

## M3L 节能灯贴片电容 MEL Energy-saving Lamps Chip Capacitor

### ■ 电容器及介质分类 Types of Capacitor and Dielectric Material

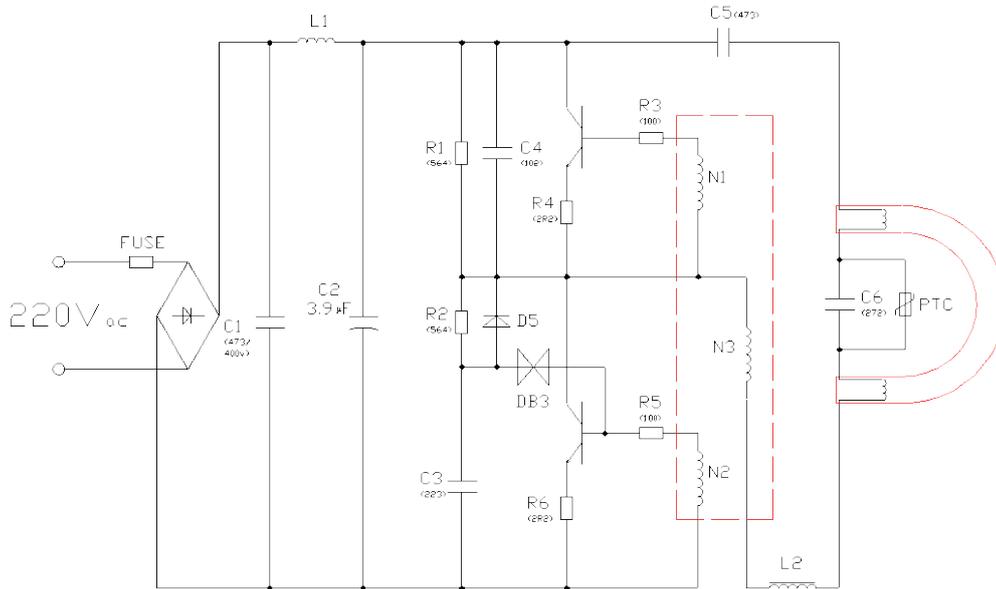
#### ※ M3L

1. M3L为I类电容器;
2. 介电常数较C0G高 (K值100左右);
3. 介质损耗较低 (通常低于0.1%);
4. 温度特性满足 - 0.1%/°C, 125°C时容量变化为-10%优于X7R的-15%;
5. 容量基本不随电压变化, 频率特性较好;
6. 产品强度较高;

1. M3L Class I capacitor
2. Higher dielectric constant than C0G (K value is about 100)
3. Lower dielectric loss
4. The coefficient of temperature is 0.1%/°C, at 125°C capacitor is changed by -10%, better than X7R (-15%)
5. Have little change with voltage and frequency characteristics is better
6. Product strength is high.

### ■ 产品用途 Application

节能灯常用电路图  
General circuit for energy-saving lamps



各位置应用电容 Application of capacitance:

C3位置: 启动电容 starting capacitance

C4位置: 续流电容 Stream capacitance

C5位置: 隔直电容 Every straight capacitance

C6位置: 谐振电容 resonance capacitance

### ■ M3L 节能灯贴片电容应用 Application

1. 用于替代温度稳定性要求不高的C0G中高压产品
2. 用于替代中低容高压产品设计中X7R因频率特性而无法设计的场合

1. Used for taking place of the C0G medium and high voltage products whose demand of temp. stability is not high.
2. Used for taking place of the situation on which X7R cannot satisfy because of frequency characteristics in design for medium and low.

