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东莞富佳电子有限公司
DONGGUAN RICHWELL ELECTRONICS CO., LTD.



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品质政策
QUALITY POLICY

以最好
最快
最佳
达

品质
交期
服务
永续经营

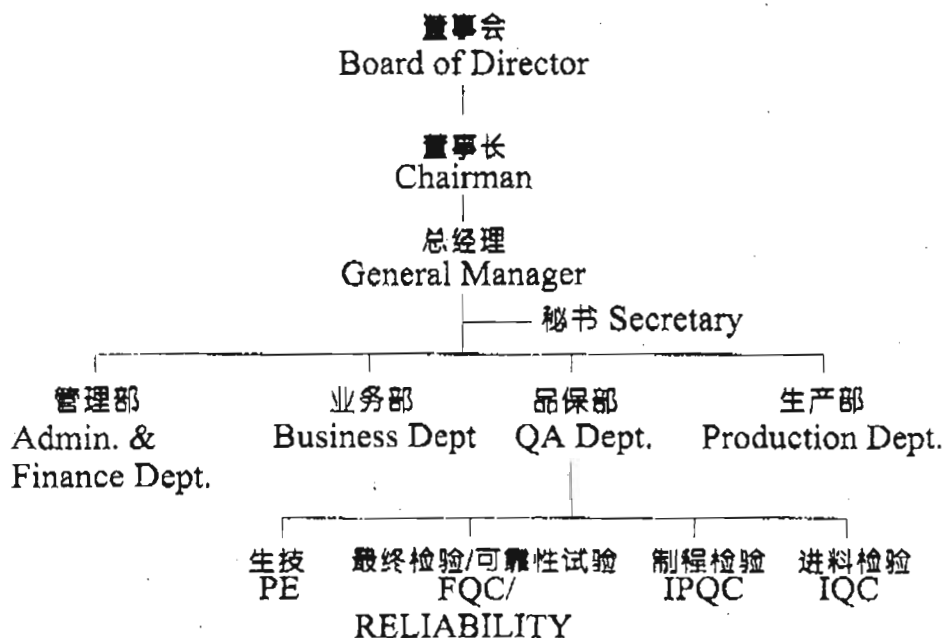
QUALITY
DELIVERY
SERVICE
之目的

经营理念
BUSINESS MOTTOS

真诚
行动
创新

SINCERITY
ACTION
CREATION

公司组织图 ORGANIZATION CHART



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瓷介电容器一般介绍

INTRODUCTION TO CERAMIC CAPACITORS

1、瓷介电容器 Ceramic Capacitors

用氧化钛、钛酸锶等材料制成陶瓷并以此作为介质制成的电容器称为陶瓷电容器。这种电容器广泛使用于各种电子设备。

The ceramic is a dielectric whose main material is Titanium Oxide, Barium Titanate or Strontium. It becomes ceramic capacitor after a process called silver coating and is widely applied in various kind of electronic equipment.

2、瓷介电容器的分类 Classification

依据瓷介电容器的特点，一般可分为三大类。

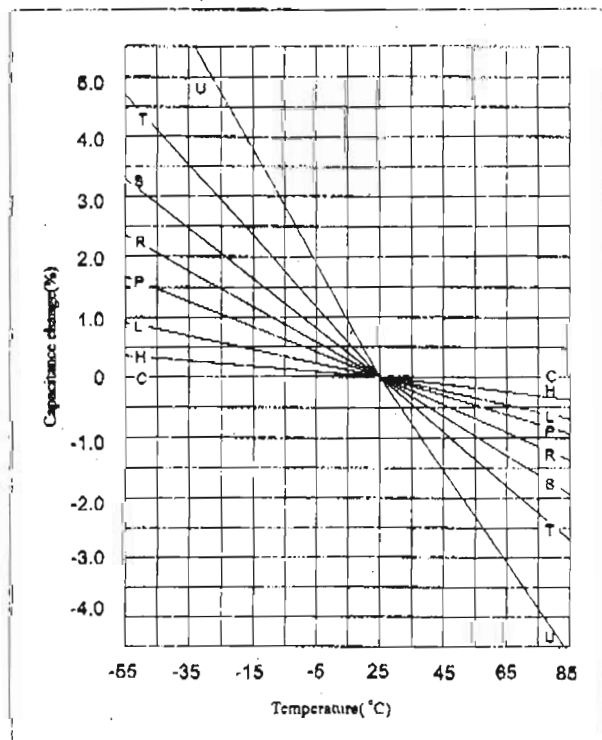
Basically, ceramic capacitor can be classified into 3 classes, according to distinct application features.

种类 I: 温度补偿电容器

Class I: Temperature Compensation Type Capacitor (T.C.)

