

SHENZHEN TERUIXIANG ELECTRONIC CO.,LTD



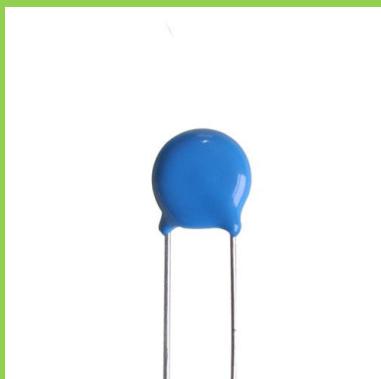
Unity Pragmatic Win-win

## Specifications for ceramic capacitors

### disc ceramic capacitors

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## Specifications for disc ceramic capacitors

## Revision history

## Directory

General Information.....	3-10
1. Scope.....	11
2. Object.....	11
3. Normative references.....	11
4. Terms and definitions.....	12
5. How to order.....	13-15
6. Capacitance and dimension.....	16-18
7. The constituent parts of capacitor.....	19
8. Figure and code of dimension.....	19
9. Requirements for concentration limits for certain hazardous substances.	20
10. Performance test.....	21-32
11. Packing.....	33-34
12. Storage conditions.....	34
13. Cautions and warnings.....	35
14. general knowledge for ceramic capacitors.....	35
15. Voltage proof test guide.....	36

## 电子设备用固定电容器常识

General Information for fixed capacitors for use in electronic equipment

### 1. 电子设备用固定电容器型号类别命名方法

Type designation system for fixed capacitors for use in electronic equipment

引用标准: GB/T 2470-1995 Normative references

电子设备用固定电阻器、固定电容器型号命名方法

Type designation system for fixed resistors and fixed capacitors for use in electronic equipment

产品型号由 4 部分组成。Type designation system consisted of 4 parts.

第一部分表示产品的主称, 用一个字母表示。如电容器用字母 C 表示, 电阻器用 R 表示。Represents a product in the first part, represented by a letter. Letter C such as capacitors, resistors used in R.

第二部分表示产品的主要材料, 用一个字母表示。

Second part of the main material, represented by a letter.

代号 Code	主要材料 main material	代号 Code	主要材料 main material
A	钽电解	L	极性有机薄膜介质
B	非极性有机薄膜介质	N	铌电解
C	I 类陶瓷介质	O	玻璃膜介质
D	铝电解	Q	漆膜介质
E	其他材料电解	S	III类陶瓷介质
G	合金电解	T	II类陶瓷介质
H	复合介质	V	云母纸介质
I	玻璃釉介质	Y	云母介质
J	金属化纸介质	Z	纸介质

第三部分表示产品的主要特征, 一般用一个数字或一个字母表示

The third part of the main characteristics of the product, usually represented by a digit or a letter.

代号 Code	主要特征 main characteristics	代号 Code	主要特征 main characteristics
1	圆形 disc	6	支柱式
2	管形(圆柱)	7	交流
3	迭片	8	高压
4	多层(独石)	9	/
5	穿心	G	高功率

第四部分是序号, 一般用数字表示(可省略)。

The forth part is serial number, generally use numbers (optional).

例如 for example: CC1 CT81 CT4 CT71

CC1: I 类圆形陶瓷电容器

CT81: II类圆形高压陶瓷电容器

CT4: II类多层陶瓷电容器(独石)

CT71: Y1 交流陶瓷电容器



## 2.电容器标志代码

Marking codes for capacitors

引用标准: GB/T 2691-1994 Normative references

电阻器和电容器的标志代码

Marking codes for resistors and capacitors

### 2.1 电容量单位 capacitance unit

法拉 farad (F)

常用单位有: 皮法(pF), 纳法(nF) 微法(uF) 毫法(mF) usual practical units:

单位间的关系:  $1F=10^3mF=10^6uF=10^9nF=10^{12}pF$  Relationships between units

### 2.2 电容量代码 capacitance code

电容量代码用三位数表示, 前两位表示有效数字, 后一位表示有效数字后面零的个数, 换成容量后的单位是 pF。 (带小数点的容量则用 P 代小数点) Codes for capacitance shall be find expression in three numbers. The first two digits are significant, and the third digit is number of zero. Into capacity unit is pF( Capacity p with decimal point the decimal point)

例如: for example

capacitance code	
CODE	CAPACITANCE
0P5	0.5PF
050	5PF
100	10PF
500	50PF
101	100PF
102	1000PF
223	22000PF

### 2.3 电容量允许偏差: capacitance tolerance

CODE	TOLERANCE
C	$\pm 0.25\text{PF}$
D	$\pm 0.5\text{PF}$
J	$\pm 5\%$
K	$\pm 10\%$
M	$\pm 20\%$
S	$+50/-20\%$
Z	$+80/-20\%$



## 2.4 制造日期代码 Manufacturing date codes

code of year				code of month		code of day			
year	code	year	code	month	code	day	code	day	code
		2020	M	1	1	1	01	16	16
↓	↓	2021	N	2	2	2	02	17	17
2010	A	2022	P	3	3	3	03	18	18
2011	B	2023	R	4	4	4	04	19	19
2012	C	2024	S	5	5	5	05	20	20
2013	D	2025	T	6	6	6	06	21	21
2014	E	2026	U	7	7	7	07	22	22
2015	F	2027	V	8	8	8	08	23	23
2016	H	2028	W	9	9	9	09	24	24
2017	J	2029	X	10	O	10	10	25	25
2018	K			11	N	11	11	26	26
2019	L		↓	12	D	12	12	27	27
						13	13	28	28
						14	14	29	29
						15	15	30	30
								31	31

注：年份代码每 20 年为一周期重复一次。

Note: the year code repeats once every 20 years for a one-week period.



### 3. 陶瓷电容器温度系数/温度特性 Temperature characteristics of product description

CC1 CC81 系列 ( ppm/°C )		CT1 CT81 CS1 系列	
CODE	材质 DIELECTRIC	CODE	材质 DIELECTRIC
CH	NP0( $0 \pm 60$ )	A	Y5E ( $\pm 4.7\%$ )
LH	N80(-80 $\pm 60$ )	B	Y5P ( $\pm 10\%$ )
PH	N150(-150 $\pm 60$ )	X	X7R ( $\pm 15\%$ )
RH	N220(-220 $\pm 60$ )	LR	Y5R ( $\pm 15\%$ )
SH	N330(-330 $\pm 60$ )	E	Z5U/Y5U (+22~56%)
TH	N470(-470 $\pm 60$ )	F	Z5V/Y5V (+22~82%)
UJ	N750(-750 $\pm 60$ )	LB	BN ( $\pm 10\%$ )
SL	SL(+140~-1000)	T	Y5T (+22~-33%)

介质种类前面的数字表示类别，如 2B 表示 II 类 B 特性，3B 表示 III 类 B 特性。  
LR 和 LB 为低损耗材质。 Media type the number before the categories, such as 2B for class II B properties, 3 B for class III B characteristics. LR and LB for low loss material.

### 4. 陶瓷电容器介质说明

引用标准: EIA- 198-D ( CT1 CT81 CS1 系列 )

#### Y5P

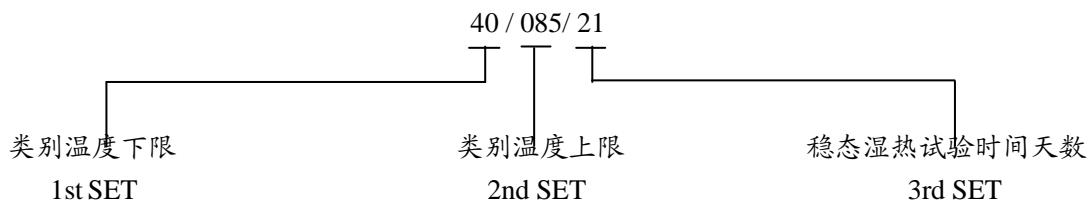
第一字母: 使用温度下限 First letter: Low temp	第二数字: 使用温度上限 Second number: High Temp	第三字母: 使用温度范围内的容量变化率 Third letter: within the temperature range of volume rate of capacitance	
Y:-30°C	4:+65°C	A: $\pm 1.0\%$	P: $\pm 10\%$
Z: +10°C	5:+85°C	B: $\pm 1.5\%$	R: $\pm 15\%$
X: -55°C	6:+105°C	C: $\pm 2.2\%$	S: $\pm 22\%$
	7:+125°C	D: $\pm 3.3\%$	T: +22/-33%
	8:+150°C	E: $\pm 4.7\%$	U: +22/-56%
		F: $\pm 7.5\%$	V: +22/-82%



## 5. 气候类别 Climatic category

The large number of possible combinations of tests and severities may be reduced by a selection of a new standard groupings according to IEC 60068

According to EIA STANDARD RS 198



1st SET : Minimum ambient temperature of operation (Cold test)

2nd SET: Maximum ambient temperature of operation (Dry heat test)

3rd SET : Number of days (Damp heat steady state test)

Category Examples according to IEC 60068-1
25/085/04
25/085/21
40/085/21
55/125/21
55/125/56

First set Two digits denoting the minimum ambient temperature of operation (Cold test)	
65	-65°C
55	-55°C
40	-40°C
25	-25°C
10	-10°C
00	0°C
05	+5°C

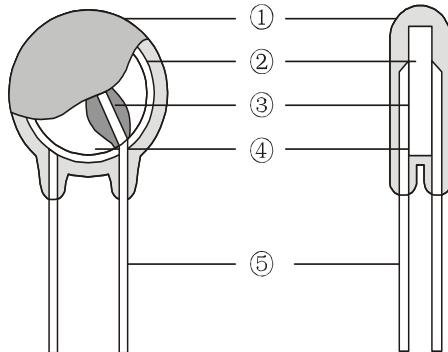
Second set Three digits denoting the maximum ambient temperature of operation (Dry heat test)	
155	+155°C
125	+125°C
110	+110°C
085	+85°C
080	+80°C
075	+75°C
070	+70°C

Third set Two digits denoting the number of days(Damp heat steady state test)	
56	56 days
21	21 days
10	10 days
04	4 days
00	The component is not required to be exposed to damp heat.



