

规格书  
SPECIFICATION

客户 CUSTOMER	立创
客户料号 CUSTOMER P/N	
规格描述 DESCRIPTION	薄膜电容CBB系列
产品编码 PART NUMBER	
日期 DATE	2023-01-31

德尔创承认栏 APPROVED BY DERSONIC			客户承认栏 APPROVED BY CUSTOMER	
批准 APPROVED BY	审核 CHECK BY	制订 FORMULATE BY	批准 APPROVED BY	审核 CHECK BY
				

东莞市德尔创电子有限公司

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# 1. 规格尺寸

## Specification & Dimensions



料号 P/N	立创编码	品名规格 Specification	外形尺寸 (单位: mm) Dimensions and Drawings					
			W±1.0	H±1.0	T±1.0	Lmin	印字	P±0.8
CFC2A104JD0676		104J/100V	9.0	6.5	3.0	20	ZNR	7.5
CFC2A404JD0494		404J/100V	9.0	9.5	3.5	7±0.5	ZNR	7.5
CFC2E104JD0531		104J/250V	9.5	8.0	4.5	20	ZNR	内弯7.5
CFC2E223JD0382		223J/250V	9.5	8.0	5.0	20	CW	7.5
CFC2E473JD0383		473J/250V	9.5	8.0	5.0	20	CW	7.5
CFC2G103JE0026		103J/400V	12.0	8.5	5.0	20	中性	10.0
CFC2G104JD0670		104J/400V	9.5	8.5	5.0	3.5±0.5	ZNR	7.5
CFC2G105JG0578		105J/400V	17.0	15.0	8.0	3.5±0.5	ZNR	15.0
CFC2G105JG0519		105J/400V	17.0	14.5	8.0	3.5±0.5	CW	15.0
CFC2G105JI0718		105J/400V	21.5	12.0	7.0	20	ZNR	20.0
CFC2G154JD0351		154J/400V	9.5	11.0	5.0	20	中性	7.5
CFC2G474JG0590		474J/400V	17.0	16.0	9.0	20	ZNR	15.0
CFC2G474JI0070		474J/400V	21.0	10.0	5.0	20	中性	20.0
CFC2G681JE0693		681J/400V	11.5	10.0	6.0	3.5±0.5	ZNR	10.0
CFC2J104JG0041		104J/630V	17.0	9.0	6.0	20	中性	15.0
CFC2J154JE0496		154J/630V	11.5	11.5	7.0	3.5±0.5	ZNR	10.0
CFC2J223JD0514		223J/630V	9.0	8.5	4.0	20	中性	7.5
CFC2J223JE0430		223J/630V	12.0	8.5	5.0	3.5±0.5	CW	10.0

CFC2J224JG0457		224J/630V	17.5	11.5	6.5	3.5±0.5	ZNR	15.0
CFC2J224JI0695		224J/630V	22.0	10.0	6.0	20	ZNR	20.0
CFC2J225JL0393		225J/630V	29.5	22.0	12.5	20	CW	27.5
CFC2J334JG0166		334J/630V	17.0	17.0	9.0	20	CW	15.0
CFC2J473JE0069		473J/630V	12.0	8.0	4.5	20	中性	10.0
CFC2J474JE0637		474J/630V	11.5	16.0	9.0	20	ZNR	10.0
CFC2J683JE0584		683J/630V	12.0	10.0	5.0	3.5±0.5	中性	10.0
CFC2W104JE0443		104J/450V	12.0	10.0	6.0	3.5±0.5	CW	10.0
CFC2W154JE0445		154J/450V	12.5	9.0	5.0	3.5±0.5	CW	10.0
CFC2W154JE0638		154J/450V	11.5	9.5	4.5	20	ZNR	10.0
CFC2W224JE0597		224J/450V	12.0	10.0	6.0	20	ZNR	10.0
CFC2W224JE0641		224J/450V	11.5	10.0	5.0	20	ZNR	10.0
CFC2W334JE0733		334J/450V	11.5	12.0	7.0	20	CW	10.0

注：产品脚距大于或等于15MM产品外形尺寸与脚距间距的公差均为±1.5MM

## 2.产品介绍

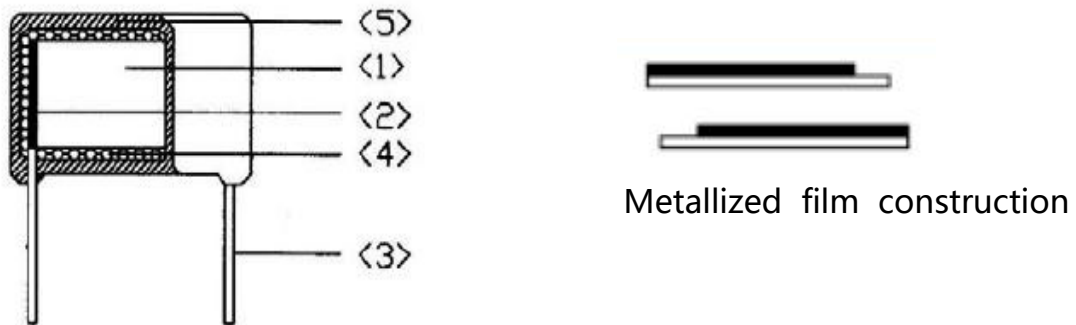
### Products Introduction

CBB 电容是由金属化聚丙烯薄膜，采用无感结构卷绕而成，引线采用镀锡铜包钢线/镀锡铜线，外部使用阻燃环氧粉体封装而成。具有良好的自愈功能和优良的阻燃性，符合 UL94-V0 标准。

