

Version: WR181024

# WEIDY SCIENCE AND TECHNOLOGY CO., LTD

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## APPROVAL SPECIFICATION

PRODUCT: SMD CERAMIC CAPACITORS

SCOPE:SAFETY CERTIFIED TYPE

CLASS NORMINAL: X1Y1

Customer:
Customer Approval Column

DCC

Quality Assurance		
Approval	Check	Made

Halogen & Beryllium Free & RoHS Compliant

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## 一、产品优势 Product advantage

1、产品注塑成型，规格尺寸一致性好。

Product injection molding, specifications and dimensions are consistent.

2、卷轴包装，适合自动化表面贴装，节省人力成本。

Reel packing, suitable for automatic surface mounting, saving manpower cost.

3、适合回流焊、波峰焊焊接工艺。Suitable for reflow soldering and wave soldering.

4、较好的耐焊接热性能。Good thermal resistance to welding.

5、较好的耐湿性能。 Good moisture resistance .

6、较高的耐电压性能。 High voltage resistance.

7、较高的阻燃等级。 Higher flame retardant rating.

8、多国的安规认证。 Multi-national safety certification.

## 二、应用application

本规范适用于安全标准认证SM注塑成型SMD型陶瓷电容器用于通用电气设备。

类型SM是安全标准认证类X1，Y1的电容器。

不使用这些产品在任何汽车动力传动系或安全设备包括电动汽车和插电式混合动力车的电池充电器。

Application This specification is applied to Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors Type SM used for General Electric equipment.

Type SM is Safety Standard Certified capacitors of Class X1, Y1.

Do not use these products in any automotive power train or safety equipment including battery charger for electric vehicles and plug-in hybrids.

批准标准及认证号码Approval standard and recognized number

	Standard number	Certified number	AC Rated volt
VDE	IEC60384-14		X1:AC500V(r.m.s.)
UL	IEC60384-14		Y1:AC500V(r.m.s.)
CQC	IEC60384-14		

### 三、额定值 Rating

3-1. 工作温度范围: Operating temperature range -40 ~ +125°C

3-2. 额定电压 Rated voltage

X1 : AC500V(r.m.s.)      Y1 : AC500V(r.m.s.)

3-3. 产品编码结构 Part number configuration

<b>Part Numbering</b> <b>零件编码</b>		<b>Version No.:</b> <b>YC180918</b>	
<b>Reinforced Insulation</b> <b>加强绝缘</b> <b>-IEC60384-14 X1、Y1 Class-</b>		<b>Page:</b> 4/13	
Part Number	<b>SM</b> <b>B</b> <b>471</b> <b>K</b> <b>3A</b> <b>ES</b> <b>25</b> <b>R</b> □□□□		
	①    ②    ③    ④    ⑤    ⑥    ⑦    ⑧    ⑨		
① Product Type 产品系列		⑦ Lead wide 框架宽度	
Code 代码	Applicable method 适用作业方法	Code 代码	Dimensions 尺寸
SM	Surface Mount 表面贴装	25	2.54±0.05mm
② Temperature Characteristics 温度特性		⑧ Packaging 包装方式	
Code 代码	Temperature Characteristics 温度特性	Capacitance Tolerance 电容公差	Temperature Range 温度范围
B	Y5P	±10%	-25 to +85 °C
E	Y5U	+20%, -55%	
③ Capacitance 电容量		⑨ Special specification 特殊规格	
Code 代码	Capacitance	Code 代码	Meaning 意义
020	020=2×10 <sup>0</sup> =2pF	□□□□	Special specification expressed by four-digit
471	471=47×10 <sup>1</sup> =470pF		预留四位编码备用特殊项目
103	103=10×10 <sup>3</sup> =10000PF		
④ Capacitance Tolerance 电容量允差			
Code 代码	Capacitance Tolerance 电容量允差		
K	±10%		
M	±20%		
⑤ Safety recognized type 安规认可类型		Note:	
Code 代码	Rated Voltage 额定电压		
3A	X1, Y1; AC300V,(VDE,UL,CQC)		
4A	X1, Y1; AC400V,(VDE,UL,CQC)		
5A	X1, Y1; AC500V,(VDE,UL,CQC)		
⑥ Case Size 本体尺寸			
Code 代码	Dimensions 尺寸		
ES	8.0X6.0mm		

### 四、标记 Marking

(Example)