温度补偿电容器主要由氧化钛组成，具有较低的介电常数，低损耗，高稳定性，电容量随温度变化近似线性。这种电容器主要使用于谐振回路或其它高要求值和高稳定性的电路。

Temperature compensation capacitors mainly consist of Titanium. They have the characteristics of low constant, low losses (high quality factor), high stability and linear temperature relationship. All these features suited its capability for temperature compensating mainly use in resonant circuits or in other circuits for which high Q and high temperature-base stability of circuit constant are required.



种类II: 高电介质常数电容器

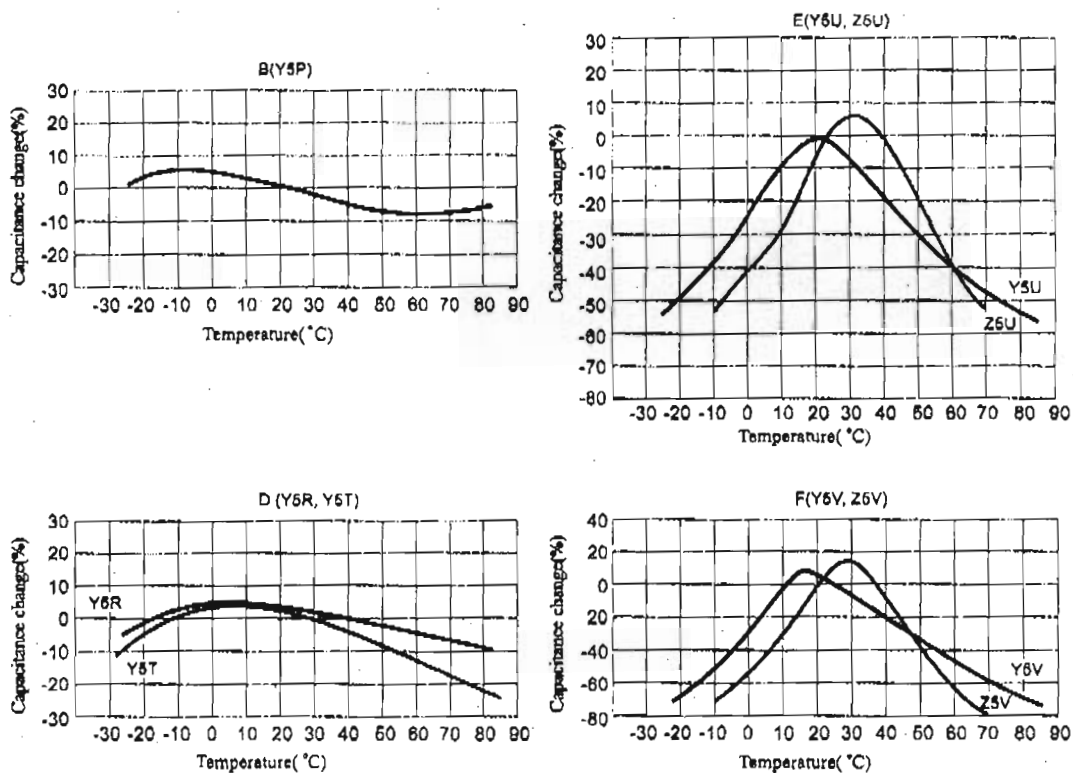
Class II : High-Dielectric Constant Type Capacitor (Hi-K)

高电介质电容器主要以钛酸钡为基而制成, 此类电容器容量大、体积小、低损耗, 在电路中隔直流、旁路、耦合之用。

High-dielectric are mainly consist of Barium Titanate. It is known as Hi-k because of its high power factor. These capacitors which have the characteristics of high capacitance value, small internal impedance and excellent power factors are widely used in electronic circuits such as coupling, decoupling and by pass purposes.

温度特性曲线

TEMPERATURE CHARACTERISTICS CURVE



种类III: 半导体电容器

Class III : Semi-Conductive Type Capacitor (S.C.)

园片型半导体电容器具有较高介电常数, 电容器体积更小, 电容量更大, 有表面和晶界层之分。

These disc type semiconductive capacitors are reformed smaller size with larger capacitance than usual Hi-K type ceramic capacitors. These capacitors are widely used in electronics circuits such as constant determination, coupling and by-pass purposes.



