Multi Layer Ceramic Chip Capacitor

DATA SHEET

For

High Voltage MLCC

Version: DS-01HVE

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HIGH VOLTAGE MLCC

Middle & high voltage MLCC is a kind of special design MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. Middle & high MLCC is widely applicable for many direct high voltage circuits in which it can improve the performance of the circuit.

•APPLICATIONS

※Analog & Digital Modems
※LAN/WAN Interface
※Lighting Ballast Circuits
※Voltage Multipliers
※DC-DC Converters
※Back-lighting Inverters

•Capacitance value and Rated Voltage

SIZE	Rated	Capacitance (pF)		
Size Code	Voltage	NPO	X7R	Y5V
0603	100V	0.5~680	100~10000	2200~68000
	200V	0.5~470	100~6800	------
0805	100V	0.5~1500	150~33000	10000~100000
	200V	0.5~820	150~22000	10000~56000
	250V	0.5~820	150~22000	10000~56000
	500V	0.5~560	150~10000	------
1206	100V	0.5~3000	150~120000	10000~330000
	200V	0.5~2000	150~47000	10000~150000
	250V	0.5~2000	150~47000	10000~150000
	500V	0.5~1000	150~22000	------
	1000V	0.5~680	150~5600	------
	2000V	0.5~150	150~1500	------
1210	100V	10~4700	150~220000	10000~820000
	200V	10~3300	150~120000	10000~390000
	250V	10~3300	150~120000	10000~390000
	500V	10~2000	150~33000	------
	1000V	10~820	150~10000	------
	2000V	10~470	150~6800	------
	Rated	Capacitance (pF)		
Size Code	Voltage	NPO	X7R	Y5V
1808	100V	10~4700	150~220000	10000~820000
	200V	10~3300	150~220000	10000~390000
	250V	10~3300	150~220000	10000~390000
	500V	10~1800	150~39000	------
	1000V	10~820	150~10000	------
	2000V	10~470	150~6800	------

	3000V	10~330	150~2200	------
	4000V	10~150	150~1000	------
	5000V	10~150	150~1000	------
1812	100V	10~10000	150~330000	10000~1000000
	200V	10~5600	150~150000	10000~470000
	250V	10~5600	150~150000	10000~470000
	500V	10~3900	150~100000	------
	1000V	10~1200	150~27000	------
	2000V	10~680	150~10000	------
	3000V	10~470	150~4700	------
	4000V	10~220	150~1500	------
	5000V	10~220	150~1500	------
2225	100V	10~27000	150~1000000	10000~2000000
	200V	10~12000	150~470000	10000~680000
	250V	10~12000	150~470000	10000~680000
	500V	10~6800	150~330000	------
	1000V	10~2200	150~56000	------
	2000V	10~1000	150~27000	------
	3000V	10~680	150~6800	------
	4000V	10~560	150~3300	------
	5000V	10~560	150~3300	------
3012	100V	10~18000	150~680000	10000~1500000
	200V	10~8200	150~390000	10000~560000
	250V	10~8200	150~390000	------
	500V	10~4700	150~270000	------
	1000V	10~1600	150~39000	------
	2000V	10~680	150~22000	------
	3000V	10~470	150~3300	------
	4000V	10~330	150~2700	------
	5000V	10~330	150~2700	------

Note: We can design according to the customer requirements.

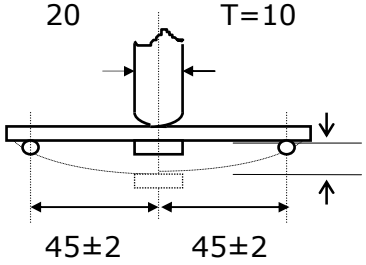
Measurement method for high voltage MLCC

Rated voltage range	Measuring Method
500V≤Vr≤1000V	Force 150%Rated voltage for 5 second. Max current should not exceed 50 mA.
1000V<Vr≤2000V	Force 120%Rated voltage for 5 seconds. Max.current should not exceed 50 mA.
2000V<Vr≤5000V	Force 120%Rated voltage for 5 seconds. Max.current should not exceed 10 mA.