CBB are wound with metallized polypropylene film dielectric, Non-inductive construction, tinned copper wire leads or tinned copper leads, and flame retardant epoxy resin coating. They have excellent features of self-healing and good flame retardant according to UL 94-V0

## 3.产品结构和关键材料

### Construction and main materials of products



NO	关键材料 Main Materials	材料规格 Specification	备注 Remark
1	金属化聚丙烯薄膜 Metallized polypropylene Film	MPPZAH or MPPA(4~12um)	...
2	锌锡层 Zn, Sn line	锌或锌锡合金 Zn or Zn and Sn alloy	...
3	导线 Terminal	镀锡铜包钢线(Φ0.6 or 0.8/1.0mm) CP or CU	镀锡层厚度7um以
4	内封装材料 Inside Coating Material	环氧树脂 Epoxy resin	UL94-V0
5	外封装材料 Outside Coating Material	环氧粉末 Epoxy power	UL94-V0

注：以上材料均符合环保要求

Note: All of the Materials are in compliance with the requirements of ROHS AND REACH.

## 4.典型应用

### Type application

本产品用于隔直流，耦合，去耦，滤波，旁路，计时，温控，广泛应用于通信设备，数据处理设备，工业设备，自动控制系统以及其他大型电子设备的理想元件。

The Products are suitable for blocking, coupling, decoupling, filtering, by pass, timing, temperature control and idea for use in telecommunication equipments, data processing equipments, industrial instruments, automatic control systems and other general electronic equipments, Etc.

## 5.特点

### Features

无感结构 Non-induction construction

优良的耐湿性 High moisture-resistance

自愈性 Self-healing property

阻燃性(符合 UL 94V-0) Flame retardant type ( compliance with UL 94V-0 )

非常小的损耗 Very small loss

优秀的容量，损耗的频率和温度特性 Excellent capacitance and DF for frequency and temperature characteristics

高绝缘阻值 High insulation resistance

## 6.电气特性

### Electrical specifications

如无其他说明，电气特性请参考 IEC 60384-16:2005

Unless otherwise specified,electric characteristics shall refer to IEC 60384-16:2005

项目 Item	特性要求 Characteristic requirement				测试方法及条件 Test method&Condition			
工作温度 Operating Temperature	-40°C ~ +105°C 在温度 85°C(AC form 75°C)以上时，每上升 1 度，额定电压下降 1.35% +85°C ~ +105°C(AC FROM 75°C): derating factor 1.35% per°C for R.V(DC))							
容量范围 Capacitance Range	0.001uF~10.0uF				1KHz ,1.0Vrms ,20°C			
容量偏差 Capacitance Tolerance	±1%(F),±2%(G),±2.5%(H),±3%(I),±5%(J),±10%(K)				1KHz ,1.0Vrms ,20°C			
额定电压 Rated Voltage	100/160/250/400/450/630/1000V							
损耗角正切 Dissipation Factor		$C \leq 0.47 \mu F$	$0.47 \mu F < C \leq 1.0 \mu F$	$C > 1.0 \mu F$	1KHz ,1.0Vrms ,20°C			
	1KHZ	0.10%	0.10%	0.10%				
	10KHZ	0.20%	0.40%	0.80%				
	100KHZ	0.60%						
绝缘阻值 Insulation Resistance		$C \leq 0.33 \mu F$	$C \geq 0.33 \mu F$		100VDC,60S,20°C			
		$IR \geq 100000M \Omega$	$IR \geq 30000s$					
		$or \geq 30000M \Omega \cdot U_f$						
端子间电压 Withstand voltage Between Terminals	应无永久性击穿或飞弧 No permanent breakdown or flashover				1.6Ur(d.c) 60s;2Ur(d.c)5s C>1uf,Cut off Current 10mA , C≤1uf,Cut off Current 5mA , ARC=OFF, Voltage raising time 5~10s,for voltage rise AC:150V/S;DC:250V/S pulse rise ≤150v/us			
最大脉冲爬升速率 Maximum Pulse rising gradient(dv/dt)	Ur(V)	dv/dt(V/us)						
		P=7.5	P=10.0	P=15.0	P=20.0/ 22.5	P=27.5/ 25.0	P=31.5	P=41.5
	100V	180	150	110	60	60	45	30
	250V	660	300	220	110	75	60	40
	400V	900	515	380	180	120	95	65
630V	1500	700	510	220	150	120	85	

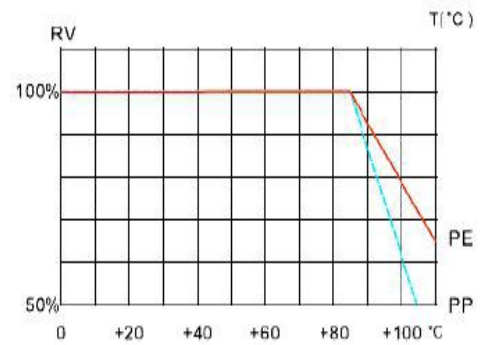
说明 NOTE:

1.若实际工作电压 (U) 比额定电压(Ur)低, 电容器可工作在更高的 dv/dt 场合, dv/dt 最大值应为上表值乘以(Ur/U).

1.If the working voltage (U) is lower than the rated voltage(Ur),the capacitor can be worked at a higher dv/dt. In this case,the maximum allowed dv/dt is obtain by multiplying the above value with Ur/U.

