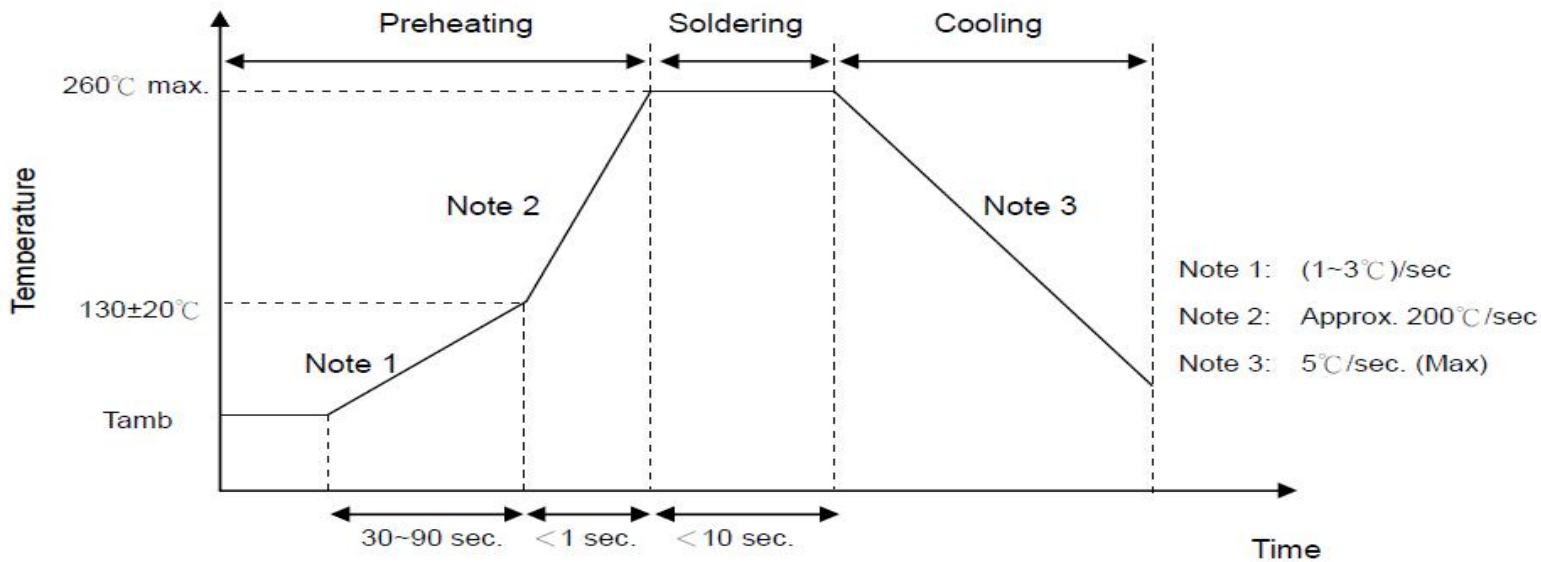


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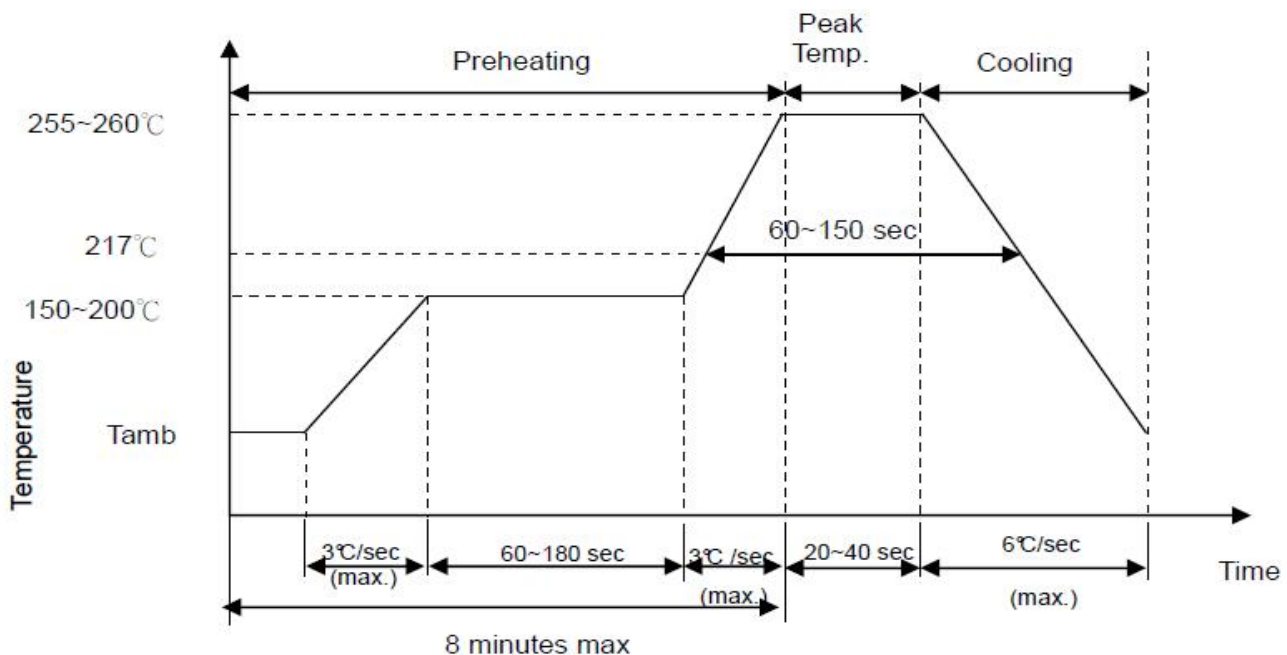
SMD zinc oxide varistor specification

