

# 獨石電容器產品承認書

## APPROVAL SPECIFICATIONS FOR MONOLITHIC CAPACITORS

客戶 CUSTOMER	立創商城		
客戶料號 CUSTOMER P/N	C3148306		
產品編碼 PART NUMBER	1E225KC9B-R1-EE-ZNR		
規格描述 DESCRIPTION	25V/225/K/F5.08/L10/X7R/0805/ZNR		
日期 DATE	2022-07-05	文件編號 DOC. NO.	DEC-WD-WI001(C)

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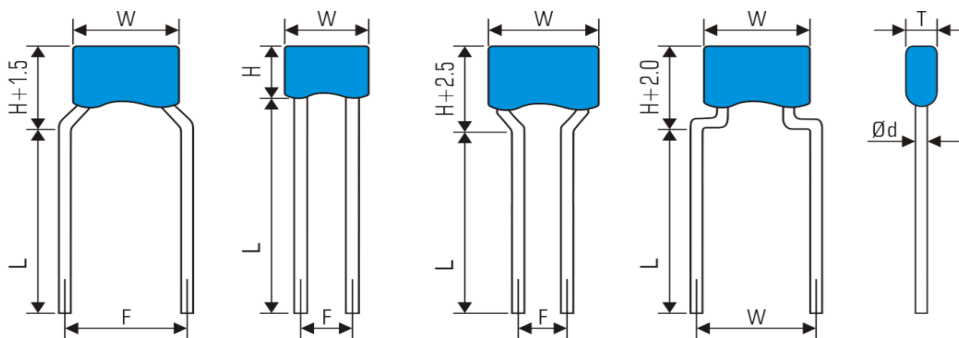
請確保我們的產品安裝到您的產品上前，已根據您的需求進行了評估。

Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.

請您在使用我們的產品時，不要偏離此標準。

You are requested not to use our product deviating from this specification.

数据表  
DATA SHEET



产品编码 Part number	1E225KC9B-R1-EE-ZNR	
规格描述 Description	25V/225/K/F5.08/L10/X7R/0805/ZNR	
客户料号 Customer P/N		
介质类别 Dielectric class	Class 2	
额定电压 Rated voltage	25Vdc	
电容量 Capacitance	2.2uF ±10% @ 1kHz 1.0V 25°C	
损耗角正切 Tangent of loss angle	0.1 max @ 1kHz 1.0V 25°C	
耐电压 Testing voltage	50Vdc (Charge/discharge 2mA max) 3s PASS	
绝缘电阻 Insulation resistance	228MΩ min @ 25V 60s, RH≤70%	
温度特性 Temperature characteristics	X7R ΔC/C: ±15% @ -55°C~125°C	
尺寸 DIMENSIONS	W (Weight)	5mm max
	H (Height)	3.8mm max
	T (Thickness)	3.2mm max
	F (Lead spacing)	5.08mm±0.8mm
	L (Lead length)	10mm±2.0mm
	Ød (Lead diameter)	0.55mm max

# 独石电容器 MONOLITHIC CAPACITORS



— 德信立業 創新開拓 —

## 特点 FEATURES

独石电容器是用多层陶瓷电容器为芯片，CP线为导线，使用无铅锡焊接、环氧树脂封装，激光打标而成，因此具有以下特点：

Monolithic capacitors with multilayer ceramic capacitor as chip, copper-clad steel wire as leads, lead-free soldering and epoxy resin coating, laser marking. So it has the following characteristics:

- 体积小、容量大，容积率为 $10\mu\text{F}/\text{cm}^3$ ，接近电解电容器，且没有极性  
Small dimensions, large capacitance, and a capacity volume ratio of  $10\mu\text{F}/\text{cm}^3$ , close to that of electrolytic capacitors. These do not have polarity.
- 频率特性极佳，且电感系数小，适于高频应用  
These have excellent frequency characteristics and due to these small internal inductance are suitable for high frequencies
- 环氧树脂封装，具有优良的防潮性能、机械强度及耐热性，阻燃性符合UL94 V-0标准  
Epoxy resin coating creates excellent performance in humidity resistance, mechanical strength and heat resistance, nonflammable to the UL94V-0 standard
- 工作温度高达 $125^\circ\text{C}$   
Operating temperature range guaranteed up to 125 degrees
- 产品规格齐全，容量从 $1\text{pF}$ 至 $22\mu\text{F}$   
Complete range of capacitance values,  $1\text{pF}$  to  $22\mu\text{F}$