注: 额定电压定义: 在工作温度范围内, 电容持续运行的可承受电压. 但是, 工作温度在 85°C~105°C之间时(AC form 75°C), 每上升 1°C, 额定工作电压应下降 1.35%。

Note:Rated voltage is defined the voltage which shall be capable of applying to capacitors continuously in the operating temperature range.However, rated voltage shall be derated 1.35% per°C when capacitors operation temperature is between 85°C to 105°C(AC from 75°C).



注: 电容器工作电压 (**Operating voltage of the capacitor**) 确认使用在电容器两个端子上的工作电压, 无论直流电压, 直流+交流电压, 交流电压, 脉冲电压, 均应在额定电压范围内。 Before using, make sure the voltage applied to the both ends of the capacitor is within the

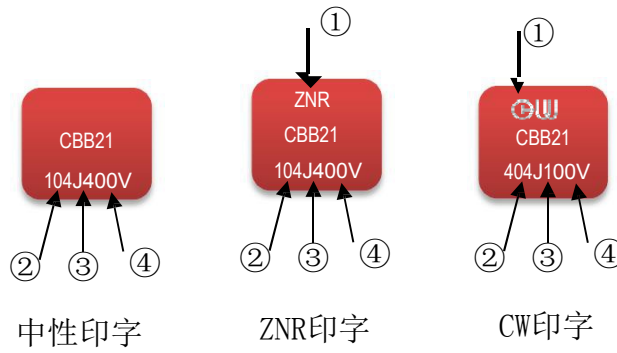
limit of the rated voltage,however DC voltage,DC and AC voltage,AC voltage,Pulse voltage etc .

Voltage	(1) DC voltage	(2) DC+AC voltage	(3) AC voltage
Positional Measurement (Rated voltage)			
Voltage	(4) Pulse voltage (A)	(5) Pulse voltage (B)	
Positional Measurement (Rated voltage)			

注: 电容器使用工作温度范围 **Capacitor working temperature range** 确认电容器使用的温度 (环境温度+电容器自身表面温升+环境辐射温度), 不要超过其额定温度范围内。 Before using,please make sure the capacitor working temperature (the ambient temperature+capacitor's temperature+temperature rise caused by environmental radiation temperature) is used should not exceed its rated temperature. 在交流或高频脉冲线路中电容器由于电流通过而发热, 如果温升过高将会烧毁电容器。 The capacitors used in AC or high frequency pulse circuit emit heat due to the current flowing through ,if the temperature is too high will burn up capacitors.

## 7.印字

### Marking



- (1) 商标 logo: ZNR
- (2) 静电容量 Capacitance: 104,224
- (3) 允许误差 Capacitance Tolerance:  $\pm 5\%$ (J)
- (4) 额定电压 Rated Voltage: 100/160/250/400/450/630/1000V

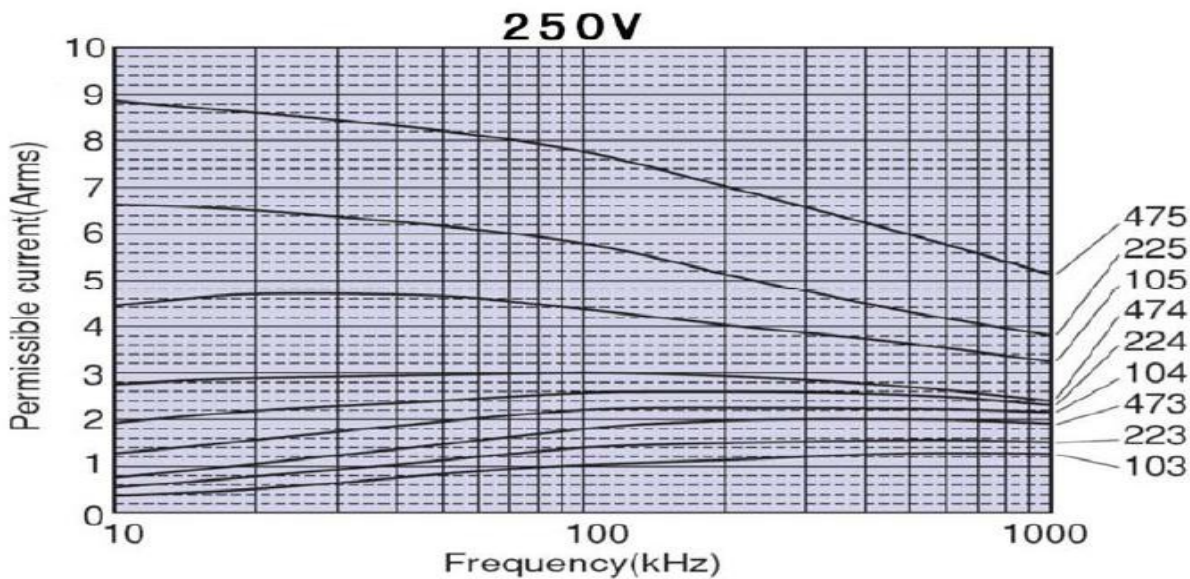
## 8.电流对频率特性

### Arms Vs Frequency

A permissible current is regulated by both a root-mean-square value current and a peak current.  
 A root-mean-square value current is to be a permissible current value to frequency attached.  
 The values of continuous peak current in the allowable peak current shall be those of continuous current,  
 And the values of single peak current shall be those of discontinuous current such as rush current in  
 Switching on or off. The highest number of times of single peak current shall be limited to 10,000times.  
 (In case of exceeding 10,000times, please contact us.)

