

# 规格书

## SPECIFICATION

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

| 德尔创承认栏<br>APPROVED BY DERSONIC |   |                    | 客户承认栏<br>APPROVED BY CUSTOMER |                |
|--------------------------------|---|--------------------|-------------------------------|----------------|
| 批准<br>APPROVED BY              | 审核<br>CHECK BY  | 制订<br>FORMULATE BY | 批准<br>APPROVED BY             | 审核<br>CHECK BY |
|                                |  |                    |                               |                |

东莞市德尔创电子有限公司

DONGGUAN DERSONIC ELECTRONIC CO., LTD.

中国广东省东莞市寮步镇松湖智谷科技产业园2栋15楼  
15/F, Building 2, Songhu Zhigu Science and Technology Industrial Park,  
Liaobu Town, Dongguan City, Guangdong Province, China  
TEL: +86-769-8533 5208 FAX: +86-769-8155 5989  
Website: <http://www.dersonic.com>

# 1. 规格尺寸

## Specification & Dimensions



| 料号<br>P/N      | 立创编码 | 品名规格<br>Specification | 外形尺寸 (单位: mm)<br>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

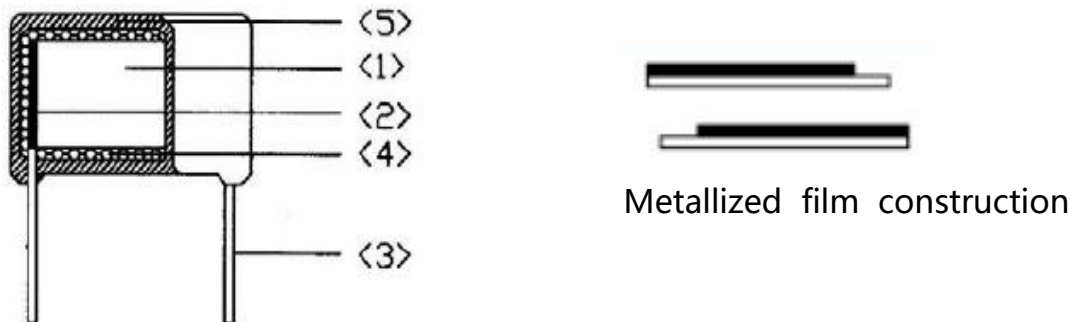
### Products Introduction

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<br>Main Materials                    | 材料规格<br>Specification                 | 备注<br>Remark |
|----|---|---------------------------------------|--------------|
| 1  | 金属化聚丙烯薄膜<br>Metallized polypropylene Film | MPPZAH or MPPA(4~12um)                | ...          |
| 2  | 锌锡层<br>Zn, Sn line                        | 锌或锌锡合金<br>Zn or Zn and Sn alloy       | ...          |
| 3  | 导线<br>Terminal                            | 镀锡铜包钢线(Φ0.6 or 0.8/1.0mm)<br>CP or CU | 镀锡层厚度7um以    |
| 4  | 内封装材料<br>Inside Coating Material          | 环氧树脂<br>Epoxy resin                   | UL94-V0      |
| 5  | 外封装材料<br>Outside Coating Material         | 环氧粉末<br>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<br>Item  | 特性要求<br>Characteristic requirement   |                           |  |          | 测试方法及条件<br>Test method&Condition   |                 |        |        |
|---|--|---------------------------|--|----------|--|-----------------|--------|--------|
| 工作温度<br>Operating Temperature                       | -40°C ~ +105°C<br>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%<br>+85°C ~ +105°C(AC FROM 75°C): derating factor 1.35% per°C for R.V(DC)) |                           |  |          |  |                 |        |        |
| 容量范围<br>Capacitance Range                           | 0.001uF~10.0uF   |                           |  |          | 1KHz ,1.0Vrms ,20°C  |                 |        |        |
| 容量偏差<br>Capacitance Tolerance                       | ±1%(F),±2%(G),±2.5%(H),±3%(I),±5%(J),±10%(K)   |                           |  |          | 1KHz ,1.0Vrms ,20°C  |                 |        |        |
| 额定电压<br>Rated Voltage                               | 100/160/250/400/450/630/1000V  |                           |  |          |  |                 |        |        |
| 损耗角正切<br>Dissipation Factor                         |  | C≤0.47 μF                 | 0.47 μF<C≤1.0 μF                           | C>1.0 μF | 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<br>Insulation Resistance                       |  | C≤0.33 μF<br>IR≥100000M Ω | C≥0.33 μF<br>IR≥30000s<br>or≥30000M Ω · Uf |          | 100VDC,60S,20°C  |                 |        |        |
| 端子间电压<br>Withstand voltage<br>Between Terminals     | 应无永久性击穿或飞弧<br>No permanent breakdown or flashover  |                           |  |          | 1.6Ur(d.c) 60s;2Ur(d.c)5s<br>C>1uf,Cut off Current 10mA ,<br>C≤1uf,Cut off Current 5mA ,<br>ARC=OFF,<br>Voltage raising time<br>5 ~ 10s,for voltage rise<br>AC:150V/S;DC:250V/S<br>pulse rise ≤150v/us |                 |        |        |
| 最大脉冲爬升速率<br>Maximum Pulse rising<br>gradient(dv/dt) | Ur(V)  | dv/dt(V/us)               |  |          |  |                 |        |        |
|   |  | P=7.5                     | P=10.0                                     | P=15.0   | P=20.0/<br>22.5  | P=27.5/<br>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

