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# SANYEAR

## 多层片式陶瓷电容器规格书

MULTILAYER CHIP CERAMIC CAPACITOR CATALOG



常规多层片式陶瓷电容器 General Multilayers Chip Ceramic Capacitor

产品特点 Product Features

- COG (NPO)：最常用的温度补偿型电容器，属于Ⅰ类介质材料，其性能稳定，温度系数在 $0 \pm 30\text{PPM}/^\circ\text{C}$ 以内，具有好的高频特性。
- X7R：工业中广泛使用的一种温度稳定型电容器，属于Ⅱ类介质材料，具有较高的介电常数，在使用温度（ $-55^\circ\text{C} \sim +125^\circ\text{C}$ ）范围内容值变化率在 $\pm 15\%$ 以内。
- X6S：工业中广泛使用的一种温度稳定型电容器，属于Ⅱ类介质材料，具有较高的介电常数，在使用温度（ $-55^\circ\text{C} \sim +105^\circ\text{C}$ ）范围内容值变化率在 $\pm 22\%$ 以内。
- X5R：工业中广泛使用的一种温度稳定型电容器，属于Ⅱ类介质材料，具有较高的介电常数，在使用温度（ $-55^\circ\text{C} \sim +85^\circ\text{C}$ ）范围内容值变化率在 $\pm 15\%$ 以内。
- Y5V：普通用途的电容器，在使用温度（ $-30^\circ\text{C} \sim +85^\circ\text{C}$ ）范围内容值变化率较大， $+22\%/-82\%$ 以内，具有高介电常数，可以用小的尺寸做大容量的电容。

- COG(NPO): The most normal temperature compensated capacitor,belongs to Class I dielectric material with stable performance,TC  $0 \pm 30\text{ppm}/^\circ\text{C}$ ,high frequency.
- X7R: Widely used in industries temperature stable capacitor,belongs to Class II dielectric material with high dielectric constant,and the capacitance changed rate is  $\pm 15\%$  for working temperature( $-55^\circ\text{C} \sim +125^\circ\text{C}$ ).
- X6S: Widely used in industries temperature stable capacitor,belongs to Class II dielectric material with high dielectric constant,and the capacitance changed rate is  $\pm 22\%$  for working temperature( $-55^\circ\text{C} \sim +105^\circ\text{C}$ ).
- X5R: Widely used in industries temperature stable capacitor,belongs to Class II dielectric material with high dielectric constant,and the capacitance changed rate is  $\pm 15\%$  for working temperature( $-55^\circ\text{C} \sim +85^\circ\text{C}$ ).
- Y5V: Y5V dielectric is generally used dielectric material,belongs to Class II dielectric material,it shows a variation of capacitance within  $+22\%/-85\%$  when the temperature is between  $-30^\circ\text{C} \sim +85^\circ\text{C}$ . This kind of dielectric is with very high dielectric constant and suitable for high value capacitors.

产品规格型号 Part Number

C	0603	X7R	102	K	500	N	T
产品类型 Product Type	尺寸 Size	温度系数 温度特性 T.C.	电容值 Capacitance	允许偏差 Tolerance	额定电压 Rate Voltage	端头类型 Terminal Type	包装 Packaging
多层式 陶瓷电 容器 MLCC	01005 0201 0402 0603 0805 1206 1210 1808 1812 2220 2225	COG (NPO) X7R X6S X5R Y5V	1R5=1.5pF 100=10pF 222=2.2NF 105=1uF 475=4.7uF	A= $\pm 0.05\text{pF}$ B= $\pm 0.1\text{pF}$ C= $\pm 0.25\text{pF}$ D= $\pm 0.5\text{pF}$ F= $\pm 1\%$ G= $\pm 2\%$ J= $\pm 5\%$ K= $\pm 10\%$ M= $\pm 20\%$ Z= $+80\%$ -20%	4R0=4V 6R3=6.3V 250=25V 500=50V 101=100V 251=250V 102=1KV	N:银 (或铜) /镍/锡 N=Ag (or Cu) /Ni/Sn	T=编带 Taping B=袋散装 Bulk

Ceramic Dielectric Material

External Electrode

Inner Electrode

尺寸 Size	MLCC尺寸规格 (单位: mm)			
	L	W	H (max)	B (max)