允许电流通常由均方根电流和尖峰电流表示。均方根电流如下附图所示

允许尖峰电流中的连续尖峰电流值应为持续电流，  
 单个尖峰电流应为不连续电流，如开关动作中的脉冲电流。  
 最高次数的单峰电流次数应限制在 10000 次内(若有超过 10000 次，请告知我们)。  
 Characteristics of permissible current (Arms)Vs Frequency - ( sinusoidal wave ,  $\Delta T \leq 12^\circ\text{C}$ )  
 允许电流 ( Arms ) 对频率特性曲线图 ( 正弦波 ,  $\Delta T \leq 12^\circ\text{C}$ )



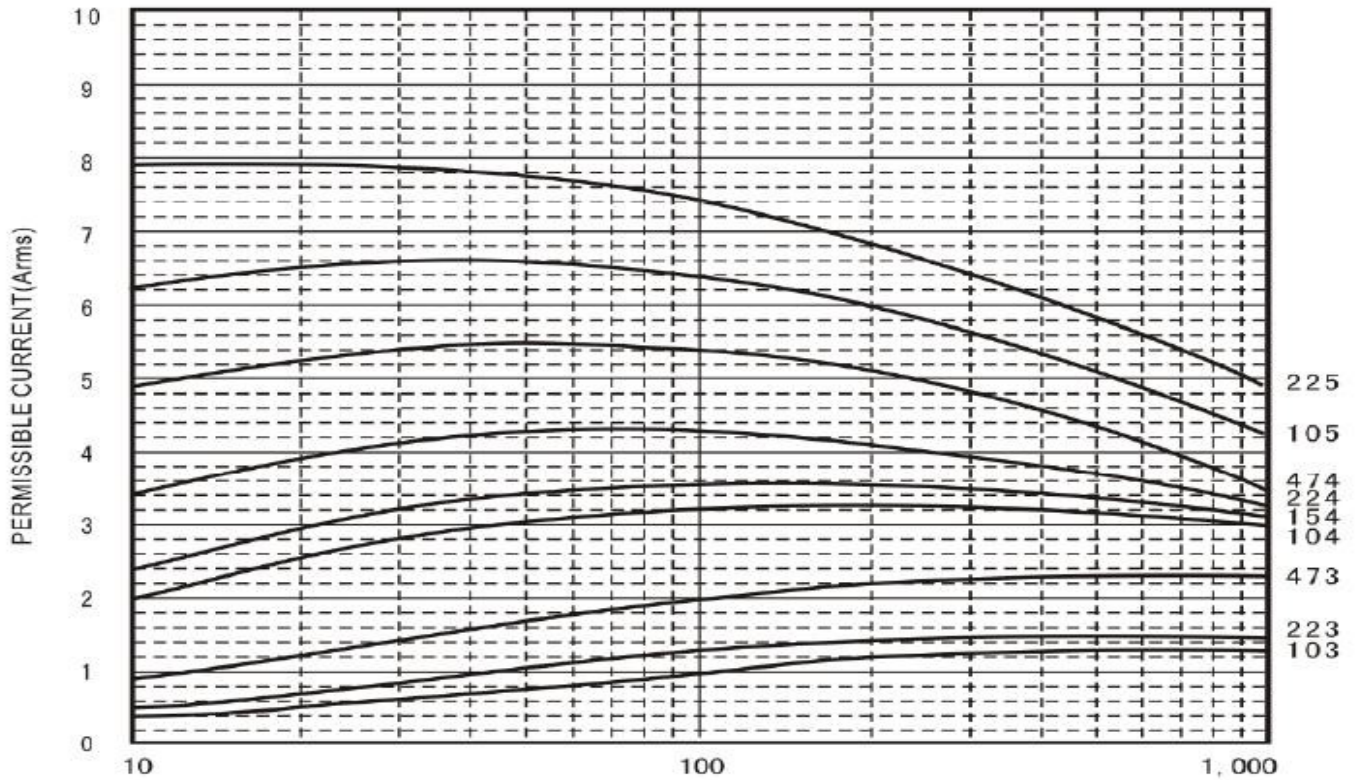
Characteristics of permissible current (Arms)Vs Frequency