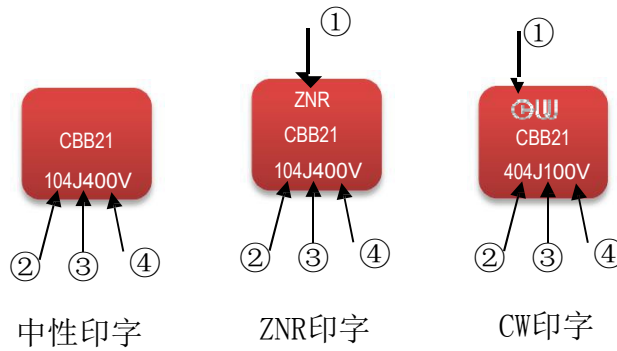
limit of the rated voltage,however DC voltage,DC and AC voltage,AC voltage,Pulse voltage etc .

| 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

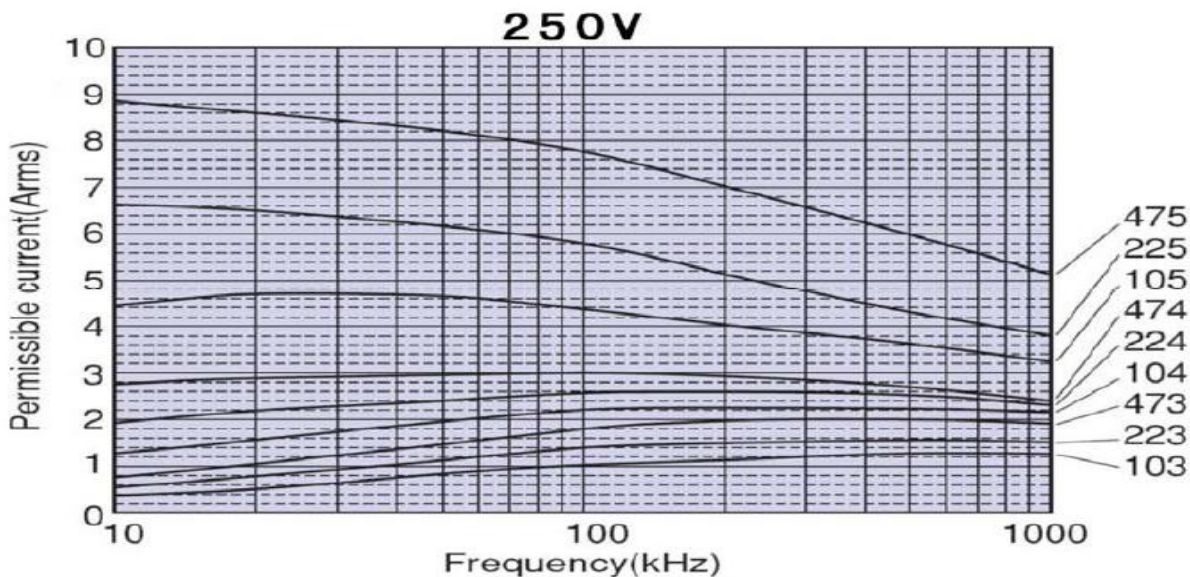