4-1. 商标 trademark

4-2. 材质 material      B: Y5P    E: Y5U

4-3. 标称容量及公差 Type name Nominal capacitance and Tolerance。

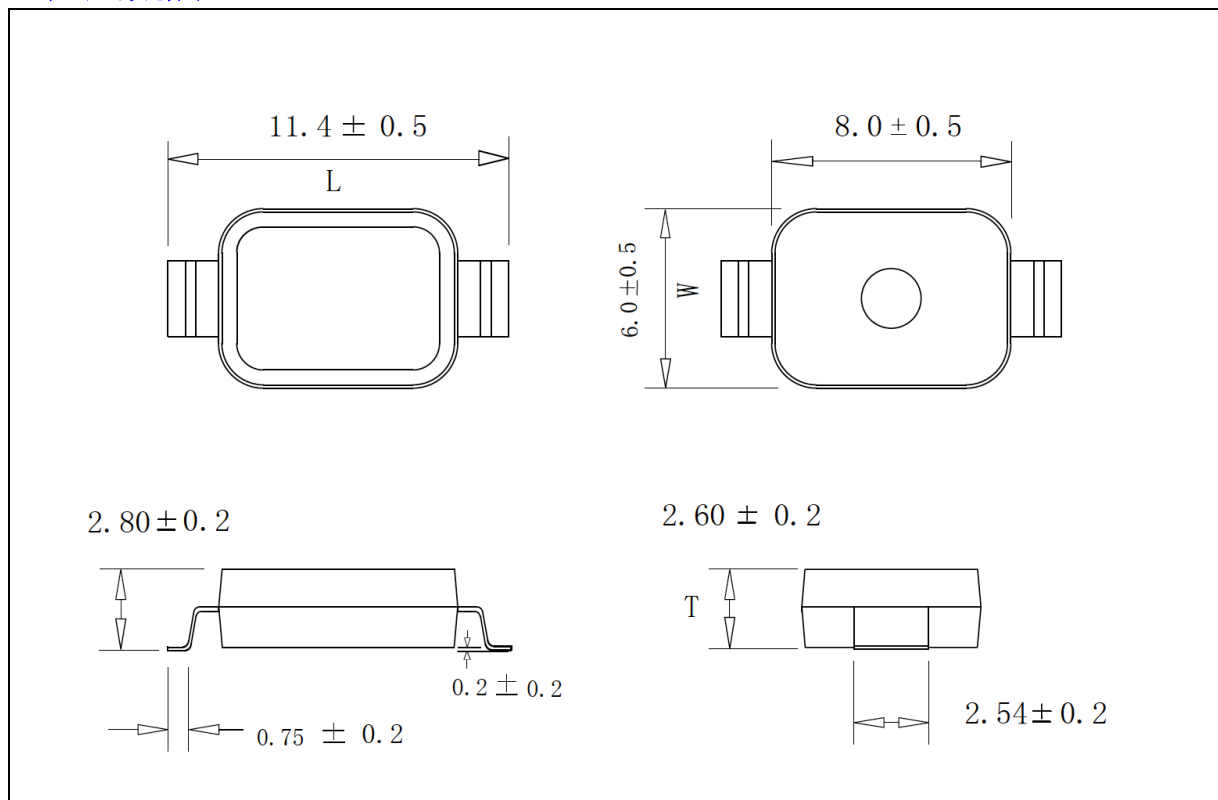
K: ±10%      M: ±20%

4-4: 额定电压 Rated Voltage : X1:500~ Y1: 500~

4-5: 安规认证列在标签上。 Safety certification is listed on the label.



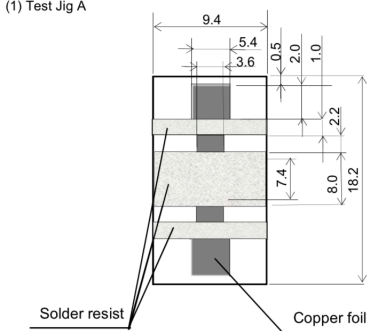
## 五、产品数据表 Part number list

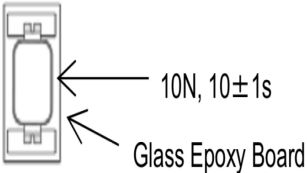


T.C	Cap (pF)	Cap Tol.	Customer Part Number	WEIDY Part Number	Dimension (mm)			Size code	Pack qty. (pcs)
					L	W	T		
B	100	$\pm 10\%$		SMB101K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
B	150	$\pm 10\%$		SMB101K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
B	220	$\pm 10\%$		SMB221K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
B	330	$\pm 10\%$		SMB331K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
B	470	$\pm 10\%$		SMB471K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
E	680	$\pm 20\%$		SME681K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
E	820	$\pm 20\%$		SME821K5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
E	1000	$\pm 20\%$		SME102M5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500
E	1500	$\pm 20\%$		SME152M5AES25R	$11.4 \pm 0.5$	$6.0 \pm 0.5$	$2.6 \pm 0.2$	ES	2500

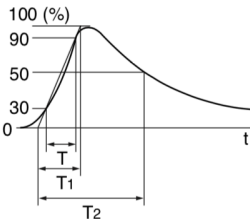
## 六、规格和测试方法 Specifications and test methods

