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多层片式陶瓷电容器规格书

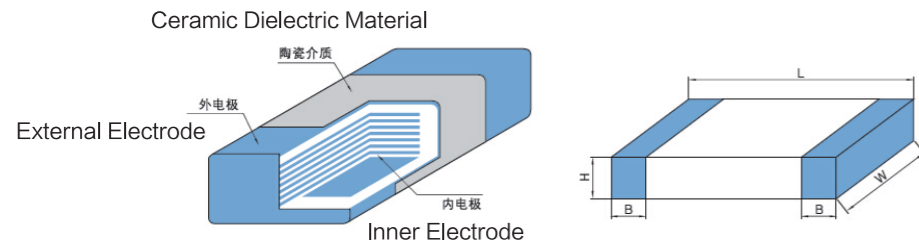
MULTILAYER CHIP CERAMIC CAPACITOR CATALOG

多层片式陶瓷电容器 Multilayer Chip Ceramic Capacitor

产品特点 Product Features

- 产品尺寸精度高, 便于自动贴片机高效装配
●端电极三层电极, 适合波峰焊与回流焊; 介电体与外表为同种材料, 环境条件影响小
●含有C0G到Y5V各种温度特性介质, 适用于计算机、通讯、家用电器和仪器仪表灯普通电子设备
●The precision of product size is high,suitable for auto SMT machines high efficiency assembly.
●External Electrode has 3 layers,suitable for both wave and reflow soldering.
●Consist of all kinds of temperature dielectric material form C0G to Y5V,suitable for computers, communications,home appliances,instruments and other normal electronic equipments.

产品结构 Product Construction



产品尺寸 Product Dimensions

Table with columns: 尺寸 Size, MLCC尺寸规格 (单位: mm) (L, W, H (max), B (max)) and rows for capacitor types: 01005, 0201, 0402, 0603, 0805, 1206, 1210, 1808, 1812, 2220, 2225.

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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
V _{DC}	6.3	16	50	10	10	10	16	16	16	16	16	16
C _p	10	25		16	16	16	25	25	25	25	25	25
	16			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	X7R														
	01005		0201		0402		0603		0805		1206	1210	1812	2220	2225
尺寸	6.3	10	6.3	10	6.3	10	6.3	10	6.3	10	6.3	10	6.3	10	6.3
V_{DC}	16	25	16	25	16	25	16	25	16	25	16	25	16	25	16
C_p	10	16	10	16	10	16	10	16	10	16	10	16	10	16	10
101															
121															
151															
181															
221															
241															
271															
331															
391															
471															
511															
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332															
392															
472															
562															
682															
822															
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															

■ 产品容值范围 Product Capacitance Range

背景色代表: 可生产型号

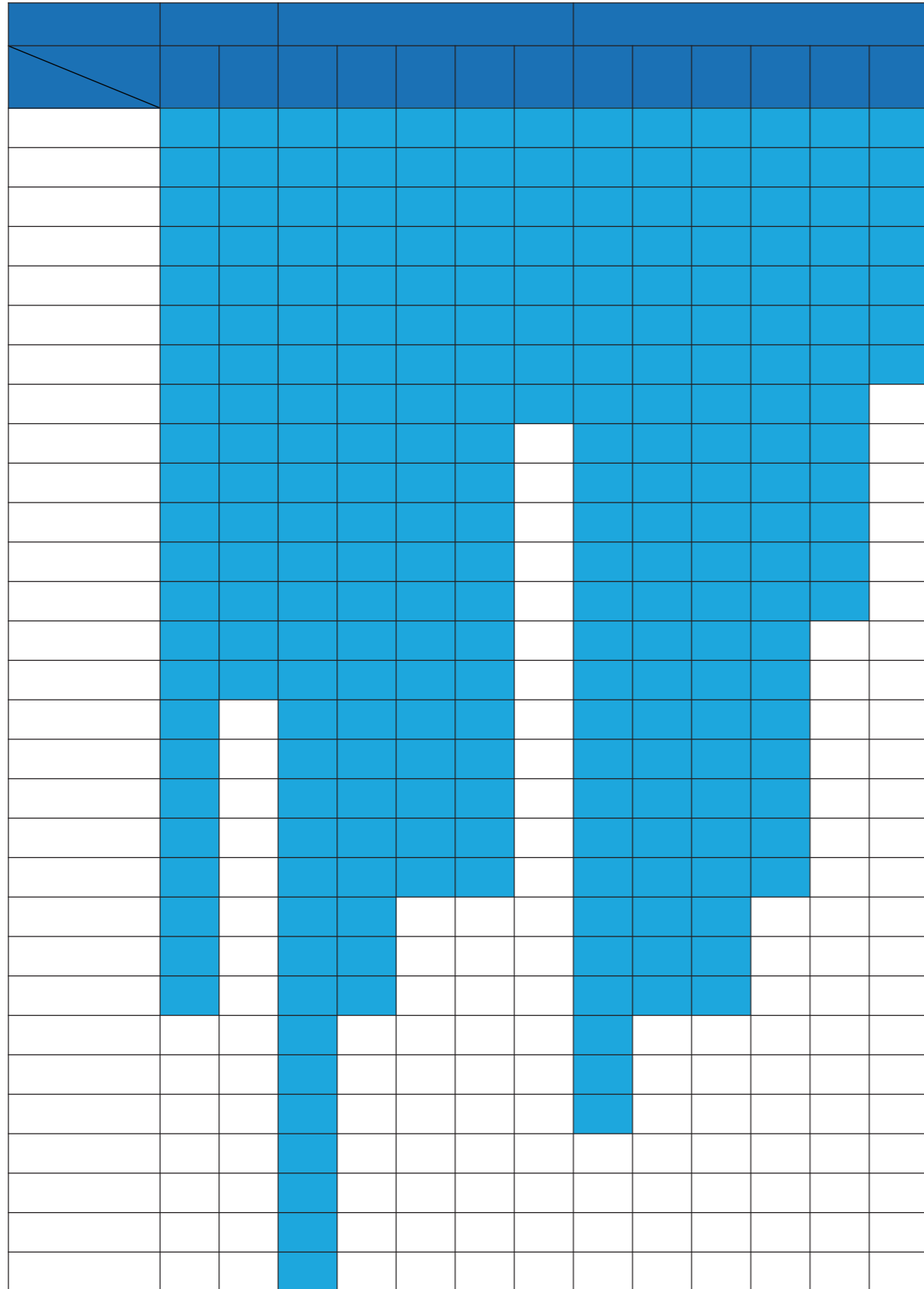
材质	X5R																																																	
	01005					0201					0402					0603					0805					1206					1210					1812					2220									
	V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P		V _{DC}		C _P															
	4	6.3	10	4	6.3	10	16	25	50	6.3	10	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50	6.3	16	25	50

