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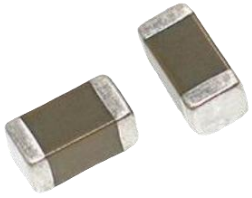


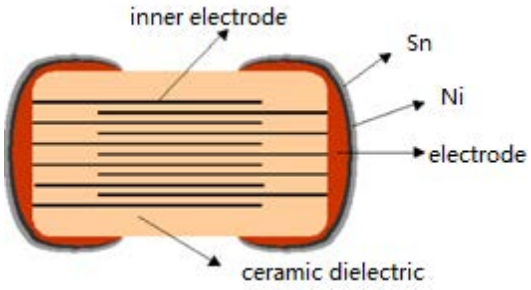
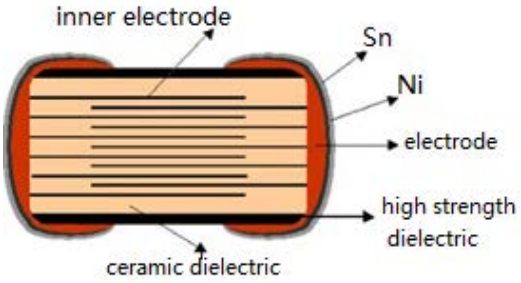
High Strength MLCC

Product features:

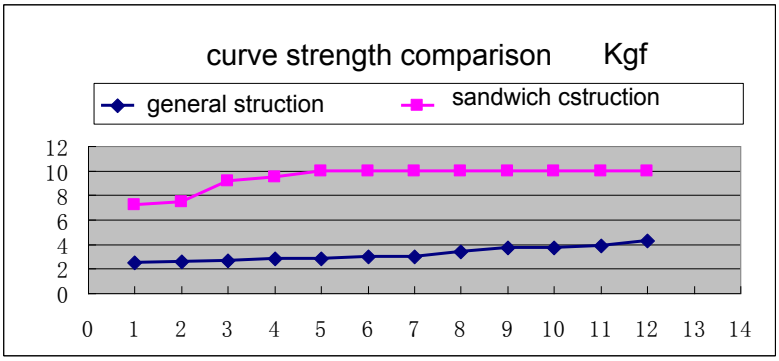
This kind of products improves the fracture problem of the II medium-X7R structurally. Compared with increasing the product thickness and the number of internal electrode layers to enhance the anti-external stress effect of MLCC, it is more significant, and the cost is more advantageous than "soft terminal". At present, this kind of products has been widely used in lighting industry and home appliance industry

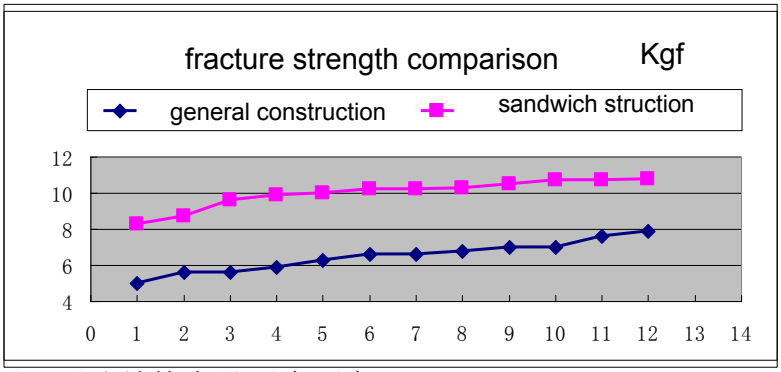
1. 产品优势 Advantages

1.1 产品结构对比 Structure

传统产品结构 Structure of traditional product	三明治产品结构 Structure of the sandwich-structure product
	
相对传统产品，三明治机构产品增加了高强度介质层。 The new product called sandwich-structure add high intensity layers .	

1.2 产品强度对比 Product Intensity Comparison





以上对比，表明三明治结构产品强度更高 Above all , the sandwich-structure products are more stronger .

2．产品应用 Product Application

三明治结构产品用于替代低容值常规 X7R 产品，如节能灯、LED 灯、通用电源、工业控制、家电等要求元件具有较好抗折强度以保证产品可靠性的领域。

With better flexural strength to ensure product reliability, Sandwich MLCC is used to replace normal low capacitance X7 R MLCCs, which applied to ESL,LED lamp, Power supply, Industrial control, Home appliance fields.