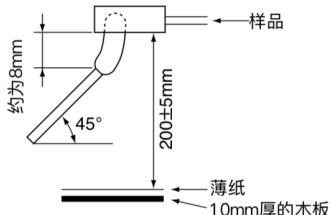
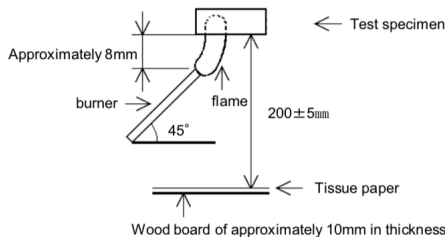
6. Specifications and test methods															
No	Item	Specification	Test method												
1	工作温度范围 Operating Temperature	-40~+125°C													
2	外观 Appearance	无缺陷或异常 No defects or abnormalities	目视检查 Visual inspection.												
3	尺寸 Dimensions	尺寸在规定范围内 Within the specified dimension.	使用卡尺或千分尺 Using calipers and micrometers.												
4	介电强度 Dielectric strength	无缺陷或异常 No defects or abnormalities.	在两根引线之间施加AC4000V试验电压达60秒时，电容器不应有任何损坏。 The capacitor shall not be damage when AC4000V(r.m.s.) is applied between the terminations for 60 s.												
5	绝缘电阻 Insulation Resistance(I.R.)	6000 MΩ or more	在DC500±50V条件下，在充电开始60±5秒内测量绝缘电阻。应通过1MΩ电阻器向电容器施加电压。 The insulation resistance shall be measured with DC500±50V within 60±5 s of charging. The voltage should be applied to the capacitor through a resistor of 1MΩ.												
6	静电容量 Capacitance	在规定偏差范围内 Within the specified tolerance.	在20°C时，以最高1±0.1kHz 和AC1±0.2V(r.m.s.)的频率和电压，测量静电容量、损耗因数。 Capacitance/D.F. shall be measured at 20°C with the frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.).												
7	损耗因素 Dissipation Factor (D.F.)	0.025 max.													
8	温度特性 Capacitance Temperature Characteristics	Cap. Change B:within ±10% E:within +22/-55% (Temp. Range:-25 to +85°C)	电容测量应在表中的每一步进行。 •预处理B、E特性。 执行热处理150 + 0/-10° C 60±5分钟,然后在室温状态下静置24±2h。 The capacitance measurement shall be made at each step in table. •Pretreatment for B,E char. Perform the heat treatment at 150+0/-10 °C for 60±5 min and then let sit for 24±2 h at *room condition.												
<table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>20±2</td> <td>-25±2</td> <td>20±2</td> <td>85±2</td> <td>20±2</td> </tr> </tbody> </table>				Step	1	2	3	4	5	Temp. (°C)	20±2	-25±2	20±2	85±2	20±2
Step	1	2	3	4	5										
Temp. (°C)	20±2	-25±2	20±2	85±2	20±2										

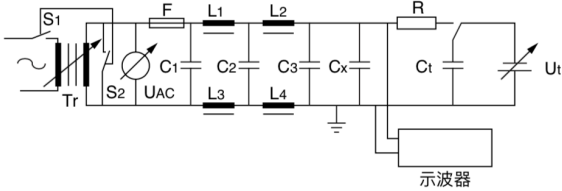
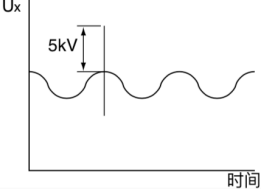
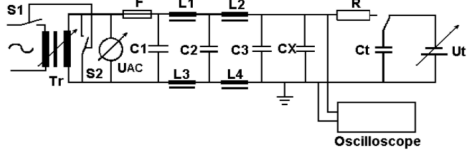
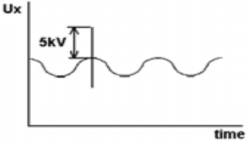
9	抗振性 Vibration resistance	外观 Appearance	无明显缺陷 No marked defect.	<p>将电容器焊接到“测试方法补充”中所示的测试夹具A(玻璃环氧树脂板)上。</p> <p>电容器应当受到简谐运动总振幅1.5毫米,多样统一的频率近似极限之间的10 - 55 hz。</p> <p>Solder the capacitor to the Test Jig A (glass epoxy board) shown in “Complement of test method”. The capacitor shall be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz.</p> <p>频率范围,从10到55 hz,回到10 hz,遍历在大约1分钟。</p> <p>适用这个运动一段2 h的三个互相垂直的方向(共6 h)。</p> <p>The frequency range, from 10 to 55Hz and return to 10Hz, shall be traversed in approximately 1 min. This motion shall be applied for a period of 2 h in each of 3 mutually perpendicular directions (total of 6h).</p> <p>测试方法的补充 Complement of Test Method</p> <p>Test Jig</p> <p>The test jig should be Jig A as described in “Specifications and Test methods”. The specimen should be soldered by the conditions as described below</p> <p>Soldering Method : Reflow soldering Solder : Sn-3.0Ag-0.5Cu</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>•Material : Glass Epoxy Board</li> <li>•Thickness : 1.6mm</li> <li>•Thickness of copper foil : 0.035mm</li> </ul>
		静电容量 Capacitance	在规格范围内 Within the specified tolerance.	
		损耗因素 D.F.	按照第7项 Pass the item No.7.	
10	引脚可焊性 Solderability of termination	外观 Appearance	无明显缺陷 No marked defects.	<p>将引脚浸入25%松香比例的助焊剂中2±0.5s。</p> <p>焊锡温度245±5°C</p> <p>Immerse the capacitor in the solution of ethanol (JIS K 8101) and rosin (JIS K 5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5s. Temp. of solder : 245±5°C</p>
11	焊接效果(回流焊) Soldering	外观 Appearance	无明显缺陷 No marked defects.	<p>预热的电容器150到180° C时间为90±30s。回流温度:230° C分钟。(Max. 温度:260° C)回流时间:30±10 s。回流次数:4次</p> <p>Preheat the capacitor at 150 to 180°C for 90±30s. Reflow temp. : 230°C min. (Max. temp. : 260°C) Reflow time :</p>
		静电容量 Capacitance	在规格范围内 Within ±10%	