Reliability Test

<table>
<tr><td>Item</td><td colspan="2">Technical Specification</td><td colspan="6">Test Method and Remarks</td></tr>
<tr><td rowspan="4">Capacitance</td><td>Class I</td><td colspan="2" rowspan="2">Should be within the specified tolerance.</td><td>Capacitance</td><td>Measuring Frequency</td><td colspan="4">Measuring Voltage</td></tr>
<tr><td>≤1000pF</td><td>1MHZ±10%</td><td colspan="4" rowspan="2">1.0±0.2Vrms</td></tr>
<tr><td>Class II</td><td>＞1000 pF</td><td>1KHZ±10%</td></tr>
<tr><td colspan="2">Should be within the specified tolerance.</td><td colspan="6">C≤10μF:
Test Frequency: 1KHZ±10%
Test Voltage: 1.0±0.2Vrms
C＞10μF X7R、Y5V
Test Frequency: 120±24 HZ
Test Voltage: 0.5±0.1Vrms
Z5U:
Test Frequency: 1±0.1KHZ
Test Voltage: 0.5±0.05Vrms</td></tr>
<tr><td rowspan="3">(DF, tanδ) Dissipation Factor</td><td>Class I</td><td colspan="2">DF≤0.15%</td><td>Capacitance</td><td>Measuring Frequency</td><td colspan="4">Measuring Voltage</td></tr>
<tr><td colspan="2">≤1000 pF</td><td>1MHZ±10%</td><td colspan="4">1.0±0.2Vrms</td></tr>
<tr><td>Class II</td><td colspan="2">＞1000 pF</td><td>1KHZ±10%</td></tr>
<tr><td></td><td>X7R</td><td>50V</td><td>25V</td><td>16V</td><td>10V</td><td>6.3V</td><td colspan="4" rowspan="2">C≤10μF
Test Frequency: 1KHZ±10%
Test Voltage: 1.0±0.2Vrms

C＞10μF X7R、Y5V
Test Frequency: 120±24 HZ
Test Voltage: 0.5±0.1Vrms Z5U:
Test Frequency: 1±0.1KHZ
Test Voltage: 0.5±0.05Vrms</td></tr>
<tr><td></td><td>≤2.5%</td><td>≤3.5%</td><td>≤3.5%</td><td>≤5.0%</td><td>≤5.0%（C＜3.3μF）
≤10.0%（C≥3.3μF）</td></tr>
<tr><td></td><td>Y5VZ5U</td><td colspan="2">50V、25V</td><td>16V</td><td>10V</td><td>6.3V</td><td colspan="4" rowspan="2">C＞10μF X7R、Y5V
Test Frequency: 120±24 HZ
Test Voltage: 0.5±0.1Vrms Z5U:
Test Frequency: 1±0.1KHZ
Test Voltage: 0.5±0.05Vrms</td></tr>
<tr><td></td><td colspan="2">≤5.0%（C＜1.0μF）
≤9.0%（C≥1.0μF）</td><td>≤7.0%（C＜1.0μF）
≤9.0%（C≥1.0μF）</td><td>≤12.5%</td><td>≤12.5%</td></tr>
<tr><td rowspan="3">(IR) Insulation Resistance</td><td>Class I</td><td colspan="2">C≤10 nF, Ri≥50000MΩ
C＞10 nF, Ri•C_R≥500S</td><td colspan="6" rowspan="3">Measuring Voltage: Rated Voltage
Duration: 60±5s</td></tr>
<tr><td rowspan="2">Class II</td><td>X7R</td><td>C≤25 nF, Ri≥10000MΩ
C＞25 nF, Ri•C_R＞100S</td></tr>
<tr><td>Y5VZ5U</td><td>C≤25 nF, Ri≥4000MΩ
C＞25 nF, Ri•C_R＞100S</td></tr>
<tr><td>Item</td><td colspan="2">Technical Specification</td><td colspan="6">Test Method and Remarks</td></tr>
</table>

<table>
<tr><td>(DWV) Dielectric Withstanding Voltage</td><td colspan="5">No breakdown or damage.</td><td>Measuring Voltage:
Class Ⅰ :300% Rated voltage
Class Ⅱ :250% Rated voltage
Duration: 5±1s
Charge/ Discharge Current: 50mA max.
(This method excludes high-voltage MLCC)</td></tr>
<tr><td>Solderability</td><td colspan="5">At least 95% of the terminal electrode is covered by new solder.
Visual Appearance: No visible damage.</td><td>Solder Temperature: 235±5℃
Duration: 2±0.5s</td></tr>
<tr><td rowspan="5">Resistance to Soldering Heat</td><td>Item</td><td>NPO 至 SL
NPO to SL</td><td>X7R</td><td>Y5V</td><td>Z5U</td><td rowspan="5">Preheating conditions: 100 to 200℃; 10±2min.
Solder Temperature: 265±5℃
Duration: 5±1s
Clean the capacitor with solvent and examine it with a 10X(min.) microscope.
Recovery Time: 24±2h
Recovery condition: Room temperature</td></tr>
<tr><td>ΔC/C</td><td>≤0.5%</td><td>-5~+10 %</td><td colspan="2">-10~+20 %</td></tr>
<tr><td>DF</td><td colspan="4">Same to initial value.</td></tr>
<tr><td>IR</td><td colspan="4">Same to initial value.</td></tr>
<tr><td colspan="5">Appearance: No visible damage.At least 95% of the terminal electrode is covered by new solder.</td></tr>
<tr><td rowspan="2">Resistance to Flexure of Substrate (Bending Strength)</td><td colspan="5">Appearance: No visible damage.</td><td rowspan="2">20 T=10
 