特性 Char.	简介 Intro	容量 Capacitance
COG (NPO)	此类介质材料的电容器为I类电容器，电性能稳定，几乎不随温度、电压和时间的变化而变化。适用于低损耗、容量稳定性要求高的电路中，如滤波器、谐振器和计时电路中。 The capacitor of this kind dielectric material is considered as Class I capacitor, including general capacitor and high frequency COG capacitor. The electrical properties of COG capacitor are the most stable one and have little change with temperature, voltage and applications where low-losses and high-stability are required, time. They are suited for such as filters, oscillators, and timing circuits.	$1\text{pF}$ to $0.01\mu\text{F}$
X7R X5R	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。 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.	$100\text{pF}$ to $10\mu\text{F}$
Y5V	此类介质材料的电容器为II类电容器，是所有电容器中介电常数最大的电容器，但其容量稳定性较差，对温度、电压等条件较敏感，适用于要求大容量，温度变化不大的电路中。 The capacitor made of this kind of material is the highest dielectric constant of all ceramic capacitors. They are used over a moderate temperature range in application where high capacitance is required because of its unstable temperature coefficient, but where moderate losses and capacitance changes can be tolerated. Its capacitance and dissipation factors are sensible to measuring conditions, such as temperature and voltage, etc.	$1000\text{pF}$ to $22\mu\text{F}$

- 符合RoHS标准，无卤  
Comply with RoHS, Halogen-free available
- 适合AI自动安装  
Cost-saving automatic insertion available

## 用途 APPLICATIONS

径向引线多层陶瓷电容器广泛应用于计算机、数据处理通信和工业控制仪表设备。  
Radial leaded multilayer ceramic capacitor has wide application in computer, data processing telecommunication, and industrial control instrumentation equipment.

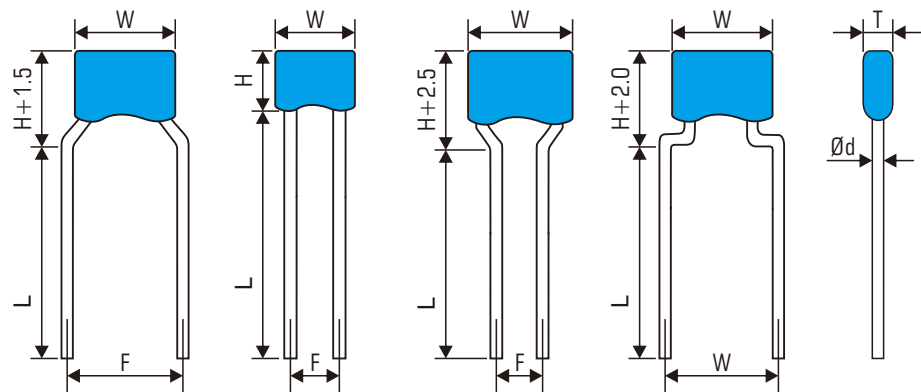
## 容量规格表 CAPACITANCE LIST

T.C.	Rated voltage	Capacitance range									
		010	100	101	102	103	104	105	106		
COG (NPO)	50V	010		152	272	103					0603
	100V	010		82	152						0805
	250V	010		471	152	472					1206
	500V	010		561	222						1210
X7R	25V			221		684		475	106		
	50V			221		104		105	225		
	100V			101		183		104	105		
	250V			101		682		333	224		
	500V			101		682		223	473		
Y5V	25V			102		105		225	475	226	
	50V			102		474		105	106		
	100V			102		104					

如果上表中没有您需求的规格，请向我公司业务咨询。  
If you do not have the specifications you need in the above table, please consult our business.

## 尺寸规格 DIMENSION SPECIFICATIONS

- 标准品尺寸规格  
Dimensions of component for standard product



脚型代码  
Lead style code: 0 1 A 9

芯片规格 Chip Spec.	脚型代码 Lead style Code	W mm max.	H mm max.	T mm max.	F ±0.8mm	L mm min.	d ±0.1mm
0603	0	4.2	3.8	3.2	2.54	20.0	0.47
	1						
	9						
0805	0	4.5	3.8	3.2	2.54	20.0	0.47
	1						
	9						
1206	0	6.0	4.5	3.8	2.54	20.0	0.47
	A						
	9						
1210	0	6.0	5.5	3.8	2.54	20.0	0.47
	A						
	9						

尺寸与脚型可以订制。  
Size and lead style can be customized.