■ 产品规格型号命名 Part Number

C	0805	M3L	221	K	102	N	T	D
产品类型 Product Type	尺寸规格 Size Type Code	温度特性 Dielectric	电容值 Capacitance	允许偏差 Tolerance	额定电压 Rated Voltage	端头类型 Terminal Type	包装 Packing	厚度 Thickness
贴片电容 MLCC	0805 1206	M3L	221=220pF 222=2.2nF	J=±5.0% K=±10% M=±20%	500=50V 101=100V 102=1000V 122=1200V	N=Ag ( or Cu ) / Ni/Sn 3-layer construction	T=编带 Taping B=袋散装 Bulk	D=0.80±0.10mm F=0.85±0.10mm G=1.00±0.10mm O=1.15±0.20mm H=1.25±0.20mm L=1.60±0.30mm Q=2.00±0.20mm R=2.50±0.30mm P=2.80±0.20mm K=0.90+0.10/-0.20mm M=0.65±0.10mm

■ 产品容量范围 Capacitance Range

续流电容 Current-Continuous Capacitor

背景色代表：可生产型号

尺寸 Size	温度特性 Dielectric	M3L
	容量 Capacitance	1000V
0805	221	
	331	
	471	
	561	
	681	
	821	
	102	
1206	222	
	272	

谐振电容 Resonant capacitor

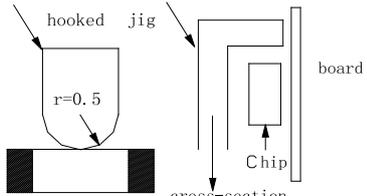
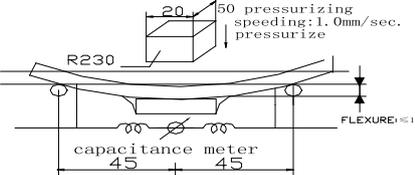
尺寸 Size	温度特性 Dielectric	M3L
	容量 Capacitance	1200V
1206	152	
	182	
	222	
	272	
	332	
	392	
	472	

\*以上容量规格仅供参考，具体可根据客户要求制作

\*All the spec above is for reference only and we can supply according to customer's requirements