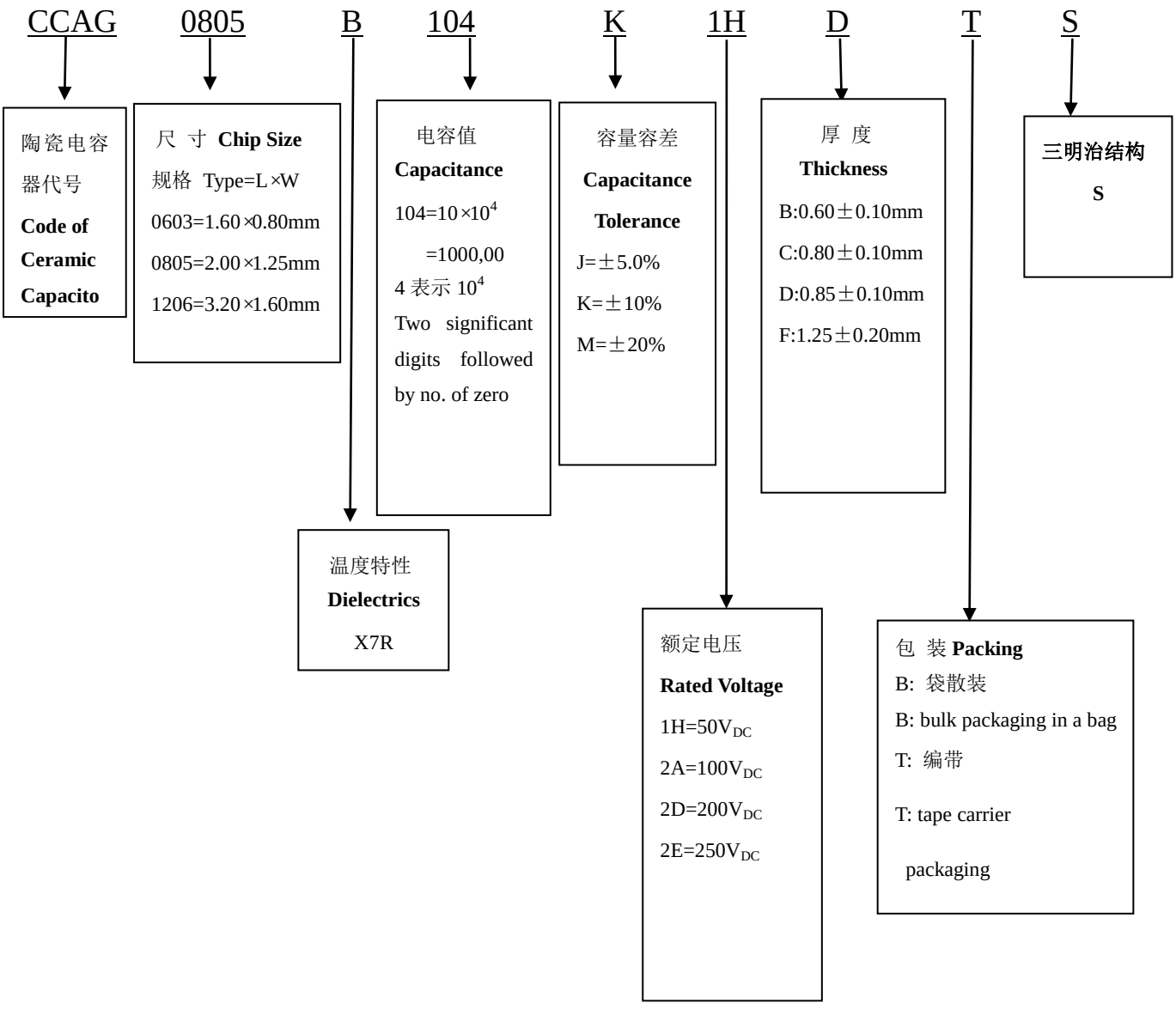
3．电容器及介质分类 Types of Capacitor and Dielectric Material

※X7R：此类介质材料的电容器为Ⅱ类电容器，具有较高的介电常数，容量比Ⅰ类电容器高，具有较稳定的温度特性，适用于容量范围广，稳定性要求不高的电路中，如隔直、耦合、旁路、鉴频等电路中。

※ X7R： material is a kind of material has high dielectric constant. The capacitor made of this kind material is considered as Class Ⅱ capacitor whose capacitance is higher than that of class Ⅰ. These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.