■ 产品容值范围 Product Capacitance Range

背景色代表：可生产型号

材质	COG											
	01005	0201		0402	0603	0805	1206	1210	1808	1812	2220	2225
尺寸	V <sub>DC</sub>	6.3	16	10	10	10	16	16	16	16	16	16
	C <sub>p</sub>	10	25	50	16	16	25	25	25	25	25	25
		16	50	25	25	25	50	50	50	50	50	50
		25		50	50	50						
0R47												
0R5												
0R56												
0R68												
0R82												
1R0												
1R2												
1R3												
1R5												
1R8												
2R2												
2R7												
3R3												
3R9												
4R7												
5R6												
6R8												
8R2												
9R0												
100												
120												
150												
180												
220												
270												
330												
390												
470												
560												
680												
750												
820												
101												
121												
151												
181												
221												
271												
331												
391												
471												
511												
561												
681												
821												
102												
122												
152												
182												
222												
272												
332												
392												
472												
562												
682												
822												
103												
123												
153												
183												
223												
273												
333												
473												
563												
104												







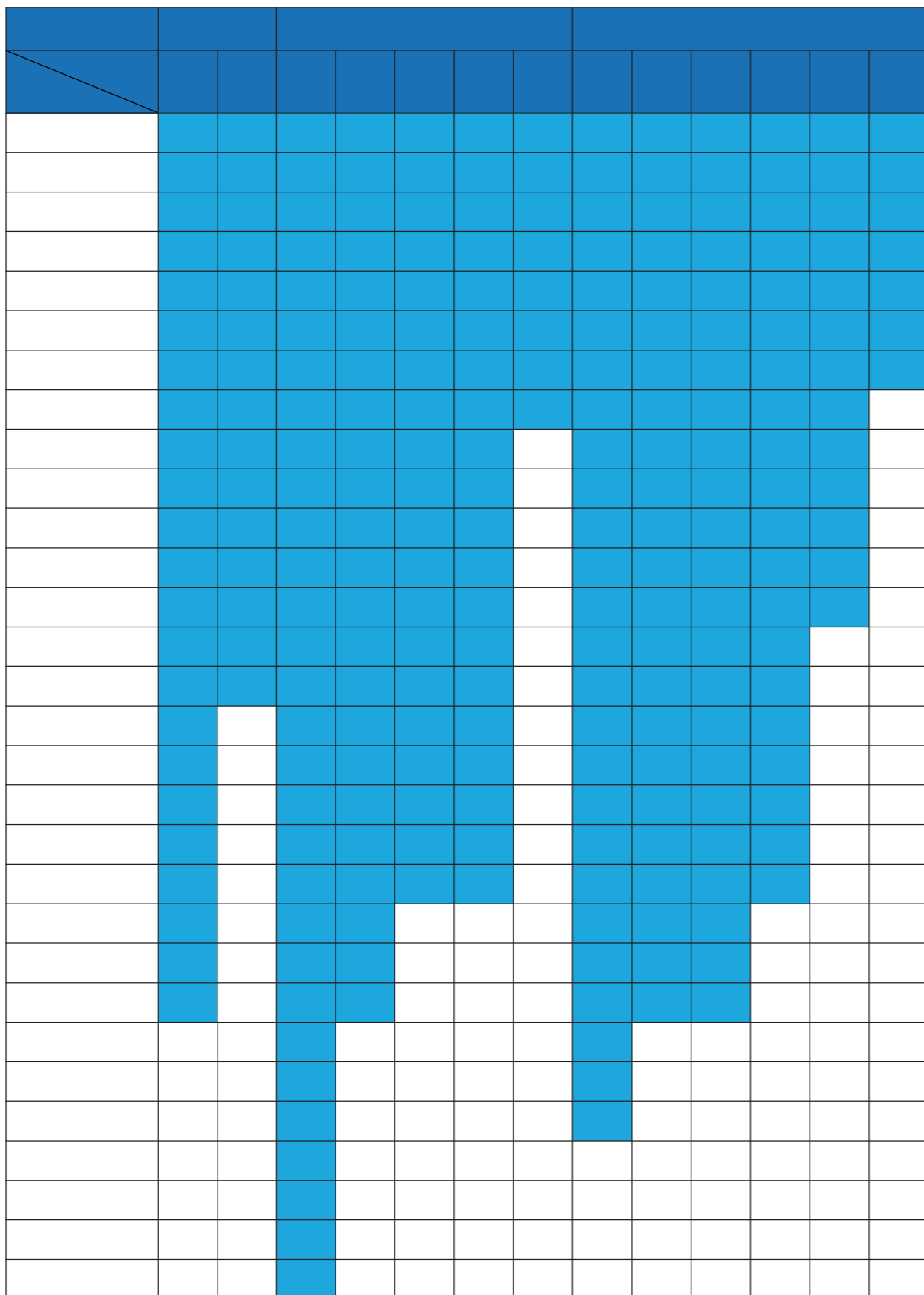
■ 产品容值范围 Product Capacitance Range

背景色代表：可生产型号

材质	Y5V																											
	0402				0603			0805				1206			1210			1808			1812		2220		2225			
尺寸	$V_{DC}$																											
	6.3 10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50
$C_p$																												
103																												
123																												
153																												
183																												
223																												
273																												
333																												
393																												
473																												
563																												
823																												
104																												
124																												
154																												
184																												
224																												
274																												
334																												
394																												
474																												
564																												
684																												
824																												
105																												
155																												
225																												
275																												
335																												
395																												
475																												
565																												
106																												
226																												
476																												
107																												

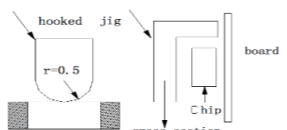


■ 技术指标和实验方法 Specifications and Test Method



NO	项目 Item	技术指标 Specification	实验方法 Test Method	
1	外观 Appearance	无异常 No abnormalities	通过显微镜视觉检测 (X10) On microscope	
2	尺寸 Dimension	在要求的范围内 Within the specified dimensions	采用精度不低于0.01mm千分尺 Using calipers on micrometer with tolerance no less than 0.01mm	