9、推荐焊接条件 Recommended soldering conditions

9.1 波峰焊曲线 Wave soldering



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



烙铁重工焊接条件 Soldering iron heavy industry welding conditions

项目 Item	温度 Temperature
烙铁头部温度 Soldering iron tip temperature	360°C (max)
焊接时间 Welding time	3s(max)
烙铁头直径 Diameter of soldering iron tip	Φ3mm(max)



贴片氧化锌压敏电阻规格

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10、可靠性试验 Reliability

项目 Item	测试项目标准 Standard	测试方法 Test condition / Method	规格值 Specifications															
耐振性 Vibration	IEC 61051-1	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:10-55-10Hz Amplitude:0.75mm and 1.5mm Direction: 3 mutually perpendicular directions,2 hrs each.	$ \Delta V/V_{1mA} \leq 5\%$ 无外在损伤 No visible damage															
可焊性 Solderability	IEC60068-2-20	将成品引脚浸入 245℃±3℃的焊锡液中 3±0.3 秒取出 Dip in solder pot with condition 245±3℃, 3±0.3 sec	上锡均匀且面积≥95% Solder coverage≥95%															
耐焊接热性 Resistance to Soldering Heat	IEC60068-2-20	将成品引脚浸入 260℃±3℃的焊锡液中 10±1 秒取出 Dip in solder pot with condition 260±3℃, 10±1 sec	$ \Delta V/V_{1mA} \leq 5\%$															
高温储存 High temperature storage	IEC 60068-2-2	将成品置于 125±5℃烤箱中 1000±24 小时，取出后置于常温 1-2 个小时，然后测量压敏电压 Oven condition 125±5℃ x 1000±24 hrs, measure after complete test 1-2H	$ \Delta V/V_{1mA} \leq 5\%$															
耐湿性 Damp Heat, Steady State	IEC60068-2-78	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} \leq 10\%$ 绝缘电阻≥100MΩ IR≥100MΩ															
冷热冲击 Rapid change of Temperature	IEC60068-2-14	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} \leq 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																
高温负荷 High Temperature load	IEC61051-4.20	将成品施加最大允许 AC 电压置于温度 125±2℃烤箱中 1000±24 小时，然后置于室温 1-2 小时测量压敏电压 125±2℃, 1000±24hrs at Max VaC, measure after 1-2H	$ \Delta V/V_{1mA} \leq 10\%$															
电压温度系数 Voltage temperature coefficient	规格标准 Specification Standard	$\frac{V_{1mA} \text{ at } 125^\circ\text{C} - V_{1mA} \text{ at } 25^\circ\text{C}}{V_{1mA} \text{ at } 25^\circ\text{C}} \times \frac{1}{100} \times 100 (\%/^\circ\text{C})$	$-0.05 \leq T_c \leq 0.05 (\%/^\circ\text{C})$															