## 标准与试验方法 SPECIFICATIONS AND TESTING METHOD

序 No.	项目 Item	标准 Specifications	试验方法 Testing Method																		
1	工作温度范围 Operating temperature range	X7R / COG: -55°C~+125°C X5R: -55°C~+85°C Y5V: -25°C~+85°C																			
2	额定电压 Rated voltage (U <sub>r</sub> )		额定电压是指在工作温度范围内, 可连续施加在电容器上的最大直流电压或最大交流电压有效值或脉冲电压的峰值。 当交流电压附加于直流电压时, V <sub>p-p</sub> 或V <sub>o-p</sub> (以较大者为准) 应维持在额定电压范围内。 The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor within the operating temperature range. When AC voltage is superimposed on DC voltage, V <sub>p-p</sub> or V <sub>o-p</sub> , whichever is larger, should be maintained within the rated voltage range.																		
3	外观与尺寸 Appearance (APP) and Dimension	外观形状没有明显的缺点, 尺寸在标准范围内。 No marked defect on appearance form and dimensions are within specified range.	电容必须用目视检查其明显的缺点。 The capacitor should be visually inspected for evidence of defect. 尺寸用游标卡尺测量。 Dimensions should be measured with slide calipers.																		
4	标志 Marking	清晰易于识别。 To be easily legible.	目视检查。 The capacitor should be visually inspected.																		
5	容量 Capacitance (C <sub>r</sub> )	在误差范围内。 Within the specified tolerance.	容量与tanδ在25±1°C下, 使用下列条件进行测量。 The capacitance, tanδ should be measured at 25°C±1°C with the following conditions.																		
6	损耗角正切 Tangent of loss angle (tanδ)	COG, ≥30pF: Q≥1,000 <30pF: Q≥400+20C <sub>r</sub> (Note: Q=1/tanδ) X7R, X5R, >25V: ≤0.035 25V: ≤0.050 Y5V, ≥100V: ≤0.050 >25V & <100V: ≤0.075 25V: ≤0.100	<table border="1"> <thead> <tr> <th>特性 Char.</th> <th>容量 Capacitance</th> <th>频率 Frequency</th> <th>电压 Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2">COG</td> <td>≤1000pF</td> <td>1MHz</td> <td>1Vrms</td> </tr> <tr> <td>&gt;1000pF</td> <td>1kHz</td> <td>1Vrms</td> </tr> <tr> <td rowspan="2">X7R, X5R Y5V</td> <td>≤10μF</td> <td>1kHz</td> <td>1Vrms</td> </tr> <tr> <td>&gt;10μF</td> <td>120Hz</td> <td>0.5Vrms</td> </tr> </tbody> </table>	特性 Char.	容量 Capacitance	频率 Frequency	电压 Voltage	COG	≤1000pF	1MHz	1Vrms	>1000pF	1kHz	1Vrms	X7R, X5R Y5V	≤10μF	1kHz	1Vrms	>10μF	120Hz	0.5Vrms
特性 Char.	容量 Capacitance	频率 Frequency	电压 Voltage																		
COG	≤1000pF	1MHz	1Vrms																		
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X7R, X5R Y5V	≤10μF	1kHz	1Vrms																		
	>10μF	120Hz	0.5Vrms																		
7	绝缘电阻 Insulation resistance (IR)	COG, <0.05μF: ≥10000MΩ ≥0.05μF: ≥500/C <sub>r</sub> (MΩ) X7R, X5R, Y5V, <0.025μF: ≥4000MΩ ≥0.025μF: ≥100/C <sub>r</sub> (MΩ) (Note: C <sub>r</sub> unit: μF)	在两导线间施加额定电压 (额定电压大于400V时, 使用400V) 进行测量, 时间不超过1分钟。 The insulation resistance should be measured with a DC voltage not exceeding the rated voltage (400V for rated voltage more than 400V) at normal temperature and humidity and less than 1 minute of charging.																		
8	耐电压 Withstand voltage (WV)	没有不合格 No failure.	在电容器两导线间施加下列测试电压1到5s后不被破坏 (充/放电流不大于2mA)。 The capacitor should not be damaged when test voltages of below are applied between the lead wires for 1 to 5 sec. (Charge/Discharge current ≤ 2mA)																		
9	导线抗张强度 Terminal tensile strength		固定住电容器, 在引线上逐步施加径向拉力直至10N, 并保持10±1秒钟。 Fix the body of the capacitor and apply a tensile weight gradually to each lead wire in the radial direction of the capacitor up to 10N and keep it for 10±1s.																		
10	导线抗折强度 Terminal bending strengt	引线不应断开, 电容器不应破裂。 Lead wire should not be cut off capacitor should not be broken.	在引线出口处沿一个方向施加5N、90°的弯曲压力, 再恢复至初始状态。之后, 在2至3秒内再以相反方向施加一次90°的弯曲压力。 Each lead wire should be subjected to 5N of weight and bent 90° at the point of egress, in one direction, then returned to its original position and bent 90° in the opposite direction at the rate of one bent in 2 to 3s.																		
11	可焊性 Solderability of Leads	导线必须有3/4以上的面积均匀附着焊锡 Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	引线必须浸入焊料中3±0.5秒钟, 浸入深度离导线根部1.5-2.0mm。 The lead wire of a capacitor should be dipped into molten solder for 3±0.5s. The depth of immersion is up to about 1.5~2.0mm from the root of lead wires. 焊锡温度: 无铅焊(Sn-3Ag-0.5Cu) 245±5°C Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C																		