### 电流 Vs 频率特性图

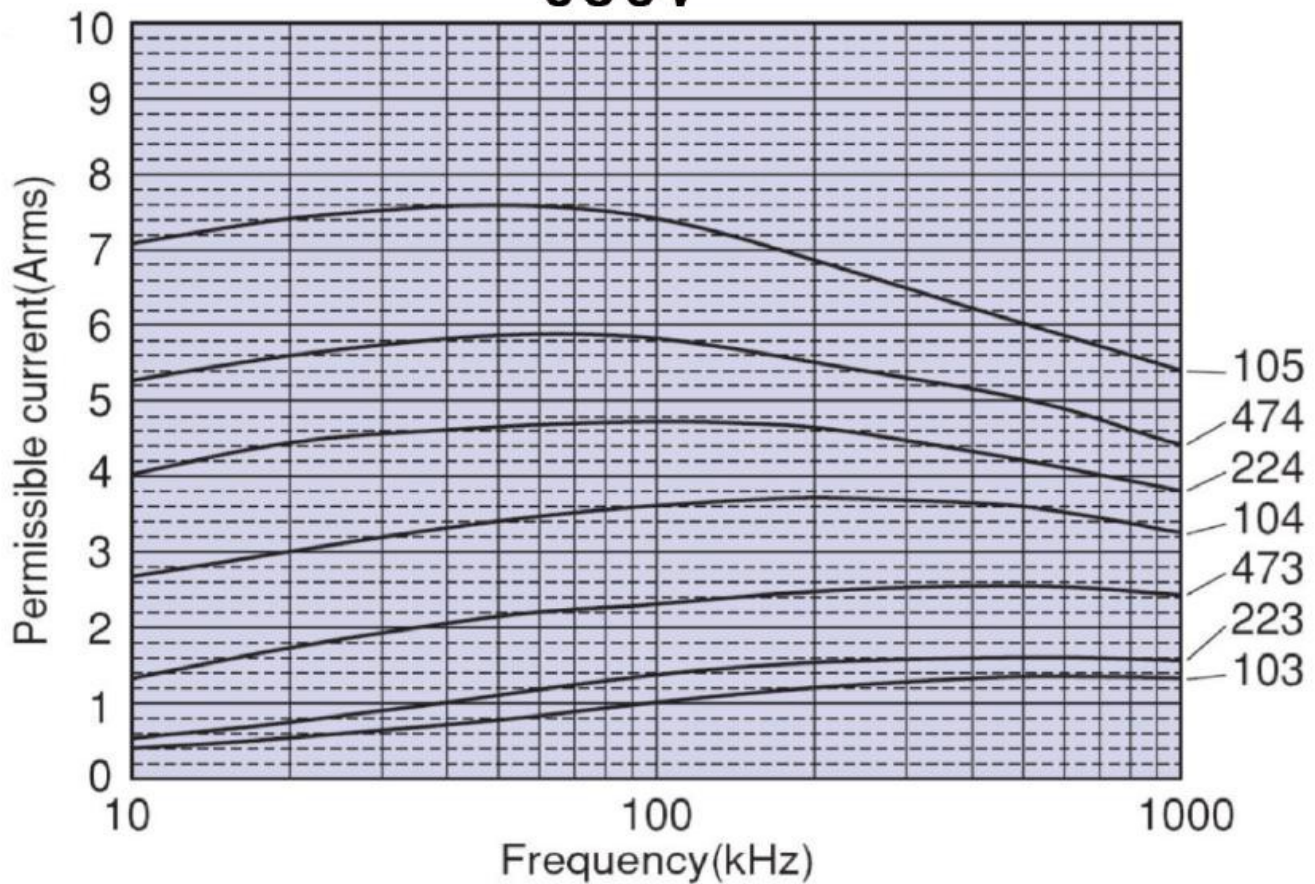
允许电流 ( Arms ) 对频率特性曲线图 ( 正弦波,  $\Delta T \leq 12^\circ\text{C}$  )

## 400V/450



允许电流 ( Arms ) 对频率特性曲线图 ( 正弦波,  $\Delta T \leq 12^\circ\text{C}$  )