3	容量(c) Capacitance	在要求的范围内 Within the specified dimensions	Class I : $C_p \leq 1000\text{pF}$ $1\text{MHz} \pm 10\%$ , $1.0 \pm 0.1\text{Vrms}$ $C_p > 1000\text{pF}$ $1\text{KHz} \pm 10\%$ , $1.0 \pm 0.1\text{Vrms}$  Class II: $C_p < 10 \mu\text{F}$ $1\text{KHz} \pm 10\%$ , $1.0 \pm 0.1\text{Vrms}$ $C_p \geq 10 \mu\text{F}$ $120 \pm 24\text{Hz}$ , $1.0 \pm 0.1\text{Vrms}$	
4	损耗(Q/DF) Dissipation Factor	C0G		$C_p < 30\text{pF}$ , $Q \geq 400+20C_p$ $C_p \geq 30\text{pF}$ , $Q \geq 1000$
		X7R X6S X5R		<ul style="list-style-type: none"> <li>■ <math>U_R \geq 100\text{V}</math>, <math>DF \leq 7.5\%</math></li> <li>■ <math>25\text{V} \leq U_R \leq 50\text{V}</math>, <math>DF \leq 3.5\%</math>  <math>DF \leq 10\%</math> 0201 <math>\geq 104</math>, 0402 <math>\geq 333</math>  0603 <math>\geq 104</math>, 0805 <math>\geq 684</math>  1206 <math>\geq 225</math>, 1210 <math>\geq 475</math>  <math>DF \leq 12.5\%</math> 0402 <math>\geq 474</math></li> <li>■ <math>U_R \leq 16\text{V}</math>, <math>DF \leq 5.0\%</math>  <math>DF \leq 10\%</math>, 0201 <math>\geq 104</math>, 0402 <math>\geq 563</math>  0603 <math>\geq 564</math>, 0805 <math>\geq 105</math>  1206 <math>\geq 475</math>, 1210 <math>\geq 106</math></li> <li>■ <math>U_R \leq 10\text{V}</math>, <math>DF \leq 7.0\%</math>  <math>DF \leq 10\%</math> 01005, 0201 <math>\geq 123</math>  0402 <math>\geq 224</math>, 0603 <math>\geq 334</math>  0805 <math>\geq 225</math>, 1206 <math>\geq 225</math>  1210 <math>\geq 226</math>  <math>DF \leq 15\%</math>, 0201 <math>\geq 104</math>, 0402 <math>\geq 105</math></li> <li>■ <math>U_R = 6.3\text{V}</math>, <math>DF \leq 10\%</math>  <math>DF \leq 15\%</math>, 0201 <math>\geq 104</math>, 0402 <math>\geq 105</math>  0603 <math>\geq 106</math>, 0805 <math>\geq 475</math>  1206 <math>\geq 476</math>, 1210 <math>\geq 107</math>  <math>DF \leq 20\%</math>, 0402 <math>\geq 225</math></li> <li>■ <math>U_R = 4\text{V}</math>, <math>DF \leq 15\%</math></li> </ul>
		Y5V		<ul style="list-style-type: none"> <li>■ <math>U_R \geq 50\text{V}</math>, <math>DF \leq 12.5\%</math></li> <li>■ <math>U_R = 25\text{V}</math>, <math>DF \leq 7.0\%</math>  <math>DF \leq 9\%</math>, 0402 <math>\geq 683</math>, 0603 <math>\geq 474</math>  0805 <math>\geq 105</math>, 1206 <math>\geq 475</math>  1210 <math>\geq 106</math></li> <li>■ <math>U_R = 16\text{V}</math>, <math>DF \leq 15\%</math></li> <li>■ <math>U_R = 10\text{V}</math>, <math>DF \leq 20\%</math></li> <li>■ <math>U_R \leq 6.3\text{V}</math>, <math>DF \leq 20\%</math></li> </ul>
		高Q		$C_p > 30\text{pF}$ $Q \geq 1000$ $1\text{pF} < C_p \leq 30\text{pF}$ $Q \geq 400+20C_p$ $C_p \leq 1\text{pF}$ $Q \geq 300$
5	绝缘电阻(IR) Insulation Resistance	$R_i \geq 10\text{G}\Omega$ 或 $500\Omega \cdot \text{F}$ , 取最小值  $R_i \geq 10\text{G}\Omega$ 或 $500\Omega \cdot \text{F}$ , whichever is smaller	施加电压: $U_R \leq 400\text{V}$ $U_{测} = U_R$ $U_R > 400\text{V}$ $U_{测} = 400\text{V}$ 充电时间: $60 \pm 5$ 秒 To apply voltage: $U_R \leq 400\text{V}$ $U_{测} = U_R$ $U_R > 400\text{V}$ $U_{测} = 400\text{V}$ Charge time: $60 \pm 5$ sec	