贴片氧化锌压敏电阻规格

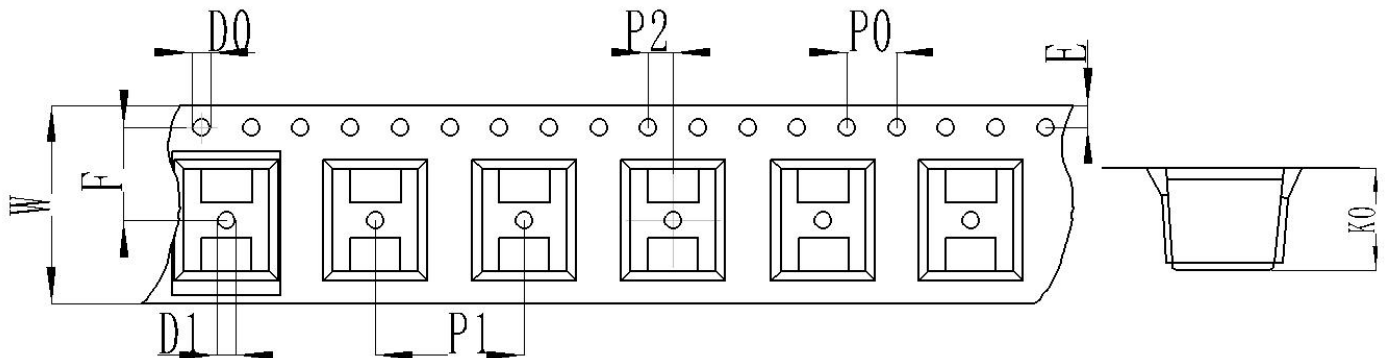
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耐电压 Voltage	IEC61051-4.8	将成品表面封装体，以金属线绕成紧密线圈状，于线圈出头端与引脚端输入电压 AC2500V 施加 1 分钟 Metal balls method, 2500 Vac 1min	无外在损伤 No visible damage
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11、包装 Packing

(单位 Unit: mm)

11.1 编带包装方式说明 Taping Packaging



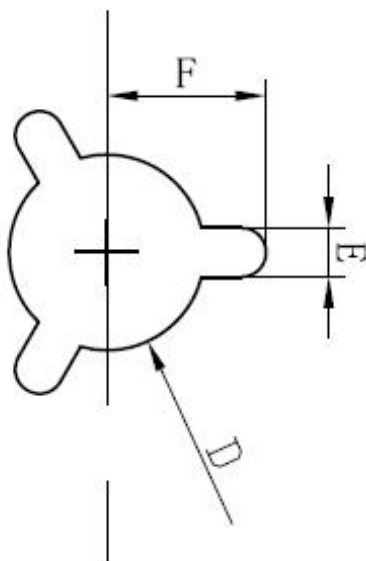
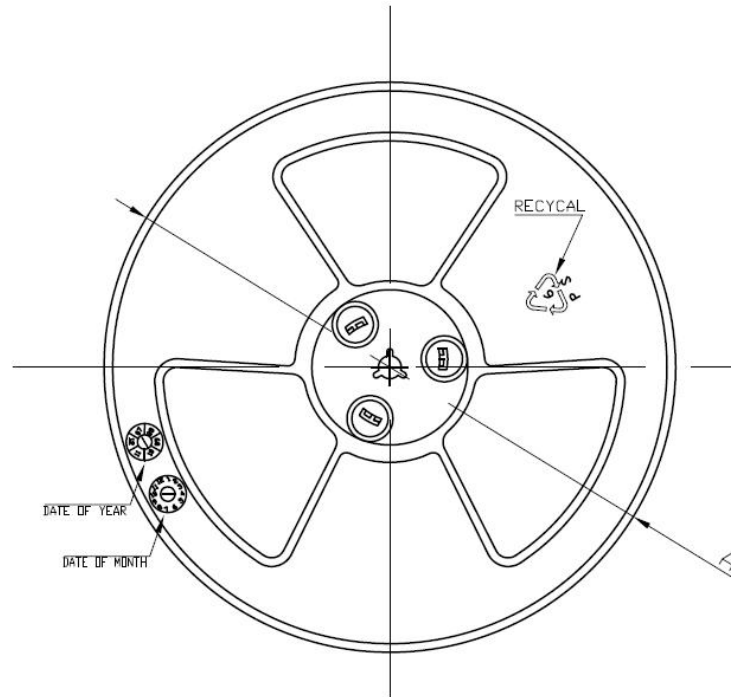
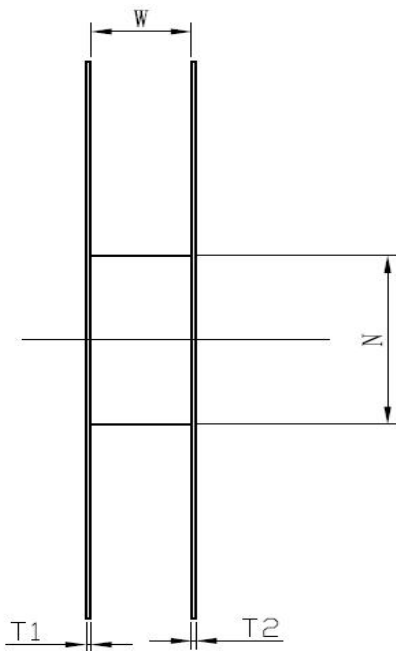
3225	Symbol	w	F	E	P0	P1	P2
	Spec	16.0±0.3	7.5±0.1	1.75±0.1	4.00±0.1	12.0±0.1	2.00±0.1
	Symbol	D0	D1	K0	数量/盘 : PCS/Reel		
	Spec	1.50±0.1	1.50±0.1	4.5±0.1	1820		
4032	Symbol	w	F	E	P0	P1	P2
	Spec	24.0±0.3	11.5±0.1	1.75±0.1	4.0±0.1	12.0±0.1	2.0±0.1
	Symbol	D0	D1	K0	数量/盘 : PCS/Reel		
	Spec	1.5±0.1	1.5±0.1	5.3±0.1	1500		