■ 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	6.3 10	16	25	50	
C_p																																	
103																																	
123																																	
153																																	
183																																	
223																																	
273																																	
333																																	
393																																	
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335																																	
395																																	
475																																	
565																																	
106																																	
226																																	
476																																	
107																																	

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



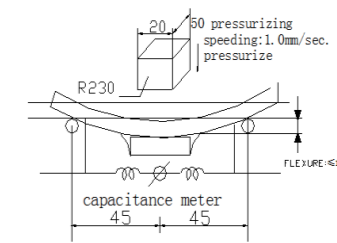
NO	项目 Item	技术指标 Specification	实验方法 Test Method	
1	外观 Appearance	无异常 No abnormalities	通过显微镜视觉检测 (X10) On microscope	
2	尺寸 Dimension	在要求的范围内 Within the specified dimensions	采用精度不低于0.01mm千分尺 Using calipers on micrometer with tolerance no less than 0.01mm	
3	容量(c) Capacitance	在要求的范围内 Within the specified dimensions		
4	损耗(Q/DF) Dissipation Factor	C0G Cp < 30pF, Q ≥ 400+20Cp Cp ≥ 30pF, Q ≥ 1000	Class I : Cp ≤ 1000pF 1MHz ± 10%, 1.0 ± 0.1Vrms Cp > 1000pF 1KHz ± 10%, 1.0 ± 0.1Vrms Class II: Cp < 10 μF 1KHz ± 10%, 1.0 ± 0.1Vrms Cp ≥ 10 μF 120 ± 24Hz, 1.0 ± 0.1Vrms	
		X7R X6S X5R		■ UR ≥ 100V DF ≤ 7.5% ■ 25V ≤ UR ≤ 50V, DF ≤ 3.5% DF ≤ 10% 0201 ≥ 104, 0402 ≥ 333 0603 ≥ 104, 0805 ≥ 684 1206 ≥ 225, 1210 ≥ 475 DF ≤ 12.5% 0402 ≥ 474 ■ UR = 16V, DF ≤ 5.0% DF ≤ 10%, 0201 ≥ 104, 0402 ≥ 563 0603 ≥ 564, 0805 ≥ 105 1206 ≥ 475, 1210 ≥ 106 ■ UR ≤ 10V, DF ≤ 7.0% DF ≤ 10% 01005, 0201 ≥ 123 0402 ≥ 224, 0603 ≥ 334 0805 ≥ 225, 1206 ≥ 225 1210 ≥ 226 DF ≤ 15%, 0201 ≥ 104, 0402 ≥ 105 ■ UR = 6.3V, DF ≤ 10% DF ≤ 15%, 0201 ≥ 104, 0402 ≥ 105 0603 ≥ 106, 0805 ≥ 475 1206 ≥ 476, 1210 ≥ 107 DF ≤ 20%, 0402 ≥ 225 ■ UR = 4V, DF ≤ 15%
		Y5V		■ UR ≥ 50V, DF ≤ 12.5% ■ UR = 25V, DF ≤ 7.0% DF ≤ 9%, 0402 ≥ 683, 0603 ≥ 474 0805 ≥ 105, 1206 ≥ 475 1210 ≥ 106 ■ UR = 16V, DF ≤ 15% ■ UR = 10V, DF ≤ 20% ■ UR ≤ 6.3V, DF ≤ 20%
		高Q		Cp > 30pF Q ≥ 1000 1pF < Cp ≤ 30pF Q ≥ 400+20Cp Cp ≤ 1pF Q ≥ 300
5	绝缘电阻(IR) Insulation Resistance	C0G Ri ≥ 10GΩ或500Ω · F, 取最小值 Ri ≥ 10 GΩ或500Ω · F, whichever is smaller	施加电压: UR ≤ 400V UR测 = UR UR > 400V UR测 = 400V 充电时间: 60 ± 5秒 To apply voltage: UR ≤ 400V UR测 = UR UR > 400V UR测 = 400V Charge time: 60 ± 5sec	