## 8.电流对频率特性

### 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 ,  $\Delta T \leq 12^\circ\text{C}$ )



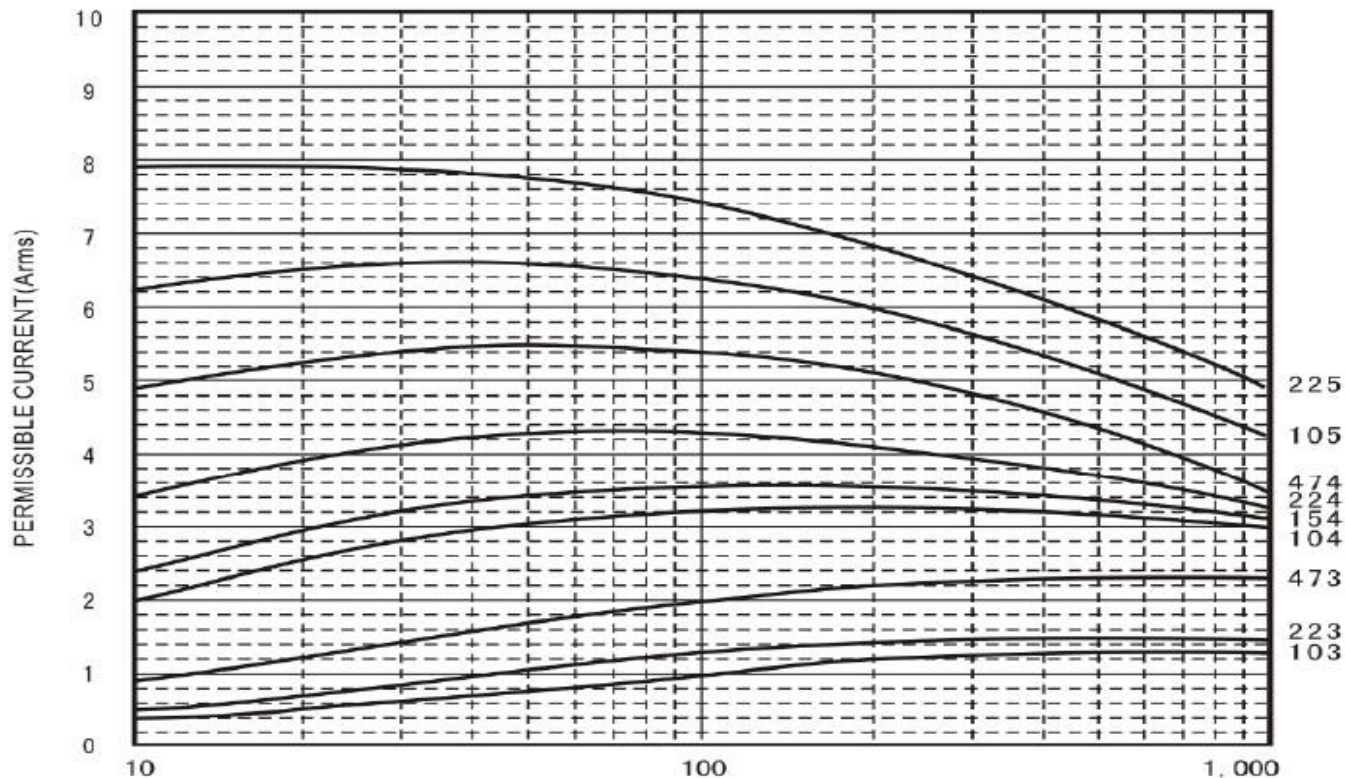
Characteristics of permissible current (Arms)Vs Frequency