4．产品命名 Product Parts Number

(例) (example)



5. 产品容量范围 Product Capacitance Range

SIZE	25V	50V	100V	200V	250V
0603	/	220pF~100nF	220pF~18nF	220pF~6.8nF	220pF~6.8nF
0805	220pF~luF	220pF~330nF	220pF~100nF	220pF~47nF	220pF~33nF
1206	220pF~470nF	220pF~470nF	220pF~470nF	220pF~100nF	220pF~100nF

SIZE	500V	630V	1000V	2000V
0603	/	/	/	/
0805	220pF~10nF	/	/	/
1206	220pF~22nF	220pF~10nF	220pF~10nF	220pF~1nF

Capacitance range	220pF~1uF
Tolerance	±10%, ±20%
Operating temperature	-55℃~+125℃
Temperature coefficient	±15%
Rated voltage	50V/100V/200V/250V/500V/630V/1000V/2000
Wear and tear	Refer to the X7R Loss Standard Table
Insulation resistance	10 GΩ or 100 Ω.F or more, whichever is smaller
Pressure-resistant	U_R≤50V，2.5*U_R（rated voltage） 100≤U_R <500V，2* U_R（rated voltage） 500≤U_R <2000V，1.5* U_R（rated voltage） 2000≤U_R，1.2* U_R（rated voltage）
Test voltage	1.0±0.2Vrms
Frequency of testing	Cp ≤ 10μF, 1KHz ± 10% Cp>10μF，120Hz±24Hz

X7R/DF

specifications	U_R	Capacity range	DF
0603	≤25V	C≤0.47μF	≤7%
		C≥0.47μF	≤10%
	>25V	C≤0.1μF	≤5%
		0.1μF<C≤0.22μF	≤7%
		C>0.22μF	≤10%
0805	≤25V	C≤1μF	≤7%
		C>1μF	≤10%
	>25V	C≤0.47μF	≤7%
		C>0.47μF	≤10%
1206	≤25V	C<2.2μF	≤7%
		2.2μF≤C≤47μF	≤10%
	>25V	C<1μF	≤7%
		1μF≤C≤47μF	≤10%

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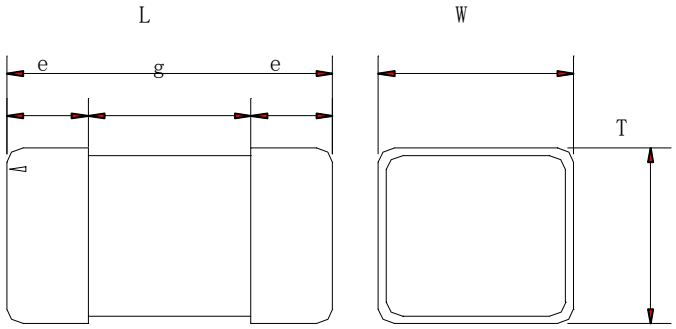
6. 产品尺寸 Dimensions

规格： 0603、0805、1206。

Chip Size： 0603、0805、1206。



规格 Type	L (mm)	W (mm)	e (mm)	g min (mm)	T (mm)				
0603	1.60±0.10	0.80±0.10	0.2~0.5	0.5	0.80±0.10	——	——	——	——
0805	2.00±0.10	1.25±0.10	0.2~0.7	0.7	0.60±0.10	0.85±0.10	1.25±0.20	——	——
1206	3.20±0.20	1.60±0.20	0.3~0.8	1.6	0.85±0.10	1.25±0.20	——	——	——

7. 技术要求和测试条件 Specification and Test Condition

7.1 外观 Appearance

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	无损伤或异常 No defects or abnormalities	目视检查 Visual inspection.

7.2 尺寸 Dimensions

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	在要求的范围内 Within the specified dimensions	用千分尺 Using calipers on micrometer

7.3 容量 Capacitance

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	在要求的容值容差范围内 Within the specified tolerance J: ±5%； K: ±10%； M: ±20%	1.0±0.2Vrms, 1KHz±10%
备注：测试温度：25℃±3℃，测试湿度：＜70%RH.		

7.4 损耗 Dissipation Factor

类型 Dielectrics	技术要求 Specification	测试条件 TestingCondition
X7R	DF≤2.5%	1.0±0.2Vrms, 1KHz±10%,
备注：测试温度：25℃±3℃，测试湿度：＜70%RH.		

7.5 绝缘电阻 Insulation Resistance

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	U_R ≤ 50V，大于 10 GΩ 或 500Ω-F(大于其中较小的数值) U_R≤50V ，More than 10 GΩ or 500Ω·F, whichever is smaller.	U_R≤50V $U_{测}$=U_R ； 充电时间:60±5 秒 温度:25℃ Charge Time:60±5sec Temperture:25℃
	U_R＞50V，大于 4GΩ 或 100s (大于其中较小的数值) U_R＞50V，More than 4 GΩ or 100s , whichever is smaller.	U_R≤400V $U_{测}$=U_R U_R＞400V $U_{测}$=400V； 充电时间:60±5 秒 温度:25℃ Charge Time:60±5sec Temperture:25℃
备注：测试温度：25℃±3℃，测试湿度：＜70%RH.		