## 6. 陶瓷电容器结构图

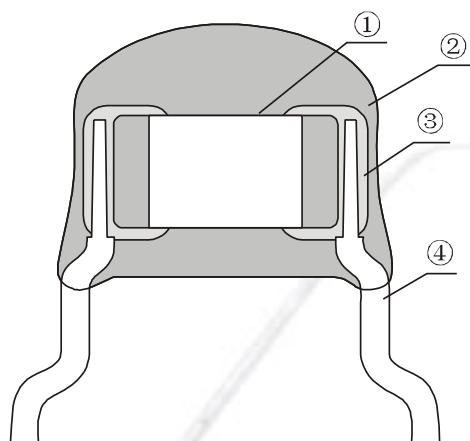
### 6.1 圆形陶瓷电容器



NO.	Constituent	Material
	部件名	材料
①	Coating	Epoxy resin
②	Ceramic medium	Ceramic
③	Solder	Soldering tin
④	Electrode	Silver oxide
⑤	Lead Frame	CP wire

圆形陶瓷电容器

### 6.2 多层陶瓷电容器(独石)



NO.	Constituent	Material
	部件名	材料
①	Ceramic Medium (陶瓷介质)	Ceramic(陶瓷芯片)
②	Coating(包封层)	Epoxy (环氧涂料)
③	Solder(焊接点)	Soldering tin (焊锡)
④	Lead Frame(引脚)	CP /Cuwire( Cp/Cu 线)

多层陶瓷电容器  
(独石)

**7. 环保要求**

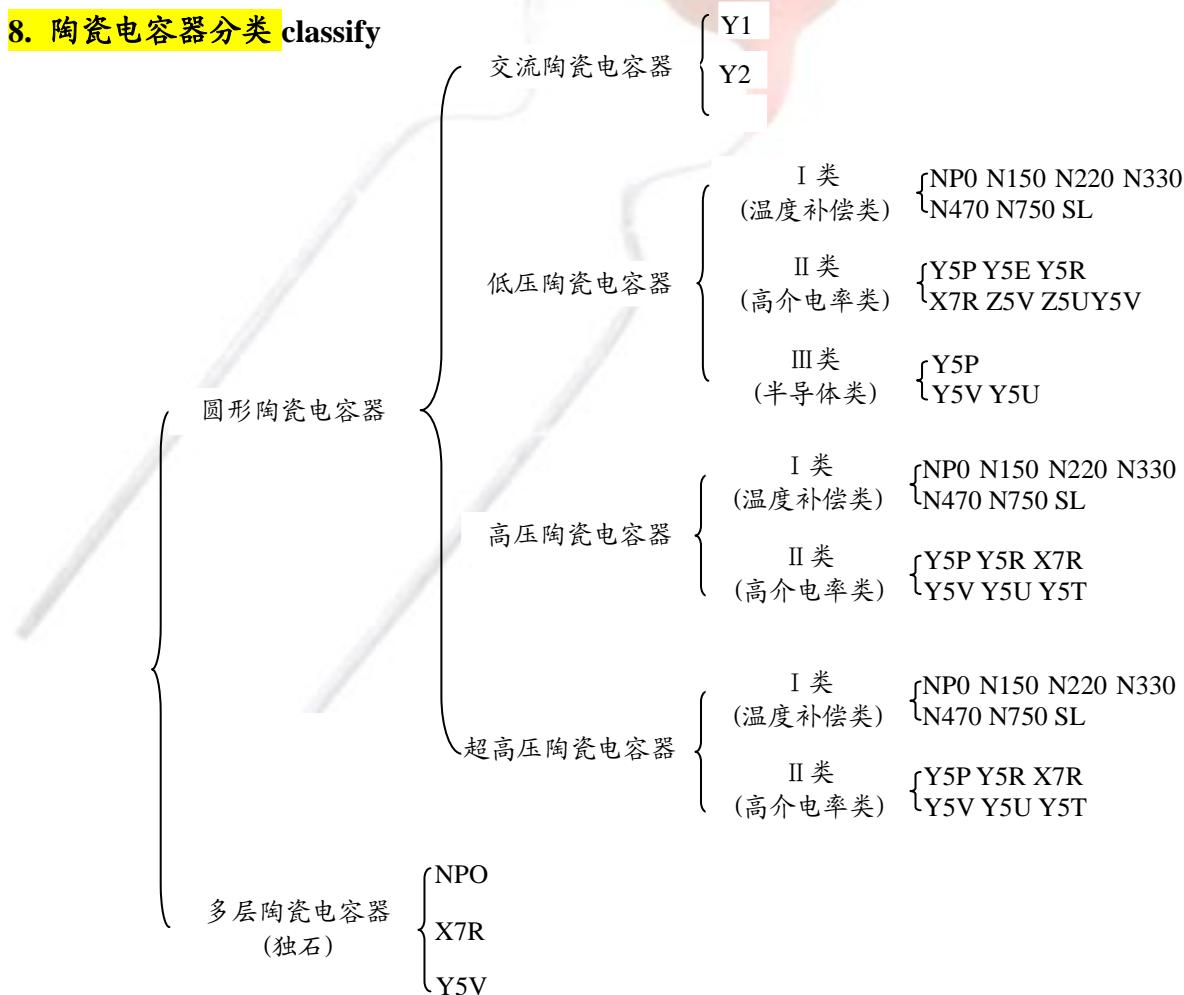
RoHS2.0 2011/65/EU

卤素 halogen

REACH No1907/2006

substances	concentration (unit: ppm)
Cadmium and cadmium compounds	<100
Lead and lead compounds	<1000
Mercury and mercury compounds	<1000
Hexavalent chromium compounds	<1000
Polubrominated biphenyls	<1000
Polubrominated diphenylethers	<1000
Cd+Pb+ Hg + Cr <sup>+6</sup> ( packing materials )	<100
Cl/Br	<900
Cl+Br	<1500
SVHC151 项	<1000

RoHS H.F  
RREACH

**8. 陶瓷电容器分类 classify**

# Specifications for disc ceramic capacitors

## 1. Scope 范围

适用于电子设备中使用的具有确定温度系数（I类介质），具有高介电常数（II类介质）和具有半导体性质（III类介质）的瓷介固定电容器。

This standard is applicable to fixed capacitors of ceramic dielectric with a defined temperature coefficient (dielectric class I, class II, class III), intended for use in electronic equipment.

## 2. Object 目的

对这类瓷介固定电容器规定优先额定值和特性，试验和测量方法以及一般特性要求。

The principal object of this standard is to prescribe preferred ratings and characteristics and to select the appropriate tests and measuring methods and to give general performance requirements for ceramic dielectric capacitors.

## 3. Normative references 引用标准

GB/T 2693-2001 (IDT IEC 60384-1: 1999) 电子设备用固定电容器 第1部分 总规范

Fixed capacitors for use in electronic equipment-

Part 1: Generic specification

GB/T 2828.1-2003 (IDT ISO 2859-1:1999) 计数抽样检验程序 第1部分 按接受限(AQL)检索的逐批检验抽样计划

Sampling procedures for inspection by attributes-

Part 1: Sampling schemes indexed by acceptance quality limit(AQL)for lot-blot inspection

GB/T 2471-1995 (IDT IEC 63:1963): 电阻器和电容器优先数系

Preferred number series for resistors and capacitors

GB/T 2691-1994 (IDT IEC 62:1992): 电阻器和电容器的标志代码

Marking codes for resistors and capacitors

SJ/T 11363-2006: 电子信息产品中有毒有害物质的限量要求

Requirements for concentration limits for certain hazardous substances in electronic information products

SJ/T 11364-2006: 电子信息产品污染控制标识要求

Marking for control of pollution caused by electronic information products

SJ/T 11365-2006: 电子信息产品中有毒有害物质的检测方法

Testing methods for hazardous substances in electronic information products

2011/65/EU: (RoHS2.0) 电子电气设备中限制使用某些有害物质指令

The Restriction of the use of certain Hazardous substances in Electrical and Electronic Equipment

2002/96/EC (WEEE): 废旧电子电气设备指令

Waste Electrical and Electronic Equipment

94/62/EC (2005/20/EC): 关于包装和包装废物的 1994 年 12 月 20 日欧洲议会和理事会指令 94/62/EC

Europe Parliament and Council Directive94/62/EC of 20 December 1994 on Packaging and packaging waste

No1907/2006(REACH): 化学品注册、评估、许可和限制

Registration, Evaluation, Authorization and Restriction of Chemicals(151item)



## 4. Terms and definitions 术语和定义

### 4.1 I类瓷介固定电容器 Fixed capacitors of ceramic dielectric, class I

专门设计并用在低损耗，电容量稳定性高或要求温度系数有明确规定的一种电容器。例如在电路中作温度补偿之用。

Designed with low loss, high stability of capacitance or temperature coefficient is required to have clearly defined the resonant circuit of a capacitor. For example, in the circuit for temperature compensation purposes.

### 4.2 II类瓷介固定电容器 Fixed capacitors of ceramic dielectric, class II

适用于旁路耦合或用在对损耗和电容量稳定性要求不高的电路中的，具有高介电常数的一种电容器。

Applied to the bypass coupling or do not ask for much of the loss and capacitance stability circuit, a capacitor with a high dielectric constant.

### 4.3 III类瓷介固定电容器 Fixed capacitors of ceramic dielectric, class III

适用于作旁路和耦合之用的电路中，具有半导体特征的一种电容器。

Apply for bypass and coupling circuit, a capacitor with semiconductor characteristics.