■ 技术指标和实验方法 Specifications and Test Method

NO	项目 Item	技术指标 Specification	实验方法 Test Method																								
5	绝缘电阻(IR) Insulation Resistance	<p><math>Ri \geq 4G\Omega</math> 或 <math>100\Omega \cdot F</math> (以下范围为 <math>50\Omega \cdot F</math>) 取较小值</p> <p><math>Ri \geq 4 G\Omega</math> or <math>100\Omega \cdot F</math> (<math>50\Omega \cdot F</math> of below range), whichever is smaller</p> <p>以下范围below range:                      ■50V: 0402<math>\geq</math>104;0603<math>\geq</math>225;                      0805<math>\geq</math>106;1206<math>\geq</math>106                      ■25V: 0201<math>\geq</math>104;0402<math>\geq</math>224;                      0603<math>\geq</math>106;0805<math>\geq</math>106;                      1206<math>\geq</math>226;01005(X6S/                      X5R) ■16V: 0603<math>\geq</math>106; 01005                      (X6S/X5R) ■10V: 0201<math>&gt;</math>104;                      0603<math>\geq</math>106;                      0805<math>\geq</math>476; 01005(X6S/                      X5R) ■6.3V: 0201<math>\geq</math>104;0603  <math>\geq</math>475;1206<math>\geq</math>106;0100(X6SX5R)                      ■4V: 0603<math>\geq</math>226;0805<math>\geq</math>                      476;                      1206<math>\geq</math>107; 01005                      (X6SX5R)</p>	<p>施加电压: <math>U_R \leq 400V</math> <math>U_{测} = U_R</math>  <math>U_R &gt; 400V</math> <math>U_{测} = 400V</math></p> <p>充电时间: <math>60 \pm 5</math>秒</p> <p>To apply voltage: <math>U_R \leq 400V</math> <math>U_{测} = U_R</math>  <math>U_R &gt; 400V</math> <math>U_{测} = 400V</math></p> <p>Charge time: <math>60 \pm 5</math>sec</p>																								
6	耐电压 Dielectric Strength	<p>C0G X7R X6S X5R Y5V</p> <p>无介质击穿和材料裂缝 No dielectric breakdown or mechanical breakdown</p>	<p>施加电压: <math>U_R &lt; 100V</math>: 250%  <math>100V \leq U_R &lt; 1000V</math>: 150%  <math>U_R \geq 1000V</math>: 120%</p> <p>测试时间: <math>60 \pm 5</math>秒,                      最大电流: 不超过50mA</p> <p>To apply voltage: <math>U_R &lt; 100V</math>: 250%;  <math>100V \leq U_R &lt; 1000V</math>: 150%;  <math>U_R \geq 1000V</math>: 120%</p> <p>Test time: <math>60 \pm 5</math>sec,                      Max current: should not exceed 50mA</p>																								
*7	电容量温度系数或温度特性 Capatiance Temperature Coefficient Or Temperature Characteristics	<p>C0G X7R X6S X5R Y5V</p> <p>温度系数<math>\leq 0 \pm 30</math>ppm/<math>^{\circ}C</math> Temperature coefficient within <math>0 \pm 30</math>ppm/<math>^{\circ}C</math></p> <p>容量变化<math>\leq \pm 15\%</math> Capacitance change within <math>\pm 15\%</math></p> <p>容量变化<math>\leq +22\% \sim -82\%</math> Capacitance change within <math>+22\% \sim -82\%</math></p>	<p>按系列温度顺序测试电容量 Measure capacitance under follow table list</p> <table border="1"> <thead> <tr> <th>步骤Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>C0G/X7R</td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>-55 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>125 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> </tr> <tr> <td>X6S/X5R</td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>-55 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>85 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> </tr> <tr> <td>Y5V</td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>-30 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> <td><math>85 \pm 3^{\circ}C</math></td> <td><math>25 \pm 2^{\circ}C</math></td> </tr> </tbody> </table> <p>PS:C0G预先干燥: 16-24小时.                      