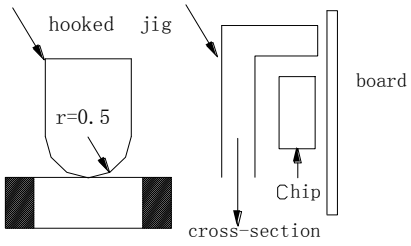
7.6 耐电压 Dielectric Strength

类型 Dielectrics	额定电压范围 Rated voltage range	耐电压性能测试方法 Measuring Method
X7R	U_R≤50V	施加额定电压的 250%,5 秒,最大电流不超过 50mA Force 300%Rated voltage for 5second. Max..current should not exceed 50 mA.
	100V≤U_R＜500V	施加额定电压的 200%,5 秒,最大电流不超过 50mA Force 200%Rated voltage for 5second. Max..current should not exceed 50 mA.
	500V≤U_R＜1000V	施加额定电压的 150%+100V,5 秒,最大电流不超过 50mA Force 150%+100V Rated voltage for 5second. Max..current should not exceed 50 mA.
	1000V≤U_R＜2000V	施加额定电压的 150%,5 秒,最大电流不超过 50mA Force 150%Rated voltage for 5second. Max..current should not exceed 50 mA.
	U_R≥2000V	施加额定电压的 120%,5 秒,最大电流不超过 30mA Force 120%Rated voltage for 5second. Max..current should not exceed 30 mA.

7.7 静电容量温度特性 Temperature Coefficient of Capacitance

<table>
<tr><th>类型
Dielectrics</th><th>技术要求 Specification</th><th>测试条件 Testing Condition</th></tr>
<tr><td>X7R</td><td>容 量 变 化 在 ±15% 以 内
Capacitance change within ±15%</td><td>按系列温度顺序测试电容容量
Measure capacitance under follow table list temperature:
<table>
<tr><th>步骤
STEP</th><th>X7R</th></tr>
<tr><td>1</td><td>25 ±2</td></tr>
<tr><td>2</td><td>-55±3</td></tr>
<tr><td>3</td><td>25 ±2</td></tr>
<tr><td>4</td><td>125±3</td></tr>
<tr><td>5</td><td>25 ±2</td></tr>
</table>
与 25℃时的电容容量相比较，电容容量在温度范围内的变化在要求的范围之内。
The ranges of capacitance change compared within the above 25℃ value over the temperature ranges shall be within the specified ranges.</td></tr>
</table>

7.8 附着力 Adhesion

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	端电极无松动，也无其它不良现象 No removal of the terminations or other defect shall occur.	施加 6N 的压力，并保持 10±1 秒 The pressurizing force shall be 6N (=600g*f) and the duration of application shall be 10±1sec. 

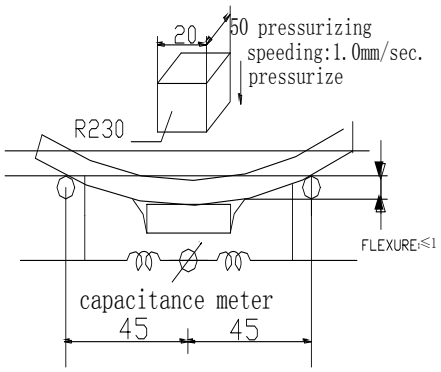
7.9 可焊性 Solderability of Termination

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	端电极挂锡面积不小于 95%，针孔或粗糙面积小于 5% 95% min. coverage of both terminal electrodes and less than 5% have pin holes or rough spots.	锡炉温度：245±5℃ 浸入时间：2±1 秒 两侧端电极完全浸入焊锡炉 Solder temperature: 245±5℃ Dipping time: 2±1 seconds. Completely soak both terminal electrodes in solder

7.10 耐焊性 Resistance to leaching

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	端电极挂锡面积不小于 95%，针孔或粗糙面积小于 5%,外观无开裂 95% min. coverage of both terminal electrodes and less than 5% have pin holes or rough spots. No remarkable visual damage.	预热：120℃~150℃/60 秒 锡炉温度：270±5℃ 浸入时间： 10±1 秒 两侧端电极完全浸入焊锡炉 Solder temperature: 270±5℃ preheated: 120℃~150℃/60sec Dipping time: 10±1 seconds. Completely soak both terminal electrodes in solder