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电容器主要规格 MAIN SPECIFICATION OF CERAMIC CAPACITOR

TYPE OF CERAMIC CAPACITOR 陶瓷电容器 类型	TEMPERATURE CHARACTERISTICS 温度特性	CAPACITANCE RANGE 容量范围 (PF)	TOLERANCE 容差	RATED VOLTAGE 额定电压 (VDC)	Q or DF 品质因数 或介质损耗角正切	INSULATION RESISTANCE 绝缘电阻
CLASS I:(T.C.) TEMPERATURE COMPENSATING TYPE 温度补偿型	(温度系数: PPM/°C) NPO (CH:0+/-60) N150 (PH:-150+/-60) N220 (RH:-220+/-60) N330 (SH:-330+/-60) N470 (TH:-470+/-60) N750 (UJ:-750+/-120) SL (SL:+350~-1,000)	COLOR 色码 BLACK 黑 1 ~ 470 ORANGE 橙 4 ~ 220 YELLOW 黄 4 ~ 240 GREEN 绿 4 ~ 270 BLUE 蓝 5 ~ 300 VIOLET 紫 5 ~ 390 NIL 无色 1 ~ 820	1) 1~5PF: +/-0.25PF +/-0.5PF 2) 1~9PF: +/-0.5PF 3) 10PF以上: +/-5% +/-10%	50 ~ 500 50 50 60 50 50 60 ~ 500	1) 30PF以上: Q>1,000 2) 30PF(含)以下: Q>400+20C	>10,000 MΩ
CLASS II: (Hi-K) HIGH DIELECTRIC CONSTANT TYPE 高电介质常数型	(静电容量变化率) B: Y5P (+/-10%) E: Z5U(+22%/-56%) F: Z5V(+22%/-82%)	100 ~ 10,000 1,000 ~ 22,000 1,000 ~ 50,000	+/-10% +/-20% +80%/-20%	50 ~ 2K 50 ~ 2K 50 ~ 2K	1) B,E特性 DF<2.5% 2) F特性 DF<5.0%	1) 0.02μF 以下: >10,000MΩ 2) 0.02μF<C<0.1μF >7,500MΩ
CLASS III: (S.C.) SEMICONDUCTIVE TYPE 半导体型	(静电容量变化率) B: Y5P(+/-10%) Y5R(+/-15%) E: Y5U (+22%/-56%) F: Y5V(+22%/-82%)	1,000 ~ 100,000 10,000 ~ 220,000 20,000 ~ 220,000	+/-10% +/-20% +80%/-20%	16 ~ 50 16 ~ 50 16 ~ 50 16 ~ 50	1) 16V:DF<7% 2) 25V,50V: DF<5.0%	1) 16V: >100MΩ 2) 25V,50V: >1,000MΩ

(注1) 测试条件: 容量测试温度规定为25℃±2℃

(注2) 使用温度范围: Y级: -25℃ ~ +85℃
Z级: +10℃ ~ +85℃



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最大主体外径 MAX. BODY DIAMETER

温度补偿型 Temperature Compensating Type

	T.C. W.V. BODY CODE	CH		PH	RH	SH	TH	UJ	SL	
		50V	500V	50V	50V	50V	50V	50V	50V	500V
容量范围 (PF)	05	1 1 51	—	4 1 33	4 1 33	4 1 47	5 1 51	5 1 50	1 1 150	—
	06	56 1 68	1 1 47	36 1 56	36 1 56	51 1 75	56 1 82	51 1 82	160 1 220	1 1 100
	07	—	50 1 68	—	—	—	—	83 1 120	—	—
	08	75 1 100	—	62 1 100	62 1 100	82 1 120	91 1 120	130 1 160	240 1 390	120 1 270
CAPACITANCE	09	110 1 160	75 1 130	110 1 160	110 1 160	130 1 180	130 1 220	180 1 200	430 1 620	300 1 330
	10	—	—	—	—	—	—	220 1 270	—	—
	11	180 1 300	150 1 160	180 1 220	180 1 240	200 1 270	240 1 300	300 1 390	680 1 820	360 1 470
	12	330	—	—	—	—	—	—	—	—
	14	360 1 390	—	—	—	—	—	—	—	—
	16	470	—	—	—	—	—	—	—	—



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最大主体外径 MAX. BODY DIAMETER

高电介质常数型 High Dielectric Constant Type

B 特性 B CHARACTERISTIC

容量范围 (PF)	BODY CODE	W.V.			
		50V	500V	1KV	2KV
CAPACITANCE	05	100 ? 1500	—	—	—
	06	1800 ? 2700	100 ? 1000	100 ? 330	100 ? 180
	07	—	—	390 ? 680	220 ? 390
	08	3300 ? 4700	1200 ? 1500	820	470 ? 560
	09	5600 ? 6800	1800 ? 2700	1000 ? 1800	680 ? 820
	11	8200 ? 10000	3300 ? 3900	2000 ? 2200	1000
	12	—	4700 ? 5600	2700 ? 3300	1500
	14	—	6800	—	2200 ? 2700
	16	—	10000	4700 ? 5600	3300
	20	—	—	10000	4700