C0G Preliminary Drying for 16-24hr.                      ▶<math>C = [(C_i - C_1) / (C_1 * T)] * 10^6</math> 或 (or)                      ▶<math>C = (C_i - C_1) / C_1 * 100\%</math>  <math>C_i</math>: 1-5温度下的容值                      Capacitance value at 1-5 temperature                      ▶T: 温度变化量 (Temperature variation)                      ▶<math>T = T_i - T_1</math></p>	步骤Step	1	2	3	4	5	C0G/X7R	$25 \pm 2^{\circ}C$	$-55 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$125 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	X6S/X5R	$25 \pm 2^{\circ}C$	$-55 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$85 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	Y5V	$25 \pm 2^{\circ}C$	$-30 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$85 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$
步骤Step	1	2	3	4	5																						
C0G/X7R	$25 \pm 2^{\circ}C$	$-55 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$125 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$																						
X6S/X5R	$25 \pm 2^{\circ}C$	$-55 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$85 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$																						
Y5V	$25 \pm 2^{\circ}C$	$-30 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$	$85 \pm 3^{\circ}C$	$25 \pm 2^{\circ}C$																						
8	附着力 Adhesion	<p>C0G X7R X6S X5R</p> <p>无明显的损伤或端电极脱落 No remarkable damage or removal of the terminations.</p>	<p>施加压力: 5N(0201:2N; 01005:1N)                      时间: <math>10 \pm 1</math>秒                      Pressurizing force: 5N(0201:2N; 01005:1N)                      time: <math>10 \pm 1</math>sec</p> 																								


■ 技术指标和实验方法 Specifications and Test Method

NO	项目 Item	技术指标 Specification	实验方法 Test Method
9	可焊性 Solderability	C0G X7R X6S X5R Y5V 端电极挂锡面积小于95% 95%min.coverage of both terminal electrodes	锡炉温度: 245 ± 5℃ 浸入时间: 2 ± 1秒 Solder temperature: 245 ± 5℃ Dipping time: 2 ± 1sec.
10	弯曲强度 Bending	外观 Appearance	无明显可见损伤 No remarkable visual damage
		容量变化 Cap change	C0G: ± 5%或 ± 0.5pF, 取较大值 X7R/X6S/X5R: ± 12.5% Y5V: ± 30% C0G: within ± 5% or ± 0.5pF, whichever is larger X7R/X6S/X5R: within ± 12.5% Y5V: within ± 30%
*11	耐焊锡热 Resistance to Soldering Heat	外观 Appearance	无明显可见损伤 No remarkable visual damage
		容量变化 Cap change	C0G: ± 2.5%或 ± 0.5pF, 取较大值 X7R/X6S/X5R: ± 15% Y5V: ± 30% C0G: within ± 2.5% or ± 0.5pF, whichever is larger X7R/X6S/X5R: within ± 15% Y5V: within ± 30%
		DF/IR	满足产品初始值得要求 Meets initial standard damage
*12	温度快速循环 Temperature Cycle	外观 Appearance	无明显可见损伤 No remarkable visual damage
		容量变化 Cap change	C0G: ± 2.5%或 ± 0.25pF, 取较大值 X7R/X6S/X5R: ± 15% Y5V: ± 30% C0G: within ± 2.5% or ± 0.25pF, whichever is larger X7R/X6S/X5R: within ± 15% Y5V: within ± 30%
		DF/IR	满足产品初始值得要求 Meets initial standard damage