7.11 端电极结合强度 Bending

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	无可见损伤； 容量变化小于等于±12.5% No remarkable visual damage Cp change ≤±12.5%	将片状电容器安装在测试夹具上，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 put it on testing stand. The middle part of substrate shall successively be pressurized by pressuring rod at a rated of about 1.0mm/sec. Until the deflection 

7.12 耐焊接热 Resistance to Soldering Heat

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	无明显可见损伤 容量变化在±7.5%以内 DF 满足产品初始值的要求 IR 满足产品初始值的要求 No remarkable visual damage Cp change within ±7.5% DF meets initial standard value. IR meets initial standard value.	焊接温度: 270±5℃ 预热: 120~150℃ 60 秒 浸入时间: 10±1 秒 在室温下放置 24±2 (COG) 或 48±4(X7R) 小时以后测量 试验后在标准条件下恢复 Soldering temperature: 270±5℃ Preheating: 120~150℃ 60sec. Dipping time: 10±1 seconds. Measurement to be made after being kept at room temperature for 48±4(X7R) hours. Recov ery for the following period under the standard condition after test.

7.13 温度快速循环 Temperature Cycle

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	无明显可见损伤 容量变化在±7.5%以内 No remarkable visual damage Cp change within ±7.5%	按下列步骤进行 5 次循环: To perform 5 cycles of the stated environment

步骤 Step	温度 Temperature	时间 Time
1	下限类别温度 +0/-3℃ Min. operating Temp.+0/-3℃	30min
2	25℃	2~3 in
3	上限类别温度 +3/-0℃ Max. operating Temp.+3/-0℃	30 min
4	25℃	2~3 min

在室温下放置 48±4(X7R) 小时以后测量
Measurement to be made after being kept at room temperature for 48±4hrs (X7R) at room temperature, then measure.

7.14 稳态湿热 Moisture Resistance ,steady state

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	外观无明显可见损伤 容量变化在±12.5%以内 DF 为初始值的 2 倍以下 IR:大于 1000MΩ 或 50Ω-F(取较小值) Cp change within ±12.5% DF:Not more than 2 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	测试温度: 40±2℃ 湿度: 90~95% RH 测试时间: 500 ±12hrs 在室温下放置 48±4 小时以后测量 Test temperature: 40±2℃ Humidity: 90~95% RH Testing time: 500 ±12hrs Measurement to be made after being kept at room temperature for 48±4hrs

7.15 耐湿负荷 Damp heat with load

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	外观无明显可见损伤 容量变化在±12.5%以内 DF 为初始值的 2 倍以下 IR: 大于 500MΩ 或 25Ω-F(取较小值) No remarkable visual damage Cp change≤±12.5% DF:Not more than 2 times of initial value R*C≥500MΩ or 25Ω·F, whichever is smaller	测试温度: 40±2℃ 湿度: 90~95% RH 电压: 额定电压 测试时间: 500 ±12hrs 在室温下放置 48±4(X7R) 小时以后测量 *在 40±2℃温度下，将电容器加额定直流电压 1hrs. 去掉电压，将电容器在室温下放置 48±4hrs 测量初始电容值。 Test temperature: 40±2℃ Humidity: 90~95% RH Voltage: 100% of the rated voltage Testing time: 500 ±12hrs Measurement to be made after being kept at room temperature for 48±4hrs (X7R) *Apply the rated DC voltage for 1 hour at 40±2℃. Remove and let sit for 48±4hrs at room temperature. Perform the initial measurement.
备注 remark：仅适用于常规产品，不适用于中高压产品 only general specification		

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7.16 耐久性 Life Test

类型 Dielectrics	技术要求 Specification	测试条件 Testing Condition
X7R	外观无明显可见损伤 容量变化在 12.5%以内 DF 为初始值的 2 倍以下 IR:大于 1000MΩ 或 50Ω-F(取较小值) No remarkable visual damage Cp change≤±12.5% DF:Not more than 2 times of initial value R*C≥1000MΩ or 50Ω·F, whichever is smaller	测试温度：上限类别温度±3℃ 电压： UR＜100V 2 倍额定电压 100V≤UR＜500V 1.5 倍额定电压 测试时间: 1000 小时 在室温下放置 48±4(X7R) 小时以后测量 Test temperature: Max. Operating Temp. ±3℃ Voltage: UR＜100V 200% of the rated voltage 100V≤UR＜500V 150% of the rated voltage 500V≤UR＜1000V 120% of the rated voltage 1000V≤UR 100% of the rated voltage Testing time: 1000 hrs Measurement to be made after being kept at room temperature for 48±4hrs (X7R)