E 特性 E CHARACTERISTIC

容量范围 (PF)	BODY CODE	W.V.			
		50V	500V	1KV	2KV
CAPACITANCE	05	100 ? 2700	—	—	—
	06	3300 ? 6800	100 ? 1000	100 ? 1000	—
	07	—	1500 ? 2200	1500	—
	08	8200 ? 15000	3300	2200	100 ? 1000
	09	18000 ? 22000	4700 ? 6800	3300 ? 4700	1500 ? 2200
	11	—	—	6800	3300
	12	—	8200 ? 10000	—	—
	14	—	—	8200 ? 10000	4700
	16	—	20000	—	—
	20	—	33000	20000	18000

F 特性 F CHARACTERISTIC

容量范围 (PF)	BODY CODE	W.V.			
		50V	500V	1KV	2KV
CAPACITANCE	05	100 ? 5000	—	—	—
	06	5600 ? 10000	100 ? 2200	—	—
	07	12000 ? 15000	3300 ? 4700	100 ? 2200	—
	08	20000 ? 22000	5000 ? 6800	3300	100 ? 2200
	09	33000 ? 40000	—	4700 ? 6800	3300
	11	47000 ? 50000	10000	10000	4700
	12	—	—	—	5000 ? 6800
	14	—	—	—	10000



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最大主体外径 MAX. BODY DIAMETER

半导体型 Semi-Conductive Type

B 特性 B CHARACTERISTIC

容量范围 (PF)	BODY CODE	W.V.		
		16V	25V	50V
05		1000 12000	1000 12000	1000 10000
06		15000 22000	15000 22000	12000 15000
07		27000 47000	27000 33000	18000 22000
08		56000 68000	39000 47000	27000 33000
09		—	56000 68000	—
11		82000 100000	82000 100000	39000 47000
12		—	—	56000 68000
14		—	—	82000 100000

E 特性 E CHARACTERISTIC

容量范围 (PF)	BODY CODE	W.V.		
		16V	25V	50V
05		10000	10000	10000
06		15000 47000	15000 33000	22000
07		56000 68000	47000	33000
08		100000	56000 68000	47000
09		—	100000	56000 68000
11		220000	—	100000
12		—	220000	—
14		—	—	—

F 特性 F CHARACTERISTIC

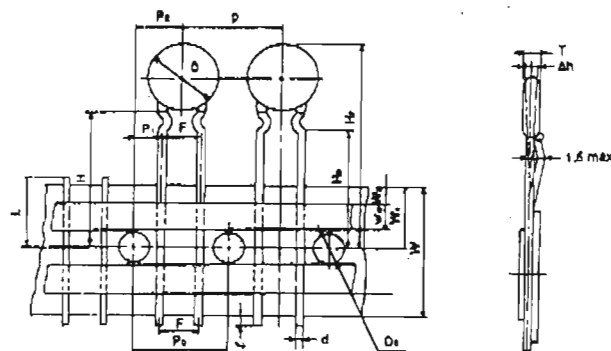
容量范围 (PF)	BODY CODE	W.V.		
		16V	25V	50V
05		20000	20000	20000
06		33000 47000	33000 47000	33000
07		50000 100000	50000 68000	47000
08		—	100000	50000 68000
09		220000	—	100000
11		—	220000	—
12		—	—	—



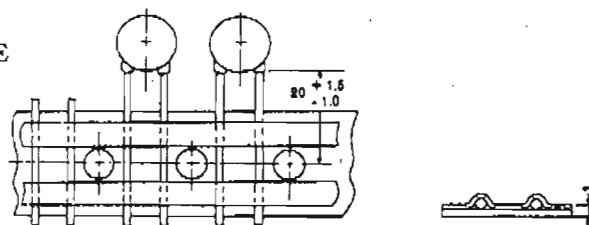
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编带尺寸规格 TAPING PARTS DIMENSIONS