电流 Vs 频率特性图

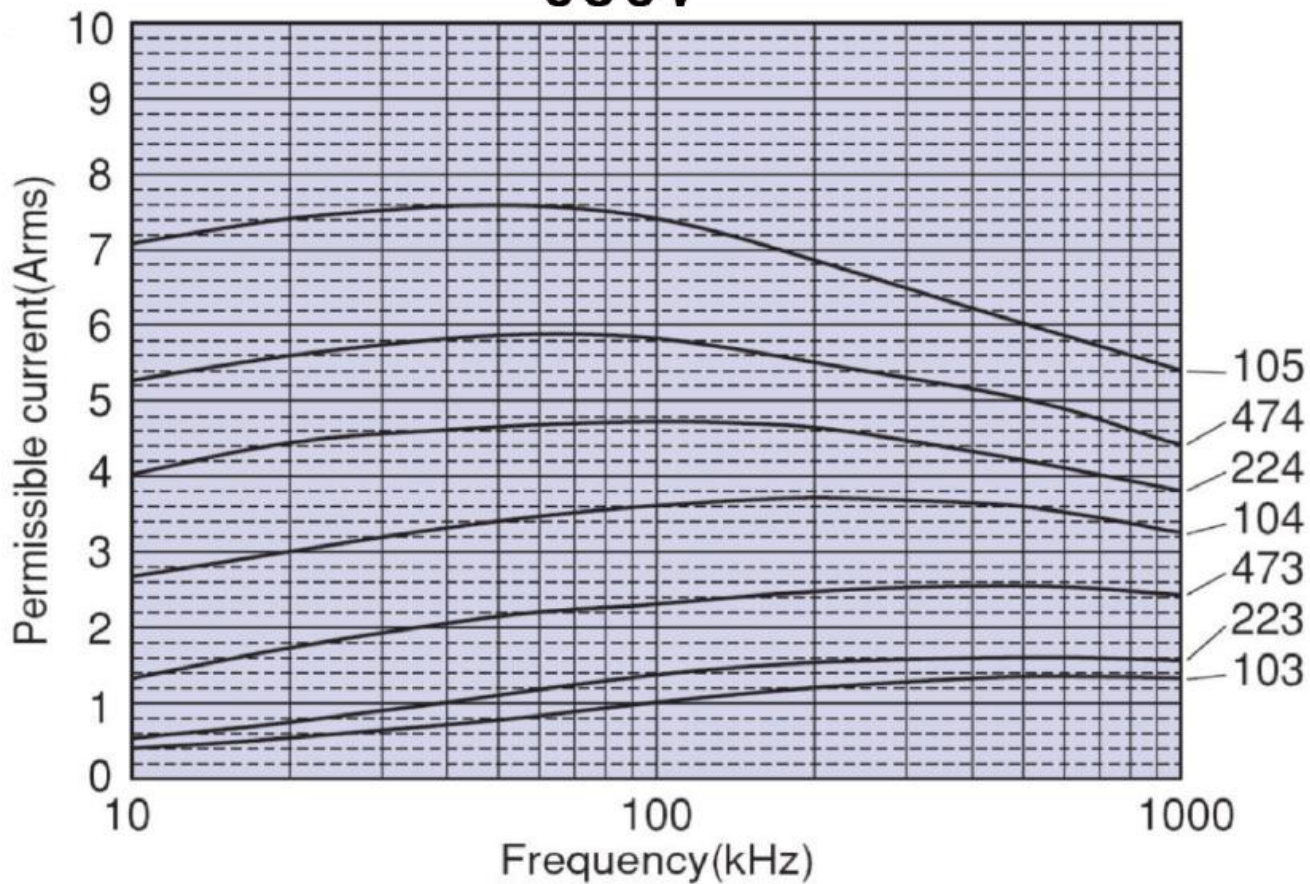
允许电流 ( Arms ) 对频率特性曲线图 ( 正弦波,  $\Delta T \leq 12^\circ\text{C}$  )