## 标准与试验方法 SPECIFICATIONS AND TESTING METHOD

序 No.	项目 Item	标准 Specifications	试验方法 Testing Method												
12	焊锡耐热性 Soldering effect	APP 没有可见损伤 No marked defect	导线浸入离导线根部1.5-2.0mm处、锡温为 $260\pm 10^{\circ}\text{C}$ 中 $3.5\pm 0.5$ 秒。 The lead wires should be immersed in solder of $260\pm 5^{\circ}\text{C}$ up to 1.5 to 2.0mm from the root of terminal for 3.5±0.5 sec. 试验后处理： Post-treatment: 电容必须存放在室温下12小时。 Capacitor should be stored for 12 h at room condition.												
		$\Delta\text{C}/\text{C}$ COG: $<10\text{pF}: \pm 0.5\text{pF}$ $\geq 10\text{pF}: \pm 5\%$ X7R, X5R: $\pm 10\%$ Y5V: $\pm 20\%$													
		IR 大于初始标准的30% More than 30% initial specified value.													
13	振动 Vibration resistance	APP 没有可见损伤 No marked defect	将电容器导线焊稳和调整振动频率范围为10-55Hz、总振幅为1.5mm、振动从10Hz到55Hz, 然后再回到10Hz, 大约一分钟。 The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. 总时间六个小时, 每两小时在相互垂直方向来回三次。 Apply for a total of 6 hours, 2 hours each in 3 mutually perpendicular directions.												
		$\text{C}_R$ 如第5项进行试验, 没有不合格 Per Item 5.													
		$\tan\delta$ 如第6项进行试验, 没有不合格 Per Item 6.													
14	电容随温度变化 Variation of capacitance with temperature	COG, $\Delta\text{C}/\text{C}: 0\pm 30\text{ppm}/^{\circ}\text{C}$ Cap. drift: $\pm 0.2\%$ or $\pm 0.05\text{pF}$ (whichever is larger) X7R, X5R, $\Delta\text{C}/\text{C}: \pm 15\%$ Y5V, $\Delta\text{C}/\text{C}: +22\%/-82\%$	电容器必须按照下列每一步骤进行测量。 The capacitance measurement should be made at each step specified in below. <table border="1" style="margin-left: 20px;"> <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>试验温度 Test temperature (<math>\pm 1^{\circ}\text{C}</math>)</td> <td>+20</td> <td>COG: -55 X7R, X5R: -55 Y5V: -25</td> <td>+20</td> <td>COG: +125 X7R: +125 X5R, Y5V: +85</td> <td>+20</td> </tr> </tbody> </table>	步骤 Step	1	2	3	4	5	试验温度 Test temperature ( $\pm 1^{\circ}\text{C}$ )	+20	COG: -55 X7R, X5R: -55 Y5V: -25	+20	COG: +125 X7R: +125 X5R, Y5V: +85	+20
步骤 Step	1	2	3	4	5										
试验温度 Test temperature ( $\pm 1^{\circ}\text{C}$ )	+20	COG: -55 X7R, X5R: -55 Y5V: -25	+20	COG: +125 X7R: +125 X5R, Y5V: +85	+20										
15	耐湿负荷 Humidity Loading	APP 没有可见损伤 No marked defect	施加额定电压的电容保持在温度为 $40\pm 2^{\circ}\text{C}$ 、相对湿度为90-95%条件下 $500\pm 12$ 小时。 Apply the rated voltage for $500\pm 12$ hours at $40\pm 2^{\circ}\text{C}$ in 90 to 95% relative humidity. 试验后处理： Post-treatment: 电容必须贮存在室温条件下24小时。 Capacitor should be stored for 24 h at room condition.												