	effect (Reflow)	ce		30±10s. Reflow number of times : 4 times  室温下静置24±2 h后测量。  Let sit at *room condition for 24±2 h, then measure.  •在样品温度降至室温后进行下一次回流处理。  • The next reflow porcess should be done after the temperature of the sample has dropped to room temperature.  •B,E 特性的预处理。  电容器应该存储在150 + 0/-10° C 1 h,并施加AC4000V 60S(r.m.s)然后放在室温下静置24±2 h后测量初值。  • Pretreatment for B,E char. Capacitor should be stored at 150+0/-10°C for 1 h, and apply the AC4000V(r.m.s.) 60s then placed at *room condition for 24±2 h before initial measurements.															
		绝缘电阻 I.R.	最小1000 MΩ  1000 MΩ or more																
		介电强度 Dielectric strength	按照第4项 Pass the item No.4.																
12	抗拉强度  Adhesive strength of termination	不移开端子或有其他缺陷  No removal of the terminations or other defects should occur.	将电容器焊接到“测试方法补充”中所示的测试夹具A(玻璃环氧树脂板)上。参见9项中。  然后按照箭头的方向施加10 n的力量。10±1 s  Solder the capacitor to the Test Jig A (glass epoxy board) shown in “Complement of Test method”.  Pass the item No.9.  Then apply 10N force in the direction of the arrow.  10N, 10±1s Glass Epoxy Board																
13	温度循环  Temperature cycle	外观 Appearance  静电容量变化 Capacitance change  损耗因素 D.F.  I.R.	无明显缺陷 No marked defect.  在±15%范围内 Within ±15%  B.E最大5% B,E:0.05 max.  最小3000 MΩ 3000 MΩ or more	将电容器固定在配套试验夹具A(玻璃环氧树脂板)上。参见9项中。 根据下表列出的4个热处理条件, 执行5周期的试验。  Fix the capacitor to the supporting Test Jig A (glass epoxy board) shown in “Complement of test method”. Pass the item No.9. Perform the 5 cycles according to the 4 heat treatments listed the following table.  <table border="1" data-bbox="705 1648 1399 1973"> <thead> <tr> <th>Step</th> <th>Templ(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>2 to 3</td> </tr> <tr> <td>3</td> <td>125±3</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>2 to 3</td> </tr> </tbody> </table> 电容器应该存储在150 + 0/-10° C 1 h,并施加AC4000V 60S(r.m.s)然后放在室温下静置24±2 h后测量初值。	Step	Templ(°C)	Time(min.)	1	-40±3	30±3	2	Room Temp.	2 to 3	3	125±3	30±3	4	Room Temp.	2 to 3
Step	Templ(°C)	Time(min.)																	
1	-40±3	30±3																	
2	Room Temp.	2 to 3																	
3	125±3	30±3																	
4	Room Temp.	2 to 3																	