**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

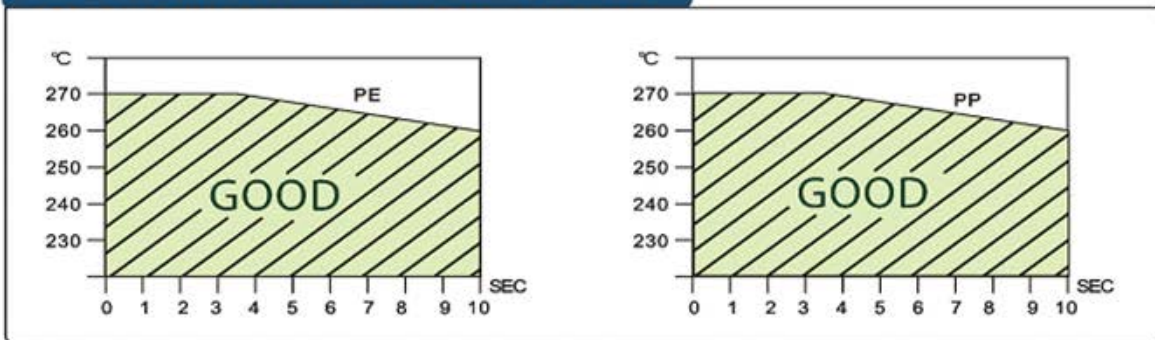


# TEMPERATURE CHARACTERISTICS

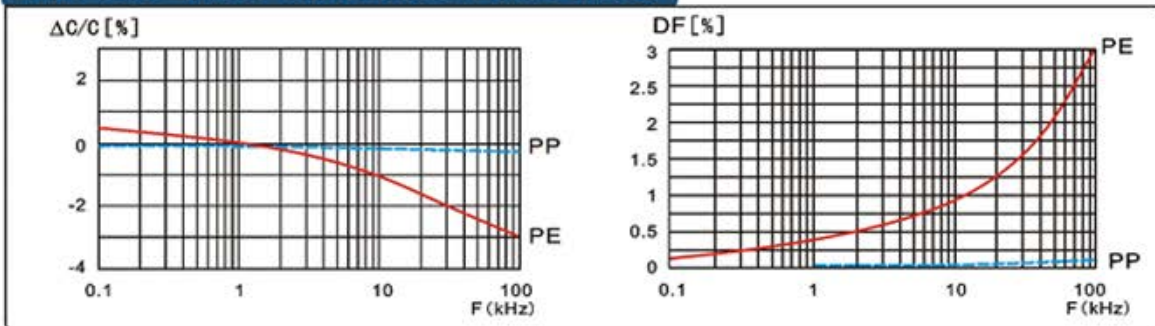
## TEMPERATURE CHARACTERISTICS



## SOLDERING TEMPERATURE VS. TIME



## FREQUENCY CHARACTERISTICS



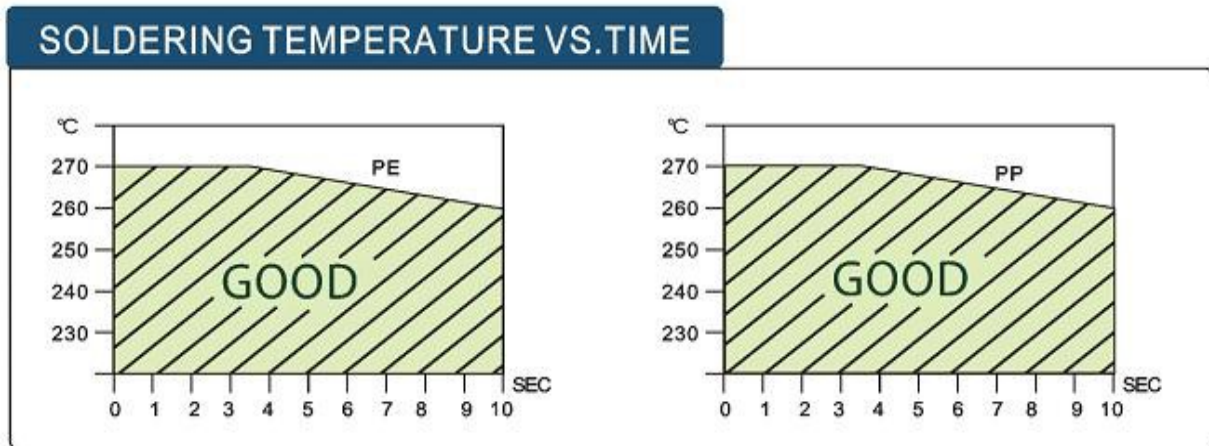
# Guide in usage

## 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<br>Item                                      | 特性要求<br>Characteristic requirement                |                          |                                 | 测试方法及条件<br>Test method&Condition  |                     |
|---|---|--------------------------|---------------------------------|---|---------------------|
| 容量范围<br>Capacitance Range                       | 0.001uF ~ 10.0uF                                  |                          |                                 | IEC60384-16 4.2.2<br>IEC60384-1 4.7   |                     |
| 容量偏差<br>Capacitance Tolerance                   | ±1%(F), ±2%(G), ±2.5%(H), ±3%(I), ±5%(J), ±10%(K) |                          |                                 | 1KHz ,1.0Vrms ,20°C   |                     |
| 额定电压<br>Rated Voltage                           | 100/160/250/400/450/630/1000V                     |                          |                                 |   |                     |