A TYPE: 弯脚型
KINK TYPE



B TYPE: 直脚型
STRAIGHT TYPE



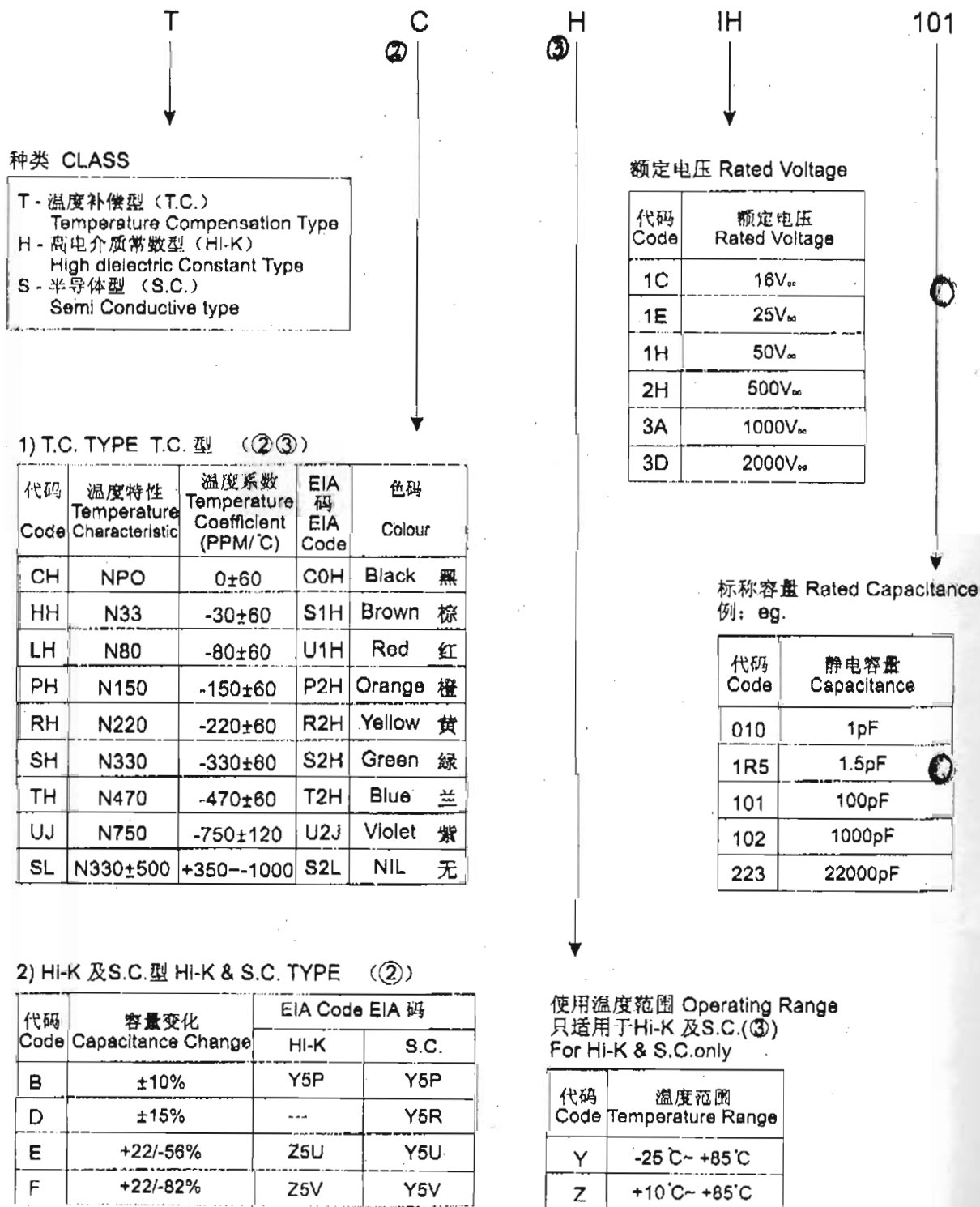
Unit:mm

Item	Symbol	Specification		Remarks
		Value	Tolerance	
Body diameter	D	11.0	max	
Body thickness	T	3.5	max	
Lead-wire diameter	d	0.6	+0.06/-0.05	
Pitch of component	P	12.7	+1.0	
Feed hole pitch	P ₀	12.7	±0.3	Cumulative pitch error: 1.0mm/20 pitch
Feed hole centre to lead	P ₁	3.85	±0.7	To be measured at bottom of clinch
Hole centre to component centre	P ₂	6.35	±1.3	
Lead-to-lead distance	F	5.0	+0.8/-0.2	
Component alignment, F-R	Δh	0	±2.0	
Tape width	W	18.0	+1.0/-0.5	
Hold-down tape width	W ₀	5.0	min	
Hold position	W ₁	9.0	±0.5	
Hold-down tape position	W ₂	3.0	max	
Height of component from tape centre	H	20.0	+1.5/-1.0	
Lead wire clinch height	H ₀	16.0	±0.5	
Component height	H ₁	32.25	max	
Lead wire protrusion	L	1.0	max	
Feed hole diameter	D ₀	4.0	±0.2	
Total tape thickness	t	0.7	±0.2	Groundpaper: 0.5±0.1mm
Length of Snipped lead	L	11.0	max	