60 pressurizing speed: 1.0mm/sec. pressurize

R230

capacitance meter

45 45

FLEXURE

NO	项目 Item	技术指标 Specification		实验方法 Test Method
		外观 Appearance	容量变化 Cap change	
*13	耐湿负荷 Damp heat with load	外观 Appearance	无明显可见损伤 No remarkable visual damage	测试温度: 40±2℃ 相对湿度: 90~95%RH 测试电压: 额定电压 (最大500V) 测试时间: 500±12hrs Test temperature:40±2℃ Humidity:90~95% RH Voltage:100% of the rated voltage(max:500V) Testing time:500±12hrs
		容量变化 Cap change	C0G: ±7.5%或±0.75pF,取较大值 X7R/X6S/X5R: ±25% Y5V: ±30%或-40%~+30% C0G:within ±7.5% or ±0.75pF, whichever is larger X7R/X6S/X5R: within ±25% Y5V:within ±30%或-40%~+30%	
		DF	初始值的2倍以下 Not more than 2 times of initial value	
		IR	Ri > 500MΩ或25Ω·F(☆为5Ω·F), 取较小值 Ri > 500MΩ或25Ω·F(5Ω·F of ☆), whichever is smaller	
*14	耐久性 Life Test	外观 Appearance	无明显可见损伤 No remarkable visual damage	温度测试: 上限类别温度±3℃ 测试电压: U <sub>R</sub> < 100V 150% 100V ≤ U <sub>R</sub> < 1000V 120% U <sub>R</sub> ≥ 1000V 100% 测试时间: 1000小时 Test temperature:Max.Operating Temp. ±3℃ Voltage: U <sub>R</sub> < 100V 150% 100V ≤ U <sub>R</sub> < 1000V 120% U <sub>R</sub> ≥ 1000V 100% Testing time: 1000hrs
		容量变化 Cap change	C0G: ±3%或±0.5pF,取较大值 X7R/X6S/X5R: ±25% Y5V: ±30%或-40%~+30% C0G:within ±3% or ±0.5pF, whichever is larger X7R/X6S/X5R: within ±25% Y5V:within ±30%或-40%~+30%	
		DF	初始值的2倍以下 Not more than 2 times of initial value	
		IR	Ri > 1GΩ或50Ω·F(☆为10Ω·F), 取较小值 Ri > 1GΩ或50Ω·F(10Ω·F of ☆), whichever is smaller	

注:

\*A.3.7.11.12.13.14项需对II类电容器做预处理(将电容器在160℃下热处理1小时),然后在标准大气条件下恢复48±4小时,再测量初始值;

B.3.11.12.13.14项实验后在室温下放置24±2(C0G)或48±4(X7R、X6S、X5R、Y5V)小时以后再测量;

C.3.11.12.13.14项电性能测量的环境条件,温度:25℃±2℃ 相对湿度:25%~80%RH。

☆ ■ 100V:X7R

■ 50V:0402>103; 0603≥105;0805≥105;1206≥475;1210≥475

■ 25V:0201≥104;0402≥224 0603≥225; 0805≥225;1206≥106;1210≥106;01005(X6S/X5R)

■ 16V: 0201≥104;0402≥224;0603≥105; 0805≥225;1206≥106;1210≥476; 01005(X6S/X5R)

■ 10V: 0201≥473;0402≥474;0603≥474; 0805≥225;1206≥475;1210≥476; 01005(X6S/X5R)

■ ≤6.3V Class II; 01005(X6S/X5R)

Note:

A.3.7.11.12.13.14Item need to do the pretreatment of class II type capacitor(Perform a heat treatment at 160℃ for 1 hour),

Then recovery the capacitor at standard pressure conditions for 48±4 hours,Perform the initial measurement

B.3.11.12.13.14Item end of experiment Measurement to be made after being kept at room temperature for 24±2(C0G) or

48±4(X7R、X6S、X5R、Y5V)hrs.

C.3.11.12.13.14Item environmental conditions for electrical performance measurement, Temperature: 25℃±2℃ Humidity:

25%~80%RH

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