### 4.4 额定电压 rated voltage

额定电压是在额定温度下，可以连续施加在电容器引出端上的最大直流电压。

Either the r.m.s. operating voltage of rated frequency or the d.c. operating voltage, which may be applied continuously to the terminations of a capacitor at any temperature between the lower and the upper category temperatures.

### 4.5 损耗角正切 tangent of loss angle( $\tan\delta$ )

在规定频率的正弦电压下，电容器的损耗功率除以电容器的无功功率。

The power loss of the capacitor divided by the reactive power of the capacitor at a sinusoidal voltage at a specified frequency.

### 4.6 上限类别温度 upper category temperature

电容器设计所确定的能连续工作和最高环境温度。

Maximum surface temperature for which the capacitor has been designed to operate continuously.

### 4.7 下限类别温度 lower category temperature

电容器设计所确定的能连续工作和最低环境温度。

Minimum surface temperature for which the capacitor has been designed to operate continuously.

### 4.8 电容量温度特性 temperature characteristic of capacitor

电容量温度特性是在一个不出类温度范围的给定温度范围内，所出现的电容量最大可逆变化。一般此变化表示相对 20°C 时电容量的百分比。

The maximum reversible variation of capacitance produced over a given temperature range within the category temperature range, normally expressed as a percentage of the capacitance related to a reference temperature of 20°C.



## 5. How to order 编码说明

CT81	2B	102	M	3A	5	035	A	E
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

### ①类别 STYLE

CODE	类别名称 STYLE	材质 DIELECTRIC
CC1	I类温度补偿型低压陶瓷电容器 Temperature-compensated low-voltage ceramic capacitors class I	NP0,N80,N150,N220,N330,N470,N750,SL
CT1	II类高介电常数型低压陶瓷电容器 High dielectric constant low-voltage ceramic capacitors class II	Y5P,BN,Y5R,Y5U,Y5V,X7R,Z5V,Z5U
CS1	III类半导体类陶瓷电容器 Semiconductor category ceramic capacitors class III	Y5P,Y5U,Y5V
CC81	I类温度补偿型高压陶瓷电容器 Temperature-compensated high-voltage ceramic capacitors class I	NP0,N80,N150,N220,N330,N470,N750,SL
CT81	II类高介电常数型高压陶瓷电容器 High dielectric constant high-voltage ceramic capacitors class II	Y5P,BN,Y5R,Y5U,Y5V,Y5T
CC4	I类温度补偿型径向引线陶瓷电容器(独石电容器) Temperature compensation of radial lead ceramic capacitors class I (monolithic capacitor)	NP0
CT4	II类高介电常数型径向引线陶瓷电容器(独石电容器) Radial lead ceramic capacitors with high dielectric constant class II (monolithic capacitor)	X7R Y5V
CC42	I类温度补偿型轴向引线陶瓷电容器(独石电容器) Temperature compensation of axial lead ceramic capacitors class I (monolithic capacitor)	NP0
CT42	II类高介电常数型轴向引线陶瓷电容器(独石电容器) Axial lead with high dielectric constant ceramic capacitors class II (monolithic capacitor)	X7R Y5V
CT71	交流陶瓷电容器 Y1 AC ceramic capacitors class Y1	NPO,SL,Y5P,Y5U,Y5V
CT72	交流陶瓷电容器 Y2 AC ceramic capacitors class Y2	NPO,SL,Y5P,Y5U,Y5V

**②材质 DIELECTRIC**

CC1 CC81 系列 ( ppm/°C )		CT1 CT81 CS1 系列	
CODE	材质 DIELECTRIC	CODE	材质 DIELECTRIC
CH	NP0(0±60)	A	Y5E (±4.7%)
LH	N80(-80±60)	B	Y5P (±10%)
PH	N150(-150±60)	X	X7R (±15%)
RH	N220(-220±60)	LR	Y5R (±15%)
SH	N330(-330±60)	E	Z5U/Y5U (+22~-56%)
TH	N470(-470±60)	F	Z5V/Y5V (+22~-82%)
UJ	N750(-750±60)	LB	BN (±10%)
SL	SL(+140~-1000)	T	Y5T (+22~-33%)

介质种类前面的数字表示类别，如 2B 表示 II 类 B 特性，3B 表示 III 类 B 特性。  
LR 和 LB 为低损耗材质。 Media type the number before the categories, such as 2B for class II B properties, 3 B for class III B characteristics. LR and LB for low loss material.

**③容量 CAPACITANCE**

CODE	CAPACITANCE
0P5	0.5PF
050	5PF
100	10PF
500	50PF
101	100PF
102	1000PF
223	22000PF

**④容量误差 CAPACITANCE TOLERANCE**

CODE	TOLERANCE
C	±0.25PF
D	±0.5PF
J	±5%
K	±10%
M	±20%
S	+50/-20%
Z	+80/-20%

电容量代码由三位数组成，前面两位数字表示有效数字，后一位数字表示有效数字后零的个数。 Codes for capacitance shall be find expression in three numbers. The first two digits are significant, and the third digit is number of zero.

**⑤额定电压 rated voltage**

第一文字	第二文字										
	A	B	C	D	E	F	G	H	I	J	K
0	1.0	1.5	1.6	2.0	2.5	3.0	4.0	5.0	6.0	6.3	8.0
1	10	15	16	20	25	30	40	50	60	63	80
2	100	150	160	200	250	300	400	500	600	630	800
3	1 000	1 500	1 600	2 000	2 500	3 000	4 000	5 000	6 000	6 300	8 000
4	10 000	15 000	16 000	20 000	25 000	30 000	40 000	50 000	60 000	63 000	80 000

注：单位为 V Note: unit v  
例如：2A 表示 100V For example: 2A 100V



## ⑥脚距 pitch

CODE	LENGTH PITCH
2	2.5±0.5mm
3	3.3±0.5mm
5	5.0±0.8mm
7	7.5±1mm
0	10.0±1mm

## ⑦包装方式/脚长 packing style or lead length

编带 TAPE(ex)	
CODE	包装方式 packing style
T16	K 脚编带 L16 盒装 K PIN taping L16 boxed
T20	直脚编带 L20 盒装 Straight PIN taping L20 boxed
散装 Bulk(ex)	
CODE	脚长 LENGTH
030	3.0mm
035	3.5mm
250	25mm

## ⑧引线型式 lead style

CODE	型别 style
A	直脚型 straight
B	内 K 型 inside kink
C	外 K 型 outside kink
D	前后侧弯型 front and back curve

## ⑨包封 COATING

CODE	材料 MATERIAL
E	环氧树脂包封 EPOXY RESIN
P	酚醛树脂包封 PHENOLIC RESIN



## 6. Capacitance and dimension 电容量、电压与尺寸表

### CLASS I

CC1 和 CC81 类电容器的电容量、电压与外形尺寸的关系见下表：

Capacitance value & rated voltage, product diameter

产品型号及尺寸代码	额定直流电压	标称电容量			尺寸 (mm)		
		电容量温度系数组别			Dmax	Tmax	F
		CH(NP0)	UJ	SL			
CC1-05	50V	0P5 ~ 560	0P5 ~ 820	180 ~ 221	5.5	4.0	5.0
CC1-06		620 ~ 101	101	221 ~ 271	6.5	4.0	5.0
CC1-08		111 ~ 151	121 ~ 151	301 ~ 431	8.0	4.0	5.0
CC1-10		181 ~ 271	181 ~ 331	471 ~ 681	10.0	4.0	5.0
CC1-12		301 ~ 391		751 ~ 102	12.5	4.0	5.0
CC1-05	500V	0P5 ~ 330	0P5 ~ 390	180 ~ 121	5.5	4.0	5.0
CC1-06		360 ~ 560	400 ~ 680	121 ~ 151	6.5	4.0	5.0
CC1-08			820 ~ 101	181 ~ 271	8.0	4.0	5.0
CC1-10			121 ~ 151	331 ~ 471	10.0	4.0	5.0
CC1-12			181 ~ 221	561	12.5	4.0	5.0
CC81-06	1KV	0P5 ~ 220	0P5 ~ 330	180 ~ 101	6.5	4.0	5.0 7.5 10.0
CC81-08		270	390 ~ 680	151 ~ 181	8.0	4.0	
CC81-10		330 ~ 680	820 ~ 151	221~471	10.0	4.0	
CC81-12		820 ~ 271	181 ~ 271	561	12.5	4.0	
CC81-06	2KV	0P5 ~ 270	0P5 ~ 330	4R0 ~ 680	6.5	5.0	5.0 7.5 10.0
CC81-08		300 ~ 680	470 ~ 560	820 ~ 101	8.0	5.0	
CC81-10		820 ~ 101	680 ~ 101	121 ~ 271	10.0	5.0	
CC81-06	3KV	2P0 ~ 120	2P0 ~ 220	2P0 ~ 220	6.5	6.0	7.5 10.0
CC81-08		150 ~ 220	250 ~ 300	250 ~ 330	8.0	6.0	
CC81-10		240 ~ 330	330 ~ 390	390 ~ 560	10.0	6.0	
CC81-12		470		680 ~ 820	12.5	6.0	
CC81-14				101 ~ 221	14.0	6.0	
CC81-16		101			16.0	6.0	
CC81-06	6KV	2P0 ~ 120	2P0 ~ 150	2P0 ~ 150	6.5	7.0	7.5 10.0
CC81-08		150 ~ 220	180 ~ 220	180 ~ 270	8.0	7.0	
CC81-10		240 ~ 330	240 ~ 270	300 ~ 390	10.0	7.0	
CC81-12		470		470 ~ 680	12.5	7.0	
CC81-14				820 ~ 151	14.0	7.0	
CC81-16		101			16.0	7.0	

**CLASS II**

CT1 和 CT81 类电容器的电容量、电压与外形尺寸的关系见下表:

Capacitance value &amp; rated voltage, product diameter

产品型号及尺寸代码	额定直流电压	标称电容量					尺寸 (mm)		
		电容量温度系数组别					Dmax	Tmax	F
		2B/2X	LR	BN	2E	2F			
CT1-05	50V	101 ~ 152	/	/	222 ~ 502	102 ~ 103	5.5	4.0	5.0
CT1-06		182 ~ 332	/	/	822 ~ 103	103	6.5	4.0	5.0
CT1-08		392 ~ 562	/	/		103 ~ 153	8.0	4.0	5.0
CT1-10		682	/	/		153 ~ 223	10.0	4.0	5.0
CT1-12		822 ~ 103	/	/			12.5	4.0	5.0
CT1-05	500V	101 ~ 561	/	/	102 ~ 222	102 ~ 332	5.5	4.0	5.0
CT1-06		681 ~ 122	/	/	272 ~ 392	392 ~ 562	6.5	4.0	5.0
CT1-08		152 ~ 272	/	/	472 ~ 682	682	8.0	4.0	5.0
CT1-10		332 ~ 392	/	/	103 ~ 123	822 ~ 103	10.0	4.0	5.0
CT1-12		472 ~ 682	/	/		123 ~ 223	12.5	4.0	5.0
CT1-14		822 ~ 103	/	/		333	14.0	4.0	5.0
CT81-06	1KV	101 ~ 681	101 ~ 471	101 ~ 102	821 ~ 222	102 ~ 272	6.5	4.0	5.0
CT81-08		821 ~ 152	561 ~ 102	102 ~ 182	272 ~ 392	332 ~ 682	8.0	4.0	
CT81-10		182 ~ 222	122 ~ 182	222 ~ 332	472 ~ 682	103	10.0	4.0	
CT81-12		272 ~ 472	22 ~ 2272	392 ~ 472	822 ~ 103	103	12.5	4.0	7.5 10.0
CT81-14		562	332 ~ 392	562		223	14.0	4.0	
CT81-16		682	472	682			16.0	4.0	
CT81-18		103		103		333473	18.0	4.0	
CT81-06	2KV	10 ~ 1471	151 ~ 331	101 ~ 561	102 ~ 122	102 ~ 222	6.5	5.0	5.0
CT81-08		561 ~ 102	391 ~ 561	681 ~ 102	152 ~ 222	272 ~ 332	8.0	5.0	
CT81-10		122 ~ 181	681 ~ 102	122 ~ 152	272 ~ 392	392 ~ 562	10.0	5.0	
CT81-12		222 ~ 272	122 ~ 152	182 ~ 272	472 ~ 682	682 ~ 103	12.5	5.0	7.5 10.0
CT81-14		332 ~ 392	222	332	103	103	14.0	5.0	
CT81-16		472	272 ~ 332	392 ~ 472		153	16.0	5.0	
CT81-18		562 ~ 682	392	562 ~ 682		223	18.0	5.0	
CT81-06	3KV	101 ~ 331		101 ~ 331	102	102 ~ 152	6.5	6.0	7.5 10.0
CT81-08		391 ~ 561	151 ~ 331	391 ~ 471	122 ~ 152	182 ~ 222	8.0	6.0	
CT81-10		681 ~ 102	391 ~ 681	681 ~ 122	182 ~ 272	272 ~ 392	10.0	6.0	
CT81-12		122 ~ 182	821 ~ 102	152 ~ 182	332 ~ 472	472 ~ 682	12.5	6.0	
CT81-14		222		222 ~ 272	562 ~ 682	103	14.0	6.0	
CT81-06	6KV	101 ~ 271	/	101 ~ 221	471 ~ 561	102	6.5	7.0	7.5 10.0
CT81-08		331 ~ 391	/	331 ~ 391	681 ~ 102	152 ~ 182	8.0	7.0	
CT81-10		471 ~ 680	/	471 ~ 681	122 ~ 182	222 ~ 272	10.0	7.0	
CT81-12		821 ~ 122	/	102	222 ~ 332	332 ~ 472	12.5	7.0	
CT81-14		152 ~ 182	/		392	562 ~ 682	14.0	7.0	

**CLASS III**

CS1 类电容器的电容量、电压与外形尺寸的关系见下表:

Capacitance value &amp; rated voltage, product diameter

产品型号 及 尺寸代码	额定 直流 电压	温度特性			尺寸 (mm)		
		3B	3E	3F	Dmax	Tmax	F
		标称电容量					
CS1-05	10V 16V 25V 50V	628 ~ 103	103 ~ 333	103 ~ 473	5.5	4.0	5.0
CS1-06		123 ~ 223	303 ~ 473	563 ~ 104	6.5	4.0	5.0
CS1-08		333 ~ 503	473 ~ 104	104 ~ 154	8.0	4.0	5.0
CS1-10		563 ~ 683	823 ~ 104	184 ~ 224	10.0	4.0	5.0
CS1-12		823 ~ 104			12.5	4.0	5.0
CS1-05	100V			103 ~ 223	5.5	4.0	5.0
CS1-06		103 ~ 153	223 ~ 333	333 ~ 473	6.5	4.0	5.0
CS1-08		203 ~ 223	473 ~ 683	563 ~ 104	8.0	4.0	5.0
CS1-10		333 ~ 393	823 ~ 104	823 ~ 104	10.0	4.0	5.0
CS1-12		473 ~ 683		224	12.5	4.0	5.0



## 7. The constituent parts of capacitor 结构图

Design1

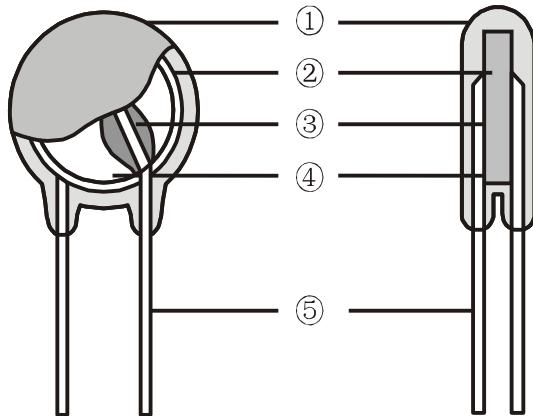


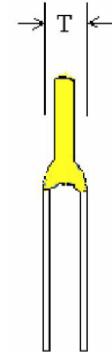
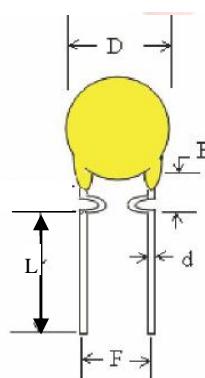
Table 3

NO.	constituent	material
①	Coating	Epoxy resin phenolic resin
②	Ceramic medium	Ceramic
③	Solder	soldering tin
④	electrode	Silver oxide
⑤	Lead Frame	cp wire

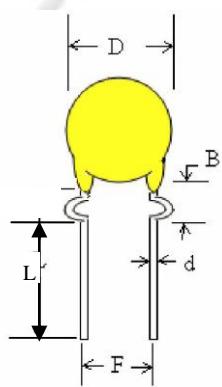
## 8. Figure and code of dimension 外型及尺寸代码

Design2

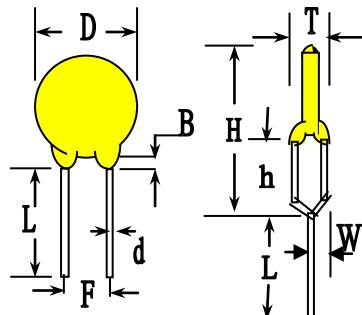
TYPE B: Inside Kink 内 K 脚



TYPE C: Outside Kink 外 K 脚



TYPE D: Front and back curve 前后弯





## 9. Requirements for concentration limits for certain hazardous substances

有毒有害物质含量控制要求

RoHS2.0 2011/65/EU

卤素 halogen

REACH No1907/2006

Table 4

Substances 物质名称	concentration (unit: ppm) 含量
Cadmium and cadmium compounds 镉及镉化合物	<100
Lead and lead compounds 铅及铅化合物	<1000
Mercury and mercury compounds 汞及汞化合物	<1000
Hexavalent chromium compounds 铬及铬化合物	<1000
Polubrominated biphenyls 多溴联苯 PBBS	<1000
Polubrominated diphenylethers 多溴联苯醚 PBDES	<1000
Cd+Pb+ Hg + Cr <sup>+6</sup> (packing materials) 镉+铅+汞+六价铬	<100
Cl 氯	<900
Br 溴	<900
Cl+Br 氯+溴	<1500
SVHC (151item) REACH 高关注物质 151 项	<1000