## 630V



### 9. 温度特性

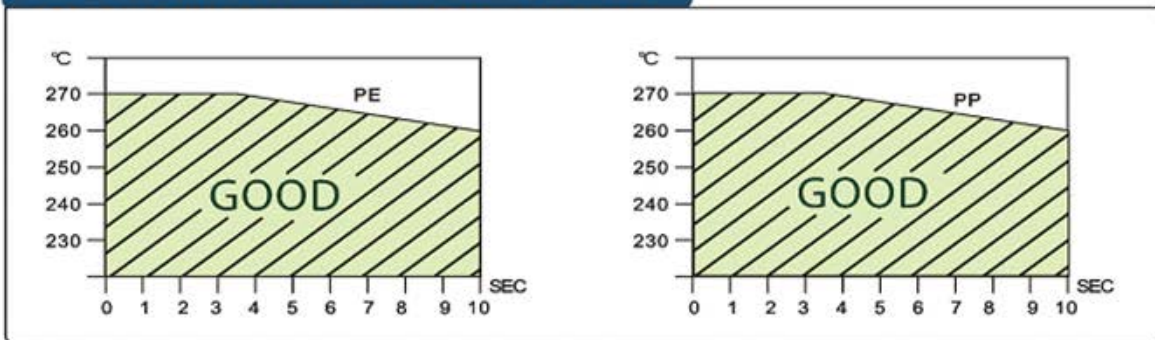


# TEMPERATURE CHARACTERISTICS

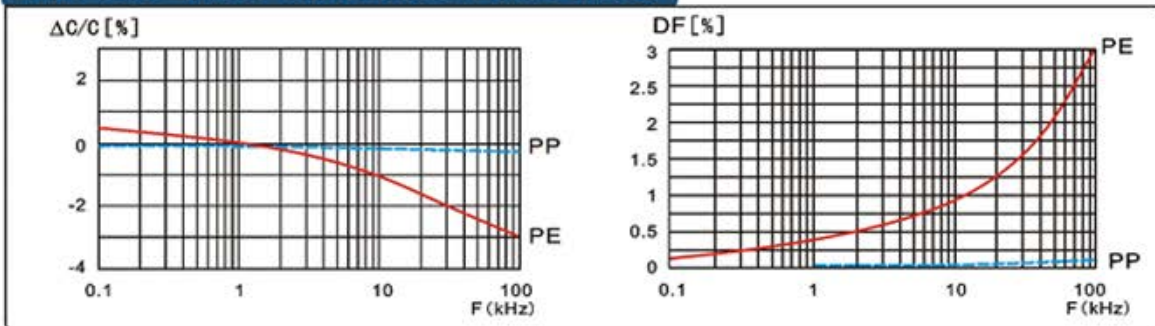
## TEMPERATURE CHARACTERISTICS



## SOLDERING TEMPERATURE VS. TIME



## FREQUENCY CHARACTERISTICS



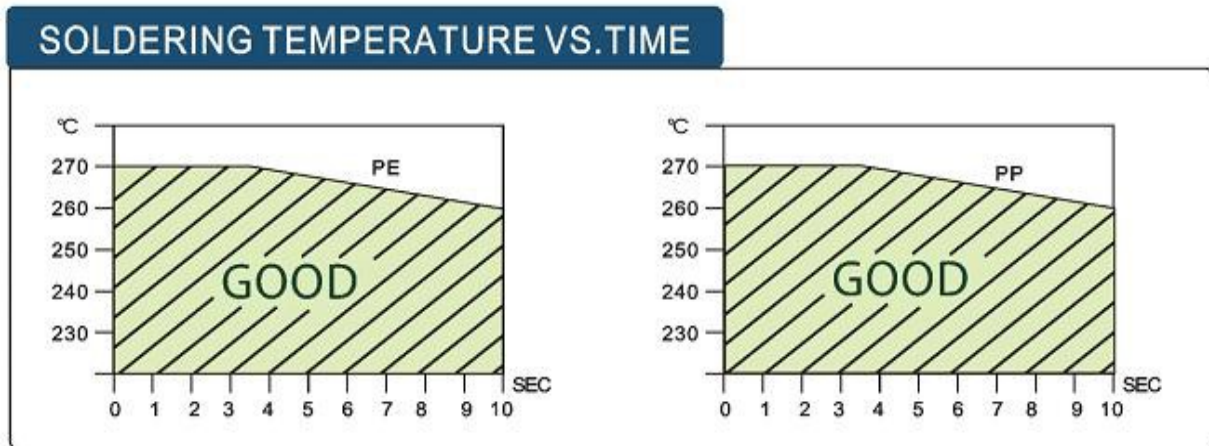
# Guide in useage

## 10.1 焊锡

Soldering 当焊接电容器时，焊锡热会通过引线端子和封装层传递到电容素子，因此必须注意高温 和长时间焊接引起的电容电气特性衰减或包封层损坏。请确认焊锡在以下温度范围内。

When soldering a capacitor,heat in soldering is conducted to the element of the capacitor from wire lead and an enclosure,and hence it should be noted that soldering under high temperature and long period may cause deterioration of characteristic or coating breakdown of capacitors.

Be sure to solder within the following temperature condition range.



## 10.2 流焊/波峰焊

FLOW / WAVE SOLDERING

PRODUCTS: FILM CAPACITORS (Application of Through-Hole)



## 10.3 烙铁焊接

soldering iron

当使用烙铁焊接时，烙铁尖端温度不得超过 350°C，焊接时间不超过 5 秒

When using soldering iron,iron tip temperature less than 350°C,Soldering time(sec.)within 5 seconds.

# 11.环保要求

## Environment requirement

符合 ROHS 要求 Compliance with the requirement of ROHS.

符合 REACH 要求 Compliance with the requirement of REACH.

符合无卤（如要求） Without Halogen(as required).

附件 2 为第三方测试的 ROHS 和 REACH 报告

Please see the attachment 2 for the test reports of the Rohs and Reach by a third party .

## 12.参考标准

### Reference standards

GB-T2693-2001 ( IDT IEC 60384-1-2008 ) 电子设备用固定电容器 第 1 部分 总规范

GB-T10190-1988 电子设备用固定电容器 第 16 部分 分规范 金属化聚丙烯膜介质直流固定电容器 IEC-

60384-16-2005 电子设备用固定电容器 第 16 部分 分规范 金属化聚丙烯膜介质直流固定电容器 GB-T

2828.1-2003 计数抽样检验程序 第 1 部分 按接收质量限(AQL)检索逐批检验抽样计划

GB-T2693-2001 ( IDT IEC 60384-1-2008 ) Fixed capacitors for use in electronic equipment –Part 1:  
Generic specification

GB-T10190-1988 Fixed capacitors for use in electronic equipment –Part 16:Sectional specification:  
Fixed metallized polypropylene film D.C. capacitor

IEC-60384-16-2005 Fixed capacitors for use in electronic equipment –Part 16:Sectional specification:  
Fixed metallized polypropylene film D.C. capacitor

GB-T 2828.1-2003 Sampling procedures for inspection by attributes—Part 1:  
Sampling schemes indexed by acceptance quality limit (AQL)for lot-by-lot inspection  
(ISO 2859-1:1999, IDT)

## 13.包装

### Packing



塑料袋最小包装，数量为 100、200、500、1000PCS

Plastic bag is the minimum packing.the quantity are 100、200、500、1000PCS.  
袋内放置产品合格环保标识标签，包括料号，规格，数量，LOT 批号，生产日期等  
The label of the ROHS include the product name、specification、quantity、  
lot No、manufacture date etc.

## 14.存储条件

## Storage conditions

14.1 请注意，长时间产品暴露在空气中会导致引线氧化，焊接性能衰减。

It should be noted that the solderability of the terminals may be deteriorated when stored barely in an atmosphere for a long periods

14.2 不能放置在高温高湿环境中，请遵循以下存储条件（原包装下保存）

It shouldn't be located in particularly high temperature and high humidity, it must submit to the following conditions(keeping in the original package)

温度 Temperature: 35°C MAX

相对湿度 Relative humidity : 60% MAX

14.3 存储时间：最长 12 个月（以包装袋上标注的生产日期为准）

Storage period: Losse: 12 months max

(from the manufacturing date marked on the label in package bag)

## 15. 可靠性实验

### Reliability test

15.1 测试条件：除非另有规定，所有试验和测量均应在 GB2421-81 第 4.3 条（IEC68-1 第 5.3 条）中规定的试验用标准大气条件下进行，条件如下：

Test condition: Unless otherwise specified, all tests and measurements shall be made under standard atmospheric conditions for testing as given in GB2421-81 NO.4.3(IEC68-1 NO.5.3), AS follows

温度 Temperature : 15°C - 35°C

相对湿度 Relative humidity : 25%—75%

气压 Air pressure : 86—106Kpa (860—1060mbra)

15.2 如对测试结果有任何疑问，则按一下限制测试：

If there may be any doubt on the results, measurements shall be made within the following limits.