| 损耗角正切<br>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<br>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<br>Withstand voltage<br>Between Terminals | 应无永久性击穿或飞弧<br>No permanent breakdown or flashover |                          |                                 | 1.6Ur(d.c)60s;2Ur(d.c)5s<br>C>1uf,Cut off Current 10mA ,<br>C≤1uf,Cut off Current 5mA ,<br>ARC=OFF,<br>Voltage raising time 5 ~<br>10s,for voltage rise<br>AC:150V/S;DC:250V/S<br>pulse rise ≤150v/us |                     |

## 寿命实验

## Life Test

| NO. | 项目<br>Item                   | 特性要求<br>Characteristic requirement   | 测试方法及条件<br>Test method&Condition                               |      |           |
|-----|------------------------------|--|--|------|-----------|
| 1   | 端子强度<br>Terminal<br>Strength | 拉伸强度<br>Pull<br>Strength<br>无可见机械损伤<br>There shall be no visible mechanical<br>damage    | 线径 mm  | 荷重   | 时间        |
|     |                              |  | wire<br>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<br>IEC60384-1 C4.13<br>IEC60068 2-21 Test Ua1 |      |           |
|     | 端子强度<br>Terminal<br>Strength | 弯曲强度<br>Bending<br>Strength<br>无可见机械损伤<br>There shall be no visible mechanical<br>damage | 线径 mm  | 荷重   | 次数        |
|     |                              |  | wire<br>diameter   | Load | Time<br>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<br>IEC60384-1 C4.13<br>IEC60068 2-21 Test Ua1 |      |           |



