

SANYEAR

多层片式陶瓷电容器规格书

MULTILAYER CHIP CERAMIC CAPACITOR CATALOG

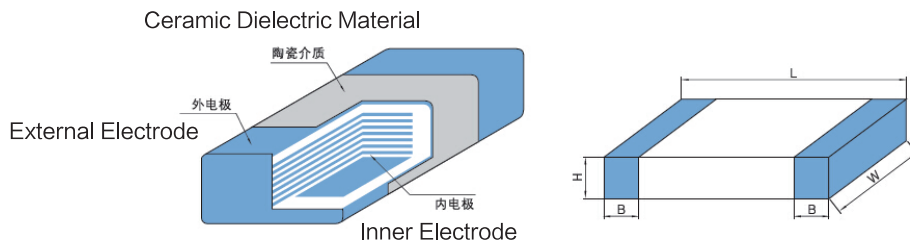
多层片式陶瓷电容器 Multilayer Chip Ceramic Capacitor

■ **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**

尺寸 Size	MLCC尺寸规格 (单位: mm)			
	L	W	H (max)	B (max)
01005	0.40 ± 0.09	0.20 ± 0.09	0.29	0.13
0201	0.60 ± 0.09	0.30 ± 0.09	0.39	0.20
0402	1.00 ± 0.30	0.50 ± 0.30	0.80	0.35
0603	1.60 ± 0.20	0.80 ± 0.20	1.00	0.60
0805	2.00 ± 0.20	1.25 ± 0.20	1.45	0.75
1206	3.20 ± 0.30	1.60 ± 0.30	1.90	0.80
1210	3.20 ± 0.40	2.50 ± 0.30	2.80	0.80
1808	4.50 ± 0.40	2.00 ± 0.30	2.80	1.50
1812	4.50 ± 0.40	3.20 ± 0.40	3.50	1.50
2220	5.70 ± 0.50	5.00 ± 0.40	3.50	1.30
2225	5.70 ± 0.50	6.40 ± 0.50	3.00	1.10

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。
- C0G(NP0): 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

■ 产品容值范围 Product Capacitance Range

背景色代表：可生产型号

材质	COG												
	尺寸	01005	0201		0402	0603	0805	1206	1210	1808	1812	2220	2225
V _{DC}	6.3				10	10	10						
	10		16		16	16	16			16	16	16	16
C _p	16		25	50	25	25	25			25	25	25	25
	25				50	50	50	50	50	50	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													
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821													
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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																								
尺寸		01005			0201			0402			0603			0805			1206		1210		1812		2220		2225	
V _{DC}	C _p	6.3			10			16			6.3			10			6.3		10		6.3		10		6.3	
		10	16	50	6.3	10	25	50	6.3	10	25	50	6.3	10	25	50	10	25	50	10	25	50	10	25	50	
101																										
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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	X6S																																							
	01005			0201				0402				0603			0805			1206			1210			1812			2220													
尺寸 V_{DC}	4	6.3	10	4 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	16	25	50	6.3	10	16	25	50	6.3 10	16	25	50	6.3 10	16	25	50					
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■ 产品容值范围 Product Capacitance Range

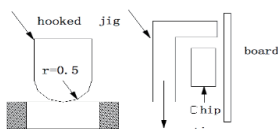
背景色代表：可生产型号

材质	X5R																																					
	01005			0201				0402				0603			0805			1206			1210			1812			2220											
V _{DC} C _p	4	6.3	10	4	10	16	25	50	6.3	16	25	50	6.3	16	50	6.3	16	50	6.3	16	50	6.3	10	16	50	6.3	16	50	6.3	16	50	6.3	16	25	50			
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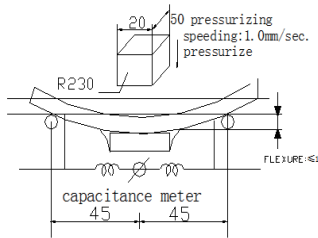
■ 技术指标和实验方法 Specifications and Test Method