环境温度 Ambient temperature: 20±2°C

环境湿度 Relative humidity: 50~70%

15.3 电性参数参考 IEC 60384-1:2008 ,IEC 60384-16:2005, IEC 60068-2-2;IEC 60068-2-21

Electric characteristics shall refer to IEC 60384-1:2008 ,IEC 60384-16:2005, IEC 60068-2-2;IEC 60068-2-21

## 电性参数

## Electric characteristics

项目 Item	特性要求 Characteristic requirement			测试方法及条件 Test method&Condition	
容量范围 Capacitance Range	0.001uF ~ 10.0uF			IEC60384-16 4.2.2 IEC60384-1 4.7	
容量偏差 Capacitance Tolerance	±1%(F), ±2%(G), ±2.5%(H), ±3%(I), ±5%(J), ±10%(K)			1KHz ,1.0Vrms ,20°C	
额定电压 Rated Voltage	100/160/250/400/450/630/1000V				
损耗角正切 Dissipation Factor		$C \leq 0.47 \mu F$	$0.47 \mu F < C \leq 1.0 \mu F$	$C > 1.0 \mu F$	1KHz ,1.0Vrms ,20°C
	1KHZ	0.10%	0.10%	0.10%	
	10KHZ	0.20%	0.40%	0.80%	
	100KHZ	0.60%			
绝缘阻值 Insulation Resistance		$C \leq 0.33 \mu F$	$C \geq 0.33 \mu F$		100VDC,60S,20°C
		$IR \geq 100000M \Omega$	$IR \geq 30000s$		
			$or \geq 30000M \Omega \cdot U$		
端子间电压 Withstand voltage Between Terminals	应无永久性击穿或飞弧 No permanent breakdown or flashover			1.6Ur(d.c)60s;2Ur(d.c)5s C>1uf,Cut off Current 10mA , C≤1uf,Cut off Current 5mA , ARC=OFF, Voltage raising time 5 ~ 10s,for voltage rise AC:150V/S;DC:250V/S pulse rise ≤150v/us	

## 寿命实验

## Life Test

NO.	项目 Item	特性要求 Characteristic requirement	测试方法及条件 Test method&Condition		
1	端子强度 Terminal Strength	拉伸强度 Pull Strength 无可见机械损伤 There shall be no visible mechanical damage	线径 mm	荷重	时间
			wire diameter	Load	Time
			≤0.5	5N	10S
			0.5<d≤0.8	10N	10S
			0.8<d≤1.25	20N	10S
			IEC60384-16 C4.3 IEC60384-1 C4.13 IEC60068 2-21 Test Ua1		
	端子强度 Terminal Strength	弯曲强度 Bending Strength 无可见机械损伤 There shall be no visible mechanical damage	线径 mm	荷重	次数
			wire diameter	Load	Time s
			≤0.5	5N	90°C×4
			0.5<d≤0.8	5N	90°C×4
			0.8<d≤1.25	5N	90°C×4
			IEC60384-16 C4.3 IEC60384-1 C4.13 IEC60068 2-21 Test Ua1		