| NO.                           | 项目<br>Item   | 特性要求<br>Characteristic requirement  | 测试方法及条件<br>Test method&Condition  |  |                               |                       |                          |  |                          |  |                               |                        |   |
|-------------------------------|--|---|---|--|-------------------------------|-----------------------|--------------------------|--|--------------------------|--|-------------------------------|------------------------|---|
| 2                             | 可焊性<br>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<br>锡料成分 Sn 97.5%+ Ag 2%+Cu 0.5%<br>At least 95% of the Circumference of the Lead wire.Around load surface dipped into with new soler,<br>the body be no visible damage.   | 焊锡温度：235±5℃<br>Solder temp<br>浸渍时间: 2.0±0.5S<br>Immersion time<br>IEC60384-16 C4.5<br>IEC60384-1 C4.15<br>IEC60068-2-20 Test Ta |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 3                             | 耐焊接热<br>Resistance to Soldering heat   | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="454 392 614 470">外观<br/>Appearance</td> <td data-bbox="614 392 1125 470">无可见损伤,标志清晰<br/>No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="454 470 614 627">容量变化<br/>Capacitance Variation</td> <td data-bbox="614 470 1125 627"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="454 627 614 750">损耗<br/>Dissipation Factor</td> <td data-bbox="614 627 1125 750"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math><br/><math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math><br/>at 1KHZ</td> </tr> <tr> <td data-bbox="454 750 614 873">耐电压<br/>Withstand Voltage</td> <td data-bbox="614 750 1125 873">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br/>No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="454 873 614 985">绝缘电阻<br/>Insulation Resistance</td> <td data-bbox="614 873 1125 985"><math>\Delta R/R \leq 50\%</math></td> </tr> </table>                     | 外观<br>Appearance  | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible. | 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$ | 损耗<br>Dissipation Factor | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ | 耐电压<br>Withstand Voltage | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover | 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$ | 焊锡温度：260±5℃<br>Solder temp<br>浸渍时间: 10±1S<br>Immersion time<br>恢复时间 1-2 小时<br>Then recovery at ordinary condition<br>1~2hours IEC60384-16 C4.4 IEC60384-1 C4.14<br>IEC60068-2-20 Test Ta                                  |
| 外观<br>Appearance              | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible.   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$  |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 损耗<br>Dissipation Factor      | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 耐电压<br>Withstand Voltage      | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 4                             | 耐久性<br>Endurance   | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="454 985 614 1064">外观<br/>Appearance</td> <td data-bbox="614 985 1125 1064">无可见损伤,标志清晰<br/>No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="454 1064 614 1209">容量变化<br/>Capacitance Variation</td> <td data-bbox="614 1064 1125 1209"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="454 1209 614 1332">损耗<br/>Dissipation Factor</td> <td data-bbox="614 1209 1125 1332"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math><br/><math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math><br/>at 1KHZ</td> </tr> <tr> <td data-bbox="454 1332 614 1456">耐电压<br/>Withstand Voltage</td> <td data-bbox="614 1332 1125 1456">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br/>No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="454 1456 614 1568">绝缘电阻<br/>Insulation Resistance</td> <td data-bbox="614 1456 1125 1568"><math>\Delta R/R \leq 50\%</math></td> </tr> </table>   | 外观<br>Appearance  | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible. | 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$ | 损耗<br>Dissipation Factor | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ | 耐电压<br>Withstand Voltage | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover | 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$ | 温度 Temp：105±3℃<br>持续时间:<br>Duration 1000+48h<br>施加电压 voltage：<br>1.25 Ur(d.c.) 50hz<br><br>恢复时间至少 16 小时<br>Then recovery at ordinary condition at least 16 hours<br>IEC60384-16 C4.12<br>IEC60384-1 C4.23<br>IEC60068 2 2 |
| 外观<br>Appearance              | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible.   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$  |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 损耗<br>Dissipation Factor      | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 耐电压<br>Withstand Voltage      | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 5                             | 稳态湿热<br>Damp heat, steady  | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td data-bbox="454 1568 614 1646">外观<br/>Appearance</td> <td data-bbox="614 1568 1125 1646">无可见损伤,标志清晰<br/>No visible damage, The marking shall be legible.</td> </tr> <tr> <td data-bbox="454 1646 614 1792">容量变化<br/>Capacitance Variation</td> <td data-bbox="614 1646 1125 1792"><math>\Delta C/C \leq 5\%</math></td> </tr> <tr> <td data-bbox="454 1792 614 1915">损耗<br/>Dissipation Factor</td> <td data-bbox="614 1792 1125 1915"><math>\Delta \text{tg} \delta &lt; 0.0080 \text{ CR} \leq 1.0 \mu\text{F}</math><br/><math>\Delta \text{tg} \delta &lt; 0.0050 \text{ CR} &gt; 1.0 \mu\text{F}</math><br/>at 1KHZ</td> </tr> <tr> <td data-bbox="454 1915 614 2038">耐电压<br/>Withstand Voltage</td> <td data-bbox="614 1915 1125 2038">1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br/>No permanent breakdown or flashover</td> </tr> <tr> <td data-bbox="454 2038 614 2134">绝缘电阻<br/>Insulation Resistance</td> <td data-bbox="614 2038 1125 2134"><math>\Delta R/R \leq 50\%</math></td> </tr> </table> | 外观<br>Appearance  | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible. | 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$ | 损耗<br>Dissipation Factor | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ | 耐电压<br>Withstand Voltage | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover | 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$ | 温度 Temp：40±2℃<br>湿度：90-95%RH<br>Humidity<br>持续时间: 56 day<br>Duration 电容不施加电压 恢复时间 1-2小时<br>Then recovery at ordinary condition 1-2 hours<br>IEC60384-16 C4.11<br>IEC60384-1 C4.22<br>IEC60068-2-78 Test Cab               |
| 外观<br>Appearance              | 无可见损伤,标志清晰<br>No visible damage, The marking shall be legible.   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 容量变化<br>Capacitance Variation | $\Delta C/C \leq 5\%$  |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 损耗<br>Dissipation Factor      | $\Delta \text{tg} \delta < 0.0080 \text{ CR} \leq 1.0 \mu\text{F}$<br>$\Delta \text{tg} \delta < 0.0050 \text{ CR} > 1.0 \mu\text{F}$<br>at 1KHZ |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 耐电压<br>Withstand Voltage      | 1.6 UR (d.c) 60S 耐电压后无击穿或飞弧<br>No permanent breakdown or flashover   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |
| 绝缘电阻<br>Insulation Resistance | $\Delta R/R \leq 50\%$   |   |   |  |                               |                       |                          |  |                          |  |                               |                        |   |

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

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

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