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命名方法 PART C



DE DESIGNATION

K

容量允差 Tolerance

代码 Code	容量允差 Tolerance
C	±0.25pF
D	±0.5pF
J	±5%
K	±10%
M	±20%
Z	+80%-20%

08

主体外径 Body Diameter

代码 Code	最大外径 Max. Body Diameter
05	5.1mm
06	6.5mm
07	7.1mm
08	8.1mm
09	9.5mm
10	10.1mm
11	11.1mm
12	12.5mm
14	14.5mm

A 5 1 6

导线直径 Lead Diameter

代码 Code	线径(mm) Diameter
5	0.5 ±0.05
6	0.6 +0.06/-0.05

导线长度 Lead Length

代码 Code	尺寸 Dimension(mm)		
	S	L	K
1	---	15min	---
2	---	25min	---
5	5.0±1.0	---	5.0±1.0
0	10.0±1.0	---	---

导线间距 Lead Spacing

代码 Code	尺寸 Dimension(mm)		
	S	L	K
2	2.5±1.0	2.5±1.0	
5	5.0±1.0	5.0±1.0	5.0±0.8
7	7.5±1.0	7.5±1.0	7.5±1.0
0	10.0±1.0	10.0±1.0	10.0±1.0

导线形式 Lead Shape

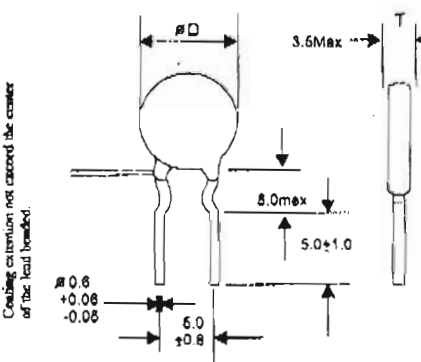
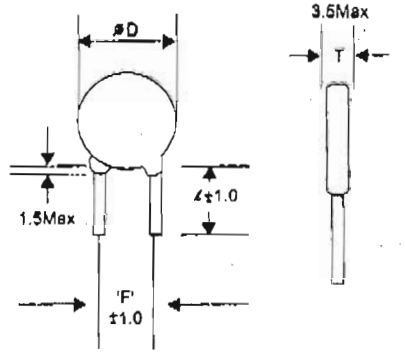
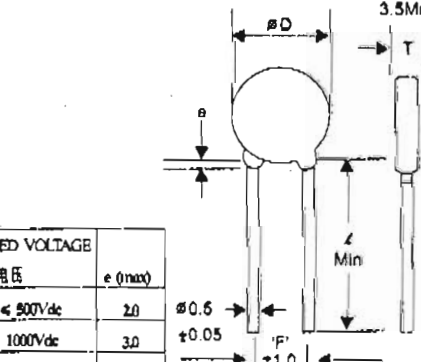
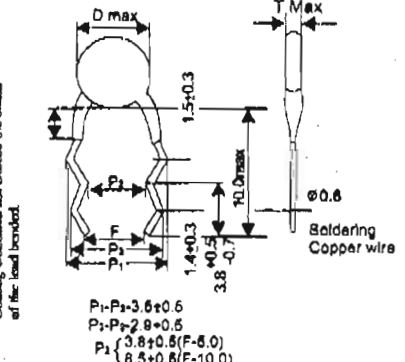
代码 Code	类别 Type	
A	绕带 TAPING	弯脚 KINK LEAD
B		直脚 STRAIGHT LEAD
S	散装 BULK	短直角 SHORT STRAIGHT
L		长直脚 LONG STRAIGHT
K		短弯脚 SHORT KINK
D		双弯 DOUBLE CRIMP

脚型及包装 SHAPE AND PACKAGE

脚型 SHAPE

散装尺寸规格 BULK PARTS DIMENSIONS

unit: mm

弯短脚 K TYPE(SHORT KINK)	短直脚 S TYPE(SHORT STRAIGHT)								
									
长直脚 L TYPE(LONG STRAIGHT)	双弯 D TYPE(DOUBLE CRIMP)								
 <table border="1" data-bbox="258 1266 454 1415"> <thead> <tr> <th>RATED VOLTAGE 额定电压</th><th>e (max)</th></tr> </thead> <tbody> <tr> <td>≤ 500Vdc</td><td>2.0</td></tr> <tr> <td>1000Vdc</td><td>3.0</td></tr> <tr> <td>2000Vdc</td><td>3.0</td></tr> </tbody> </table>	RATED VOLTAGE 额定电压	e (max)	≤ 500Vdc	2.0	1000Vdc	3.0	2000Vdc	3.0	 $P_1 - P_2 = 3.6 \pm 0.6$ $P_1 - P_2 = 2.8 \pm 0.6$ $P_1 \begin{cases} 3.8 \pm 0.6 (F-6.0) \\ 8.5 \pm 0.6 (F-10.0) \end{cases}$
RATED VOLTAGE 额定电压	e (max)								
≤ 500Vdc	2.0								
1000Vdc	3.0								
2000Vdc	3.0								