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	
		X7R X6S X5R <ul style="list-style-type: none"> ■ 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 <ul style="list-style-type: none"> ■ 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 U测 = UR UR > 400V U测 = 400V 充电时间: 60 ± 5秒 To apply voltage: UR ≤ 400V U测 = UR UR > 400V U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>$R_i \geq 4G\Omega$ 或 $100\Omega \cdot F$ (以下范围为 $50\Omega \cdot F$) 取较小值</p> <p>$R_i \geq 4 G\Omega$ or $100\Omega \cdot F$ (50 $\Omega \cdot F$ of below range), whichever is smaller</p> <p>以下范围below range: ■ 50V: 0402 ≥ 104; 0603 ≥ 225; 0805 ≥ 106; 1206 ≥ 106 ■ 25V: 0201 ≥ 104; 0402 ≥ 224; 0603 ≥ 106; 0805 ≥ 106; 1206 ≥ 226; 01005 (X6S/X5R) ■ 16V: 0603 ≥ 106; 01005 (X6S/X5R) ■ 10V: 0201 > 104; 0603 ≥ 106; 0805 ≥ 476; 01005 (X6S/X5R) ■ 6.3V: 0201 ≥ 104; 0603 ≥ 475; 1206 ≥ 106; 0100 (X6S/X5R) ■ 4V: 0603 ≥ 226; 0805 ≥ 476; 1206 ≥ 107; 01005 (X6S/X5R)</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 温度系数 $\leq 0 \pm 30$ppm/°C Temperature coefficient within 0 ± 30ppm/°C</p> <p>X7R X6S X5R 容量变化 $\leq \pm 15\%$ Capacitance change within $\pm 15\%$</p> <p>Y5V 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>$25 \pm 2^\circ C$</td> <td>$-55 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</td> <td>$125 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</td> </tr> <tr> <td>X6S/X5R</td> <td>$25 \pm 2^\circ C$</td> <td>$-55 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</td> <td>$85 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</td> </tr> <tr> <td>Y5V</td> <td>$25 \pm 2^\circ C$</td> <td>$-30 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</td> <td>$85 \pm 3^\circ C$</td> <td>$25 \pm 2^\circ C$</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 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℃ 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	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℃ 60秒 焊接温度: 270 ± 5℃ 浸入时间: 10 ± 1秒 Preheating:120~150℃ 60sec Soldering temperature :270 ± 5℃ 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 <table border="1" data-bbox="935 1608 1375 1925"> <thead> <tr> <th>步骤 Step</th> <th>温度 Temperature</th> <th>时间 Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>下限温度+0/-3℃ Min.operating Temp.+0/-3℃</td> <td>30min</td> </tr> <tr> <td>2</td> <td>25℃</td> <td>2~3min</td> </tr> <tr> <td>3</td> <td>上限温度+3/-0℃ Min.operating Temp.+3/-0℃</td> <td>30min</td> </tr> <tr> <td>4</td> <td>25℃</td> <td>2~3min</td> </tr> </tbody> </table>	步骤 Step	温度 Temperature	时间 Time	1	下限温度+0/-3℃ Min.operating Temp.+0/-3℃	30min	2	25℃	2~3min	3	上限温度+3/-0℃ Min.operating Temp.+3/-0℃	30min	4	25℃	2~3min
		步骤 Step	温度 Temperature		时间 Time														
		1	下限温度+0/-3℃ Min.operating Temp.+0/-3℃		30min														
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DF/IR	满足产品初始值得要求 Meets initial standard damage																		

NO	项目 Item	技术指标 Specification		实验方法 Test Method
*13	耐湿负荷 Damp heat with load	外观 Appreance	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 25 Ω · F (☆为5 Ω · F), 取较小值 Ri > 500MΩ 或 25 Ω · F (5 Ω · F of ☆), whichever is smaller	
*14	耐久性 Life Test	外观 Appreance	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 > 1G Ω 或 50 Ω · F (☆为10 Ω · F), 取较小值 Ri > 1G Ω 或 50 Ω · F (10 Ω · 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