RoHS H.F.  
REACH



## 10. Performance test 性能与试验

## CLASS I

No.	项目 item	试验结果 (规格值) specification			试验条件 Test method and test condition									
1	适用温度范围 Operating temperature range	-55 ~ +125°C, 包括电容器自身发热 Includes capacitors heating			可在此温度范围内连续使用 This continuous use temperature range									
2	外观和尺寸检查 Appearance and size check	元件表面清洁, 无异物附着, 标志清晰, 无可见损伤, 尺寸符合规定要求 Component surfaces clean, as attachment, mark clear, no visible damage, dimensional compliance requirements			目测检查产品外观 尺寸用游标卡尺检查 Visually inspect the product appearance Dimension checked by calipers.									
3	电容量 capacitance	在允许的偏差等级范围内 Within the scope of the permitted deviation level			温度: 25 ±3°C Testing temperature									
4	损耗角正切 (tgδ) (品质因素: Q) (注: tgδ=1/Q) Dissipation factor	<table border="1"> <tr> <th>Cap.</th> <th>Q</th> <th>tgδ</th> </tr> <tr> <td>C &lt; 30pF</td> <td>≥400+20C</td> <td>1/Q</td> </tr> <tr> <td>C ≥ 30pF</td> <td>≥1000</td> <td>≤0.001</td> </tr> </table>			Cap.	Q	tgδ	C < 30pF	≥400+20C	1/Q	C ≥ 30pF	≥1000	≤0.001	频率: f=1MHz±20% Testing frequency 电压: 1.0±0.1Vrms Testing voltage
Cap.	Q	tgδ												
C < 30pF	≥400+20C	1/Q												
C ≥ 30pF	≥1000	≤0.001												
5	绝缘电阻 Insulation resistance	IR≥10000MΩ		额定电压 Rated voltage	测试电压 Applied voltage	时间 time	电流 current							
6	耐电压 voltage proof	端子之间 Between lead wire	无击穿或飞弧 No permanent break-down or flashover during the test period		50~500V	U <sub>R</sub>	60±5s	≤0.05A						
					1KV、2KV 3KV、6KV	500V	60±5s	≤0.05A						
					额定电压 Rated voltage	测试电压 Applied voltage	时间 time	电流 current						
					50~500V	2.5U <sub>R</sub>	1~5s	≤0.05A						
					1KV	2U <sub>R</sub>	1~5s	≤0.05A						
		端子与外壳之间 Body insulation			2KV、3KV	1.5U <sub>R</sub> +500	1~5s	≤0.05A						
					6KV	1.5U <sub>R</sub>	1~5s	≤0.05A						
			使用金属小球法, 施加电压 DC1500V 测试 1-5s, 充放电电流≤0.05A Used by metal balls, voltage application DC1500V testing 1-5s, charge and discharge current ≤ 0.05A											



续表:

No.	项目 item	试验结果 (规格值) specification		试验条件 Test method and test condition												
7	温度特性 Temperature characteristic	NPO: ( 0±60 ppm/°C ) SL: ( +140 ~ -1000ppm/°C )		在下列阶段温度测量容量值: 基准 T3 Temperature measurements in the following phase capacity value: (for T3 in base)												
				<table border="1"> <thead> <tr> <th>步骤 step</th><th>温度 Temperature</th></tr> </thead> <tbody> <tr> <td>T1</td><td>20±2°C</td></tr> <tr> <td>T2</td><td>-25±2°C</td></tr> <tr> <td>T3</td><td>20±2°C</td></tr> <tr> <td>T4</td><td>85±2°C</td></tr> <tr> <td>T5</td><td>20±2°C</td></tr> </tbody> </table>	步骤 step	温度 Temperature	T1	20±2°C	T2	-25±2°C	T3	20±2°C	T4	85±2°C	T5	20±2°C
步骤 step	温度 Temperature															
T1	20±2°C															
T2	-25±2°C															
T3	20±2°C															
T4	85±2°C															
T5	20±2°C															
8	引出端强度 Robustness of terminations	<table border="1"> <thead> <tr> <th>S(mm)</th><th>拉力 tensile</th></tr> </thead> <tbody> <tr> <td>0.35 &lt; S≤0.5</td><td>&gt;5N</td></tr> <tr> <td>0.5 &lt; S≤0.8</td><td>&gt;10 N</td></tr> </tbody> </table>	S(mm)	拉力 tensile	0.35 < S≤0.5	>5N	0.5 < S≤0.8	>10 N	<p>固定电容器本体和引脚, 向下拉动引脚。 Fixed capacitor'body and Lead wire , lower lead wire.</p>							
S(mm)	拉力 tensile															
0.35 < S≤0.5	>5N															
0.5 < S≤0.8	>10 N															
	弯曲 bending	引线无断裂, 本体无损伤, 无可见损伤 Lead wire shall not cut off. Capacitor shall not be broken. No visible damage.		在每个方向上连续进行两次弯曲, 拉力 F=5N Two times in a row in each direction bending, tension F=5N												
9	耐焊接热 Resistance to soldering heat	<table border="1"> <tr> <td>外观检查 Appearance check</td><td>无可见损伤, 标志清晰 no visible damage, mark clear</td></tr> <tr> <td>容量变化率 Capacitance change</td><td>NPO: ±0.5 % SL: ±1 %</td></tr> <tr> <td>绝缘电阻 Insulation resistance</td><td>IR≥10000MΩ</td></tr> <tr> <td>耐电压 voltage proof</td><td>无击穿或飞弧 No permanent break-down or flashover during the test period</td></tr> </table>	外观检查 Appearance check	无可见损伤, 标志清晰 no visible damage, mark clear	容量变化率 Capacitance change	NPO: ±0.5 % SL: ±1 %	绝缘电阻 Insulation resistance	IR≥10000MΩ	耐电压 voltage proof	无击穿或飞弧 No permanent break-down or flashover during the test period	<p>不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm</p> <table border="1"> <tr> <td>焊锡温度 Solder bath temperature</td><td>260±5°C</td></tr> <tr> <td>焊锡时间 Solder time</td><td>5±0.5S</td></tr> </table> <p>在标况下恢复 24±2 小时测量 Measurement of recovery for 24 ± 2 hours under standard conditions</p>		焊锡温度 Solder bath temperature	260±5°C	焊锡时间 Solder time	5±0.5S
外观检查 Appearance check	无可见损伤, 标志清晰 no visible damage, mark clear															
容量变化率 Capacitance change	NPO: ±0.5 % SL: ±1 %															
绝缘电阻 Insulation resistance	IR≥10000MΩ															
耐电压 voltage proof	无击穿或飞弧 No permanent break-down or flashover during the test period															
焊锡温度 Solder bath temperature	260±5°C															
焊锡时间 Solder time	5±0.5S															
10	可焊性 solderability	包锡良好, 在 3 秒内流合。 Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within 3s.		<p>不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm</p> <table border="1"> <tr> <td>焊锡温度 Solder bath temperature</td><td>235±5°C</td></tr> <tr> <td>焊锡时间 Solder time</td><td>2±0.5S</td></tr> </table>	焊锡温度 Solder bath temperature	235±5°C	焊锡时间 Solder time	2±0.5S								
焊锡温度 Solder bath temperature	235±5°C															
焊锡时间 Solder time	2±0.5S															



续表:

No.	项目 item	试验结果 (规格值) specification	试验条件 Test method and test condition															
11	温度快速变化 (温度循环) Rapid change of temperature (temperature cycling)	无可见损伤, 标志清晰 No visible damage. mark clear.	以下步骤为 1 个循环, 循环 5 次 Following step 1 loop, loop 5 times															
			<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>-25±2°C</td><td>30minutes</td></tr> <tr> <td>2</td><td>20±2°C</td><td>3minutes</td></tr> <tr> <td>3</td><td>85±2°C</td><td>30minutes</td></tr> <tr> <td>4</td><td>20±2°C</td><td>3minutes</td></tr> </tbody> </table>	步骤 step	温度 Temperature	时间 time	1	-25±2°C	30minutes	2	20±2°C	3minutes	3	85±2°C	30minutes	4	20±2°C	3minutes
步骤 step	温度 Temperature	时间 time																
1	-25±2°C	30minutes																
2	20±2°C	3minutes																
3	85±2°C	30minutes																
4	20±2°C	3minutes																
12	振动 vibration	无可见损伤, 标志清晰 容量: -20%≤ΔC/C≤+20% No visible damage. mark clear. Capacitance: -20%≤ΔC/C≤+20%	<p>频率 frequency: 10-55-10Hz 1minute</p> <p>振幅 amplitude of vibration: 1.5mm</p> <p>方向 direction: 上下、左右、前后 high and low, left and right, front and back side</p> <p>时间 time: 2hours</p> <p>状态 condition: 正弦波振动 sinusoidal wave</p>															
13	冲击 shock	外观: 标志清晰, 本体无可见损伤 容量: -20%≤ΔC/C≤+20% No visible damage. mark clear. Capacitance: -20%≤ΔC/C≤+20%	<p>条件 condition: 加速度 accelerated speed: 490m/s<sup>2</sup></p> <p>脉冲持续时间 pulse duration: 11ms</p> <p>方向 direction: X Y Z</p> <p>次数 number of times: 3times</p>															



续表:

No.	项目 item	试验结果 (规格值) specification			试验条件 Test method and test condition							
14	稳态湿热 Damp heat steady state	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.									
		容量变化率 capacitance change	NP0: $\pm 2\%$ max SL: $\pm 3\%$ max									
		损耗角正切 Dissipation factor	<table border="1"> <tr> <td>电容量 capacitance</td> <td>Q</td> <td><math>\text{tg}\delta</math></td> </tr> <tr> <td><math>C &lt; 30\text{pF}</math></td> <td><math>\geq 200+10C</math></td> <td><math>1/Q</math></td> </tr> <tr> <td><math>C \geq 30\text{pF}</math></td> <td><math>\geq 500</math></td> <td><math>\leq 0.002</math></td> </tr> </table>			电容量 capacitance	Q	$\text{tg}\delta$	$C < 30\text{pF}$	$\geq 200+10C$	$1/Q$	$C \geq 30\text{pF}$
电容量 capacitance	Q	$\text{tg}\delta$										
$C < 30\text{pF}$	$\geq 200+10C$	$1/Q$										
$C \geq 30\text{pF}$	$\geq 500$	$\leq 0.002$										
绝缘电阻 Insulation resistance	5000MΩmin											
15	稳态湿热 (负荷) Damp heat steady state (charge)	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.									
		容量变化率 capacitance change	NP0: $\pm 2\%$ max SL: $\pm 3\%$ max									
		损耗角正切 Dissipation factor	<table border="1"> <tr> <td>CAP. ( C )</td> <td>Q</td> <td><math>\text{tg}\delta</math></td> </tr> <tr> <td><math>C &lt; 30\text{pF}</math></td> <td><math>\geq 200+10C</math></td> <td><math>1/Q</math></td> </tr> <tr> <td><math>C \geq 30\text{pF}</math></td> <td><math>\geq 500</math></td> <td><math>\leq 0.002</math></td> </tr> </table>			CAP. ( C )	Q	$\text{tg}\delta$	$C < 30\text{pF}$	$\geq 200+10C$	$1/Q$	$C \geq 30\text{pF}$
CAP. ( C )	Q	$\text{tg}\delta$										
$C < 30\text{pF}$	$\geq 200+10C$	$1/Q$										
$C \geq 30\text{pF}$	$\geq 500$	$\leq 0.002$										
绝缘电阻 Insulation resistance	5000MΩmin											
16	耐久性 Endurance	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.									
		容量变化率 capacitance change	NP0: $\pm 3\%$ max SL: $\pm 5\%$ max									
		损耗角正切 Dissipation factor	<table border="1"> <tr> <td>静电容量 capacitance</td> <td>Q</td> <td><math>\text{tg}\delta</math></td> </tr> <tr> <td><math>C &lt; 30\text{pF}</math></td> <td><math>\geq 270+14C</math></td> <td><math>1/Q</math></td> </tr> <tr> <td><math>C \geq 30\text{pF}</math></td> <td><math>\geq 667</math></td> <td><math>\leq 0.0015</math></td> </tr> </table>			静电容量 capacitance	Q	$\text{tg}\delta$	$C < 30\text{pF}$	$\geq 270+14C$	$1/Q$	$C \geq 30\text{pF}$
静电容量 capacitance	Q	$\text{tg}\delta$										
$C < 30\text{pF}$	$\geq 270+14C$	$1/Q$										
$C \geq 30\text{pF}$	$\geq 667$	$\leq 0.0015$										
绝缘电阻 Insulation resistance	5000MΩmin											



## CLASS II

No.	项目 item	试验结果 ( 规格值 ) specification			试验条件 Test method and test condition					
1	适用温度范围 Operating temperature rang	B、E、 F、R	-25 ~ +85°C, 包括电容器自身发热 Includes capacitors heating		可在此温度范围内连续使用 This continuous use temperature range					
		X	-55 ~ +125°C, 包括电容器自身发热 Includes capacitors heating							
2	外观和尺寸检查 Appearance and size check	元件表面清洁, 无异物附着, 标志清晰, 无可见损伤, 尺寸符合规定要求 Component surfaces clean, as attachment, mark clear, no visible damage, dimensional compliance requirements		目测检查产品外观 尺寸用游标卡尺检查 Visually inspect the product appearance Dimension checked by calipers.						
3	电容量 capacitance	在允许的偏差等级范围内 Within the scope of the permitted deviation level		温度: 25 ±3°C Testing temperature 频率: f=1KHz±20% Testing frequency 电压: 1.0±0.1Vrms Testing voltage						
4	损耗角正切 (tgδ)	2B、2E、2X: tgδ≤2.%5 LR、LB: tgδ≤0.5% 2F: tgδ≤5.0%								
5	绝缘电阻 Insulation resistance	IR≥4000MΩ		额定电压 Rated voltage 50、 500V 1KV、 2KV 3KV、 6KV	测试电压 applied voltage UR	时间 time 60±5s	电流 current ≤0.05A			
6	耐电压 voltage proof	端子之间 Between lead wire	无击穿或飞弧 No permanent break-down or flashover during the test period			500V	500V	60±5s	≤0.05A	
						1KV	2UR	1~5s	≤0.05A	
						2KV、 3KV	1.5UR+500	1~5s	≤0.05A	
						6KV	1.5UR	1~5s	≤0.05A	
		端子与外 壳之间 Body insulation			使用金属小球法, 施加电压 DC1500V 测试 1-5s, 充放电电流≤0.05A Used by metal balls, voltage application DC1500V testing 1-5s, charge and discharge current ≤ 0.05A					



续表:

No.	项目 item		试验结果 (规格值) specification	试验条件 Test method and test condition												
7	温度特性 Temperature characteristic		2B: (-10% ~ +10%) 2X: (-15% ~ +15%) LR: (-15% ~ +15%) 2E: (-56% ~ +22%) 2F: (-80% ~ +30%) LB: (-10% ~ +10%)	在下列阶段温度测量容量值: 基准 T3 Temperature measurements in the following phase capacity value: (for T3 in base) <table border="1" data-bbox="1024 467 1405 720"> <thead> <tr> <th>步骤 step</th><th>温度 Temperature</th></tr> </thead> <tbody> <tr> <td>T1</td><td>20±2</td></tr> <tr> <td>T2</td><td>-25±2</td></tr> <tr> <td>T3</td><td>20±2</td></tr> <tr> <td>T4</td><td>85±2</td></tr> <tr> <td>T5</td><td>20±2</td></tr> </tbody> </table>	步骤 step	温度 Temperature	T1	20±2	T2	-25±2	T3	20±2	T4	85±2	T5	20±2
步骤 step	温度 Temperature															
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8	引出端强度 Robustness of terminations	拉力 tensile	<table border="1" data-bbox="504 804 870 961"> <thead> <tr> <th>S(mm)</th><th>拉力 tensile</th></tr> </thead> <tbody> <tr> <td>0.35 &lt; S ≤ 0.5</td><td>&gt;5N</td></tr> <tr> <td>0.5 &lt; S ≤ 0.8</td><td>&gt;10 N</td></tr> </tbody> </table>	S(mm)	拉力 tensile	0.35 < S ≤ 0.5	>5N	0.5 < S ≤ 0.8	>10 N	固定电容器本体和引脚, 向下拉动引脚。 Fixed capacitor'body and Lead wire , lower lead wire.						
S(mm)	拉力 tensile															
0.35 < S ≤ 0.5	>5N															
0.5 < S ≤ 0.8	>10 N															
	在每个方向上连续进行两次弯曲, 拉力 F=5N Two times in a row in each direction bending, tension F=5N															
9	耐焊接热 Resistance to soldering heat	外观检查 Appearance check  容量变化率 Capacitance change  绝缘电阻 Insulation resistance  耐电压 voltage proof	无可见损伤, 标志清晰 no visible damage	不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm <table border="1" data-bbox="997 1372 1473 1507"> <tr> <td>焊锡温度 Solder bath temperature</td><td>260±5°C</td></tr> <tr> <td>焊锡时间 Solder time</td><td>5±0.5S</td></tr> </table>	焊锡温度 Solder bath temperature	260±5°C	焊锡时间 Solder time	5±0.5S								
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	IR≥4000MΩ															
	无击穿或飞弧 No permanent break-down or flashover during the test period	在标况下恢复 24±2 小时测量 Measurement of recovery for 24 ± 2 hours under standard conditions														
10	可焊性 solderability	包锡良好, 在 3 秒内流合。 Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within 3s.	不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm	<table border="1" data-bbox="997 1843 1473 1989"> <tr> <td>焊锡温度 Solder bath temperature</td><td>235±5°C</td></tr> <tr> <td>焊锡时间 Solder time</td><td>2±0.5S</td></tr> </table>	焊锡温度 Solder bath temperature	235±5°C	焊锡时间 Solder time	2±0.5S								
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续表:

No.	项目 item	试验结果 (规格值) specification	试验条件 Test method and test condition															
11	温度快 速变化 (温度循环) Rapid change of temperature (temperature cycling)	外观检查: 无可见损伤, 标志清晰 Appearance check No visible damage. mark clear.	以下步骤为 1 个循环, 循环 5 次 Following step 1 loop, loop 5 times <table border="1" data-bbox="1024 399 1473 696"> <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>-25±2°C</td><td>30minutes</td></tr> <tr> <td>2</td><td>20±2°C</td><td>3minutes</td></tr> <tr> <td>3</td><td>85±2°C 2X:125±2°C</td><td>30minutes</td></tr> <tr> <td>4</td><td>20±2°C</td><td>3minutes</td></tr> </tbody> </table>	步骤 step	温度 Temperature	时间 time	1	-25±2°C	30minutes	2	20±2°C	3minutes	3	85±2°C 2X:125±2°C	30minutes	4	20±2°C	3minutes
步骤 step	温度 Temperature	时间 time																
1	-25±2°C	30minutes																
2	20±2°C	3minutes																
3	85±2°C 2X:125±2°C	30minutes																
4	20±2°C	3minutes																
12	振动 vibration	最后检查、测量和要求: 无可见损伤, 标志清晰 容量: -20%≤ΔC/C≤+20% Appearance check and measurement: No visible damage. mark clear. Capacitance: -20%≤ΔC/C≤+20%	频率 frequency: 10-55-10Hz 1minute 振幅 amplitude of vibration: 1.5mm 方向 direction: 上下、左右、前后 high and low, left and right, front and back side 时间 time: 2hours 状态 condition: 正弦波振动 sinusoidal wave															
13	冲击 shock	最后检查、测量和要求: 外观: 标志清晰, 本体无可见损伤 容量: -20%≤ΔC/C≤+20% Appearance check and measurement: No visible damage. mark clear. Capacitance: -20%≤ΔC/C≤+20%	条件 condition: 加速度 accelerated speed: 490m/s <sup>2</sup> 脉冲持续时间 pulse duration: 11ms 方向 direction: X Y Z 次数 number of times: 3times															



续表:

No.	项目 item	试验结果 (规格值) specification		试验条件 Test method and test conditio
14	稳态湿热 Damp heat steady state	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature 40±2°C  相对湿度 Relative humidity 90% ~ 95%  时间 time 500 (+24/-0) Hours  标况下恢复 24±2 小时后测量 Measurement of recovery for 24 ± 2 hours under standard conditions
		容量变化率 capacitance change	2B、2X: ±10 % max LR、LB: ±15max 2E: ±20max 2F: ±30max	
		损耗角正切 Dissipation factor	2B、2X: 0.050max 2E、2F: 0.070max LR、LB: 0.070max	
		绝缘电阻 Insulation resistance	2000MΩmin	
15	稳态湿热 (负荷) Damp heat steady state (charge)	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature 40±2°C  相对湿度 Relative humidity 90% ~ 95%  电压 voltage 额定电压 Rated voltage  时间 time 500 (+24/-0) 小时  标况下恢复 24±2 小时后测量 Measurement of recovery for 24 ± 2 hours under standard conditions
		容量变化率 capacitance change	2B、2X: ±10 % max LR、LB: ±15max 2E: ±20ax 2F: ±30max	
		损耗角正切 Dissipation factor	2B、2X: 0.050max LR、2E、2F: 0.070max BN: 0.070max	
		绝缘电阻 Insulation resistance	2000MΩmin	
16	耐久性 Endurance	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature 125±2 °C (2X) 85±2 °C (2B 2R 2E 2F BN)  电压 voltage 1.5 倍额定电压  时间 time 1000 (+48/-0) 小时  标况下恢复 24±2 小时内测量 Measurement of recovery for 24 ± 2 hours under standard conditions
		容量变化率 capacitance change	2B、2X、LR、2E: ±20 % max 2F: ±30%max LB: ±20 % max	
		损耗角正切 Dissipation factor	2B、2X: 0.050max LR、2E、2F: 0.070max LB: 0.070max	
		绝缘电阻 Insulation resistance	2000MΩmin	



## CLASS III

No.	项目 item	试验结果 (规格值) specification		试验条件 Test method and test condition												
1	适用温度范围 Operating temperature range	-25 ~ +85°C, 包括电容器自身发热 Includes capacitors heating		可在此温度范围内连续使用 This continuous use temperature range												
2	外观和尺寸检查 Appearance and size check	元件表面清洁, 无异物附着, 标志清晰, 无可见损伤, 尺寸符合规定要求 Component surfaces clean, as attachment, mark clear, no visible damage, dimensional compliance requirements		目测检查产品外观 尺寸用游标卡尺检查 Visually inspect the product appearance Dimension checked by calipers.												
3	电容量 capacitance	在允许的偏差等级范围内 Within the scope of the permitted deviation level		温度: 25 ±3°C Testing temperature												
4	损耗角正切 (tgδ)	3B、3E、3F: (tgδ) ≤5.0%		频率: f=1KHz ±20 % Testing frequency 电压: 0.1 ±0.05Vrms Testing voltage												
5	绝缘电阻 Insulation resistance	10V≤UR≤25V: IR≥100MΩ UR > 25V: IR≥1000MΩ	<table border="1"> <tr> <th>额定电压 Rated voltage</th> <th>测试电压 applied voltage</th> <th>时间 time</th> <th>电流 current</th> </tr> <tr> <td>10~100V</td> <td>UR</td> <td>60±5s</td> <td>≤0.05A</td> </tr> </table>	额定电压 Rated voltage	测试电压 applied voltage	时间 time	电流 current	10~100V	UR	60±5s	≤0.05A					
额定电压 Rated voltage	测试电压 applied voltage	时间 time	电流 current													
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6	耐电压 voltage proof	端子之间 Between lead wire	<table border="1"> <tr> <th>额定电压 Rated voltage</th> <th>测试电压 applied voltage</th> <th>时间 time</th> <th>电流 current</th> </tr> <tr> <td>50V</td> <td>1.5UR</td> <td>1 ~ 5s</td> <td>≤0.05A</td> </tr> <tr> <td>100V</td> <td>1.5UR</td> <td>1 ~ 5s</td> <td>≤0.05A</td> </tr> </table>	额定电压 Rated voltage	测试电压 applied voltage	时间 time	电流 current	50V	1.5UR	1 ~ 5s	≤0.05A	100V	1.5UR	1 ~ 5s	≤0.05A	
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端子与外壳之间 Body insulation	使用金属小球法, 施加电压 DC150V 测试 1-5s, 充放电电流≤0.05A Used by metal balls, voltage application DC150V testing 1-5s, charge and discharge current ≤ 0.05A															



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No.	项目 item	试验结果 (规格值) specification		试验条件 Test method and test condition												
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9	耐焊接热 Resistance to soldering heat	外观检查 Appearance check	无可见损伤, 标志清晰 no visible damage	不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm												
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		绝缘电阻 Insulation resistance	IR≥100MΩ	<table border="1"> <thead> <tr> <th>焊锡时间 Solder time</th><th>5±0.5S</th></tr> </thead> </table>	焊锡时间 Solder time	5±0.5S										
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		耐电压 voltage proof	在初期规格范围之内	在标况下恢复 24±2 小时测量 Measurement of recovery for 24 ± 2 hours under standard conditions												
10	可焊性 solderability	包锡良好, 在 3 秒内流合。 Good tinning as evidenced by free flowing of the solder with wetting of the terminations or solder shall flow within 3s.		不预先干燥, 采用焊槽法, 引线插入 t=1.6mm, 孔径 Φ=1.0mm 电路板中, 离锡面 2mm Without prior drying, welding method, lead insert t=1.6mm, diameter φ =1.0mm circuit boards, Tin 2mm												
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No.	项目 item	试验结果 (规格值) specification	试验条件 Test method and test condition															
11	温度快 速变化 (温度循环) Rapid change of temperature	外观检查: 无可见损伤, 标志清晰 Appearance check No visible damage. mark clear.	以下步骤为 1 个循环, 循环 5 次 Following step 1 loop, loop 5 times <table border="1" data-bbox="1024 393 1468 662"> <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>-25±2°C</td><td>30minutes</td></tr> <tr> <td>2</td><td>20±2°C</td><td>3minutes</td></tr> <tr> <td>3</td><td>85±2°C</td><td>30minutes</td></tr> <tr> <td>4</td><td>20±2°C</td><td>3minutes</td></tr> </tbody> </table>	步骤 step	温度 Temperature	时间 time	1	-25±2°C	30minutes	2	20±2°C	3minutes	3	85±2°C	30minutes	4	20±2°C	3minutes
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13	冲击 shock	最后检查、测量和要求: 外观: 标志清晰, 本体无可见损伤 容量: $-20\% \leq \Delta C/C \leq +20\%$ Appearance check and measurement: No visible damage. mark clear. Capacitance: $-20\% \leq \Delta C/C \leq +20\%$	条件 condition: 加速度 accelerated speed: 490m/s <sup>2</sup> 脉冲持续时间 pulse duration: 11ms 方向 direction: X Y Z 次数 number of times: 3times															



续表:

No.	项目 item	试验结果 (规格值) specification		试验条件 Test method and test conditio	
14	稳态湿热 Damp heat steady state	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature	40±2°C
		容量变化率 capacitance change	3B: ±10% max 3E、3F: ±20% max	相对湿度 Relative humidity	90% ~ 95%
		损耗角正切 Dissipation factor	3B: 0.07 max 3E、3F: 0.1max	时间 time	500 (+24/-0) Hours
		绝缘电阻 Insulation resistance	100MΩmin	标况下恢复 24±2 小时后测量 Measurement of recovery for 24 ± 2 hours under standard conditions	
15	稳态湿热 (负荷) Damp heat steady state (charge)	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature	40±2°C
		容量变化率 capacitance change	3B: ±10% max 3E、3F: ±20% max	相对湿度 Relative humidity	90% ~ 95%
		损耗角正切 Dissipation factor	3B: 0.07 max 3E、3F: 0.1max	电压 voltage	额定电压 Rated voltage
		绝缘电阻 Insulation resistance	100MΩmin	时间 time	500 (+24/-0) 小时
标况下恢复 24±2 小时后测量 Measurement of recovery for 24 ± 2 hours under standard conditions		标况下恢复 24±2 小时后测量 Measurement of recovery for 24 ± 2 hours under standard conditions			
16	耐久性 Endurance	外观检查 Appearance check	无可见损伤, 标志清晰 No visible damage. mark clear.	温度 temperature	85±2°C
		容量变化率 capacitance change	3B、3E、3F: ±20% max	电压 voltage	1.5 倍额定电压
		损耗角正切 Dissipation factor	3B: 0.07max 3E、3F: 0.1max	时间 time	1000 (+48/-0) 小时
		绝缘电阻 Insulation resistance	100MΩmin	标况下恢复 24±2 小时内测量 Measurement of recovery for 24 ± 2 hours under standard conditions	

注: 上述测试均在标况下进行, “标况”解释如下 Note: the above tests are conducted under standard conditions, the "standard conditions" are explained in the following:

温度 temperature	相对湿度 temperature	气压 air pressure
15 ~ 35°C	45 ~ 85°C	86 ~ 106kPa

当测试结果有争议是, 仲裁标况为 When the test results are at issue, the arbitration:

温度 temperature	相对湿度 temperature	气压 air pressure
25±1°C	48 ~ 52 %	86 ~ 106kPa

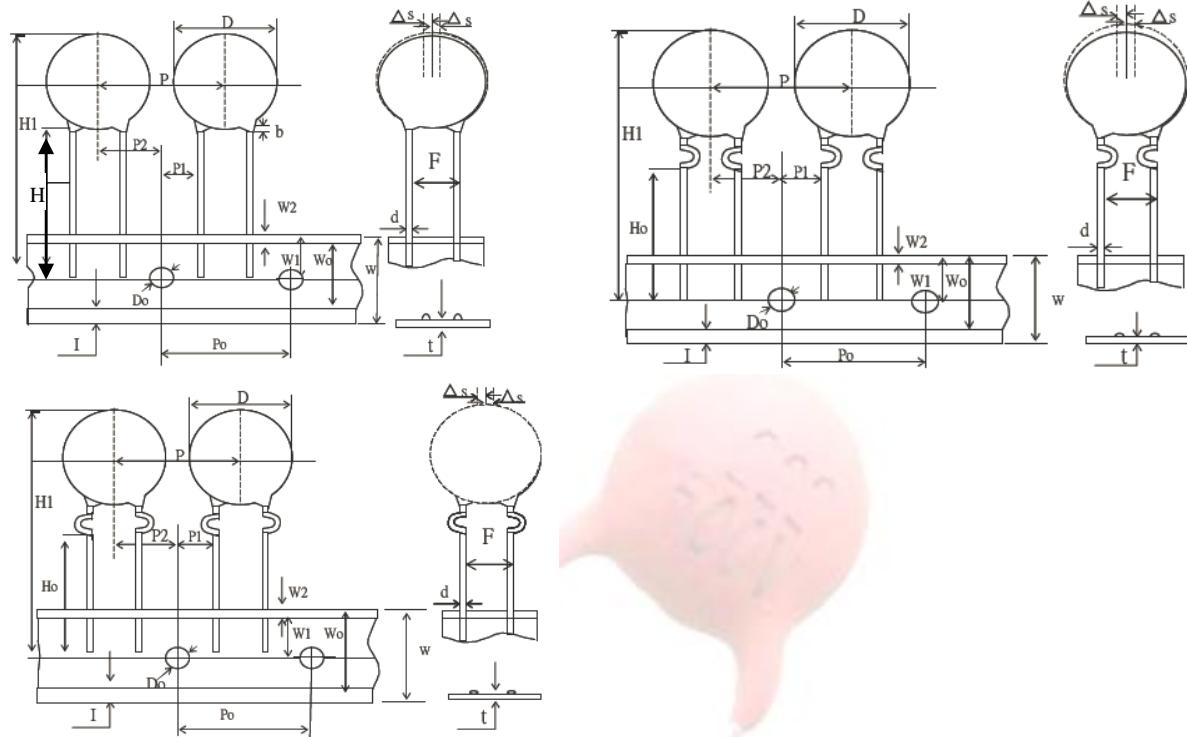
## 11. Packing 包装

**A:bulk 散装**

DIMENSION	$\Phi D < 8\text{mm}$	$\Phi D \geq 8\text{mm}$
Bag Ammo	1000PCS	500PCS

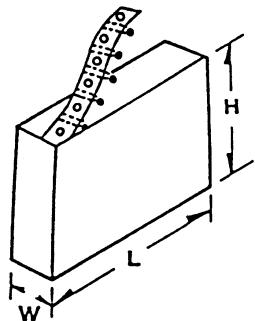
**B: TAPE (2000PCS/BOX) 编带**

Capacitors on tape type pitch 2.5/5.0/7.5/10mm 编带脚距 2.5/5.0/7.5/10.0mm



Parameter	Symbol	Taping Specifications(unit: mm)				
		Pitch 2.5	Pitch 5.0	Pitch 7.5	Pitch 10	Tolerance
lead diameter 线径	$\Phi d$	0.45	0.45	0.55	0.55	$\pm 0.1$
pitch between capacitors 电容间距	p	12.7	12.7	12.7	25.4	$\pm 1.0$
feed-hole pitch 孔间距	$P_0$	12.7	12.7	12.7	12.7	$\pm 0.3$
feed-hole centre to lead centre 孔中心到脚中心距离	$P_1$	5.1	3.85	2.6	7.7	$\pm 0.7$
lead spacing 脚距	F	2.5	5.0	7.5	10.0	$\pm 1.0$
component alignment 本体偏斜误差	$\Delta S$	0	0	0	0	$\pm 3.0$
tape width 纸带宽度	w	18.0	18.0	18.0	18.0	$\pm 0.5$
hold-down tape width 热熔胶带宽度	$W_0$	8-12	8-12	8-12	8-12	-
hole position 孔中心到纸带边宽度	$W_1$	9.0	9.0	9.0	9.0	$\pm 0.5$
hold-down tape position 留边宽度	$W_2$	0-3.0	0-3.0	0-3.0	0-3.0	-
seated height to tape centre 编带脚长	$H_0$	-	16.0	16.0	16.0	$\pm 1.0$
	H	20	20	20	20	$\pm 1.0$
maximum component height 电容到孔中心总体高度	$H_1$	37.0	37.0	37.0	37.0	MAX
feed-hole diameter 孔径	$D_0$	4.0	4.0	4.0	4.0	$\pm 0.3$
total tape thickness 编带纸带总厚度	t	0.65	0.65	0.65	0.65	$\pm 0.2$

AMMO PACK 编带盒尺寸



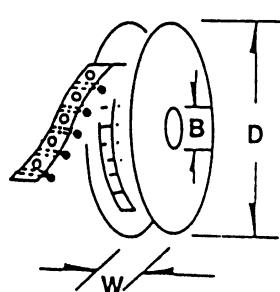
H =  $260 \pm 5$  mm

L =  $330 \pm 5$  mm

W =  $45 \pm 3$  mm

Acceptable to standard radial type cartridge.

REEL



D  $\leq 354(13.93)$

$30(1.18") \leq B \leq 21(0.83")$

W  $\leq 55(2.16")$

Acceptable to standard radial type cartridge with a few extra accessories. Reeled axials are also acceptable to standard axial type cartridge with a few accessories.

## 12. Storage conditions 贮存条件

The capacitors are must not stored in a corrosive atmosphere, where sulphide or chloride gas, acid, alkali or salt are present. Exposure of the components to moisture, should be avoided. 防潮，防尘，防压，防跌倒，防酸碱物质，避免阳光直射和结露。

Capacitors can be stored for short periods at any temperature within the entire range of category temperature. 电容器可在额定的气候类别温度范围内短期（3个月）贮存。

For long storage periods, however, the following conditions should be observed: 电容器长时间贮存块=需要满足下列条件:

■ Storage temperature: -25 to +40°C 贮存温度: -25 to +40°C

■ Maximum relative humidity 85%, no dew allowed on the capacitor.

贮存湿度: 不超过 80%，并无结露现象

■ Maximum duration 12months. 贮存期限: 最大 12 个月

### 13. Cautions and warnings 敬告和警告

1. Attention is drawn to the fact that repetition of the voltage proof test by the user may damage the capacitor. 用户进行的重复耐压测试可能损坏电容器，故试验后的电容器不可以当合格品再使用。
2. Do not place the capacitor a PC board whose hole space differs from the specified lead space. 电容器在PCB板上安装时要求PCB板孔径需与电容器脚距相吻合,相反可能会导致电容器与PCB板焊接不良,电容器引脚断裂或本体破坏而损坏电容器。
3. Avoid any compressive, tensile or flexural stress. 避免任何挤压, 弯折, 外部撞击。
4. Please consult us first if you wish to embed the capacitor in plastic resins. 在电容器上进行树脂成型时, 应事先咨询我司相关技术人员。
5. Do not move the capacitor after it has been soldered to the board. 焊接于PCB板的电容器不可用力移动或将本体用力倾斜。
6. Do not pick up the PC board by the soldered capacitor. 不可于焊接于PCB板后的电容将板提取, 可能破坏电容焊接和包封层破损。

### 14. general knowledge for ceramic Capacitors

#### 1 for capacitance and Dissipation factor( $\tan\delta$ ) : 容量和损耗测试

1.1 The capacitor is tested after be clamped with the test tool, can't take the capacitor's noumenon for test with hand. Capacitance and dissipation factor are not exact because of temperature in hand and test result is not right. 用测试夹具紧密接触或夹住电容两脚进行测试读数, 不可用手拿着电容本体进行测试。因手温传给电容本体后会影响电容的容量和损耗, 造成测试结果有出入而引起误判。

1.2 The capacitor's capacitance and Dissipation factor after voltage tested may not test before the capacitor is stored for 24 hours after voltage test. the capacitor must be discharge between leads before test, or else voltage of remainder attaint test apparatus. 耐压测试后的产品在进行容量和损耗测试前必须是电容已经放置24小时以上, 并且在测试时需将电容两引脚进行短路放电, 避免残余电量损坏测试仪表。

#### 2 for Voltage proof: 耐电压

Charge to capacitor after AC or DC Voltage, value, time and current are set in test apparatus, clamping capacitor's lead with clamp for test apparatus output. Space between clamps for test apparatus output must meet standard, or else flashover will be happened between two leads if space is too small. Capacitor's configuration was be destroyed if great current will be happened in capacitor for moment. 先调节好测试用耐压仪的测试电压性质, 数值, 最大电流和测试时间, 再用测试仪两电源输出端夹子夹住电容的两支引脚, 且两夹具的内间距不能小于电容脚距(若两夹具的内间距小于电容脚距时, 在充电测试中会因爬电距离过小产生飞弧, 瞬间在电容内部产生大电流而破坏电容结构)。



## 15. Voltage proof test guide 电容高压测试操作指引

### A. Correct Method

正确方法



#### Operate explain: 操作说明

1. Set up test voltage , current and time in high voltage instrument. 设定耐压仪测试电压，电流，测试时间。
2. The two pins of capacitor are nipped in fixture of high voltage instrument. 将电容两引脚夹于高压输出端夹具上，使引脚与夹具接触牢固。
3. Give the start button a slight press and the capacitor changed and tested, high voltage instrument stop output when the time arrived. 按下启动按钮，电压输出，电容进行高压测试，测试时间完成时，耐压仪自动切断电压输出。

### B. Error Method

错误方法



#### Operate explain: 描述

Capacitor was test with high voltage test probe for electriferous touch the two pins of capacitor. 直接用带电的测试棒去接触电容的两引脚进行测试。

#### Harm: 危害

It will happen flashover in high voltage test probe and two pins of capacitor. One part of capacitors will hazardous. It will emerge bad in used. 在测试棒与引脚为接触，但距离又很近时，会产生拉弧现象，瞬间产生大电流，对电容 产生破坏作用，部分现场不良，部分产生隐患，在生产或客户使用时产生不良。