包装 PACKAGE

包装方式 PACKAGE FORM

散装 BULK



1,000PCS PER BAG

捆带 TAPING



2,000PCS PER AMMO BOX



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规格及试验方式

SPECIFICATION AND TEST METHOD

温度补偿型

Temperature Compensation

1 使用温度范围 OPERATING TEMPERATURE RANGE	-25 ~ +85°C
2 静电容量 CAPACITANCE	在温度25±2°C下以1±0.1MHz 及3 Vrms max. 测定时在规格范围内 SATISFIED WITHIN SPECIFIED CAPACITANCE TOLERANCE WHEN MEASURED AT 25±2°C WITH 1±0.1MHz AND 3 Vrms max.
3 耐电压 TEST VOLTAGE	额定电压 WORKING VOLTAGE --- 50V 3倍的额定电压印加1.5秒 (充放电电流50mA以下) 无异常发生。 3 TIMES OF WORKING VOLTAGE (50mA and under) FOR 1 TO 5 SECONDS WITH NO FAILURE. 额定电压 WORKING VOLTAGE --- 500V 2.5倍的额定电压印加1.5秒 (充放电电流50mA以下) 无异常发生。 2.5 TIMES OF WORKING VOLTAGE (50mA and under) FOR 1 TO 5 SECONDS WITH NO FAILURE.
4 绝缘阻抗 INSULATION RESISTANCE	依额定电压±3%印加60±5秒达到10000MΩ以上。 10000MΩmin AT THE RATED VOLTAGE ±3% WITHIN 60±5 SEC. OF CHARGING.
5 Q	同静电容量方法测定而能满足第4页数值。 FULFIL THE SPECIFICATION STATED ON PAGE 4 WITH THE SAME CONDITION TEST ON CAPACITANCE.

高电介质常数型

High Dielectric Constant

1 使用温度范围 OPERATING TEMPERATURE RANGE	Y: -25 ~ +85°C Z: +10 ~ +85°C
2 静电容量 CAPACITANCE	在温度25±2°C下以1±0.1KHz 及3 Vrms max. 测定时在规格范围内。 SATISFIED WITHIN SPECIFIED CAPACITANCE TOLERANCE WHEN MEASURED AT 25±2°C WITH 1±0.1KHz AND 3 Vrms max.
3 耐电压 TEST VOLTAGE	额定电压 WORKING VOLTAGE --- 50V-500V 2.5倍的额定电压印加1.5秒 (充放电电流50mA以下) 无异常发生。 2.5 TIMES OF WORKING VOLTAGE (50mA and under) FOR 1 TO 5 SECONDS WITH NO FAILURE. 额定电压 WORKING VOLTAGE --- 1KV-2KV 2倍的额定电压印加1.5秒 (充放电电流50mA以下) 无异常发生。 2 TIMES OF WORKING VOLTAGE (50mA and under) FOR 1 TO 5 SECONDS WITH NO FAILURE.
4 绝缘阻抗 INSULATION RESISTANCE	容量值<0.02μF: 依额定电压±3%印加60±5秒达到10000MΩ以上。 FOR CAPACITANCE<0.02μF: 10000MΩ min AT THE RATED VOLTAGE ±3% WITHIN 60±5 SEC. OF CHARGING. 0.02μF <容量值<0.1μF: 依额定电压±3%印加60±5秒达到7500MΩ以上。 FOR 0.02μF<CAPACITANCE<0.1μF: 7500MΩ min AT THE RATED VOLTAGE ±3% WITHIN 60±5 SEC. OF CHARGING.
5 损耗角正切(D.F) DISSIPATION FACTOR (D.F.)	同静电容量方法测定而能满足第4页tanδ值。 FULFIL THE SPECIFICATION STATED ON PAGE 4 WITH THE SAME CONDITION TEST ON CAPACITANCE.