		介电强度 Dielectric strength	按照第4项 Pass the item No.4.	Let sit for 24±2 h at *room condition, then measure. •Pretreatment for B,E char. Capacitor should be stored at 150+0/-10°C for 1 h, and apply the AC4000V(r.m.s.) 60s then placed at *room condition for 24 ±2 h before initial measurements.
14	湿度 (稳态)  Humidity (Steady state)	外观 Appearance	无明显缺陷 No marked defect.	电容器置于40±2° C,相对湿度90~95%的空间。500 + 24/-0 移除,室温条件下静置24±2 h,然后测量。  Sit the capacitor at 40±2°C and relative humidity 90 to 95% for 500+24/-0 h. Remove and let sit for 24±2 h at *room condition, then measure.  电容器应该存储在150 + 0/-10° C 1 h,并施加AC4000V 60S(r.m.s)然后放在室温下静置24±2 h后测量初值。  • Pretreatment for B,E char. Capacitor should be stored at 150+0/-10°C for 1 h, and apply the AC4000V(r.m.s.) 60s then placed at *room condition for 24 ±2 h before initial measurements.
		静电容量 Capacitance change	在±20%范围内 Within ±20%	
		损耗因素 D.F.  绝缘电阻 I.R.	5%最大 B,E:0.05 max.  最小3000 MΩ  3000 MΩ or more	
		Dielectric strength	Pass the item No.4.	
15	耐湿负荷  Humidity Loading	Appearance	No marked defect.	电容器施加额定电压,置于40±2° C,相对湿度90~95%的空间。500 + 24/-0 移除,室温条件下静置24±2 h,然后测量。  Apply the rated voltage at 40±2°C and relative humidity 90 to 95% for 500+24/-0 h. Remove and let sit for 24±2 h at *room condition, then measure.  电容器应该存储在150 + 0/-10° C 1 h,并施加AC4000V 60S(r.m.s)然后放在室温下静置24±2 h后测量初值  • Pretreatment for B,E char. Capacitor should be stored at 150+0/-10°C for 1 h, and apply the AC4000V(r.m.s.) 60s then placed at *room condition for 24 ±2 h before initial measurements.
		Capacitance change	Within ±20%	
		D.F.	B,E:0.05 max.	
		I.R.	3000 MΩ or more	
16	寿命  Life	外观 Appearance	无明显缺陷 No marked defect.	脉冲电压完成寿命测试后,均应对每个电容器实施8kV的脉冲电压测试。  mpulse Voltage test is performed. Each individual capacitor shall be subjected to a 8kV Impulse  the voltage value means zero to peak) for 3 times. Then the capacitors are applied to life test.    前端时间(T1)=1.2μ s=1.67T 到达电压半值的时间(T2)=50μ s  在125+2/-0°C及相对湿度低于50%的条件下施加表4所示
		静电容量 Capacitance change	在±20%范围内 Within ±20%	
		I.R.	3000 MΩ or more	
		Dielectric strength	Pass the item No.4.	

			<p>的电 压1000小时</p> <p>Apply voltage as Table for 1000 h at 125+2/-0°C, relative humidity 50% max.</p> <div style="border: 1px solid black; padding: 5px;"> <p>外加电压Applied voltage</p> <p><b>AC550V (r.m.s.), 但每小时一次将电压增大至AC1000V (r.m.s.) 0.1秒的情况除外。</b></p> <p>AC550V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1s.</p> </div> <p>Remove and let sit for 24±2 h at *room condition, then measure.</p> <p>Pretreatment for B,E char. Capacitor should be stored at 150+0/-10°C for 1 h, and apply the AC4000V(r.m.s.) 60s then placed at *room condition for 24 ±2 h before initial measurements.</p>
17	<p>被动燃烧</p> <p>Passive flammability</p>	<p>燃烧时间不应超过30秒。</p> <p>纸不应该点燃。</p> <p>The burning time should not be exceeded the time 30s. The tissue paper should not ignite.</p>	<p>测试的电容器应在燃烧效果最佳的位置。每个样品应一次性燃烧。</p> <p>燃烧时间: 30秒</p> <p>火焰尺寸 : 12± 1mm          喷烧器 : 35mm长                    内径: 0.5± 0.1mm                    外径: 最大0.9mm          气体 : 纯度95%以上的丁烷</p>  <p>The capacitor under test shall be held in the flame in the position which best promotes burning. Each specimen shall only be exposed once to the flame. Time of exposure to flame : 30 s.</p> <p>Length of flame : 12±1mm</p> <p>Gas burner : Length 35mm min.                    Inside dia : 0.5±0.1mm                    Outside dia : 0.9mm max.</p> <p>Gas : Butane gas purity 95% min.</p> 

<p>18</p>	<p>主动燃烧</p> <p>Active flammability</p>	<p>粗绵布不燃烧。</p> <p>The cheese-cloth should not be on fire</p>	<p>应将电容器单独包裹在至少1层粗绵布中,但不得超过2层。然后,对电容器实施20次放电。逐次放电间隔应为5秒。实施最后一次放电后,应保持U<sub>AC</sub>2分钟。</p>  <p>示波器</p> <p>C<sub>1,2</sub> : 1μ F ± 10%      C<sub>3</sub> : 0.033μ F ± 5% 10kV  L<sub>1</sub>至<sub>4</sub>: 1.5mH ± 20% 16A 杆状扼流  C<sub>t</sub> : 3μ F ± 5% 10kV      R : 100Ω ± 2%  C<sub>x</sub> : 电容器(测试对象)      U<sub>AC</sub> : U<sub>R</sub> ± 5%  F : 保险丝 额定电流10A      U<sub>R</sub> : 额定电压  U<sub>t</sub> : 施加电压到C<sub>t</sub>上</p>  <p>U<sub>x</sub></p> <p>5kV</p> <p>时间</p> <p>The capacitor shall be individually wrapped in at least one but more than two complete layers of cheesecloth. The capacitor shall be subjected to 20 discharges. The interval between successive discharges shall be 5 s. The U<sub>AC</sub> shall be maintained for 2 min after the last discharge.</p>  <p>Oscilloscope</p> <p>C<sub>1,2</sub> : 1mF ± 10%, C<sub>3</sub> : 0.033mF ± 5% 10kV L<sub>1</sub>~<sub>4</sub> : 1.5mH ± 20% 16A Rod core choke Capacitance/Q/D.F. shall be measured at 20°C with the U<sub>AC</sub> : U<sub>R</sub> ± 5%, U<sub>R</sub> : Rated Voltage F : Fuse, rated 16A C<sub>x</sub> : Capacitor specimens U<sub>t</sub> : Voltage impressed on the tank capacitor C<sub>t</sub></p>  <p>U<sub>x</sub></p> <p>5kV</p> <p>time</p>
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\*1 "室内条件" 温度: 15至35°C, 相对湿度: 45至75%, 大气压: 86至106kPa