■ 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>$Ri \geq 4G\Omega$ 或 $100\Omega \cdot F$ (以下范围为 $50\Omega \cdot F$) 取较小值</p> <p>$Ri \geq 4 G\Omega$ or $100\Omega.F$ ($50\Omega \cdot F$ of below range), whichever is smaller</p> <p>以下范围below range: ■50V: 0402\geq104;0603\geq225; 0805\geq106;1206\geq106 ■25V: 0201\geq104;0402\geq224; 0603\geq106;0805\geq106; 1206\geq226;01005(X6S/ X5R)■16V: 0603\geq106; 01005 (X6S/X5R)■10V: 0201$>$104; 0603\geq106; 0805\geq476; 01005(X6S/ X5R)■6.3V: 0201\geq104;0603 \geq475;1206\geq106;0100(X6SX5R) ■4V: 0603\geq226;0805\geq 476; 1206\geq107; 01005 (X6SX5R)</p>	<p>施加电压: $U_R \leq 400V$ $U_{测}=U_R$ $U_R > 400V$ $U_{测}=400V$ 充电时间: 60 ± 5秒</p> <p>To apply voltage: $U_R \leq 400V$ $U_{测}=U_R$ $U_R > 400V$ $U_{测}=400V$ Charge time: 60 ± 5sec</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: $U_R < 100V$: 250% $100V \leq U_R < 1000V$: 150% $U_R \geq 1000V$: 120%</p> <p>测试时间: 60 ± 5秒, 最大电流: 不超过50mA</p> <p>To apply voltage: $U_R < 100V$:250%; $100V \leq U_R < 1000V$:150%; $U_R \geq 1000V$:120%</p> <p>Test time: 60 ± 5sec, 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$\leq 0 \pm 30$ppm/$^{\circ}C$ Temperature coefficient within 0 ± 30ppm/$^{\circ}C$</p> <p>容量变化$\leq \pm 15\%$ Capacitance change within $\pm 15\%$</p> <p>容量变化$\leq +22\% \sim -82\%$ Capacitance change within $+22\% \sim -82\%$</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>25\pm2$^{\circ}C$</td> <td>-55\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> <td>125\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> </tr> <tr> <td>X6S/X5R</td> <td>25\pm2$^{\circ}C$</td> <td>-55\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> <td>85\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> </tr> <tr> <td>Y5V</td> <td>25\pm2$^{\circ}C$</td> <td>-30\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> <td>85\pm3$^{\circ}C$</td> <td>25\pm2$^{\circ}C$</td> </tr> </tbody> </table> <p>PS:C0G预先干燥: 16-24小时. C0G Preliminary Drying for 16-24hr. ▶$C = [(C_i - C_1) / (C_1 * T)] * 10^6$或(or) ▶$C = (C_i - C_1) / C_1 * 100\%$ C_i: 1-5温度下的容值 Capacitance value at 1-5 temperature ▶T: 温度变化量(Temperature variation) ▶$T = T_i - T_1$</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: 10 ± 1秒 Pressurizing force: 5N(0201:2N; 01005:1N) time: 10 ± 1sec</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°C 浸入时间: 2 ± 1秒 Solder temperature: 245 ± 5°C Dipping time: 2 ± 1sec.
10	弯曲强度 Bending	外观 Appearance	无明显可见损伤 No remarkable visual damage	将电容安在测试夹具上, 按图所示方向以1.0mm/s的速率施加压力, 弯曲1mm. Solder the capacitor on testing substrate and putt on testing stand. The middle part of substrateshall successively be pressurized by pressuringrod at a rated of about 1.0mm/sec. Until the deflection become means of the 1.0mm.
		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	预热: 120~150°C 60秒 焊接温度: 270 ± 5% °C 浸入时间: 10 ± 1秒 Preheating: 120~150°C 60sec Soldering temperature : 270 ± 5°C Dipping time: 10 ± 1seconds
		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	按下列步骤进行5次循环: To perform 5cycles of the stated environment
		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	



步骤 Step	温度 Temperature	时间 Time
1	下限温度+0/-3°C Min.operating Temp.+0/-3°C	30min
2	25°C	2-3min
3	上限温度+3/-0°C Min.operating Temp.+3/-0°C	30min
4	25°C	2-3min

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 _R < 100V 150% 100V ≤ U _R < 1000V 120% U _R ≥ 1000V 100% 测试时间: 1000小时 Test temperature:Max.Operating Temp. ±3℃ Voltage: U _R < 100V 150% 100V ≤ U _R < 1000V 120% U _R ≥ 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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