■ 技术指标和试验方法 Specifications and Test Methods

NO	项目 Item	技术指标 Specification	试验方法 Test Method												
1	外观 Appreance	外观无异常 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用千分尺 Using calipers on micrometer with tolerance no less than 0.01mm												
3	容量 Capacitance (C)	在要求的容值容差范围内 Within the specified tolerance	1.0 ± 0.1Vrms, 1KHz ± 10%, 25°C ± 2°C												
4	损耗 Dissipation Factor (DF)	DF ≤ 2.5%	1.0 ± 0.1Vrms, 1KHz ± 10%, 25°C ± 2°C												
5	绝缘电阻 Insulation Resistance (Ri)	Ri > 10 GΩ 或 100 Ω · F(取较小值) More than 10GΩ or 100 Ω · F whichever is smaller	UR ≤ 400V U测=UR UR > 400V U测=400V; 充电时间:60 ± 5秒 温度:25°C ± 2°C 相对湿度: 25% ~ 80% RH Charge time:60 ± 5sec Temperature:25°C ± 2°C Humidity: 25% ~ 80% RH												
6	耐电压 Dielectric Strength	无介质击穿和材料裂缝 No dielectric breakdown or mechanical breakdown	在电容器的两端施加试验电压1分钟, 最大电流不超过50mA Force test voltage for 1min Max. current should not exceed 50 mA. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>额定电压 Rated voltage</th> <th>测试电压 Test voltage</th> </tr> </thead> <tbody> <tr> <td>50V</td> <td>125V</td> </tr> <tr> <td>100V</td> <td>200V</td> </tr> <tr> <td>400V</td> <td>750V</td> </tr> <tr> <td>1000V</td> <td>1400V</td> </tr> <tr> <td>1200V</td> <td>1500V</td> </tr> </tbody> </table>	额定电压 Rated voltage	测试电压 Test voltage	50V	125V	100V	200V	400V	750V	1000V	1400V	1200V	1500V
额定电压 Rated voltage	测试电压 Test voltage														
50V	125V														
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400V	750V														
1000V	1400V														
1200V	1500V														
7	电容量温度特性 Temperature Characteristics	容量变化 ≤ -0.05%/°C ~ -0.15%/°C Temperature coefficient within -0.05%/°C ~ -0.15%/°C	按系列温度顺序测试电容量 Measure capacitance under follow table list <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>步骤 Step</th> <th>M3L</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25 ± 2°C</td> </tr> <tr> <td>2</td> <td>-55 ± 3°C</td> </tr> <tr> <td>3</td> <td>25 ± 2°C</td> </tr> <tr> <td>4</td> <td>125 ± 3°C</td> </tr> </tbody> </table> <p>预先干燥: 16 ~ 24小时 与步骤3的电容量相比较, 电容量在温度范围内的变化在要求的范围之内。 Preliminary Drying for 16 ~ 24hrs The ranges of capacitance change compared with step 3 at the above 25°C value over the temperature ranges shall be within the specified ranges.</p>	步骤 Step	M3L	1	25 ± 2°C	2	-55 ± 3°C	3	25 ± 2°C	4	125 ± 3°C		
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NO	项目 Item	技术指标 Specification	试验方法 Test Method
8	附着力 Adhesion	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5N(=500g*f)的压力, 并保持10 ± 1秒 The pressurizing force shall be 5N(=500g*f) and the duration of application shall be 10 ± 1sec 
9	可焊性 Solderability of Termination	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°C 浸入时间: 2 ± 1秒 两侧端电极完全浸入焊锡炉 Solder temperature: 245 ± 5°C Dipping time: 2 ± 1 seconds. Completely soak both terminal electrodes in solder
10	端电极结合强度 Bending	无可见损伤; 容量变化 ≤ ± 5% 或 ± 0.5pF (取较大值) Cp change ≤ ± 5% or ± 0.5 pF whichever is larger	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1.0mm。 Solder the capacitor on testing substrate and put it on testing stand. The middle part of substrate all successively be pressurized by pressuring rod a rated of about 1.0mm/sec. Until the deflection become means of the 1.0mm. 
11	耐焊接热 Resistance to Soldering Heat	端电极挂锡面积不小于95%, 针孔或粗糙面积小于5%, 无明显可见损伤 95% min.coverage of both terminal electrodes and less than 5% have pin holes or rough spots. No remarkable visual damage. 容量变化 ≤ ± 2.5% 或 ± 0.25pF (取较大值) DF满足产品初始值的要求 IR满足产品初始值的要求 Cp change within ± 2.5% or ± 0.25pF whichever is larger. DF meets initial standard value. IR meets initial standard value.	预热: 120 ~ 150°C 60秒 焊接温度: 270 ± 5°C 浸入时间: 10 ± 1秒 在室温下放置24 ± 2小时以后测量 Preheating: 120 ~ 150°C 60sec. Soldering temperature: 270 ± 5°C Dipping time: 10 ± 1 seconds. Measurement to be made after being kept at room temperature for 24 ± 2 hrs.