\* "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

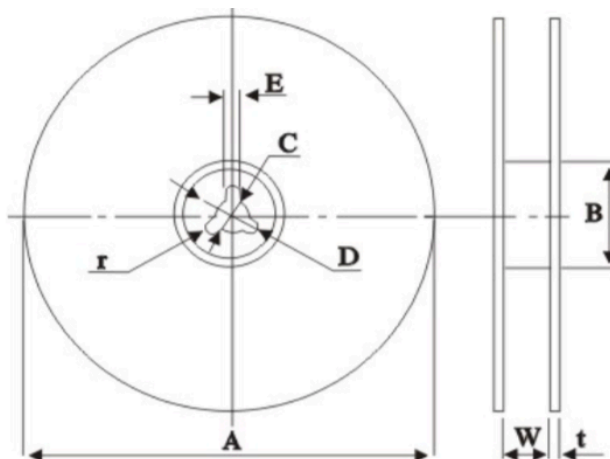
## 七、包装图 Packaging figure

R——卷轴编带 Reeling

包装数量：2500PCS/卷

卷式编带盘图形及尺寸 Skech & Dimensions of **Reel** (Fig. I)

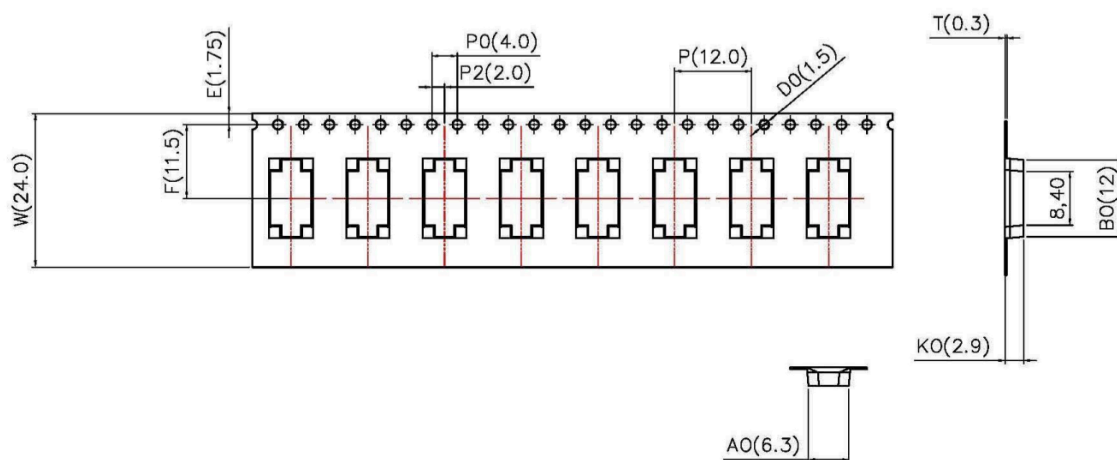
图 I 卷式编带盘图形及尺寸 (mm) Fig.I Skech & Dimensions of reel (mm)



卷盘尺寸 (待定)

代码	A	B	C	D	E	W	T	R
尺寸	330±5.0	80±1.0	13.0±0.2	21±0.8	2.0±0.5	24±1.0	2.0±0.5	R1.0

载带尺寸:



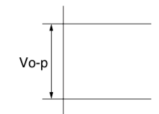
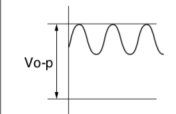
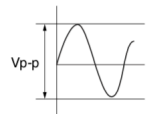
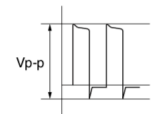
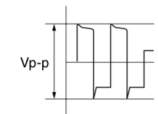
## 八、使用注意事项 Matters needing attention

### 警告 CAUTION

#### 1. 工作电压 OPERATING VOLTAGE

在交流电路或纹波电流电路中使用直流额定电压电容器时，请务必将外加电压的 $V_{p-p}$ 值或包含直流偏置电压的 $V_{o-p}$ 值维持在额定电压范围内。若向电路施加电压，开始或停止时可能会因谐振或切换产生暂时的异常电压。请务必使用额定电压范围包含这些异常电压的电容器。

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the  $V_{p-p}$  value of the applied voltage or the  $V_{o-p}$  which contains DC bias within the rated voltage range. When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing these irregular voltage.