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半导体型 Semi Conductive

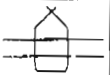
1 使用温度范围 OPERATING TEMPERATURE RANGE	Y: -25 → 85℃
2 静电容量 CAPACITANCE	在温度 $25\pm 2^{\circ}\text{C}$ 下以 $1\pm 0.1\text{KHz}$ 及 0.1Vrms max. 测定时在规格范围内 SATISFIED WITHIN SPECIFIED CAPACITANCE TOLERANCE WHEN MEASURED AT $25\pm 2^{\circ}\text{C}$ WITH $1\pm 0.1\text{MHz}$ AND 0.1Vrms max.
3 耐电压 TEST VOLTAGE	2倍的额定电压印加1-5秒(充放电流 10mA 以下)无异常发生。 2 TIMES OF WORKING VOLTAGE (10mA and under) FOR 1 TO 5 SECONDS WITH NO FAILURE.
4 绝缘阻抗 INSULATION RESISTANCE	额定电压=16V: 依额定电压印加1分钟达到 $100\text{M}\Omega$ 以上。 FOR W.V.=16V: $100\text{M}\Omega\text{ min}$ AT RATED VOLTAGE WITHIN 1min. 额定电压=25V,50V: 依额定电压 $\pm 3\%$ 印加1分钟达到 $1000\text{M}\Omega$ 以上。 FOR W.V.=25V,50V: $1000\text{M}\Omega\text{ min}$ AT THE RATED VOLTAGE WITHIN 1min.
5 损耗角正切(D.F.) DISSIPATION FACTOR	同静电容量方法测定而能满足第4页tan δ 值。 FULFIL THE SPECIFICATION STATED ON PAGE 4 WITH THE SAME CONDITION TEST ON CAPACITANCE.



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生产及品质管制流程图

PRODUCTION AND QUALITY CONTROL FLOW CHART

制程 PROCESS	样品 SAMPLE	品质项目 QUALITY CONTROL ITEMS
制银薄片 SILVER DISC ELEMENT		静电容量, 温度特性, 耐电压, 尺寸, 银片氧化, 确认是否与投入卡相符 CAPACITANCE, TEMPERATURE CHARACTERISTICS, W.V., DIAMETER THICKNESS, SILVER OXIDATION, CFM WITH INPUT CARD DATA
导线成型 LEAD WIRE FORMING		导线间距, 脚型, 线长, 张力, 导线规格 PITCH-F, SHAPE APPEARANCE, LEAD LENGTH, TENSION, LEAD WIRE SPECIFICATION
贴片 ELEMENT INSERTING		贴片位置: 低/高, 左/右, 换批前清线。 ELEMENT POSITION: LOW / HIGH, LEFT / RIGHT, CLEAR-UP BEFORE CHANGING LOT.
焊锡 SOLDERING		焊锡温度, 浸入时间, 预热温度及时间。 SOLDERING TEMPERATURE, DIPPING TIME, PRE-HEAT TEMPERATURE AND TIME.
焊锡检视 SOLDERING CHECKING		空焊, 破薄片, 贴片, 拉张力, 导线沾助焊剂 MISSED SOLDERING, DISC ELEMENT BROKEN, ELEMENT DROPPED PULLING STRENGTH, LEAD WIRE WITH FLUX
清洗 CLEANING		IPA情况, 清晰/不清晰, 导线清洁/不清洁。 CONDITION OF IPA-CLEAR / CLOUDLY, LEAD WIRE-CLEAR / DIRTY
绝缘涂装 COATING		厚度, 涂装长度 THICKNESS, LENGTH OF COATING EXTENSION
干燥 AIR DRY		干度 DRYNESS
标示 MARKING		标示规格, 容量, 耐电压, 温度特性, 标示外观 MARKING SPECIFICATION, CAPACITANCE, W.V., T.C., APPEARANCE OF MARKING
烧成 BAKING		烧成温度, 烧成时间, 硬度 BAKING TEMPERATURE, BAKING TIME, HARDNESS.
上腊 WAXING		上腊温度, 时间, 腊高 TEMPERATURE, TIME, LEVEL OF WAX
测试 TESTING		100%检查 - 静电容量, 电压, 功能检查 测试电压: 50V-300V 500V - 1500V >1KV - X2额定电压 100%CHECK - CAPACITANCE, W.V., FUNCTIONAL CHECKING. TESTING VOLTAGE: 50V-300V 500V - 1500V >1KV - X2RATED VOLTAGE
外观检查 APPEARANCE CHECKING		尺寸/外观 PHYSICAL DIMENSION / APPEARANCE
QA		静电容量, Q/DF值, 耐电压, 绝缘电阻, 可靠性试验 严度: 0.04; 主要: 0.16; 次要: 0.4 CAPACITANCE, Q/DF, W.V., IR, RELIABILITY TEST, BY MIL-STD-105E, CRITICAL; 0.04; MAJOR: 0.16; MINOR: 0.4
包装 PACKING		批号, 产品规格, 标签, 数量, 包装 LOT NO, PRODUCT SPECIFICATION, LABEL, QUANTITY, PACKING
QA		尺寸/外观 PHYSICAL DIMENSION / APPEARANCE
仓库 STORE		批号, 产品规格, 标签, 数量 LOT NO, PRODUCT SPECIFICATION, LABEL, QUANTITY
出货 DELIVERY		产品规格, 数量 PRODUCT SPECIFICATION, QUANTITY