NO.	项目 Item	特性要求 Characteristic requirement	测试方法及条件 Test method&Condition										
2	可焊性 Solderability	端子引线周围至少 95%的面积均匀附锡，且本体无破裂等损坏现象 锡料成分 Sn 97.5%+ Ag 2%+Cu 0.5% At least 95% of the Circumference of the Lead wire.Around load surface dipped into with new soler, the body be no visible damage.	焊锡温度：235±5℃ Solder temp 浸渍时间: 2.0±0.5S Immersion time IEC60384-16 C4.5 IEC60384-1 C4.15 IEC60068-2-20 Test Ta										
3	耐焊接热 Resistance to Soldering heat	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="287 392 454 470">外观 Appearance</td> <td data-bbox="454 392 1125 470">无可见损伤,标志清晰 No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="287 470 454 627">容量变化 Capacitance Variation</td> <td data-bbox="454 470 1125 627"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="287 627 454 750">损耗 Dissipation Factor</td> <td data-bbox="454 627 1125 750"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math> <math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math> at 1KHZ</td> </tr> <tr> <td data-bbox="287 750 454 873">耐电压 Withstand Voltage</td> <td data-bbox="454 750 1125 873">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="287 873 454 985">绝缘电阻 Insulation Resistance</td> <td data-bbox="454 873 1125 985"><math>\Delta R/R \leq 50\%</math></td> </tr> </table>	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.	容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$	损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ	耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover	绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$	焊锡温度：260±5℃ Solder temp 浸渍时间: 10±1S Immersion time 恢复时间 1-2 小时 Then recovery at ordinary condition 1~2hours IEC60384-16 C4.4 IEC60384-1 C4.14 IEC60068-2-20 Test Ta
外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.												
容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$												
损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ												
耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover												
绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$												
4	耐久性 Endurance	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="287 985 454 1064">外观 Appearance</td> <td data-bbox="454 985 1125 1064">无可见损伤,标志清晰 No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="287 1064 454 1209">容量变化 Capacitance Variation</td> <td data-bbox="454 1064 1125 1209"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="287 1209 454 1332">损耗 Dissipation Factor</td> <td data-bbox="454 1209 1125 1332"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math> <math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math> at 1KHZ</td> </tr> <tr> <td data-bbox="287 1332 454 1456">耐电压 Withstand Voltage</td> <td data-bbox="454 1332 1125 1456">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="287 1456 454 1568">绝缘电阻 Insulation Resistance</td> <td data-bbox="454 1456 1125 1568"><math>\Delta R/R \leq 50\%</math></td> </tr> </table>	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.	容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$	损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ	耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover	绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$	温度 Temp：105±3℃ 持续时间: Duration 1000+48h 施加电压 voltage： 1.25 Ur(d.c.) 50hz  恢复时间至少 16 小时 Then recovery at ordinary condition at least 16 hours IEC60384-16 C4.12 IEC60384-1 C4.23 IEC60068 2 2
外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.												
容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$												
损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ												
耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover												
绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$												
5	稳态湿热 Damp heat, steady	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="287 1568 454 1646">外观 Appearance</td> <td data-bbox="454 1568 1125 1646">无可见损伤,标志清晰 No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="287 1646 454 1792">容量变化 Capacitance Variation</td> <td data-bbox="454 1646 1125 1792"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="287 1792 454 1915">损耗 Dissipation Factor</td> <td data-bbox="454 1792 1125 1915"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math> <math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math> at 1KHZ</td> </tr> <tr> <td data-bbox="287 1915 454 2038">耐电压 Withstand Voltage</td> <td data-bbox="454 1915 1125 2038">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="287 2038 454 2134">绝缘电阻 Insulation Resistance</td> <td data-bbox="454 2038 1125 2134"><math>\Delta R/R \leq 50\%</math></td> </tr> </table>	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.	容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$	损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ	耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover	绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$	温度 Temp：40±2℃ 湿度：90-95%RH Humidity 持续时间: 56 day Duration 电容不施加电压 恢复时间 1-2小时 Then recovery at ordinary condition 1-2 hours IEC60384-16 C4.11 IEC60384-1 C4.22 IEC60068-2-78 Test Cab
外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.												
容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$												
损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ												
耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover												
绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$												

NO.	项目 Item	特性要求 Characteristic requirement	测试方法及条件 Test method&Condition
6	干热 Dry heat	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.
		容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$
		损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ
		耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover
		绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$
			温度 Temp : $105 \pm 2^\circ\text{C}$ 持续时间: 16h Duration 恢复时间不低于 4 小时 Then recovery at ordinary condition at least 4 hours IEC60384-16 C4.10.2 IEC60384-1 C4.21.2 IEC60068-2-2, test Bb
7	寒冷 Cold	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.
		容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$
		损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ
		耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover
		绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$
			温度 Temp : $-40 \pm 2^\circ\text{C}$ 持续时间: 4h Duration 恢复时间不低于 4 小时 Then recovery at ordinary condition at least 4 hours IEC60384-16 C4.10.4 IEC60384-1 C4.21.4 IEC60068-2-1, test Ab
8	浪涌 Surge	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.
		容量变化 Capacitance Variation	$\Delta C/C \leq 5\%$
		损耗 Dissipation Factor	$\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ
		耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover
		绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$
			When $\text{CR} \leq 1.0 \mu\text{F}$ $\text{UP} = 1.6\text{UR}$ When $\text{CR} > 1.0 \mu\text{F}$ $\text{UP} = \text{UR}$ time:10s Cycle times:24 次 前三次脉冲没有发生自愈性击穿,则可停止,为合格 IEC60384-1 C4.26 IEC60060-1

NO.	项目 Item	特性要求 Characteristic requirement	测试方法及条件 Test method&Condition
9	充放电 Charge and discharge	外观 Appearance	Test voltage: UR (d. c.) time:1Cycle/s Cycle times:10000 Dv/Dt:100 V/ $\mu$ s. resistor: (220*10 <sup>-6</sup> / CR) $\Omega$  IEC60384-16 C4.13 IEC60384-1 C4.27
	容量变化 Capacitance Variation	无可见损伤,标志清晰 No visible damage, The marking shall be legible.  $\Delta C/C \leq 5\%$	
	损耗 Dissipation Factor	$\Delta \text{tg } \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$ $\Delta \text{tg } \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$ at 1KHZ	
	耐电压 Withstand Voltage	1.6 UR (d.c) 60S 耐电压后无击穿或飞弧 No permanent breakdown or flashover	
	绝缘电阻 Insulation Resistance	$\Delta R/R \leq 50\%$	
10	振动 Vibration	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.  上下左右前后三个方向各 2H, 频率 10-55Hz 振幅 0.75mm 或 98m/S <sup>2</sup>  3 directions at 2 hours each 10-55Hz at 0.75mm or 98m/s <sup>2</sup> IEC60384-16 C4.7 IEC60384-1 C4.17 IEC 60068-2-6, test Fc,
11	碰撞或冲击 Bump	外观 Appearance	无可见损伤,标志清晰 No visible damage, The marking shall be legible.  次数 number of bumps: 1 000 or 4 000 加速度 Acceleration: 400 m/s <sup>2</sup> Pulse duration: 6 ms IEC60384-16 C4.8 IEC60384-1 C4.18 IEC 60068-2-29, test Eb,
12	阻燃试验 Passive flammability test	火焰等级 : B Category of flammability 火焰时间 : 10S Flame exposure time 最大燃烧时间 : 10s Maximum burning time	UL94-V0  IEC60384-1 C4.38 IEC60695-11-5.

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