电压	直流电压	直流+交流电压	交流电压	冲激电压 (1)	冲激电压 (2)
位置测量					

#### 2. 工作温度和自生热 (适用于B/E特性)

##### OPERATING TEMPERATURE AND SELF-GENERATED HEAT

电容器的表面温度应保持在额定工作温度范围的上限以下。务必考虑到电容器的自生热。电容器在高频电流、冲激电流等中使用可能会因介电损耗发出自生热。外加电压应使自生热等负荷在 $25^{\circ}\text{C}$ 周围温度条件下不超过 $20^{\circ}\text{C}$ 范围。测量时应使用 $\phi 0.1\text{mm}$ 小热容量的(K)的热电偶，而且电容器不应受到其它元件的散热或周围温度波动影响。过热可能会导致电容器特性及可靠性下降。(切勿在冷却风扇运转时进行测量。否则无法确保测量数据的精确性)

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or the like, it may have the self-generated heat due to dielectric-loss. Applied voltage should be the load such as self-generated

heat is within  $20^{\circ}\text{C}$  on the condition of atmosphere temperature  $25^{\circ}\text{C}$ . When measuring, use a thermocouple of small thermal capacity-K of  $\phi 0.1\text{mm}$  and be in the condition where capacitor is not affected by radiant heat of other components and wind of surroundings. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

#### 3. 耐电压的测试条件 (1) 测试设备

##### TEST CONDITION FOR WITHSTANDING VOLTAGE (1) TEST EQUIPMENT

交流耐电压的测试设备应具有能够产生类似于 $50/60\text{Hz}$ 正弦波的性能。如果施加变形的正弦波或超过规定电压值的过载电压，则可能会导致故障。

Test equipment for AC withstanding voltage should be used with the performance of the wave similar to  $50/60\text{ Hz}$  sine wave. If the distorted sine wave or over load exceeding the specified voltage value is applied, the defective may be caused.

##### (2) 电压外加方法 VOLTAGE APPLIED METHOD

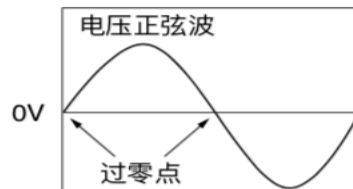
施加耐电压时，电容器的引线或端子应与耐电压测试设备的输出端连接牢固；然后再将电压从近零增加到测试电压。如果测试电压不从近零逐渐提高而是直接施加在电容器上，则施加时应包含\*过零点。测试结束时，测试电压应降到近零；然后再将电容器引线或端子从耐电压测试设备的输出端取下。如果测试电压不从近零逐渐提高而是直接施加在电容器上，则可能会出现浪涌电压，从而导致故障。

\*过零点是指电压正弦通过 $0\text{V}$ 的位置。参见下图。

When the withstanding voltage is applied, capacitor's lead or terminal should be firmly connected to the out-put of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage. If the test voltage without the raise from near zero voltage would be applied directly to capacitor, test voltage should be applied with the \*zero cross. At the end of the test time, the test voltage should be reduced to near zero, and then capacitor's lead or terminal should be taken off the out-put of the withstanding voltage test equipment.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, the surge voltage may arise, and therefore, the defective may be caused. \*ZERO CROSS is the point where voltage sine wave pass 0V.

- See the right figure -



#### 4.失效安全性FAIL-SAFE

如果电容器破损，会导致短路电路故障。务必在本产品上 适当提供例如保险丝等自动防故障功能，以免导致电击、火灾、或冒烟等。

When capacitor would be broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure would follow an electric shock, fire or fume.

#### 5. 振动和冲击VIBRATION AND IMPACT

在使用过程中，不要过度冲击或振动导致电容器或引脚暴露

Do not expose a capacitor or its leads to excessive shock or vibration during use.

#### 6. 焊接SOLDERING

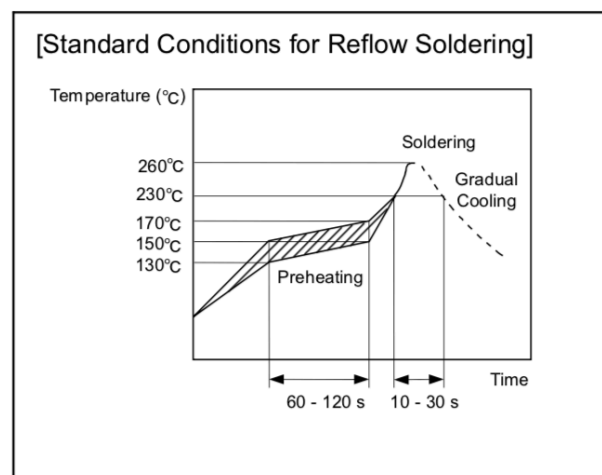
6-1 回流焊焊接电容器时,它应该在以下条件下执行。

Reflow Soldering When soldering capacitor, it should be performed in following conditions.