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11.2 15 寸胶盘尺寸 15 inch plastic tray size

(单位 Unit: mm)



SPEC	3225	4032
W	16.4 ± 0.3	24.4 ± 0.3
N	Φ100 ± 3.0	Φ100 ± 3.0
T1	2.2 ± 0.3	2.2 ± 0.3
T2	2.2 ± 0.3	2.2 ± 0.3
A	Φ380 ± 3.0	Φ380 ± 3.0
D	13.3 ± 0.3	13.3 ± 0.3
E	2.3 ± 0.5	2.3 ± 0.5
F	10.75 ± 0.5	10.75 ± 0.5



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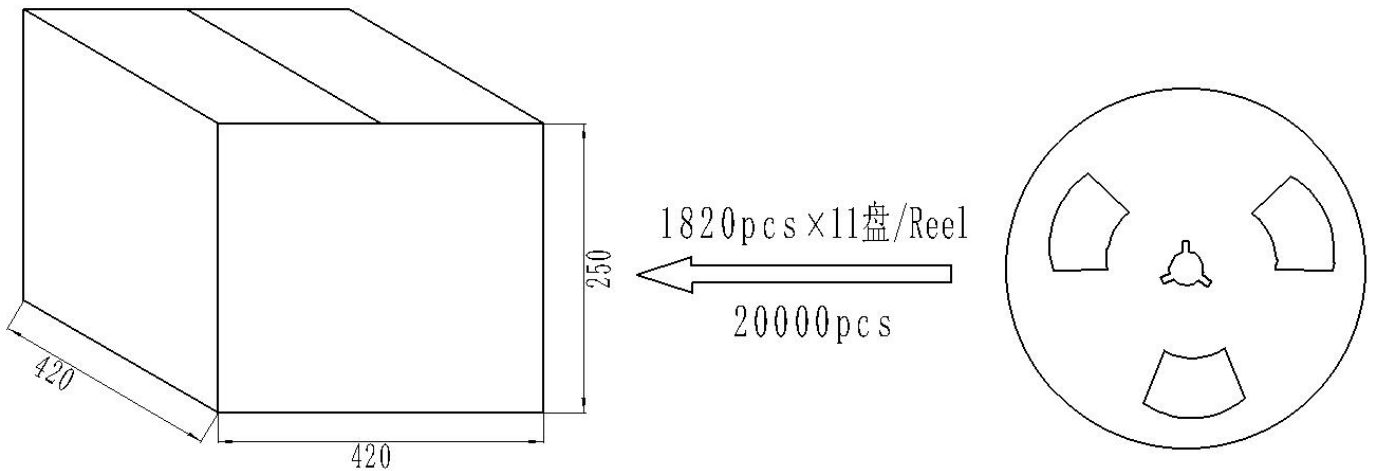
12、包装纸箱 Carton Packing

(单位 Unit: mm)

3225

重量: 20 千克/箱

Weight: 20kg/Box



4032

重量: 16 千克/箱

Weight: 16kg/Box