NO	项目 Item	技术指标 Specification	试验方法 Test Method															
12	温度快速循环 Temperature Cycle	<p>无明显可见损伤 容量变化<math>\leq \pm 2.5\%</math>或<math>\pm 0.25\text{pF}</math> (取较大值) 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 <math>\pm 2.5\%</math> or <math>\pm 0.25\text{pF}</math> whichever is larger. DF meets initial standard value. IR meets initial standard value.</p>	<p>按下列步骤进行5次循环: To perform 5 cycles of the stated environment</p> <table border="1"> <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>下限类别温度+0/-3°C Min.operating Temp.+0/-3°C</td> <td>30min</td> </tr> <tr> <td>2</td> <td>25°C</td> <td>2~3 min</td> </tr> <tr> <td>3</td> <td>上限类别温度+3/-0°C Max.operating Temp.+3/-0°C</td> <td>30min</td> </tr> <tr> <td>4</td> <td>25°C</td> <td>2~3 min</td> </tr> </tbody> </table> <p>在室温下放置<math>24 \pm 2</math>小时以后测量 Measurement to be made after being kept at room temperature for <math>24 \pm 2</math>hrs then measure.</p>	步骤 Step	温度 Temperature	时间 Time	1	下限类别温度+0/-3°C Min.operating Temp.+0/-3°C	30min	2	25°C	2~3 min	3	上限类别温度+3/-0°C Max.operating Temp.+3/-0°C	30min	4	25°C	2~3 min
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3	上限类别温度+3/-0°C Max.operating Temp.+3/-0°C	30min																
4	25°C	2~3 min																
13	耐湿负荷 Damp heat with load	<p>外观无明显可见损伤 容量变化<math>\leq \pm 7.5\%</math>或<math>\pm 0.75\text{pF}</math> (取较大值) Cp &lt; 30pF, Q<math>\geq 100+10/3 \cdot \text{Cp}</math> Cp<math>\geq 30\text{pF}</math>, Q<math>\geq 200</math> IR &gt; 500M<math>\Omega</math>或25<math>\Omega \cdot \text{F}</math>(取较小值) No remarkable visual damage Cp change<math>\leq \pm 7.5\%</math> or <math>\pm 0.75\text{pF}</math> whichever is larger. Cp &lt; 30pF, Q<math>\geq 100+10/3 \cdot \text{Cp}</math> Cp<math>\geq 30\text{pF}</math>, Q<math>\geq 200</math> IR &gt; 500M<math>\Omega</math> or 25<math>\Omega \cdot \text{F}</math> whichever is smaller</p>	<p>测试温度: <math>60 \pm 2^\circ\text{C}</math> 相对湿度: 90~95% RH 电压: 额定电压 测试时间: <math>500 \pm 12</math>hrs Test temperature: <math>60 \pm 2^\circ\text{C}</math> Humidity: 90~95% RH Voltage: 100% of the rated voltage Testing time: <math>500 \pm 12</math>hrs</p> <p>在室温下放置<math>24 \pm 2</math>小时以后测量 Measurement to be made after being kept at room temperature for <math>24 \pm 2</math>hrs</p>															
14	耐久性 Life Test	<p>外观无明显可见损伤 容量变化<math>\leq \pm 3\%</math>或<math>\pm 0.5\text{pF}</math> (取较大值) Q<math>\geq 350</math> (Cp<math>\geq 30</math> pF) Q<math>\geq 275+</math> (2.5* Cp) (10 pF<math>\leq</math> Cp &lt; 30 pF) Q<math>\geq 200+</math> (10*Cp) (Cp &lt; 10 pF) IR &gt; 1000M<math>\Omega</math>或50<math>\Omega \cdot \text{F}</math>(取较小值) No remarkable visual damage Cp change<math>\leq \pm 3\%</math> or <math>\pm 0.5\text{pF}</math> whichever is larger. Q<math>\geq 350</math> (Cp<math>\geq 30</math> pF) Q<math>\geq 275+</math> (2.5* Cp) (10 pF<math>\leq</math> Cp &lt; 30 pF) Q<math>\geq 200+</math> (10*Cp) (Cp &lt; 10 pF) IR &gt; 1000M<math>\Omega</math> or 50<math>\Omega \cdot \text{F}</math> whichever is smaller</p>	<p>测试温度: 上限类别温度<math>\pm 3^\circ\text{C}</math> 电压: UR &lt; 100V 2倍额定电压 100V<math>\leq</math>UR &lt; 500V 1.5倍额定电压 500V<math>\leq</math>UR &lt; 1000V 1.2倍额定电压 1000V<math>\leq</math>UR 1倍额定电压 测试时间: 1000 小时 Test temperature: Max. Operating Temp. <math>\pm 3^\circ\text{C}</math> Voltage: UR &lt; 100V 200% of the rated voltage 100V<math>\leq</math>UR &lt; 500V 150% of the rated voltage 500V<math>\leq</math>UR &lt; 1000V 120% of the rated voltage 1000V<math>\leq</math>UR 100% of the rated voltage Testing time: 1000 hrs</p> <p>在室温下放置<math>24 \pm 2</math>小时以后测量 Measurement to be made after being kept at room temperature for <math>24 \pm 2</math>hrs.</p>															