焊接温度Soldering temperature : 230 ~ 260 °C

焊接时间Soldering time : 10 ~ 30s

预热温度Preheating temperature : 170 °C max.



6-2波峰焊焊接电容时,它应该在以下条件下执行

Wave Soldering When soldering capacitor, it should be performed in following conditions.

焊接温度Soldering temperature : 260 °C max.

焊接时间Soldering time : 5s max.

预热温度Preheating temperature : 120 °C max.

预热时间Preheating time : 60s max.

### 6-3焊接时烙铁

本产品PCB / PWB,不超过电容器的焊锡耐热性规范。使该产品受热过度可能会熔化内部连接焊料,并可能导致热冲击,使陶瓷元件破裂。

Soldering Iron When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

烙铁焊接电容时,应该表现在以下条件下执行。

When soldering capacitor with a soldering iron, it should be performed in following conditions.

烙铁尖端温度Temperature of iron-tip : 400 °C max.

烙铁瓦数Soldering iron wattage : 50W max.

焊接时间 Soldering time : 3.5s max.

## 7. 粘合、成型或涂装BONDING, RESIN MOLDING AND COATING

在粘合、成型或涂装本产品之前,通过测试在预定设备内的粘合、模制或涂覆产品的性能,验证这些过程不会影响电容器的质量。

在应用程序的数量的情况下,干燥/粘合剂硬化条件和成型树脂含有有机溶剂(乙酸乙酯、甲基乙基酮、甲苯、等等)是不合适的,有机溶剂可能导致电容器外层的树脂损坏,出现损坏的案例或短路。

Before bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance of the bonded, molded or coated product in the intended equipment. In case of the amount of applications, dryness / hardening conditions of adhesives and molding resins containing organic solvents (ethyl acetate, methyl ethyl ketone, toluene, etc.) are unsuitable, the outer coating resin of a capacitor is damaged by the organic solvents and it may result, worst case, in a short circuit.

在温度循环过程中,胶粘剂、成型树脂或涂层厚度的变化可能会导致外壳树脂开裂和/或陶瓷元件开裂

The variation in thickness of adhesive, molding resin or coating may cause a outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.

## 8. 操作和存储环境OPERATING AND STORAGE ENVIRONMENT

电容器的绝缘涂层不能形成完美的密封;因此,不要在腐蚀性的环境中使用或储存电容器,特别是在氯化物气体、硫化物气体、酸、碱、盐或类似物质存在的环境中。避免接触湿气。对这个产品清洗、焊接或成型之前,验证这些过程不影响产品质量。

The insulation coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

这是一个MSL3的产品。因此,为了避免吸收水分,电容器被装在防潮的密封袋中。

This one is MSL 3 product. So, in order to avoid the absorption of moisture, capacitors are packed in moisture-proof envelope.

电容器储存在下列条件下,并在交付后6个月内使用

Store the capacitors in the following conditions at all times, and use within 6 months after delivered.

温度: Temperature : 10 to 30°C

湿度Humidity : 60% max.

打开防潮包装后,在168小时内焊接电容器。打开后,将电容器存储在有干燥剂防潮包内,备注信息卡并保持上述条件。

Solder the enclosed capacitors within 168 hours after opening the moisture-proof package. After opening, store the capacitors in moisture-proof package with a desiccant and HIC card and keep the above condition.

贮藏期已经超过6个月或封闭包被打开时,在焊接之前执行烘烤(60°C x 168小时)。

In case the storage period has been exceeded 6 months or the indicator color of a enclosed HIC card has changed when the package has been opened, perform baking (60°C x 168 hr ) before soldering.

## 9. 限制的应用程序LIMITATION OF APPLICATIONS

在使用我们的产品之前,请联系我们,以下列出的应用程序需要特别高的可靠性,以防止可能直接对第三方的生命、身体或财产造成损害的缺陷。

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

1. 航空设备Aircraft equipment
2. 航天设备Aerospace equipment
3. 水下设备Undersea equipment
4. 电站控制设备Power plant control equipment
5. 医疗Medical equipment
6. 运输设备Transportation equipment (automotives, trains, ships, etc.)
7. 交通信号设备Traffic signal equipment
8. 灾害预防/犯罪预防设备 Disaster prevention / crime prevention equipment
- 9.对公众产生影响的数据处理设备Data-processing equipment exerting influence on public
10. 类似复杂性和/或可靠性要求的应用程序Application of similar complexity and/or reliability requirements to the applications listed in the above.