		$\Delta\text{C}/\text{C}$ COG: $<10\text{pF}: \pm 0.5\text{pF}$ $\geq 10\text{pF}: \pm 5\%$ X7R, X5R: $\pm 10\%$ Y5V: $\pm 20\%$													
		$\tan\delta$ 小于初始标准的2倍 Less than 200% initial specified value.													
		IR 大于初始标准的25% More than 25% initial specified value.													
16	高温负荷 High Temperature Load	APP 没有可见损伤 No marked defect	在 $125\pm 2^{\circ}\text{C}$ (X5R, Y5V: $85^{\circ}\text{C}$ )、相对温度不大于50%条件下施加下列电压 $1000+48/0$ 小时 (充/放电流小于2mA) Apply a DC voltage of following voltage for $1000+48/0$ hours at $125\pm 2^{\circ}\text{C}$ (X5R, Y5V: $85^{\circ}\text{C}$ ) with a relative humidity of 50% max. $\leq 200\text{V}: 1.5U_R$ $>200\text{V}, \leq 500\text{V}: 1.3U_R$ $>500\text{V}: 1.2U_R$ 试验后处理: 电容器应在室温下储存24小时。 Post-treatment: Capacitor shall be stored for 24 h at room condition.												
		$\Delta\text{C}/\text{C}$ COG: $<10\text{pF}: \pm 0.5\text{pF}$ $\geq 10\text{pF}: \pm 5\%$ X7R, X5R: $\pm 10\%$ Y5V: $\pm 20\%$													
		$\tan\delta$ 小于初始标准的1.5倍 Less than 150% initial specified value.													
		IR 大于初始标准的50% More than 50% initial specified value.													
17	温度循环 Temperature and immersion cycle	APP 没有可见损伤 No marked defect	温度循环试验按以下条件进行试验和测量 Temperature cycling shall be measured in the following test. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-55\pm 2^{\circ}\text{C}</math> (Y5V: <math>-25^{\circ}\text{C}</math>)</td> <td>30min</td> </tr> <tr> <td>2</td> <td><math>+125\pm 2^{\circ}\text{C}</math> (X5R, Y5V: <math>+85^{\circ}\text{C}</math>)</td> <td>30min</td> </tr> </tbody> </table> 循环次数: 5次 Cycle numbers: 5 cycles 试验后处理: 电容器应在室温下储存12小时。 Post-treatment: Capacitor shall be stored for 12 h at room condition.	Step	Temperature	Time	1	$-55\pm 2^{\circ}\text{C}$ (Y5V: $-25^{\circ}\text{C}$ )	30min	2	$+125\pm 2^{\circ}\text{C}$ (X5R, Y5V: $+85^{\circ}\text{C}$ )	30min			
		Step		Temperature	Time										
		1		$-55\pm 2^{\circ}\text{C}$ (Y5V: $-25^{\circ}\text{C}$ )	30min										
		2		$+125\pm 2^{\circ}\text{C}$ (X5R, Y5V: $+85^{\circ}\text{C}$ )	30min										
$\Delta\text{C}/\text{C}$ COG: $<10\text{pF}: \pm 0.5\text{pF}$ $\geq 10\text{pF}: \pm 5\%$ X7R, X5R: $\pm 10\%$ Y5V: $\pm 20\%$															
$\tan\delta$ 小于初始标准的1.5倍 Less than 150% initial specified value.															
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