45±2 45±2
Test Board: Al_2O_3 or PCB
Warp: 1mm
Speed: 0.5mm/sec.
Unit: mm
The measurement should be made with the board in the bending position.</td></tr>
<tr><td>ΔC/C</td><td colspan="4">≤±10%</td></tr>
<tr><td>Item</td><td colspan="5">Technical Specification</td><td>Test Method and Remarks</td></tr>
<tr><td>Termination Adhesion</td><td colspan="5">No visible damage.</td><td>Applied Force: 5N Duration: 10±1S</td></tr>
</table>

<table>
<tr><td>Temperature Cycle</td><td colspan="2">ΔC/C

Class Ⅰ : ≤±1% or ±1pF,
whichever is larger.
Class Ⅱ : B: ≤±10%
E,F: ≤±20%</td><td>Preheating conditions: up-category temperature, 1h
Recovery time: 24±1h
Initial Measurement
Cycling Times: 5 times, 1 cycle, 4 steps:<table><tr><td>Step</td><td>Temperature (℃)</td><td>Time (min.)</td></tr><tr><td>1</td><td>Low- category temp. (NPO/X7R: -55 Y5V:-25 Z5U:+10)</td><td>30</td></tr><tr><td>2</td><td>Normal temp. (+20)</td><td>2～3</td></tr><tr><td>3</td><td>Up- category temp. (NPO/X7R: +125 Y5V/Z5U: +85)</td><td>30</td></tr><tr><td>4</td><td>Normal temp. (+20)</td><td>2～3</td></tr></table>Recovery time after test: 24±2h</td></tr>
<tr><td rowspan="4">Moisture Resistance</td><td>ΔC/C</td><td>Class Ⅰ : ≤±2% or ±1pF,
whichever is larger.
Class Ⅱ : B: ≤±10%
E,F: ≤±30%</td><td rowspan="4">Temperature: 40±2℃
Humidity: 90~95%RH
Voltage: Rated Voltage
Duration: 500h
Charge/Discharge Current: 50mA max.
Recovery conditions: Room temperature
Recovery Time: 24h (Class1) or 48h (Class2)</td></tr>
<tr><td>DF</td><td>Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>Class Ⅰ : Ri≥2500MΩ OR Ri•C_R≥25S whichever is smaller.</td></tr>
<tr><td>Class Ⅱ : Ri≥1000MΩ OR Ri•C_R≥25S whichever is smaller.</td></tr>
<tr><td colspan="2">Appearance: No visible damage.</td></tr>
<tr><td>Item</td><td colspan="2">Technical Specification</td><td>Test Method and Remarks</td></tr>
<tr><td rowspan="4">Life Test</td><td>ΔC/C</td><td>Class Ⅰ :≤±2% or ±1pF,
whichever is larger.
Class Ⅱ : B: ≤±20%
E,F: ≤±30%</td><td rowspan="4">Applied Voltage: 2 × Rated Voltage
Duration: 1000h
Charge/ Discharge Current: 50mA max.
Recovery Conditions: Room Temperature
Recovery Time: 24h (Class 1), or 48h (Class2)</td></tr>
<tr><td>DF</td><td>Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>Class Ⅰ : Ri≥4000MΩ OR Ri•C_R≥40S whichever is smaller.</td></tr>
<tr><td>Class Ⅱ : Ri≥2000MΩ OR Ri•C_R≥50S whichever is smaller.</td></tr>
<tr><td colspan="2">Visual Appearance: No visible damage.</td></tr>
</table>

Note: Pretreatment (only for class2 capacitor)

Pretreatment (only for class2 capacitor) is a method to treat the capacitor before measurement. First, place the capacitor in the up-category temperature or other specified higher temperature environment for 1hour. Then recovery the capacitor at standard pressure conditions for 24±1hours.

For more information, please contact us.

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